EXECUTIVE SUMMARY
STATUS OF THE ENVIRONMENTAL REMEDIATION OF THE HUNTERS POINT SHIPYARD

MARCH 2015

Office of Community Investment and Infrastructure

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This Executive Summary has been prepared by the Office of Community Investment and Infrastructure (OCII), as the Successor to the San Francisco Redevelopment Agency, with technical support from the San Francisco Department of Public Health and Langan Treadwell Rollo, an environmental consulting firm. The summary and attachments contained herein will provide the Hunters Point Shipyard Citizens Advisory Committee, the Commission on Community Investment and Infrastructure, and the public with a comprehensive, accessible picture of the status of the environmental cleanup and transfer of Navy property at Hunters Point Shipyard to OCII in furtherance of the redevelopment of the Hunters Point Shipyard. The content and figures incorporated in this document will be updated and redistributed from time to time to ensure that stakeholders are kept up to date on the Navy and City's efforts. Additional information is available at any time by contacting:

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EXECUTIVE SUMMARY
STATUS OF THE ENVIRONMENTAL REMEDIATION OF THE HUNTERS POINT SHIPYARD, MARCH 2015

In the summer of 2010, after many years of community-based planning, the San Francisco Redevelopment Agency and the City and County of San Francisco certified the Final Environmental Impact Report (FEIR) and approved redevelopment plans for Phase 2 of the Hunters Point Shipyard (Shipyard), together with Candlestick Point (the CP-HPS Phase 2 Project). For a detailed summary of the redevelopment plans for the Shipyard and Candlestick Point, and other related documents, please see http://sfocii.org/. This *Executive Summary on the Status of Environmental Remediation of the Hunters Point Shipyard, March 2015* is an update to previous 2010 and 2013 versions prepared for the San Francisco Redevelopment Agency or its successor agency, the Office of Community Investment and Infrastructure (OCII). This Executive Summary describes the environmental remediation work the Navy has completed and the portions of the Phase 2 area of the Shipyard that are almost ready to transfer. The Executive Summary includes a section answering frequently asked questions (FAQs) about the Shipyard cleanup. Additionally, this update provides current information on many related environmental issues.

Because the Shipyard is a federal Superfund Site located within a community with long-standing environmental justice concerns, the Navy has taken significant measures over the last 23 years to (i) investigate the conditions onsite that need to be remediated to protect human health and the environment, (ii) fund and implement the environmental cleanup, and (iii) establish safe construction procedures and uses of the Shipyard after the cleanup is complete. The Executive Summary describes measures the Navy has taken, explains how the measures relate to the redevelopment plans for the property, and explains the land transfer process. Pursuant to an agreement between the Navy and OCII, before the Navy can transfer any land to OCII, the state and federal regulatory agencies overseeing the cleanup must each review and concur that the remediation has been completed to a standard that is

LAND TRANSFER

Before any land may transfer from the Navy to the Successor Agency to the San Francisco Redevelopment Agency (OCII), the regulatory agencies (USEPA, DTSC, and RWQCB) must each review and concur that the environmental remediation has been completed to a standard which is protective of human health and the environment for the intended reuse of the land.

If further remedial action is found to be necessary, even after transfer of the property, the Navy remains responsible for completing any required cleanup.

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protective of human health and the environment for the intended reuse of the land. Additionally, if further remedial action is found to be necessary after transfer of the property, the Navy remains responsible for completing any required cleanup.

I. Regulatory Oversight of Navy's Cleanup

For over 23 years, the Navy has been investigating and remediating contamination (i.e. conducting cleanup) on the Shipyard. The cleanup work has been implemented in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA[1]) which is commonly called Superfund. Superfund provides broad federal authority to clean up releases or threatened releases of hazardous substances (contaminants) that may endanger public health or the environment. The law authorized the United States Environmental Protection Agency (USEPA) to identify parties responsible for contamination of sites and compel the parties to clean up the sites.

Remediation of the Shipyard is subject to the oversight of the USEPA and two departments within the California Environmental Protection Agency (Cal-EPA): the Department of Toxics Substances Control (DTSC) and the San Francisco Bay Area Regional Water Quality Control Board (RWQCB). All three of these agencies work together on the Shipyard under the terms of a Federal Facilities Agreement (FFA) dated 1992. The City, through the San Francisco Department of Public Health (SFDPH) and working with OCII and its consultant, Langan Treadwell Rollo, also closely monitor the Navy cleanup. SFDPH and Langan Treadwell Rollo have presented detailed information about the Navy's cleanup activities at many community meetings and workshops.

REMEDIATION OVERSIGHT

Remediation of the Shipyard is subject to the oversight of the USEPA and two departments within the Cal-EPA: the DTSC and the RWQCB. All three of these agencies work together on the Shipyard under the terms of the FFA dated 1992.

The City, through SFDPH and its consultant, Langan Treadwell Rollo, also closely monitor the Navy cleanup.

[1] CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

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The San Francisco Redevelopment Agency, along with all 400 redevelopment agencies in California, was dissolved on February 1, 2012, by order of the California Supreme Court in a decision issued on December 29, 2011 (California Redevelopment Association et al. v. Ana Matosantos). On June 27, 2012, the California Legislature passed and the Governor signed AB 1484, a bill making technical and substantive changes to AB 26, the dissolution bill that was found largely constitutional by the Supreme Court on December 29, 2011. In response to the requirements of AB 26 and AB 1484, the City and County of San Francisco (City) has created the Office of Community Investment and Infrastructure (OCII) as the Successor Agency to the San Francisco Redevelopment Agency (Successor Agency). Under AB 26 and AB 1484, the OCII is authorized to continue to implement three "Major Approved Development Projects"— Mission Bay, Transbay and the Shipyard/Candlestick Point development — along with other obligations that were previously administered by the former Redevelopment Agency such as regulating land use in certain former project areas, administering certain affordable housing obligations, disposing of assets, and managing debt.

Pursuant to state and local legislation, the OCII is governed by two bodies, the Oversight Board of the Successor Agency and the Commission on Community Investment and Infrastructure. The Commission on Community Investment and Infrastructure exercises land use, development and design approval authority for the Major Approved Development Projects, including the Shipyard and Candlestick Point, in place of the former Agency Commission. The Oversight Board of the Successor Agency oversees certain fiscal management of former Redevelopment Agency assets other than affordable housing assets.

As shown on Attachment 1, for cleanup purposes and to enable the phased development of the site, the Shipyard is currently divided into 15 parcels: A-1, A-2, B-1, B-2, C, D-1, D-2, E, E-2, F (offshore underwater area), G, IR7/18, UC-1, UC-2 and UC-3.

Under CERCLA and the 2004 Conveyance Agreement between the former Redevelopment Agency (now OCII) and the Navy (the Conveyance Agreement), the Navy is required to complete the necessary remediation for each of the Shipyard parcels given the

IS THE SHIPYARD SAFE FOR EXISTING TENANTS, VISITORS, AND NEIGHBORS?

Yes. The Shipyard hosts thousands of tenants, workers and visitors every year and has for many years with the approval of regulatory agencies overseeing the cleanup of the Shipyard. The regulatory agencies have reviewed the current uses of the site and determined that in its current condition, the Shipyard is safe for these users. In addition, the Navy has conducted air monitoring during all their activities and demonstrated, under Regulatory Agency oversight, that they have protected the tenants and visitors on the Shipyard as well as the neighbors living adjacent to the Shipyard.

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intended reuse and to provide a warranty that the property has been cleaned to a level that is protective of human health and the environment. Prior to any transfer, the Navy must obtain the written concurrence from the USEPA, DTSC, and the RWQCB that sufficient remedial action has been taken to protect human health and the environment for the parcel's intended future use. In addition, under applicable federal laws, the Navy is responsible for taking any further remedial action found to be necessary on account of unknown or newly discovered hazardous materials or contaminants, even after transfer to the OCII or a developer. The Navy must also indemnify subsequent owners for claims related to such contaminants. As was done in connection with the transfer of Parcels A-1 and A-2 to the Redevelopment Agency in 2004, for any subsequent transfers, the OCII will procure pollution legal liability insurance covering potential environmental claims related to construction and development on the Shipyard.

II. Environmental Conditions at the Shipyard have been Thoroughly Studied

One important advantage of the many and often overlapping regulatory jurisdictions overseeing the cleanup of the Shipyard is the knowledge that the scope of potential contamination at the Shipyard and that the appropriateness of the proposed remedies have been thoroughly studied – the scope of environmental sampling and characterization at the Shipyard is extensive and thorough. As shown on the map in Attachment 2, over the last 23 years, more than 25,000 soil samples and 14,000 groundwater samples have been analyzed across the Shipyard wherever prior activities may have resulted in releases of contaminants to the environment.

The cleanup process mandated by CERCLA and the FFA regulatory agencies requires the Navy to thoroughly investigate and remediate the Shipyard property. In doing so, the Navy must prepare an iterative series of reports documenting its investigation and remedial activities and the FFA regulatory agencies must review and approve these reports. The CERCLA process involves extensive public review, expert peer review, and regulatory agencies' reviews and approvals. Over the last 23 years, the Navy has completed an extensive amount of investigation and remediation and completed numerous specific reports documenting its work in areas of potential contamination on the Shipyard. The Navy has developed specific remedial action plans that have been approved by the FFA regulatory

HOW DOES PROPOSITION P RELATE TO THE CLEANUP OF THE SHIPYARD?

On November 7, 2000, the voters of San Francisco voted to approve Proposition P which called upon the Navy to remediate the Shipyard to the highest levels practical to assure flexible reuse of the property. More details on Proposition P are included in Attachment 22. On July 30, 2001, the Board of Supervisors approved a resolution confirming as the policy of the City and County of San Francisco that the Hunters Point Naval Shipyard should be cleaned of toxic and hazardous pollution by the Navy to the highest practical level. In furtherance of Proposition P, in 2004, the City approved a Conveyance Agreement with the Navy that contemplated the phased transfer of parcels on the Shipyard provided that the regulators concur the property can safely be used for its intended use. That agreement and the processes set forth in it, together with applicable federal, state and local laws, will govern future transfers between the Navy and the OCII.

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agencies. As described further below, in many cases the Navy has already completed the remediation called for under the approved remediation plans. After the Navy finishes specific cleanup actions, it is required to conduct additional confirmatory testing to ensure the cleanup meets the prescribed cleanup criteria and the property can be safely reused. A more detailed description of the various steps in the CERCLA process is presented in Attachment 3.

In addition to parcel-by-parcel investigation and remedial actions described above, the Navy has conducted several base-wide investigation and remediation programs for specific types of hazardous materials and contaminants, including potential radiological contamination, asbestos in buildings, and underground petroleum storage tanks.

III. Status of the Navy's Cleanup

To date, the Navy has spent or obligated over $875,000,000 on the cleanup of the Shipyard. About 90% of the necessary "removal actions" are complete for the properties planned for transfer in the next two years and many of the other expected "removal actions" for the whole Shipyard are complete or in progress and nearing completion. A more detailed, parcel-by-parcel status of the Shipyard cleanup is presented in Attachment 4.

The ultimate conclusions of the testing, analyses, and cleanup completed on the Shipyard are twofold:

- First, in its current state, there are areas of the Shipyard that are cleaned up and ready for transfer. For the remaining parcels, testing has shown that the parcels do not present a threat or substantial risk to long-term existing tenants, the surrounding environment or the local community. For many years the various environmental regulatory agencies have approved, based on their evaluation that the areas are safe, a number of long-standing leaseholds on the Shipyard, including with the San Francisco Police Department and hundreds of artists among many others, all in close proximity to various active remediation sites.

- Second, while the remaining Shipyard parcels do not present a health risk in their current state, extensive cleanup is required to allow the type of subsurface construction necessary to implement the community's long-standing vision for redevelopment of the site. Under the Conveyance Agreement, the Navy is obligated to clean up the Shipyard to levels consistent with the

HOW CAN I STAY UP TO DATE ON THE NAVY'S CLEANUP?

The Navy actively implements a Community Involvement Plan (CIP) that includes outreach through Fact Sheets and newsletters, community meeting presentations, and shipyard tours. The Navy is currently updating the CIP based on community member input. Contact information for the Navy Base Closure and regulatory agency project managers, past environmental documents and publications, community meeting presentations and minutes, Fact Sheets, newsletters and the Community Events Calendar can be found at: http://www.bracpmo.navy.mil/basepage.aspx?baseid=45 under Community Informational Meeting Material or call the Hunters Point Naval Shipyard Information Line at (415) 295-4742.

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City's reuse plans. With the substantial support of the City's congressional delegation, the Navy has been extraordinarily successful in securing funds for the Navy cleanup. In fact, over the last several years the Navy has spent more money on the cleanup of the Shipyard than any other closed base in the country.

IV. Nature of the Navy's Cleanup

Generally, the Navy is required to physically remove any contaminants that may pose a threat to human health or the environment if it was left at the site. Low-levels of contaminants, commonly found in urban areas, may remain in the ground so long as they meet USEPA and DTSC "risk ranges" which require that they will not pose a significant hazard to residents, workers, tenants, visitors, neighbors, or the environment. Restrictions on land uses, activities, or engineering controls, such as physical covers, have been put in place to protect human health or the environment from exposure to low-levels of contaminants where removal or treatment is not feasible or technically practical. As described in more detail below, in many cases, the buildings, streets, sidewalks or new parks created by the development will serve as physical covers that act as barriers to prevent exposure to residual low-level contaminants in soil.

Groundwater "plumes" are saturated subsurface areas that contain contaminants in solution and are treated and monitored by the Navy. When low levels of residual groundwater contaminants are too difficult to completely remove from the groundwater, natural processes will continue to occur over the course of several years to reduce the chemical concentrations. The progress of this natural process is monitored by the Navy to verify that contamination levels are decreasing.

In many cases building foundations are able to act as an effective physical barrier to prevent exposure to residual contamination in soil; however, in some areas, contaminated soil vapors beneath the foundation may pose a threat to human occupants of buildings. In these cases, vapor barriers or a vapor collection system can be installed to prevent contaminated vapors from entering the building. This type of mitigation is a commonly accepted regulatory requirement to ensure that building occupants are completely safe.

A summary of the strategies for dealing with specific types of contaminant releases and other environmental information are presented in Attachments 5 through 17. These attachments include information about: groundwater and

CLEANUP STRATEGIES

Brownfields may be cleaned up using a variety of techniques including:

- Removal
- Soil Vapor Extraction (SVE)
- In-situ Treatments
- Covers
- Containment Caps
- Institutional Controls

A summary of the strategies for dealing with specific types of contamination and other environmental information are presented in Attachments 5 through 17.

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volatile organic compounds (VOCs), the Parcel E-2 landfill, cleanup strategies, low-level radiological materials, naturally occurring asbestos, abrasive blast material, naturally occurring metals, lead-based paint (LBP), driving foundation support piles through contaminated soil, public participation and notification requirements, monitoring and enforcement of environmental restrictions, asbestos containing materials (ACM), and Superfund and Brownfields sites.

The cleanup approach described above is common in the development of properties known as "Brownfields." Brownfield redevelopment typically involves reusing former industrial lands – usually polluted – into more productive uses like residential, commercial or recreational uses. The successful reuse of Brownfields is made possible by environmental remediation strategies which remove all contaminants that pose an unacceptable exposure risk and even low-level contaminants that can practically be removed or treated so no restrictions on the land are necessary. In cases where there are low-level, ubiquitous materials that cannot be feasibly or practically treated or removed, exposure is adequately controlled through techniques such as property management restrictions, land use covenants (LUCs), deed restrictions, and engineering and institutional controls that are typically used to protect human health and the environment. Superfund sites can be considered to be a type of Brownfield site and former military bases comprise a large group of Brownfield sites. As shown in Attachment 16, many former military bases are Superfund sites.

Many industrial areas within cities are Brownfields and many have been successfully cleaned up and reused as the sites of mixed-use developments. This type of reuse of contaminated land is one of the most environmentally sound ways of addressing regional growth (as opposed to paving over "green fields"). Brownfield redevelopment of contaminated land is common and is proven to provide significant economic, environmental and public health benefits.

In fact, much of downtown San Francisco and the eastern neighborhoods on the Bay from Mission Bay down through Islais creek have been Brownfields since the 1906 earthquake when these neighborhoods were created by filling in the Bay with earthquake rubble. The fact that this rubble contained chemical contamination

WHAT ARE "RISK RANGES"?

Risk to public health from chemical contaminants is determined after extensive scientific evaluation including review of human and animal studies. This field of scientific study has established the level of risks associated with various levels of contaminants. At each step of the evaluation, safety factors are used when there is uncertainty in the calculations. These safety factors result, in most cases, in a slight overestimation of the risk for the average person, in order to protect the most vulnerable members of the population.

Since some substances, like metals, which occur naturally in the soil and rock represent a background risk, risk ranges are calculated to take into account what is "the ideal" meaning negligible risk versus what is practical and reasonable. For instance, arsenic is a naturally occurring metal in the bedrock at the Shipyard but it also is a chemical that might have been used in pesticides or in some industrial processes. The cancer risk from a lifetime of exposure to the arsenic in the naturally occurring rock is calculated to be above the ideal risk of one in a million. So a risk range is used to protect against the levels that are above the naturally occurring risk but still within the risk range.

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was recognized long before the word "Brownfields" became fashionable. The SFDPH established the Maher ordinance in 1986 (now Article 22A of the Health Code) to deal with these fill areas of the City and the contamination associated with them.[2]

Once the Navy has prepared land at the Shipyard for transfer, the condition of the land will be very similar to other Brownfields in the Bay Area like Mission Bay, Emeryville, the America Center in San Jose, Mandela Gateway in Oakland, Oyster Point in South San Francisco and the Uptown Development in Oakland. These developments have typically used a combination of contaminant removal and treatment followed by engineering and institutional controls to assure protection of public health and the environment. A synopsis of a number of local Brownfields projects where contaminated land was converted for productive reuse is included as Attachment 17.

Mission Bay and Emeryville are particularly relevant examples of the successful reuse of a Brownfield. Mission Bay is a typical urban Brownfield site. It was an area of Bay fill that was used for rail yards, warehousing and miscellaneous dumping. After extensive testing, the City decided to redevelop the site, but to prevent exposure to low-level contaminants in soil, institutional and engineering controls have been developed for this land. Examples of the controls include requiring gardens to be planted in raised boxes (example of an institutional control) and a requirement for a durable cover (buildings or roads) or clean topsoil across the site (example of an engineering control). Additionally, as a result of organic material decomposing in the Bay fill and underlying organic-rich native peat and bay mud around Mission Bay, methane is sometimes detected in soil gas. If methane is determined to be present above action levels, methane gas mitigation systems must be designed and installed as part of new building construction to prevent the possibility of explosion.

BROWNFIELD REDEVELOPMENT

Brownfields are not unique to the Bay Area. Almost all major cities have similar sites, often located along the waterfront where the first industrial uses were located that are in the process of being cleaned up for residential, commercial and open space reuse. Although there is no comprehensive national data that represent the full breadth of Brownfields redevelopment activity, in the US Conference of Mayors' 2010 National Report on Brownfield's Redevelopment, 83 cities of 99 sampled cities reported brownfield redevelopment success with 54 cities reporting that over 160,000 jobs have been created, additional revenues have been generated, and thousands of acres of land have been reclaimed.

http://www.usmayors.org/pressreleases/uploads/November2010BFreport.pdf

[2] The Maher Ordinance does not specifically apply to the Shipyard site. However, the Maher Ordinance requirements were incorporated into the Health Code Article 31 requirements (described below and in Attachment 20) and are designed to comprehensively address the contamination issues at this site in the same manner as intended by the Maher Ordinance.

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Emeryville was a former hub of industrial activity and as industrial activities began to contract and relocate to other cities in the 1970s, they left behind properties with contaminants that had to be cleaned up before new land uses could be developed. Many properties in Emeryville have been redeveloped using the Brownfields model of evaluating risk and implementing engineering controls (ECs) like "caps" and "covers" and institutional controls like deed restrictions prohibiting gardens at grade. Like the planned Shipyard redevelopment, much of the redevelopment in Emeryville has focused on housing, commercial, retail and park uses. Emeryville is rapidly redeveloping into a commercial and residential community with a diverse population that has been that is growing at a rate more than 1.5 times the rate of surrounding Alameda County (US Census Bureau, 2010-2013).

V. Regulatory Oversight during Construction

After the various regulatory agencies have agreed that the property can be safely redeveloped for its intended uses under the City's redevelopment plan, the Navy will transfer land at the Shipyard to the OCII. Once transferred, construction on the Shipyard must comply with a variety of activity and use restrictions applicable to the site through the CERCLA process as well as other applicable federal, state and local environmental laws. These restrictions and laws will be enforced through provisions in land transfer documents, applicable laws, and mitigation measures included in the Mitigation Monitoring and Reporting Program (MMRP) that OCII and the City adopted as part of the findings during the California Environmental Quality Act (CEQA) approvals in the summer of 2010. The mitigation measures related to the issues discussed in this summary and the applicable portions of the MMRP are presented in Attachment 18.

In general, the cleanup approved by the FFA regulatory agencies through the CERCLA process will require the Navy to put controls in place to make sure all future property owners and users of the property comply with any use or activity restrictions that apply to the property.

WHAT IS THE DIFFERENCE BETWEEN A CAP AND A COVER?

Both "caps" and "covers" are typical of Brownfields development. The term "cover" refers to a remedy requiring that physical barriers be installed (or remain in place) to support the development (e.g., building slabs, pavement for roads, concrete for sidewalks, clean soil in parks), meet certain specifications of thickness and be maintained to minimize breaches except during approved activities. The controls imposed in conjunction with cover remedies include an operation and maintenance plan and generally contemplate that breaches of the cover will be allowed with the approval of the regulatory agency as part of maintenance and redevelopment activities and will require specific construction practices (e.g. dust control) during construction and replacement of the cover after the activity. In addition, cracks or potholes due to weathering or as a result of earthquakes will require repair within a specified time period.

The term "cap" refers to a remedy requiring the installation of a surface specifically engineered to be placed on top of an area of known or suspected residual contamination (typically a landfill). The surface may be asphalt, concrete, or soil, but is generally more robust than a "cover" remedy; includes a "demarcation layer" of some sort; usually includes monitoring; and, requires more intensive operation and maintenance than a "cover" remedy. The controls imposed in conjunction with cap remedies generally make it more difficult to secure approval for a breach of the cap than the controls for a cover remedy.

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These restrictions will require the final development to include: building, street, and clean soil covers over the existing soil; vapor controls as part of new building constructions in certain areas; restrictions on the type of land uses that generally conform to the City's adopted redevelopment plan; and approved work plans for work that involves disturbance of existing soil and groundwater.

To ensure that all of the environmental restrictions are complied with, the MMRP requires any builder working on the Shipyard, before obtaining any permits for construction, to provide documentation to the SFDPH that the work will comply with all environmental restrictions imposed on the property through the CERCLA process, or a separate process that the RWQCB is overseeing to address petroleum contamination. In addition, DTSC and the Navy will enter into covenants to restrict use of the property (CRUPs) that will bind future owners and require compliance with the restrictions. Furthermore, all restrictions identified in the CRUPs will also appear in deeds for the land.

The Deeds and CRUPs will reference a Risk Management Plan (RMP) approved by the FFA regulatory agencies. The RMP identifies a subset of restricted activities for which the FFA regulatory agencies has approved a set of protocols that if followed can be undertaken without further FFA approvals. The protocols concern such issues as: the discovery of unexpected conditions, construction worker health and safety, soil management, dust control, and off-site disposal of soil and waste. To engage in other restricted activities not covered by the RMP will require approval of the FFA of specific work plans. Further information on the RMP is provided in Attachment 19.

Other hazardous materials laws will also control construction activities at the Shipyard. For example, if soil or groundwater containing contaminants must be disposed of off-site, the handling and disposal will be subject to an array of state and federal laws. Also, in the case of existing buildings that contain asbestos or lead based paint (LBP), these materials will be removed and abated pursuant to special laws governing their handling administered by the Bay Area Air Quality Management District (BAAQMD), the California Division of Occupational Safety and Health (Cal/OSHA) and the San Francisco Building Department through Chapter 34 of the City's

ARTICLE 31

San Francisco Health Code, Article 31, specifically applies to construction on the Shipyard.

Article 31 requires that prior to receiving permit approval for excavating or grading, a builder must submit planning documents to ensure safe work practices and environmental protection during construction. The builder must comply with all institutional controls on the property. They must also evaluate any areas within 1,000 feet of the landfill for landfill gas issues. Lastly, prior to receiving permission to occupy a newly constructed building they must submit a closure report verifying that all plans were properly implemented.

The term "cap" refers to a remedy requiring the installation of a surface specifically engineered to be placed on top of an area of known or suspected residual contamination (typically a landfill). The surface may be asphalt, concrete, or soil, but is generally more robust than a "cover" remedy; includes a "demarcation layer" of some sort; usually includes monitoring; and, requires more intensive operation and maintenance than a "cover" remedy. The controls imposed in conjunction with cap remedies generally make it more difficult to secure approval for a breach of the cap than the controls for a cover remedy.

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Building Code.

In addition to federal and state regulatory oversight, the City will oversee a number of environmental activities related to construction on the Shipyard, including the removal of any remaining underground storage tanks and the handling of LBP and asbestos at existing buildings as the buildings are demolished. A section of the San Francisco Health Code, Article 31, specifically applies to environmental conditions during construction on the Shipyard. Article 31 requires that prior to receiving permit approval for excavating or grading at the Shipyard, a builder must submit the following plans to ensure safe work practices and environmental protection during construction: a Dust Control Plan (DCP); an Unknown Contaminant Contingency Plan; a Disposal Plan (if applicable); a Site Specific Health and Safety Plan (HASP); a Soil Importation Plan (if applicable); a Serpentinite Cover Plan (if applicable); a Foundation Support Pile Installation Plan (if applicable), and a Closure Report. Additionally, the builder must comply with all institutional controls on the property and must evaluate any areas within 1,000 feet of the landfill for landfill gas issues. Lastly, prior to receiving permission to occupy a newly constructed building, the builder must submit a closure report for SFDPH approval verifying that all approved work plans were properly implemented. These Article 31 requirements and other information about City Permitting are described in Attachment 20.

VI. Construction Dust

One of the most widely discussed issues regarding construction at the Shipyard has concerned construction dust. As with any large site, construction activities at the Shipyard will generate dust. The entire site will be subject to BAAQMD regulations as well as the SFDPH controls on dust contained in Articles 22B and 31 of the San Francisco Health Code, which require wetting down areas and implementing other site-specific dust measures to control visible dust, air monitoring to verify the control of dust, recordkeeping, verification by third party inspectors, and establishing a hotline for surrounding community members to call and report visible dust problems.

To assure compliance with these requirements, the approved Mitigation Measures for the Project

DUST CONTROL

With the grading of the hilltop site on the Shipyard in 2005, several concerns were raised by the community about the impact of dust. In response, an extensive investigation was conducted by DPH with extensive oversight from BAAQMD, CDPH, ATSDR, and the USEPA. The investigation concluded that the grading and excavation work was properly executed and did not present a long-term health risk to nearby residents. Nevertheless, a variety of additional measures have been taken to ensure that dust on the site is minimized. More information on this program is included in Attachment 21.

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requires builders to obtain approval of an Asbestos Dust Mitigation Plan (ADMP) from BAAQMD for areas over one acre that contain or might contain naturally occurring asbestos as well as approval of a Dust Control Plan from SFDPH for all areas of the Shipyard. The purpose of these monitoring and control requirements is to trigger health protective actions such as increased dust control or temporary health protective shut downs of the dust generating activities (i.e. construction). The levels of dust or naturally occurring asbestos that trigger these actions are set at levels well below any level of health concern so that if there are any issues with the monitoring or control there will not be any long term health effects.

BAAQMD, which is a department within the California Environmental Protection Agency, is the lead regulatory agency for air quality in the Bay Area. BAAQMD has enacted specific regulations for construction impacts related to the disturbance of serpentine rock, which is known to contain naturally occurring asbestos. Prior to commencing construction on Parcel A, Lennar Urban, the developer at the Shipyard, was required to obtain BAAQMD's approval of an ADMP. In granting that approval, BAAQMD went beyond the minimum requirements of the regulations and required Lennar to prepare an air monitoring plan and establish a network of airborne asbestos monitoring stations at different locations on the perimeter of the site. The regulatory agencies review of the potential impacts of construction dust at the Shipyard also considered hazardous substances other than serpentine rock that may be present in the soil that could have been released into the air during construction. The regulatory agencies' conclusion was that Parcel A could be used for unrestricted residential use and that there would not be an unacceptable hazard from the construction dust.

A detailed summary of prior issues concerning construction dust at the Shipyard is attached as Attachment 21. As explained in the attachment, despite numerous past allegations, thorough studies by SFDPH, the BAAQMD, the California Department of Public Health (CDPH), the US Agency for Toxic Substances and Disease Registry (ATSDR), and the USEPA have been undertaken and none recommended shutting down construction or concluded that completed grading or excavation work had created a substantial or long-term health risk. SFDPH has and will continue to work with BAAQMD and other regulatory agencies overseeing the site to assure that any recommended improvements to required dust monitoring and control measures are implemented in conjunction with future construction activities.

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VII. Frequently Asked Questions

Has all cleanup in the entire Hunters Point Shipyard been completed?

The cleanup is implemented in phases on the various Shipyard parcels, and a parcel cannot transfer until the cleanup is complete and certified by the regulatory agencies. As part of their review, regulatory agencies determine that any continuing Navy cleanup on Navy owned land (i.e. land that has not yet transferred to OCII from the Navy) will not impact public health at adjacent parcels that have already transferred. The three regulatory agencies are the USEPA, DTSC, and RWQCB. A summary of remediation activities at each parcel as well as their anticipated transfer dates are included in Attachment 4.

What are some of the tools available to ensure that the development will comply with restrictions on property and that public health will be protected?

As described in Attachments 14 and 20, provisions designed to ensure the ongoing protection of public health in the deeds and Covenants to Restrict the Use of Property (CRUPs) will be enforceable by the Navy, USEPA and/or DTSC. In addition, the City has many enforcement tools available to it to ensure that public health is protected. Under Article 31 of the San Francisco Health Code, the developer must submit a number of required plans to SFDPH, as described above, and receive approval of those plans prior to receiving a permit to begin construction. Compliance with the plans becomes a condition of the permit and construction will not begin until SFDPH is assured that all aspects of the construction will be health protective. During construction, SFDPH may periodically conduct inspections to ensure implementation of the approved plans and enforce any of the institutional controls that were put in place during the property transfer. In addition to responding to complaints and conducting inspections, SFDPH can: issue notices of violation; require the applicant (i.e. the developer or their construction contractor) to stop work for a specified period of time; require the applicant to attend a Director's Hearing; issue cleanup and abatement orders; impose administrative civil penalties, or; ask the City Attorney to pursue injunctive relief. The Department of Building Inspection and the Department of Public Works also have similar enforcement authority and can enforce any conditions in the permits they issue, including conditions imposed through the Article 31 process.

In addition to the provisions in the deeds and CRUPs and the requirements under Article 31, the Risk Management Plan (RMP) will be binding on all future property owners. The RMP prescribes risk management protocols and requirements related to development activities, including but not limited to: the discovery of unexpected conditions; construction worker health and safety; soil management; dust control, and; off-site disposal of contaminated soil and other waste. The RMP is intended for use by future property owners to ensure protection of the remedy put in place by the Navy and for use by the FFA regulatory agencies and SFDPH to assist in ensuring that future property owners comply with the applicable restrictions in CRUPs and deeds. Further information on the RMP is provided in Attachment 19.

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Where will residential use be allowed at the Shipyard?

The environmental remedies approved at the Shipyard include removal or treatment of elevated levels of hazardous substances, with the exception of any low-levels of contaminants that cannot feasibly or practically be removed. To assure protection of public health and the environment in light of these remaining low-levels of contaminants, physical barriers (e.g., covers consisting of a building, street, sidewalk or two feet of clean soil in parks) are required to be placed on top of existing soil and, in some small areas where there is residual groundwater contamination, special foundations for buildings. These two requirements, physical barriers and special foundations, will be the same and will look the same in both residential and commercial areas of the site as presented in the table in Attachment 23.

Cleanup to standards consistent with residential use has already been approved by the regulatory agencies within the dark green areas of the map in Attachment 23. Many of the light green areas contained in the map are currently planned for non-residential uses (e.g. open space, industrial, commercial, research and development); however, the remedy requirements for commercial areas are the same as residential areas: physical barriers for soil and small areas with special building foundations for groundwater. Given that the same remedial strategies have been used in areas planned for residential, commercial, and research and development uses, it is anticipated that some areas the Navy remediated for commercial and research and development areas will also be found to be safe for residential use with the existing remedy after existing soil and groundwater data has been thoroughly reviewed by the regulatory agencies.

How can we be certain that the Shipyard will be suitable for redevelopment when it is transferred?

Federal Law (i.e. CERCLA) requires that the Navy must remediate hazardous substances (contaminants) to a level consistent with the protection of human health and the environment prior to the transfer of land at the Site; or, if conveying property before completion of remediation, the Navy must ensure that the property is suitable for conveyance for the use intended and that the intended use is consistent with the protection of human health and the environment. There are two ways in which the Navy can transfer title for land at the Shipyard: (1) after completing remediation of a parcel (e.g., the approach taken with Parcel A) or (2) as an early transfer before remediation is completed. The City has determined to accept transfer only after the Navy has completed remediation at the Shipyard.

In conveying property that has been remediated, the Navy documents its findings in a document called a Finding of Suitability for Transfer (FOST). The FOST documents environmental cleanup that has been completed, summarizes the current environmental condition of the property, and where appropriate, identifies any environmental conditions that would pose constraints to activities or uses of the property. At the time of transfer, the Navy is required to covenant that all required remediation has been completed and that if additional remedial action is needed with respect to contaminants on the property at the time of transfer, further cleanup will be the responsibility of the Navy. The Conveyance Agreement for the Shipyard also requires that federal and state environmental regulators concur with the FOST prior to land being conveyed.

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After cleanup, if new pollutants are discovered in soil or groundwater, who is responsible for the cleanup and how would the cleanup process be done?

The Navy is responsible if any new conditions requiring environmental remediation are found in the future. Discoveries of hazardous substances (contaminants) would most likely happen during the construction phase and very detailed plans for how to clean up the hazardous substances would be drafted and approved by the regulatory agencies. Additionally, the RMP includes instructions so that construction workers know how to identify pollutants and what to do when they find any unexpected conditions (see Attachment 19 regarding the RMP).

Once new construction is complete, it is unlikely that any new contaminants will be found because there won't be any digging below ground except for utility repairs in streets. Health and Safety Plans and plans for what to do if pollution is found during utility repairs will be drafted before any work is started. Utility workers will be trained to identify unexpected conditions.

How is potential sea level rise being addressed and what does it mean for the cleanup?

There has been a concern expressed that sea level rise due to climate change could potentially cause flooding of the redevelopment area, causing environmental concerns such as migration of contaminants or physical concerns such as an increase in liquefaction potential. More details about sea level rise are included in Attachment 24. The Navy has planned for three feet (36 inches) of sea level rise in the design of shoreline protection structures required to be installed by the Navy. The approach to addressing sea level rise has been closely integrated with the physical barriers that will be constructed on the site to ensure that the site is safe for people and the environment. In addition, the Shipyard and Candlestick Point redevelopment project includes several measures to address sea level rise including: Setting back development at least 100 feet from the shoreline; Raising the occupied floors of the future buildings to 55 inches above the 100 year flood level; and Ensuring the adoption of adaptive management strategies such as landscaped berms or seawalls at the shoreline that would prevent wave over-topping in the event that sea level rise exceeds current projections. In addition, the physical barriers that will be on the Shipyard along with the proposed sea level rise strategies are also illustrated in Attachment 24.

Will sea level rise affect residual soil contamination?

The groundwater levels under the Shipyard have gone up and down over time, as much as eight feet or more in some areas of the site, depending on the amount of winter rainfall. These varying groundwater levels have been considered in selecting the approved remedies for contamination at the site. When the sea level rises, groundwater levels near the shore will also rise. These varying groundwater levels have been considered in selecting the approved remedies for contamination at the site. If sea level were to rise, there was an associated rise in groundwater, and the potential for the interaction with groundwater were to present a risk to human health or the environment, then further remedial activities would be required by law. As an added precaution, residual soil contamination will be under a physical barrier (e.g., soil cover, pavement, sidewalk, concrete building foundation) that will reduce human exposure to these residual contaminants in the soil. Additionally, the institutional controls placed on

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areas with residual contamination, would enforce action to maintain the protection to the environment and prevent human exposure.

Will sea level rise affect vapor mitigation systems or residual groundwater contamination?

After remediation is complete there may still be low levels of residual chemicals in groundwater in a few known areas (see map in Attachment 5) that could result in vapors accumulating under buildings constructed over these areas. Subsurface soil vapor sampling will be conducted to refine the boundary of these small areas. If needed, a vapor mitigation system (thick plastic sheeting and vent pipes) will be constructed within and underneath building foundations. These vapor mitigation systems are common, well-tested, and protective of building occupants, be they residential or commercial occupants. All soil vapor sampling programs, definition of areas requiring vapor controls, and the design and installation of vapor mitigation systems will be overseen and approved by the regulatory agencies. Furthermore, any soil vapor mitigation system will be subject to periodic inspection and maintenance to ensure proper operation. If the groundwater, in the few small, well-defined areas, rises to the surface prior to the completion of residual remediation and/or prevents the proper operation of a soil vapor mitigation system, then current laws will require the reevaluation of the groundwater hazard to human health or the environment. Additionally, VOC vapors occur in soil that is not saturated with water. Therefore, if sea level were to rise and if there was an associated rise in groundwater, the volume of VOC vapors under a building might be reduced.

Was sea level rise considered for the Parcel E-2 remedy?

The Navy also considered sea level rise for the landfill that comprises Parcel E-2 when designing the remedy that was selected by the USEPA and the Navy in their 2012 Record of Decision (ROD). Some results of contaminants in groundwater show that contaminants leaching from the landfill have the potential to impact to the San Francisco Bay. The Parcel E-2 ROD has identified remedies to mitigate these potential impacts through containment, monitoring, and removal. During the design of the engineered cap that the Navy will construct on top of the E-2 landfill, they will evaluate and make sure that the design will contain the waste in the landfill even if the groundwater in the landfill rises as a result of sea level rise.

Additionally, emergency response plans will be carried out following major flooding and seismic events, at which time the landfill engineered cap, if chosen as the remedy, will be investigated for potential breaches and repaired.

What happens if there is a large earthquake?

Given the Shipyard's proximity to major area faults and the subsurface conditions present, seismic hazards (earthquakes) and liquefaction (a situation in which the strength and stiffness of a soil is reduced by earthquake shaking) could occur, but would be unlikely to result in health and safety concerns greater than other areas of the City built on landfill (such as the Marina, large parts of downtown San Francisco and South of Market) and would not uncover contaminants that could expose the public or the environment to unacceptable levels of contaminants. More details about seismic hazards and liquefaction issues are included in Attachment 25.

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The Seismic Hazard Mapping Act was passed in 1990 following the Loma Prieta earthquake. The Act was designed to reduce threats to public health and safety and to minimize property damage caused by earthquakes. This Act is considered in all new designs for structures at the Shipyard. Based on existing data and Navy studies of the site, there is little risk of large ground movements at the site as a result of liquefaction, except deep under the landfill (see below). To further investigate liquefaction and earthquake hazards, site-specific geotechnical and seismic studies will be required for the project prior to issuance of any building permits. Seismic mitigation measures will include structural measures (specific structural design) and possible ground improvement methods (e.g., over-excavation, compaction). These measures will be determined by a site-specific seismic analysis. These studies will provide ground improvement/mitigation recommendations to address potential liquefaction-related ground hazards, should they exist.

Will earthquakes affect residual soil contamination?

Residual chemicals in soil largely consist of metals that are associated with the rock and soil that were historically used to fill in the Bay. The residual metals are only a concern for health after a lifetime of significant daily exposure. Exposure to a small amount of dust is not a health concern. To prevent long-term exposure, these residual metals will be under a physical barrier (e.g., soil cover, pavement, sidewalk, concrete building foundation) that will reduce human exposure to the metals in the soil. Operation and maintenance plans for these physical barriers will be carried out to periodically monitor and repair any cracks. If cracks do occur after an earthquake, the cracks will be discovered during the required post-earthquake inspections and will be repaired.

Will earthquakes affect vapor mitigation systems?

After remediation is complete there may still be low levels of residual chemicals in groundwater in a few known small areas (see figure in Attachment 5). If the subsurface vapor sampling predicts a problem with vapors from these small groundwater areas accumulating under a building, the building is designed with a vapor mitigation system (thick plastic sheeting and vent pipes) to vent the vapors to the atmosphere. This vapor mitigation system and the building are designed to withstand shaking during an earthquake and continue operating as designed after an earthquake.

Were earthquakes and potential liquefaction considered for the Parcel E-2 remedy?

The ROD evaluated all aspects of the chosen remedy and included a liquefaction and slope stability evaluation. The evaluation concluded that, for soil layers that could liquefy during the largest potential earthquakes, lateral movement of soil below the waste might be as much as 4 to 5 feet. Further technical review and reports may refine this estimate. Settlement of liquefiable soil below the waste may be up to 10 inches. The USEPA and the Navy selected a remedy in the Parcel E-2 ROD that includes an engineered cap on top of the landfill. Site-specific geotechnical studies were used in the design of the engineered cap to minimize potential breaks during earthquakes. The cap would limit exposure and protect humans from long-term health risks even if breaks in the cap temporarily occur. Operation and maintenance plans for the engineered cap will be carried out to monitor and repair potential breaks. Therefore, if ground rupture were

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to occur, contaminants should not be released at levels presenting a concern to human or ecological health.

An interim landfill gas collection system was installed along the northern edge of the landfill in 2002 and is still operating; the design intent of this system was to cut off the migration of landfill gas onto the adjacent UCSF property. Methane is the primary component of landfill gas. Methane is non-toxic and vented to the atmosphere through the collection system. The landfill gas has been tested for other chemicals of concern and none have been found at a level of concern. After an earthquake, the landfill gas collection system would be checked and repaired if there were any problems found. The ROD for Parcel E-2 includes installation of a full-scale landfill gas control system for the entire landfill.

Emergency response, documented in the Operation and Maintenance plans will be carried out following major flooding and seismic events, at which time the landfill engineered cap will be investigated for potential breaches and repaired.

Should I be concerned about the risk of inhaling something toxic and/or absorbing the pollution into my skin while living near the Shipyard while Navy cleanup is being done on the Navy's land?

The regulatory agencies review the Navy's plans and remedies with the goal of protecting residents, tenants, visitors and the public during cleanup activities. The Navy has very detailed health and safety plans to protect all workers while they are doing cleanup work. There is a perimeter set up around the work area and air monitoring is conducted to verify that dust levels meet or exceed all regulatory standards for protecting any residents, tenants, adjacent workers, and the public. In other words, the Navy is not allowed to produce airborne dust or any airborne contaminant levels that might cause health concerns for the workers inside the site perimeter or for tenants, residents, or visitors in adjacent areas. In addition, the Navy has a strict access control protocol in place that is designed to keep the public out of active remediation areas.

Should I be concerned about exposure to any toxic and harmful chemicals in groundwater?

The contaminated groundwater is below the ground and is located in specific well defined areas in the flat low lying areas of Hunters Point Shipyard. It is not possible for residents, tenants or adjacent workers to come in contact with contaminated groundwater.

The potable water that is piped to existing residences and will be supplied to future HPS residences for drinking, showering, and other uses is from the San Francisco Public Utilities Commission (SFPUC) and includes water from the Hetch Hetchy reservoir – some of the finest drinking water in the Bay Area. The underground pipes where the current condos/apartments are being built on Parcel A will not be anywhere near any low level contaminated groundwater at HPS. In the future, when new construction is built near the low level contaminated groundwater, the contaminated groundwater will not be able to enter any pipes because water supply pipes are under pressure; if there is a crack or leak, the clean water flows out of the pipe and low level contaminated water cannot flow into the pipe.

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Any construction workers who may come into contact with the low level contaminated groundwater during construction (in the parcels that will be transferred in the future) will do their work under the guidance of a detailed health and safety plan.

Is radioactive material present at the Shipyard both airborne and in the soil?

Radioactivity at or below background levels – meaning normal levels of radioactivity – exists in soil everywhere. It also exists in your body, your food and your water. These low levels are not harmful. The Navy is tasked with removing any levels that are above their cleanup standards which are very similar to background levels. Background levels in the San Francisco Bay Area are extremely low. In areas where people live at higher elevations or where there are higher levels of naturally occurring radioactivity in the rocks or soil, the background levels are higher. For more information on radiation and the radiological cleanup process at Hunters Point Shipyard, see Attachment 7.

While removing soil that might contain radioactivity, the Navy has very detailed health and safety plans to protect all workers while they are doing cleanup work. There is a perimeter set up around the work area and air monitoring is conducted to verify that dust levels are below all regulatory standards for protecting any residents, tenants, adjacent workers, etc. In other words, the Navy is not allowed to produce dust levels that might cause health concerns for adjacent areas (or for the workers inside the perimeter). Residents and visitors' health is protected through the oversight of the regulatory agencies.

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LIST OF ATTACHMENTS

Attachment 1	Parcel Map of the Hunters Point Shipyard
Attachment 2	Soil and Groundwater Sampling Locations
Attachment 3	Steps in the CERCLA Process and Public Participation
Attachment 4	Parcel-by-Parcel Summary and Expected Transfer Dates
Attachment 5	Groundwater and Volatile Organic Compounds
Attachment 6	Parcel E-2 Landfill Cleanup Strategies
Attachment 7	Low-level Radiological Materials Cleanup
Attachment 8	Naturally Occurring Asbestos
Attachment 9	Abrasive Blast Material
Attachment 10	Naturally Occurring Metals
Attachment 11	Lead-Based Paint
Attachment 12	Pile Driving Through Contaminated Soil
Attachment 13	Public Participation and Notification
Attachment 14	Monitoring and Enforcement of Environmental Restrictions
Attachment 15	Asbestos Containing Materials
Attachment 16	Superfund Sites
Attachment 17	Bay Area Brownfields Sites
Attachment 18	Environmental Mitigation Measures and the MMRP
Attachment 19	Risk Management Plan
Attachment 20	City Permitting and City Maintenance of Public Property
Attachment 21	Summary of Prior Dust Issues
Attachment 22	Proposition P and the Precautionary Principle
Attachment 23	Residential Use Areas Table and Map
Attachment 24	Sea Level Rise
Attachment 25	Seismic Hazards and Liquefaction
Attachment 26	Acronym List

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LIST OF TABLES

Table 16-1 Superfund Site Environmental Management Summary

Table 17-1 Bay Area Brownfields Environmental Management Summary

Table 23-1 Remediation Required for Residential versus Commercial Development

Table 24-1 Summary of Reviewed Documents on Sea Level Rise Estimates

LIST OF FIGURES

Figure 1-1 Parcel Map of Hunters Point Shipyard

Figure 2-1 Soil and Groundwater Sampling Locations

Figure 3-1 June 2013 Status of CERCLA Process

Figure 5-1 Groundwater Detections

Figure 23-1 Residential Use Areas

Figure 24-1 Illustrative Section Showing Finished Remedy and Land Improvements in Relation to Sea Level Rise

Figure 24-2 Illustrative Section of Parcels in IR7/18 and E Shoreline and Sea Level Rise

Figure 24-3 Illustrative Section of Parcel E-2 and Sea Level Rise

Figure 24-4 Physical Barriers and Sea Level Rise

Figure 25-1 Seismic Hazard Map for the City and County of San Francisco

Figure 25-2 Illustrative Section of Potential Post-Seismic Impact

Figure 25-3 Illustrative Section of Potential Post-Seismic Impacts, Parcels IR7/18 and E Shoreline

Figure 25-4 Illustrative Section of Parcel E-2 Potential Post-Seismic Impacts

LIST OF EXHIBITS

Exhibit 6-1	Fact Sheet – Draft Parcel E-2 Record of Decision and Summary of Responses to Community, April 2012
Exhibit 6-2	Parcel E-2 Remedial Design Fact Sheet, Part 1 - Hot Spot Excavations and Underground Barriers
Exhibit 6-3	Parcel E-2 Remedial Design Fact Sheet, Part 2 - Soil Cover and Landfill Gas Collection System
Exhibit 7-1	Fact Sheet – Hunters Point Naval Shipyard Radiological Program, August 2014
Exhibit 21-1	Informational Memorandum to SFRA regarding Monitoring the Enforcement of Dust Control Measures and the Evaluation of Health Concerns Related to Phase I Construction, from SFDPH, February 2007
Exhibit 21-2	Memorandum to All Interested Parties regarding Assessment of Exposure to Airborne Asbestos at Parcel A, from SFDPH, February 2007
Exhibit 21-3	Letter to SFDPH from ATSDR, September 2007, and Letter to ATSDR from CDPH, September 2007, regarding Recommendations Related to Parcel A Development Activities
Exhibit 21-4	Letter to SFDPH regarding Tests for Asbestos Exposure, from ATSDR, June 2007
Exhibit 21-5	BAAQMD Presentation – Lennar Bay View Hunters Point, Parcel A, Naturally Occurring Asbestos, Asbestos Dust Mitigation Plan, October 2007
Exhibit 21-6	Letter to the Bayview-Hunters Point Community Regarding Assessment of Health Issues Related to Construction Activities at Parcel A, from John R. Balmes, MD, Professor of Medicine at University of California, San Francisco, and Chief of Occupational and Environmental Medicine at San Francisco General Hospital, September 2007
Exhibit 21-7	Letter to CDPH in response to Recommendations for Asbestos and Nuisance Dust Control at Parcel A, from SFDPH, October 2007

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Exhibit 21-8 USEPA Review of Dust/Naturally Occurring Asbestos Control Measures and Air Monitoring at the Former Shipyard, June 2010

Exhibit 21-9 Letter to San Francisco Board of Education regarding Health Concerns Related to the Asbestos and Dust Control Program at the Shipyard, from Mayor's Shipyard Citizen's Advisory Committee, October 2007

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Attachment 1

Parcel Map of the Hunters Point Shipyard

Parcel	Status or Expected Transfer Date
A	Transferred
B-1	Late 2015
B-2	2016
C	2017
D-1	2016
D-2	Early 2015
E	After 2022
E-2	After 2018
F (Pier)	After 2019
G	Late 2015
IR 7/18	Late 2015
UC-1	Early 2015
UC-2	Early 2015
UC-3	2017

Legend

- Building Footprint

Parcel Transfer Date

- Transferred
- Early 2015
- Late 2015
- 2016
- 2017
- After 2018

Notes:

1. Parcels boundaries are considered to be approximate; updated July 2014.
2. Data and information provided by San Francisco Department of Public Health and Kleinfelder.
3. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

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Feet

HUNTERS POINT SHIPYARD
San Francisco, California

PARCEL MAP OF HUNTERS POINT SHIPYARD

Date 3/10/2015	Project 731609901	Figure 1-1

LANGAN TREADWELL ROLLO

Attachment 2

Soil and Groundwater Sampling Locations

- Over 25,000 soil samples
- Over 14,000 groundwater samples

Legend

- Soil Sampling Location
- Monitoring Well
- Fuel Line (removed or in place)
- Sanitary Sewer Line/Storm Line (removed or in place)
- Building Footprint
- Extent of Landfill
- Parcel Boundary
- Non-Navy Property

Notes:

1. Sampling locations are to be considered approximate. Completeness and accuracy not guaranteed.
2. Data and information provided by Kleinfelder.
3. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

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Feet

HUNTERS POINT SHIPYARD
San Francisco, California

SOIL AND GROUNDWATER SAMPLING LOCATIONS

Date 3/10/2015	Project 731609901	Figure 2-1

LANGAN TREADWELL ROLLO

Attachment 3

Steps in the CERCLA Process and Public Participation

Attachment 3
Steps in the CERCLA Process and Public Participation

The CERCLA[1] process is defined in general terms below. A summary of the steps in the CERCLA process is described here and is illustrated in Figure 3-1, Status of CERCLA Process. The relevant environmental regulatory agencies would require performance of the remedial activities that the Navy is undertaking regardless of whether any redevelopment projects were proceeding. Potential environmental effects of the remedial activities (i.e., soil excavation, soil transport, and operation of treatment systems) have been, and will continue to be evaluated by the Navy and regulatory agencies in conjunction with the approval process for specific remedial actions. Appropriate environmental controls have been, and will continue to be, incorporated into the design and implementation of those remedial actions.

Summary of Navy Cleanup Process

The Navy is carrying out each step in the CERCLA process listed below for each parcel at the Shipyard. Each step results in the preparation of a document which is available to the public at the official document repository that the Navy is required to maintain for the project (located at the San Francisco Public Library located at 100 Larkin Street, San Francisco, California). In addition, recent documents are made available at a local repository at the Shipyard Site Office, 690 Hudson Ave, SF, CA 94124, 415-822-4622 and on-line at:

http://www.bracpmo.navy.mil/brac_bases/california/former_shipyard_hunters_point/documents1.html.

Many of these documents (e.g., the Feasibility Study (FS) and Proposed Plan) are made available in draft form for public review and comment before they are finalized. Pursuant to the Community Involvement Plan Update (2014) implemented by the Navy and approved by the regulatory agencies, various types of community outreach activities are conducted in association with each of these steps.

1. **Preliminary Assessment/Site Inspection** — An initial review of the site, including review of historic records and visual inspections. Sampling and analysis of soil, surface water, and/or groundwater may occur to evaluate whether the site needs to move to the next phase for further investigations.

[1] CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

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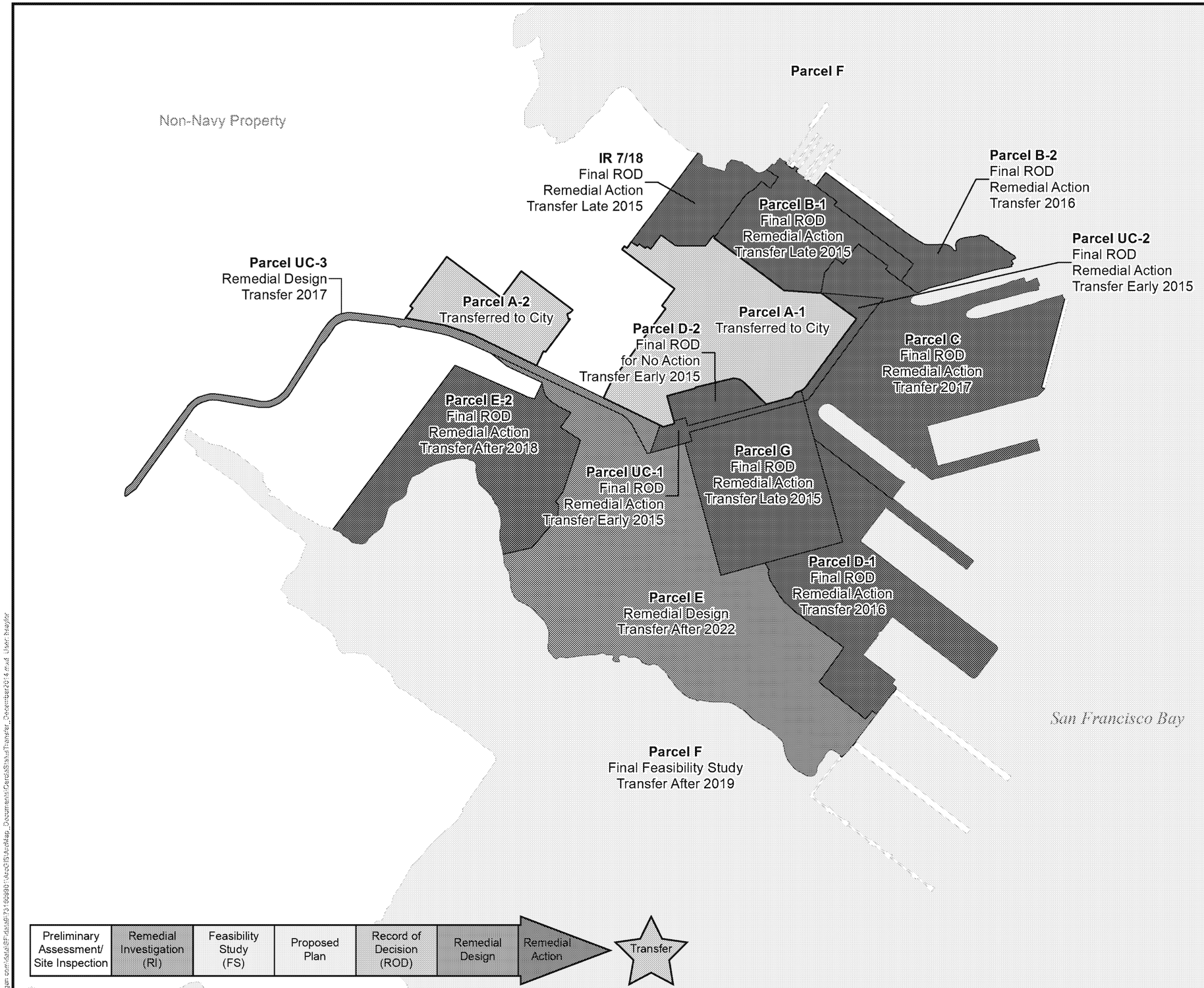

Legend

Cercla Status

- Remedial Design
- Remedial Action
- Transferred

Notes:

1. Parcels boundaries are considered to be approximate; updated July 2014.
2. Data and information provided by San Francisco Department of Public Health and Kleinfelder.
3. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

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HUNTERS POINT SHIPYARD
San Francisco, California

MARCH 2015
STATUS OF CERCLA PROCESS

Date 3/10/2015	Project 731609901	Figure 3-1

LANGAN TREADWELL ROLLO

2. **Remedial Investigation (RI)** — A closer look at site conditions, including collecting and analyzing samples to assess risk to human health and the environment. Treatability studies may occur in conjunction with or alongside physical investigation and alternative evaluation. A Removal Action may also be performed at this point.

3. **Removal Action** — An early cleanup action that is implemented before a Record Of Decision (ROD) is issued, and involves actions to contain, collect, or treat hazardous wastes that are an immediate or perceived threat to human health and the environment. A removal action can occur at any time during the remedial action process.

4. **Feasibility Study (FS)** — Results of the risk assessment, along with other data collected during the Remedial Investigation (RI), are used to evaluate cleanup alternatives that have been screened for community acceptance, effectiveness, implementability, and cost.

5. **Proposed Plan** — A fact sheet that describes cleanup alternatives evaluated in the FS and explains the preferred alternative. This step requires an informational meeting to be held for the public and allow the public to comment on the preferred cleanup alternative.

6. **Record of Decision (ROD)** — The selected cleanup alternative is documented and publicized in this document. A summary and responses to all comments on the Proposed Plan are included in this document.

7. **Remedial Design** — A design for implementing the selected cleanup alternative is prepared. A fact sheet is sent to the public before the Navy begins work on the cleanup.

8. **Remedial Action —** The cleanup remedy is carried out and the public is kept informed. Remedial system operation and maintenance may be needed for remedies such as soil vapor extraction where physical systems are in place. Site completion is achieved when all response actions have been completed consistent with CERCLA, the ROD and all institutional controls are in place and documented in a Completion Report.

9. **Completion Report —** This document describes how the cleanup was accomplished and provides the overall technical justification for site completion. USEPA, DTSC, and RWQCB, and for radiological remedies, CDPH, review and comment on the completion report and the Navy is required to resolve all their concerns.

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10. **Post-Project Activities** — Post-project activities may include long-term monitoring at sites where residual contaminants remain after the remedial action has been completed such as inspecting durable cover to make sure it is being maintained. Long-term monitoring is also used to confirm that previous site remediation continues to be effective. Every five years the Navy will conduct a review of cleanup where residual contamination is left in place to ensure the remedy remains protective of human health and the environment.

11. **Site Closeout** — Site closeout occurs when all necessary remedial action activities are complete and the Navy and regulatory agencies agree no further action is appropriate at the site.

12. **Transfer** — The Navy prepares a Finding of Suitability to Transfer (FOST) that summarizes the Navy's cleanup and completion process, all remaining environmental conditions on the property and specifies the notices that will be included in the deed(s) about any restrictions remaining on the property. The USEPA, DTSC and RWQCB review and comment on the FOST and when all comments are resolved provide written concurrence that the property is suitable for its intended use.

Public Participation

Community outreach activities are conducted in association with each CERCLA cleanup and closeout step, as designated in the updated Community Involvement Plan, which was updated in October 2014. More information on public participation in this process is included in Attachment 13.

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Attachment 4

Parcel-By-Parcel Summary and Expected Transfer Dates

Attachment 4
Parcel-By-Parcel Summary and Expected Transfer Dates

Three Shipyard parcels are scheduled to transfer in early 2015 and include Parcels D-2, UC-1, and UC-2. There are other areas of the Shipyard that may be ready for transfer late in 2015 (all cleanup has been or will be completed) that are awaiting final paperwork approvals and final transfer documents (e.g., property surveys, deeds, etc.). These parcels include Parcels B-1, G and IR7/18. The figure presented in Attachment 3 shows the current stage of the CERCLA process for each parcel. The current expected transfer dates are shown in Attachment 1 and reiterated at the end of this section.

Parcels A-1 and A-2: *Transferred* – In 2004, eighty-eight acres of the Shipyard, known as Parcels A-1 and A-2 were transferred from the Navy to the former San Francisco Redevelopment Agency. Parcels A-1 and A-2 are currently under construction. (Please note: State legislation dissolved the former San Francisco Redevelopment Agency in February 2012;but the San Francisco Office of Community Infrastructure and Investment (OCII) is authorized as the successor to the San Francisco Redevelopment Agency to continue to implement the Shipyard Redevelopment Project, including Parcels A-1 and A-2. The OCII is governed by the Oversight Board of the Successor Agency and the Commission on Community Investment and Infrastructure.)

Parcels B-1 and B-2: *Implementing Remedy* – The Navy has completed the preliminary investigation, site inspection, RI, FS, proposed plan, and ROD for Parcel B. The Navy issued an initial ROD in 1997, prepared a remedial design, and proceeded with remedial action implementation. After a decade of work and additional study, the Navy developed a revised remedy. The Navy issued an amended ROD in 2009. Since then, the Navy issued a Remedial Design (2010) and Remedial Action Work Plan (2012) and has been implementing the remedy. Since 2012, the Navy has issued three Remedial Action Work Plan Addenda to document revisions to the Remedial Action Work Plan. In 2014, Parcel B was subdivided into two parcels: Parcel B-1 and Parcel B-2. Parcel B-1 encompasses the inland area of the former Parcel B, and Parcel B-2 encompasses the shoreline area of the former Parcel B. The Navy is in the process of preparing a fourth Remedial Action Work Plan Addendum to document additional work related to excavation within the remedial action footprint of the revetment at Parcel B-2 adjacent to the bay.

In addition, the Navy has been implementing a remedy for petroleum compounds pursuant to the petroleum Corrective Action Plan (CAP). The petroleum CAP is a cleanup plan that includes remedies like those in the ROD designed specifically for petroleum compounds. The implementation of the CERCLA remedy, for areas excluding IR7/18 (which is described separately below), has included or will include the following:

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- Removal and off-site disposal of radiological contamination identified in buildings, former building sites, sewer lines, and other areas affected by radiological sources.

- Removal and off-site disposal of excavated soil in areas where there are known concentrations of organic chemicals and some metals above cleanup goals.

- Installation of durable covers over the entire Parcel to minimize contact with residual ubiquitous metals. A durable cover is defined in the Amended ROD and Remedial Design as hardscape (e.g., asphalt, buildings, sidewalks, etc.) or a minimum of two feet of clean imported fill.

- Installation of a revetment wall along portions of the Parcel B-2 shoreline to cover and prevent access to shoreline sediments.

- Operation of a soil vapor extraction system to remove and treat VOCs in soil on Parcel B-1.

- Treatment of groundwater to reduce the contaminant concentrations to or near the cleanup goals defined in the Amended ROD and CAP on Parcel B-1.

- Implementation of a groundwater monitoring program to verify that remediation efforts continue to meet the cleanup goals defined in the Amended ROD and CAP.

- Use of land use and activity restrictions to prevent or minimize exposure to contaminated soil, and soil vapor, and to prevent or minimize exposure to contaminated groundwater by restricting activities related to groundwater.

Some of the completion paperwork for this work has already been submitted by the Navy and approved by the Regulatory Agencies. The completion reports are called Removal Action and Remedial Action Completion Reports. Additional Remedial Action Completion Reports to document the remaining work, mostly the groundwater treatment, soil vapor extraction, and the durable cover construction will be submitted to and approved by the Regulatory Agencies prior to transfer of Parcels B-1 and B-2. In addition, the Regulatory Agencies will approve and provide concurrence on a FOST. Once the property is transferred, following protocols written in an approved RMP and in work plans that regulators will be asked to approve for specific work, developers may remove the existing buildings, pavement and imported soil (the durable cover) and construct new development that incorporates new durable covers in their place.

Parcel B-1 may be ready for transfer in late 2015. Parcel B-2 may transfer in 2016.

Parcel B IR 7/18: ***Finalizing closure and transfer paperwork*** – IR 7/18, an area that is currently a part of Parcel B, has all cleanup work completed including the installation of a demarcation layer over a portion of the site and a protective revetment

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along the shoreline. The site has received Regulatory Agency approval and sign-off that all remedial action has been completed. The final FOST was issued and received concurrence from the Regulatory Agencies in February 2013. This property may be ready for transfer in 2015. Once transferred, work in the demarcation layer area will require submittal and approval of work plans prior to constructing the planned park.

Parcel C: ***Implementing Remedy*** – The Navy has completed the preliminary investigation, site inspection, RI, FS, proposed plan, ROD and an Explanation of Significant Differences to the ROD for Parcel C. The ROD was finished in 2010 and the Remedial Design was finished in 2012. The Explanation of Significant Differences to the ROD was completed in 2014 to document changes to excavation boundaries based on human health risk assessment results where concentrations of certain contaminants will be removed rather than excavating to remedial goals. Remedial Action Work Plans have been written and are being implemented. The Navy has also been implementing a remedy for petroleum compounds pursuant to the petroleum CAP. Implementation of the remedy has included or will include the following:

- Removal and off-site disposal of radiological contamination identified in buildings, former building sites, sewer lines, and other areas affected by radiological sources.

- Removal and off-site disposal of excavated soil in areas where known concentrations of organic chemicals and some metals are above cleanup goals.

- Installation of durable covers over the entire Parcel to minimize contact with residual ubiquitous metals. A durable cover is defined in the Remedial Design as hardscape (e.g., asphalt, buildings, sidewalks, etc.) or a minimum of two feet of clean imported fill.

- Operation of a soil vapor extraction system to remove and treat VOCs in soil.

- Treatment of groundwater to reduce the contaminant concentrations to or near the cleanup goals defined in the ROD and CAP.

- Implementation of a groundwater monitoring program to verify that remediation efforts continue to meet the cleanup goals defined in the ROD and CAP.

- Use of land use and activity restrictions to prevent or minimize exposure to contaminated soil, and soil vapor, and to prevent or minimize exposure to contaminated groundwater by restricting activities related to groundwater.

In addition, the Regulatory Agencies will approve and provide concurrence on a FOST. Once the property is transferred, following protocols written in an approved RMP and in work plans that regulators will be asked to approve for specific work, developers may remove the existing buildings, pavement and imported soil (the durable cover) and construct new development that incorporates new covers in their place.

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Parcels D-1, D-2, G and UC-1 (formerly Parcel D) – The original Parcel D consisted of 101 acres of the southeast-central portion of the Shipyard. After completing the preliminary investigation/site assessment, RI, and FS for Parcel D, the Navy prepared a Proposed Plan that presented a proposal for remedial action to be selected in the ROD for the entire Parcel. Although the Proposed Plan covered all of Parcel D, for final remedy selection the Navy divided Parcel D into four new parcels: Parcels D-1, D-2, G, and UC-1 ("UC" stands for Utility Corridor). One combined ROD for Parcels D-1 and UC-1 was issued and separate RODs were prepared for Parcel D-2 and Parcel G.

Parcel D-1: *Implementing Remedy* — The Final Parcel D-1 ROD was issued in 2009. The Remedial Design was finished in 2011, the Remedial Action Work Plan was completed in 2014 and the Navy has been implementing the CERCLA remedy. The Navy has also been implementing a remedy for petroleum compounds pursuant to the petroleum CAP. Implementation of the remedy has included or will include the following:

- Removal and off-site disposal of radiological contamination identified in buildings, former building sites, sewer lines, and other areas affected by radiological sources.

- Removal and off-site disposal of excavated soil in areas where known concentrations of organic chemicals and some metals are above cleanup goals.

- Installation of durable covers over the entire Parcel to minimize contact with residual ubiquitous metals. A durable cover is defined in the ROD and Remedial Design as hardscape (e.g., asphalt, buildings, sidewalks, etc.) or a minimum of two feet of clean imported fill.

- Installation of a rip-rap stabilization in one area of the Parcel D-1 shoreline to cover and prevent access to shoreline sediments.

- Treatment of groundwater to reduce the contaminant concentrations to or near the cleanup goals defined in the ROD and CAP.

- Implementation of a groundwater monitoring program to verify that remediation efforts continue to meet the cleanup goals defined in the ROD and CAP.

- Use of land use and activity restrictions to prevent or minimize exposure to contaminated soil, and soil vapor, and to prevent or minimize exposure to contaminated groundwater by restricting activities related to groundwater.

In addition, the Regulatory Agencies must approve and provide concurrence on a FOST. Once the property is transferred, following protocols written in an approved RMP and in work plans that regulators will be asked to approve for specific work, developers may remove the existing buildings, pavement and imported soil (the durable cover) and construct new development that incorporates new covers in their place.

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Parcel D-2: ***Ready for transfer*** — The final "No Further Action" ROD for Parcel D-2 was issued in 2010. The FOST was issued in April 2012 and the Regulatory Agencies issued concurrence letters in May 2012. The final real estate paperwork is being prepared for OCII approval so that the parcel can be transferred in early 2015.

Parcel G: ***Finalizing closure and transfer paperwork*** — The Navy issued a final ROD for Parcel G in February 2009, a final Remedial Design document in October 2010, a Remedial Action Work Plan in December 2012 and a final Remedial Action Completion Report March 2014. The Navy has also been implementing a remedy for petroleum compounds pursuant to the petroleum CAP. Transfer may occur in 2015. Implementation of the remedy has included the following:

- Removal and offsite disposal of radiological contamination identified in buildings, former building sites, sewer lines, and other areas affected by radiological sources.
- Removal and off-site disposal of excavated soil in areas where known concentrations of organic chemicals and some metals are above cleanup goals.
- Installation of durable covers over the entire Parcel to minimize contact with residual ubiquitous metals. A durable cover is defined in the ROD and Remedial Design as hardscape (e.g., asphalt, buildings, sidewalks, etc.) or a minimum of two feet of clean imported fill.
- Treatment of groundwater to reduce the contaminant concentrations to or near the cleanup goals defined in the ROD and CAP.
- Implementation of a groundwater monitoring program to verify plume stability or that remediation efforts continue to meet the cleanup goals defined in the ROD and CAP.
- Use of land use and activity restrictions to prevent or minimize exposure to contaminated soil, and soil vapor, and to prevent or minimize exposure to contaminated groundwater by restricting activities related to groundwater.
- In addition, the Regulatory Agencies are reviewing and will approve and provide concurrence on a FOST.

Once the property is transferred, following protocols written in an approved RMP and in work plans that regulators will be asked to approve for specific work, developers may remove the existing buildings, pavement and imported soil (the durable cover) and construct new development that incorporates new covers in their place.

Parcel UC-1: ***Finalizing closure and transfer paperwork*** — see discussion under "Parcels UC-1 and UC-2" below.

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Parcel E: ***Designing Remedy*** – The Navy has completed the preliminary investigation, site inspection, RI, FS, proposed plan and ROD for Parcel E. The ROD for Parcel E was issued in December 2013 and the remedial design is underway. The Navy has also been implementing a remedy for petroleum compounds pursuant to the petroleum CAP. Implementation of the remedy will include the following:

- Removal and off-site disposal of radiological contamination identified in buildings, former building sites, sewer lines, and other areas affected by radiological sources.
- Removal and off-site disposal of excavated soil containing non-radioactive chemicals (metals, PCBs, SVOCs and TPH).
- Operation of a soil vapor extraction system to remove and treat VOCs in soil (Building 406).
- Installation of durable covers over the entire Parcel to minimize contact with residual contaminants in soil and also a protective liner to minimize water seeping into contaminated soil.
- Removal and disposal of contaminated shoreline sediment.
- In the open space area along the shoreline, a demarcation layer will be installed to identify the areas where digging will only be allowed with submittal and approval of work plans.
- Installation of a revetment wall along portions of the Parcel E shoreline to cover and prevent access to shoreline sediments.
- Installation of rock under-armoring along portions of the Parcel E shoreline to cover and prevent access to shoreline sediments.
- Treatment of VOC contamination in groundwater at inland plumes using injected biological nutrients (or potentially a mixture of biological nutrients and zero-valent iron) to accelerate the breakdown of VOCs to nontoxic compounds to meet cleanup goals.
- Installation of a below-ground barrier in the northwest portion of IR-02 to control discharge of contaminated groundwater (containing primarily metals and PCBs) into San Francisco Bay (below-ground barrier would work, in combination with protective liner installed under the soil cover in this area, to limit contaminant migration).
- Implement a program to monitor groundwater concentrations and plumes to support the selected remedies, including documenting the beneficial impact to groundwater quality following implementation of the selected remedies (e.g., the ongoing degradation of VOC contamination by natural processes).

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- Removal or treatment of contaminated materials at the Former Oily Waste Ponds at IR-03 using injected biological nutrients to accelerate breakdown of chemicals to nontoxic compounds (primarily non-aqueous phase liquid [NAPL], but also including associated soil and groundwater contamination).
- Installation of a below-ground barrier to control discharge of NAPL and contaminated groundwater into San Francisco Bay (below-ground barrier would work, in combination with protective liner installed under the soil cover in this area, to limit contaminant migration).
- Use of land use and activity restrictions to prevent or minimize exposure to contaminated soil, and soil vapor, and to prevent or minimize exposure to contaminated groundwater by restricting activities related to groundwater.
- Implementation of a long term monitoring program to monitor and maintain the different parts of the selected remedies to ensure they are working properly.

The Navy predicts that the Remedial Design will be issued in 2016.

Parcel E-2: Writing Remedial Action Work Plan – Parcel E-2 is the landfill parcel. The Navy has completed the preliminary investigation, site inspection, RI, FS, proposed plan, ROD, and Remedial Design for Parcel E-2. The remedies in the ROD were selected through a lengthy publicly reviewed process that included reviews not only by the EPA, DTSC, RWQCB and CDPH but numerous other government agencies and many interested citizens and non-profit environmental groups. The final ROD includes 110 pages of comments and responses on the final document in addition to responses on the draft and draft final versions of the document. The ROD was completed in 2012 and the remedial design in 2014. The Navy has also been implementing a remedy for petroleum compounds pursuant to the petroleum CAP. Implementation of the remedy has included or will include the following:

- Removal and offsite disposal of radiological contamination identified in buildings, former building sites, sewer lines, and other areas affected by radiological sources.
- Removal and off-site disposal of excavated soil in areas where known concentrations of organic chemicals and some metals are above cleanup goals.
- Installation of a cap over the entire Parcel to prevent contact with residual contaminants. The cap will include a protective liner (except for beneath the new wetlands area) and several feet of soil. Digging will only be allowed with submittal and approval of work plans.
- Installation of tidal and freshwater wetlands.
- Installation of a revetment wall along portions of the Parcel E-2 shoreline to cover and prevent access to shoreline sediments.

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- Removal and treatment of landfill gas and monitoring of landfill gas.
- Installation of underground barriers to prevent flow of contaminated groundwater to the Bay.
- Installation of underground barriers and drain to divert flow of groundwater around the landfill.
- Implementation of long term monitoring for groundwater, storm water, and landfill gas to assess whether chemicals are migrating and to monitor changes in ambient conditions.
- Use of land use and activity restrictions to prevent or minimize exposure to contaminated soil, and soil vapor, and to prevent or minimize exposure to contaminated groundwater by restricting activities related to groundwater.

Parcel F: ***Feasibility Study done*** – Parcel F is approximately 460 underwater acres surrounding the Shipyard. The Navy has completed the preliminary assessment/site investigation and a combined RI/FS, as well an updated FS. A Proposed Plan is expected to be issued in 2015. The ROD is predicted to be finished in 2016.

Parcels UC-1 and UC-2: ***Finalizing closure and transfer paperwork*** – The RODs for Parcels UC-1 and UC-2 were completed in 2009. All sewers, storm drains and any residual contamination have been removed and durable covers were installed. The Remedial Action Closeout Report was finalized in February 2013. The FOST was issued in February 2015 and the property is ready for transfer.

Once the property is transferred, following protocols written in an approved RMP and in work plans that regulators will be asked to approve for specific work, developers may remove the existing buildings, pavement and imported soil (the durable cover) and construct new development that incorporates new covers in their place.

Parcel UC-3: ***Remedial Design*** – Parcel UC-3, formerly a part of Parcel E, consists of Crisp Road and a railroad right of way that extends into the adjacent industrial area. The Proposed Plan was issued in February 2013 and the ROD was issued in 2014. The Navy completed removal of sewer and storm drains in Crisp Road and removal of residual radiological contamination in 2010. The Regulatory Agencies have concurred on the radiological Removal Action Completion Report for this work. A few small excavations will need to be conducted prior to regulatory closure and transfer. Implementation of the remedy will include the following:

- Removal and disposal of contaminated soil in selected areas.
- Installation of durable covers (in a portion of Crisp Road) to minimize contact with residual chemicals in soil.
- Treatment of groundwater to reduce the contaminant concentrations to or near the preliminary remediation goals.

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- Implementation of a program to monitor groundwater to verify that cleanup efforts meet the remediation goals.
- Use of land use and activity restrictions to prevent or minimize exposure to contaminated soil, and soil vapor, and to prevent or minimize exposure to contaminated groundwater by restricting activities related to groundwater.

Once the property is transferred, following protocols written in an approved RMP and in work plans that regulators will be asked to approve for specific work, developers may remove the existing buildings, pavement and imported soil (the durable cover) and construct new development that incorporates new covers in their place.

Timeline for Transfers

Expected parcel transfer dates are shown on the parcel map of the Shipyard in Attachment 1 and listed below.

Parcels D-2, UC-1 and UC-2 are expected to transfer in early 2015.

Parcels B-1, B IR7/18, and G may transfer in late 2015.

Parcels B-2 and D-1 may transfer in 2016.

Parcel C and UC-3 may transfer in 2017.

Parcels E, E-2 and F may transfer after 2018.

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Attachment 5

Groundwater and Volatile Organic Compounds

Attachment 5
Groundwater and Volatile Organic Compounds

Groundwater contamination in areas like the Shipyard, where the groundwater is not used for drinking water, is typically treated and monitored. Groundwater contamination at the Shipyard dates back to when the area was an active shipyard. Chemicals were used to clean metal ship parts in partially buried pits. These pits were often made of concrete and in some areas, the chemicals leaked through the concrete into the soil and groundwater. These chemicals, referred to as volatile organic compounds or VOCs, remain in the groundwater and might form vapors underground that could leak or intrude into the air space of new occupied buildings. As described in this attachment, modern design standards require systems to cut off exposure to any residual vapors so that building occupants are protected. The Navy is required to treat the groundwater as much as possible to reduce the potential for vapor intrusion into occupied buildings.

Primary treatment at the Shipyard usually consists of injecting zero-valent iron (ZVI) – a form of iron metal that can react with and destroy VOCs in the groundwater – or injection of compounds that can rapidly enhance biodegradation of the VOCs. Other primary treatments can include extraction and treatment of soil vapors or groundwater. Once the primary treatment is done, low levels of residual VOCs which are sometimes too difficult to completely remove from the groundwater may remain. Ongoing enhanced natural processes that occur post-treatment over several years' time, either through residual ZVI that remains or through the increase in naturally occurring bacteria during the biodegradation process can be monitored to verify that the levels of residual VOCs are decreasing.

A typical regulatory requirement for these areas includes the installation of vapor barriers to completely cut off exposure of building occupants to the residual soil vapors. The requirement for vapor barriers is an extra level of protection that ensures that occupants are safe. This section discusses the areas of the Shipyard with residual VOCs in groundwater, as shown on Figure 5-1.

To protect future building occupants, the Navy has conducted or will conduct soil gas sampling on parcels with VOCs in groundwater to assess potential health risks from vapor intrusion and designate the Areas Requiring Institutional Controls (ARICs) for VOCs. As described in the deeds and transfer documents, these ARICs for VOCs will require additional sampling and documentation in the future to demonstrate that chemicals have degraded over time to safe levels or will require the construction of passive vapor mitigation systems for new buildings (described further below) to provide adequate protection for building occupants. The Navy documented their approach for soil gas sampling and comparison of results against current risk standards.[2]

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[2] Navy, 2011. Revised Final Memorandum: Approach for Developing Soil Gas Action Levels for Vapor Intrusion Exposure at Hunters Point Naval Shipyard. 2 December.

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Parcels B-1 and B-2

VOCs have been detected in the subsurface beneath Parcels B-1 and B-2. Levels of VOCs in groundwater at Parcels B-1 and B-2 are currently monitored at IR-10/Building 123, IR-20, IR-24, and IR-26.[3] At IR-10, soil vapor extraction was implemented by the Navy from June 2000 to September 2002. A treatability study using ZVI was conducted at IR-10 between September 2003 and March 2004. Remedial action at the IR-10 plume included polylactate injection in February and March 2013. The soil vapor extraction system was expanded and reactivated at IR-10 in November 2012 to remove VOCs in soil gas present in the subsurface.

The Navy has also issued a report documenting soil vapor sampling results and designating the ARICs for VOCs for Parcels B-1 and B-2.[4] VOCs in groundwater are being treated and/or monitored in Parcels B-1 and B-2. Thus, VOCs in Parcels B-1 and B-2 will not pose a risk to the health and safety of future owners, residents or visitors because the VOCs will either have been removed or the areas designated as an ARIC for VOCs. In the ARIC for VOCs there will be requirements to conduct additional sampling and reporting to demonstrate that chemicals have degraded over time to safe levels or to construct special vapor mitigation systems beneath the building foundations. These vapor mitigation systems consists of a vapor barrier membrane installed beneath foundations, and a series of perforated pipes installed within a gravel layer immediately beneath the membrane which is connected to vent risers that discharge the vapors above the building roof line. This type of vapor mitigation system will prohibit residual VOCs from collecting under the building and intruding into the building air space.

Parcel G

The Navy implemented a treatability study at several locations within Parcel G, which was formerly part of Parcel D, for groundwater using ZVI in October 2008 to April 2009. Groundwater sampling that occurred after the ZVI treatment resulted in concentrations of VOCs below remedial goals. The Navy decided, with concurrence from BRAC Cleanup Team (BCT), to discontinue treatment because the treatability study concluded that the risk of migration of volatile chemicals to indoor air was less than the target risk threshold for a commercial/ industrial worker. The remedy has been completed through the treatability study, institutional controls and groundwater monitoring.[5] Groundwater monitoring continues at the former IR-33 Plume, the former IR-71 East Plume, and the former IR-09 North Plume to verify plume stability or that the remedy meets the remedial goals defined in the Parcel G ROD. A Technical Memorandum established the new ARICs for VOCs in Parcel G.[4]

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3 CE2-Kleinfelder, 2014. Semiannual Groundwater Monitoring Report, July – December 2013, Hunters Point Naval Shipyard, San Francisco, CA. April.

4 Sealaska, 2013. Final Technical Memorandum: Soil Vapor Investigation in Support of Vapor Intrusion Assessment Parcels B, D-1, G, and UC-2. 1 March.

5 Arcadis, 2014. Final Remedial Action Completion Report, Durable Covers, Groundwater Treatment and Institutional Controls for Parcel G, Hunters Point. March.

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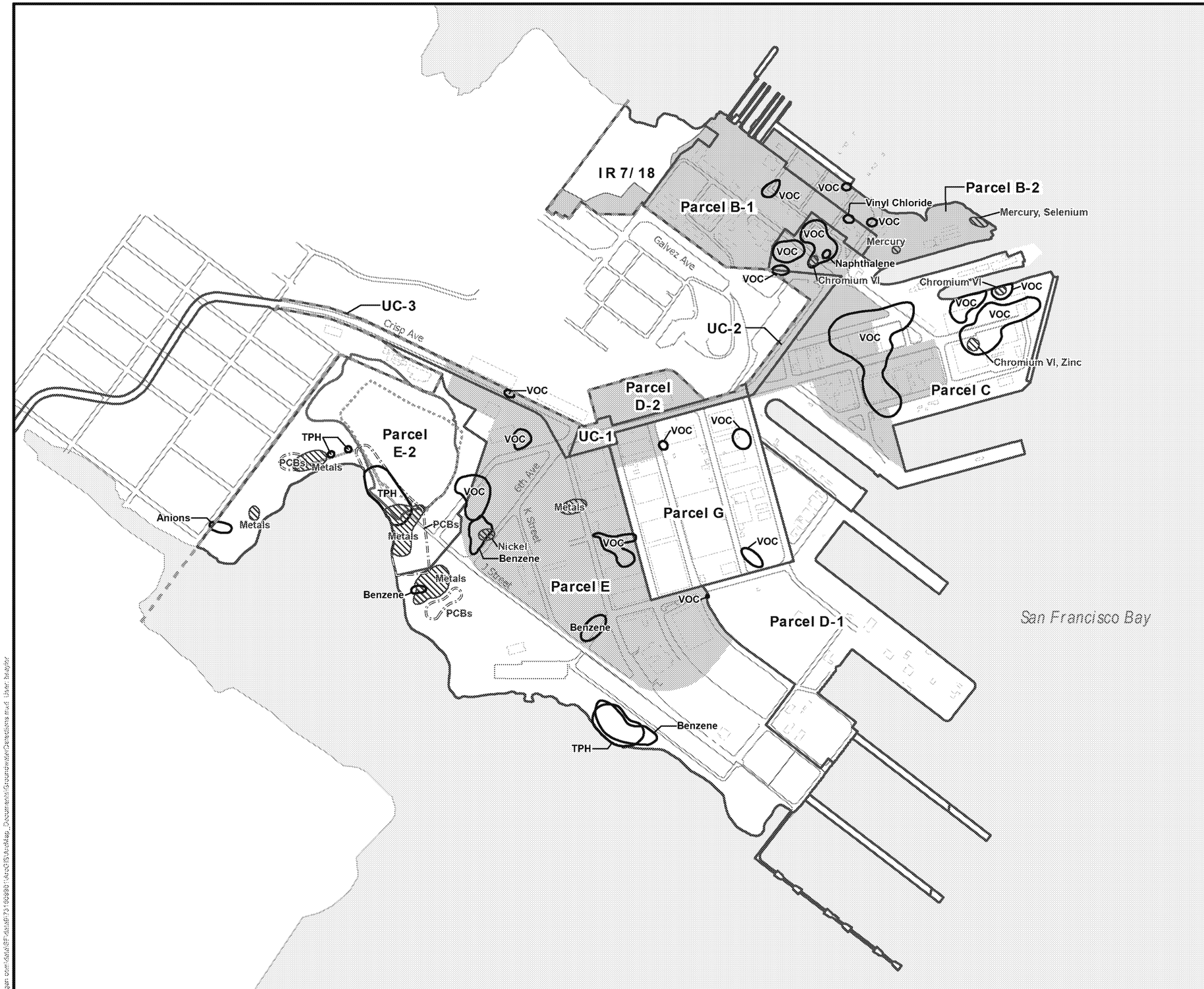

Legend

- Parcel Boundary
- Project Boundary (Phase II)
- Closure Includes Demarcation Layer
- Estimate of Solid Waste Extent
- Interim Landfill Cap Extent
- Building

Groundwater Detections

- Naphthalene; Vinyl Chloride; Selenium; Benzene; TPH; VOC; Anions
- PCBs
- Metals

Reuse Area

- Residential Use Allowed Per Navy Approvals
- Residential Use May Be Allowed or Possible in Future with Additional Regulatory Approval

Notes:

1. Parcels boundaries are considered to be approximate; updated December 2014.
2. Data and information provided by San Francisco Department of Public Health and Kleinfelder.
3. Redevelopment plans may have different land use designations in some areas.
4. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 500 1,000 2,000
Feet

HUNTERS POINT SHIPYARD
San Francisco, California

GROUNDWATER DETECTIONS

Date 3/10/2015	Project 731609901	Figure 5-1

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Parcels C, D-1, and E

VOCs have also been detected in groundwater and/or soil gas on Parcels C, D-1, and E.

At Parcel C, six VOC groundwater plumes are located in IR-06, IR-25, and IR-28 (which has four plumes). Soil vapor associated with these groundwater plumes has been extracted for treatment and groundwater has also been extracted or treated at five of these VOC plumes. The Navy has planned for additional treatment at all plumes located on Parcel C and is expected to achieve the remedial action objectives in three to 10 years based on the *Final Remedial Design and Design Basis Report for Parcel C* (KCH, 2012). The Navy will conduct soil gas sampling following the remedial action.

VOCs in groundwater on Parcel D-1 have been treated by the Navy as part of a groundwater treatability study conducted in 2008. VOCs are still being monitored by the Navy at the former IR-71 East plume through the Basewide Groundwater Monitoring Program. VOC groundwater concentrations at Parcel D-1 are less than remediation goals or exhibit declining trends. The Navy has conducted soil gas sampling following the remedial action and issued a Technical Memorandum documenting soil vapor sampling results and defining the ARICs for VOCs within Parcel D-1.[6]

Multiple groundwater plumes exist on Parcel E and are part of current groundwater treatability studies by the Navy designed to reduce VOC, metals, and TPH concentrations. Plumes at Parcel E will be treated through injection of biological nutrients that accelerate the breakdown of chemicals and ZVI for a more aggressive treatment.[7] At Parcel E, additional studies have been conducted to assess VOCs in soil gas; risks and hazards will be further characterized in a future soil gas survey.

Parcels UC-1, UC-2, and UC-3

VOCs have also been detected in groundwater and/or soil gas on Parcels UC-1, UC-2, and UC-3.

The Navy conducted soil gas sampling following the remedial action at Parcel UC-1 and issued a Technical Memorandum documenting soil vapor sampling results and defining the ARICs for VOCs within Parcel UC-1.[8]

Low levels of VOCs in groundwater remain at Parcel UC-2 above remediation goals. The ROD for Parcel UC-2 selected monitored natural attenuation as the remedy for the low concentrations of VOCs in groundwater. Groundwater is currently being monitored by the Navy through the Basewide Groundwater Monitoring Program. The Navy conducted soil gas sampling prior to the remedial action at Parcel UC-2 and issued a Technical

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6 Sealaska, 2013. Final Technical Memorandum Soil Vapor Investigation in Support of Vapor Intrusion Assessment, Parcel B, D-1, G and UC-2, Hunters Point Naval Shipyard. March.

7 Navy, 2013. Record of Decision for Parcel E, Hunters Point Naval Shipyard. December.

8 ERRG, 2014. Final Technical Memorandum, Soil Vapor Investigation in Support of Vapor Intrusion Assessment at Parcel UC-1, Hunters Point Naval Shipyard. August.

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Memorandum documenting soil vapor sampling results and defining the ARICs for VOCs within Parcel UC-2.[9]

Low levels of VOCs have been detected under Crisp Avenue on Parcel UC-3, formerly part of Parcel E. The source of these VOC detections may have been associated with sewers and storm drains, which have since been removed as part of the radiological investigation. The Navy, the regulators, including the California Department of Resources Recycling and Recovery (formerly the California Integrated Waste Management Board) and the City's independent consultant, Langan Treadwell Rollo, have considered these potential concerns and agree that VOC levels that were detected on Crisp Avenue are well below any level that would cause an unacceptable risk to human health in the areas adjacent to Crisp Avenue. The Navy will conduct soil gas sampling on Parcel UC-3 and to assess potential health risks from vapor intrusion and designate potential ARICs for VOCs.

Parcel E-2

Low levels of VOCs have also been detected in the groundwater in some areas of the landfill on Parcel E-2. A VOC plume on the border of Parcel E-2 and Parcel E is expected to be treated as part of the Parcel E remedial action. The Navy will construct a landfill cap on the majority of Parcel E-2, and the area will be developed into open space after transfer.[10] VOCs and methane in soil vapor are monitored as part of the landfill gas collection system monitoring program, which is described in more detail in Attachment 6.

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9 Sealaska, 2013. Final Technical Memorandum Soil Vapor Investigation in Support of Vapor Intrusion Assessment, Parcel B, D-1, G and UC-2, Hunters Point Naval Shipyard. March.

10 ERRG, 2014. Remedial Design Package, Parcel E-2, Hunters Point Shipyard. 15 August.

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Attachment 6

Parcel E-2 Landfill Cleanup Strategies

Attachment 6
Parcel E-2 Landfill

The existence of a landfill on a Brownfield site is common. Some notable Brownfields that contain landfills that have been successfully redeveloped include Shoreline Amphitheater in Mountain View, America Center in San Jose, Oyster Point in South San Francisco, Seal Point in San Mateo, and Sierra Point in Brisbane. All of these sites were developed into commercial or recreational uses with buildings and facilities on top or immediately adjacent to the landfill. The Parcel E-2 landfill is proposed for open space reuse.

The Shipyard landfill was used to dispose of all of the garbage generated at the Shipyard. In addition, construction debris was also dumped in the landfill. There is also evidence that chemicals were dumped in the landfill. Because there were no accurate records kept of the disposal activities, it is not possible to know the exact extent of chemicals dumped in the landfill; however, it is possible to measure the extent of any possible impact to human health and the environment from the landfill.

On August 16, 2000, a brush fire burned approximately 45 percent of the landfill surface area; small subsurface areas continued to burn for approximately one month after the surface fire was extinguished. An interim cap was constructed over the majority of the landfill in order to extinguish the fire and prevent future fires until the chosen remedy could be implemented. The interim cap covers approximately 14.5 acres and effectively limited air intrusion into the landfill, thus smothering any smoldering subsurface areas remaining from the fire. In addition, the interim cap significantly reduced storm water infiltration through the landfill, thereby reducing the potential for contaminants to leach out from the landfill. The interim cap has been vegetated to stabilize surface soils and limit erosion. Additional information on construction of the interim cap is provided in the *Final Removal Action Landfill Cap Closeout Report*[11].

Soil Vapor

Measurements have been made of the vapors from the landfill. Typical of all landfills, landfill gas or vapor is being generated by breakdown (decomposition) of the organic materials disposed in the landfill. Methane and carbon dioxide are the two main components of landfill gas. Non-methane organic compounds are present in landfill gas to a lesser extent. Methane is non-toxic but it can create a potential explosion hazard if it collects inside of a structure. In 2002, the Navy installed a gas control system on the north side of the landfill, and between the landfill and Parcel A, which includes a subsurface gas cutoff wall, landfill gas extraction wells, and three tiers of gas monitoring

[11] TtEMI, 2005. Final Removal Action Landfill Cap Closeout Report, Parcel E-2, Hunters Point Shipyard, San Francisco, California. February 7.

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probes (GMPs) that are sampled monthly with results reported quarterly[12]. The three tiers of GMPs primarily detect whether the gas is migrating beyond the boundaries of the landfill and onto the immediately adjacent UCSF property. If methane or non-methane organic compounds are detected in gas above the trigger levels in the GMPs, the Navy promptly activates its mobile extraction system to remove the gas from the subsurface. The Navy has a detailed Landfill Gas Monitoring and Control Plan in place, which includes steps for notifying the relevant regulators. There are 13 GMPs located on Crisp Avenue north of the landfill which are monitored for methane and non-methane organic compounds. To date these GMPs have each been sampled 50 to 100 times, and there have been no detections of methane or non-methane organic compounds greater than applicable action levels in the Crisp Avenue probes. In addition, in 2002, the Navy conducted an ambient air survey across the landfill and within 300 feet of the landfill perimeter. Results indicated that landfill gas was not in the breathing zone across the landfill, within 300 feet of the landfill perimeter, or within accessible buildings surveyed outside the 300 foot perimeter.[13] A recent Navy evaluation of landfill gas at Parcel E-2[14] included installation of a total of 88 soil gas probes using a 100-foot grid pattern over Parcel E-2. The evaluation confirmed that elevated levels of methane, VOCs, and naphthalene are present at Parcel E-2. The Remedial Design was finalized based on recommendations presented in this evaluation report.

Groundwater

The groundwater flowing out of the landfill has been tested and monitored for almost 20 years. The groundwater is slowly flowing into the Bay. In a few areas on the east side of the landfill that contain volatile chemicals in groundwater, the concentrations of chemicals are a potential concern for human exposure if they migrate onto adjacent Parcel E, because models predict indoor air problems if new buildings were to be constructed without proper mitigation systems. These areas of volatile chemicals will be treated over the next few years (similar to the treatment of volatile chemicals on Parcels B-1, C, D-1, E, and G).

The other main chemical found in the groundwater effluent from the landfill is PCBs. This PCB contamination is of concern for small aquatic organisms in the Bay. It is also a concern because it is possible that it could contribute to the PCBs in the fish that visit the South Basin area at the Shipyard. Due to these concerns, the Navy is conducting extensive cleanup of PCBs in the downgradient shoreline area of the landfill parcel. The Navy's selected long-term remedy will control groundwater migration from the landfill and protect human health and the environment from any further contamination.

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[12] ITSI, 2008. Final Landfill Gas Monitoring Report for July-September 2008, Post-Removal Action, Parcel E-2, Industrial Landfill, Hunters Point Shipyard, San Francisco, California. October 27.

[13] TtEMI, 2003. Final Parcel E-2 Nonstandard Data Gaps Investigation Landfill Gas Characterization, Hunters Point Shipyard, San Francisco, California. December 23.

[14] ITSI GILBANE, 2014. Final Landfill Gas Evaluation Report, Landfill Gas Survey at Parcel E-2, Hunters Point Naval Shipyard, San Francisco, California. May 30.

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Radiological Issues

Sampling and analysis results indicate that concentrations of radioactive chemicals in surface soil pose a potential unacceptable risk to future site users, and the remedy selected in the ROD address these potential risks. The remedy for radiological materials in the E-2 landfill is to:

- Survey structures, former building sites, and radiologically impacted areas.
- Decontaminate buildings.
- Excavate storm drain and sanitary sewer lines.
- Dispose of excavated materials and soils at off-site facilities.
- Conduct surveys to ensure that sites are safe.

Once this work is done, the engineered cap will be built on the Parcel to protect future users from remaining buried fill material that might contain sand-blast grit used in decontaminating ships that participated in atomic weapons testing and radioluminescent dials and gauges buried in the landfill. In addition, administrative and/or legal controls will be put in place to restrict access to the area and prevent certain activities, such as excavation beneath the clean imported fill material.

Groundwater does not appear to have been impacted by radionuclides. However, non-radioactive chemicals in groundwater within and in close proximity to the landfill area will be addressed by the installation of an underground barrier along the shoreline.

Removal Actions

The Navy has performed removal actions at Parcel E-2 that have involved excavation and offsite disposal of low-level radioactive waste. At the Metal Slag Area, the Navy removed and disposed of off-site approximately 8,200 cubic yards of soil, metal slag, and debris; of this removed material, approximately 74 cubic yards of the soil was identified as radiologically impacted. The Navy also removed and disposed of off-site 32 radiological devices, 15 cubic yards of radiological debris (primarily fire bricks), and approximately 30 cubic yards of metal debris. At the PCB Hot Spot Area, the Navy removed and disposed of off-site, approximately 86,650 cubic yards of soil and debris; 533 cubic yards of the removed soil and fire brick debris identified as radiologically impacted as well as 40 radiological devices, 78 cubic yards of metal debris, and 56 pieces of other radioactively contaminated debris and two drums of mixed waste.

The CERCLA process (see Attachment 3), which governs the environmental investigation, risk assessment, evaluation of remediation alternatives, and selection and design of a remedy, is ongoing at Parcel E-2. The City and County of San Francisco regularly reviews and comments on Navy documents related to the CERCLA process. The Navy published the ROD for Parcel E-2 outlining the selected remedy in November

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2012. The ROD remedy was selected through a lengthy publicly reviewed process that included reviews not only by the EPA, DTSC, RWQCB and CDPH but numerous other government agencies and many interested citizens and non-profit environmental groups. In addition, the EPA's Technical Assistance Grant recipient, ARC Ecology, conducted an intensive detailed review of the ROD including hiring three independent technical experts who reported on their findings concerning radiological issues, the landfill cleanup strategies and risk assessments. ARC Ecology held two well attended public meetings where the public were able to express their concerns and talk with the independent technical reviewers. Their report was thoroughly evaluated and discussed in the Navy's responsiveness summary included in the final ROD (see Exhibit 6-1).

As noted in Attachment 4, Parcel by Parcel Summary and Expected Transfer Dates, the Navy published the Parcel E-2 ROD in November 2012. The Navy's remedial objective is to prevent exposure to contaminants at levels exceeding remediation goals. The Navy proposes the following actions to address contaminants in soil, shoreline sediment, landfill gas, and groundwater at Parcel E-2:

- Remove and dispose of contaminated soil in selected areas.
- Separate and dispose of materials and soil with radiological contamination.
- Install a protective liner and soil cover over all of Parcel E-2.
- Install a below-ground vertical barrier (cutoff wall or similar) to limit groundwater flow from the landfill to San Francisco Bay and conduct groundwater monitoring.
- Remove and treat landfill gas to prevent it from moving beyond the Parcel E-2 boundary.
- Build a shoreline revetment.
- Build new wetlands.
- Monitor and maintain the different parts of the preferred alternative (soil cover, shoreline revetment, wetlands, etc.) to ensure they are working properly.
- Restrict specific land uses and activities on parcel E-2.

Specific radiological control procedures to properly screen, segregate, characterize, and dispose of radioactive materials will be part of this work.

Because of the extensive knowledge that we have about the landfill, the redevelopment of the area is designated for open space and recreational uses as the most easily implemented and most protective end use. The Navy has selected an engineered cap remedy for the E-2 landfill that includes several feet of clean soil and other protective layers. Since the Navy has already conducted surveys that found no hazardous vapors in ambient air on top of the landfill, the extra layers of soil will provide an added measure of protection to allow for recreational uses on top of the engineered cap. This is a common solution for new development built on top of landfill.

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In August 2014, the Navy published the Remedial Design for Parcel E-2 which describes:

- the ROD selected remedy to be constructed;
- the approach for monitoring groundwater, landfill gas, stormwater, and restored wetlands, institutional controls;
- inspection, maintenance, monitoring, and repair approach for maintenance of the remedy;
- quality control and quality assurance inspections and tests required during construction of the remedy; and
- provides an engineer's opinion of probable costs for construction of the remedy. More detail on the Navy's Remedial Design is presented in Exhibits 6-2 and 6-3.

The USEPA must supervise remedy implementation, and must then concur that the Navy has fully implemented the remedy. The Navy, USEPA, DTSC, RWQCB, and CDPH will require that before any development activity occurs at the Parcel E-2, appropriate and legally enforceable environmental restrictions on uses and activities at Parcel E-2 be in place and applicable to that activity, whether in the form of a recorded covenant, deed provision, easement, or lease term. The restrictions will be sufficient under CERCLA and other applicable laws to ensure protection of human health and the environment during and after the development activity process and will identify the specific mechanisms to be used to implement and enforce the restrictions.

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Exhibit 6-1

Fact Sheet
Draft Parcel E-2 Record of Decision
and
Summary of Responses to Community
April 2012

Hunters Point Naval Shipyard

Draft Parcel E-2 Record of Decision Summary of Responses to Community

Fact Sheet
April 2012

The purpose of this fact sheet is to provide a summary of questions and comments submitted by the community on the Proposed Plan for Parcel E-2, which was available for public review and comment in fall 2011. This fact sheet also presents the Navy's responses to the questions and comments that are presented in the Draft Parcel E-2 Record of Decision (ROD) released in March 2012.

Overview of Proposed Plan to Clean Up Parcel E-2

In September 2011, the Navy published the Hunters Point Naval Shipyard (HPNS) Proposed Plan for Parcel E-2, which summarized the cleanup choices evaluated by the Navy and explained the reasons for choosing the specific cleanup solution to address remaining contamination in Parcel E-2.

During the Public Comment Period for the Proposed Plan for Parcel E-2 (September 7, 2011 through November 21, 2011), the Navy received comments from 13 individuals or groups about the Navy's proposed cleanup solution for Parcel E-2.

The Navy reviewed each comment and found that there were six primary themes expressed by community members. This fact sheet discusses these themes and the Navy's responses.

Additional information can be found on the Navy's website at www.bracpmo.navy.mil, or in the Draft ROD and Proposed Plan for Parcel E-2 that are available at the Information Repository locations (see Page 2). The cleanup team appreciates the feedback they received and looks forward to completing cleanup on HPNS in anticipation of transfer of the property to the City and County of San Francisco (City) for redevelopment.

The HPNS Cleanup Team includes:

Base Realignment and Closure Program (BRAC)
Department of the Navy
www.bracpmo.navy.mil

United States Environmental Protection Agency (USEPA)
www.usepa.gov

California Department of Toxic Substances Control (DTSC)
www.dtsc.ca.gov

San Francisco Bay Regional Water Quality Control Board
www.swrcb.ca.gov

In the September 2011 Parcel E-2 Proposed Plan, the Navy proposed the following actions to address hazardous substances in soil, shoreline sediment, landfill gas, and groundwater at Parcel E-2. This preferred alternative was Alternative 5 in the Proposed Plan.

- Remove and dispose of contaminated soil in selected areas
- Separate and dispose of materials and soil with radiological contamination
- Install a protective liner and soil cover over all of Parcel E-2
- Install a below-ground barrier to limit groundwater flow from the landfill to San Francisco Bay
- Remove and treat landfill gas to prevent it from moving beyond the Parcel E-2 boundary
- Build an erosion control on the shoreline
- Build new wetlands
- Monitor and maintain the different parts of the cleanup solution (e.g. soil cover, shoreline erosion control, wetlands) to make sure they are working properly
- Use institutional controls to restrict specific land uses and activities on Parcel E-2

What is a ROD?

A Record of Decision (ROD) is a public document that explains which cleanup solution has been chosen to clean up a site. It contains background information on the site, community participation, enforcement activities, the contaminants present, and the selected cleanup solution. The ROD also presents responses to public comments received during the public comment period for the Proposed Plan. This part of the ROD is referred to as the Responsiveness Summary.

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Summary of Community Feedback

Six primary themes were identified when the Navy reviewed community feedback on the Proposed Plan for Parcel E-2. These themes, and the Navy's responses to them, are summarized below.

Theme 1: Does the Navy know enough about the Parcel E-2 Landfill to select a remedy?

Yes. The Navy has worked closely with the United States Environmental Protection Agency (USEPA), California Department of Toxic Substances Control (DTSC), San Francisco Bay Regional Water Quality Control Board (Water Board), City of San Francisco, Department of Public Health (DPH), and other interested groups for more than 20 years to gather and evaluate data from the Parcel E-2 Landfill. Results from many previous investigations provided data for the regulatory agencies to support the Navy's cleanup solution for Parcel E-2.

Theme 2: Why was Alternative 5 selected instead of Alternative 2?

The Navy acknowledges the input from many community members expressing their support for Cleanup Alternative 2 instead of Cleanup Alternative 5. Cleanup Alternative 5 was selected because it will remove significant amounts of contaminants and safely contain the remaining material while preventing unacceptable exposure to humans and wildlife during current and future use of the site. Cleanup Alternative 5 provides the best balance of tradeoffs (e.g. effectiveness, ease to implement, time to cleanup, expense) used to weigh the benefits and limitations among the alternatives, including Alternative 2. The Navy worked with the regulatory agencies and the HPNS community represented by the San Francisco Redevelopment Agency (SFRA), the Mayor's Hunters Point Shipyard Citizens Advisory Committee, and several residents near HPNS who have concurred with the cleanup solution.

Theme 3: How are Environmental Justice principles considered in the remedy selection process?

On February 11, 1994, the President of the United States issued Executive Order 12898 which outlined federal actions to address environmental justice in minority and low-income populations. The Navy and the regulatory agencies involved in cleanup work at HPNS have worked together to achieve the environmental justice goals of fully protective cleanup actions, fair and equal treatment, and meaningful involvement for all people in the Bayview-Hunters Point community. These goals and objectives are described in detail in the May 2011 HPNS Community Involvement Plan (CIP) which is available on the Navy's website listed below.

In summary, the substantial regulatory review and oversight of all Navy cleanup activities at HPNS in conjunction with the significant financial contribution by the Navy, as much as $716 million over the past 20 years, provides the groundwork for an effective cleanup of HPNS. Community involvement through federal grants available to interested community members and the outreach plan described in the CIP ensures that local residents are involved in the cleanup process. In addition, Navy contractors hire local community members and contract with local businesses to promote the revitalization of the greater HPNS community.

Theme 4: How is Alternative 5 consistent with City and County of San Francisco Proposition P?

Proposition P, per the Board of Supervisors Resolution 634-01 in August 2001, expresses a recommendation from the Hunters Point-Bayview community to clean up HPNS to a level allowing unrestricted use of the property in a manner that does not rely on future owners to maintain protective barriers, unless other remedies are technically not possible. The proposition was later addressed in a Conveyance Agreement between the Navy and SFRA in March 2004, which restated community support for cleanup to the highest level practical.

The cleanup solution for Parcel E-2 meets the planned reuse outlined in the 2010 SFRA redevelopment plan that was issued 9 years after Proposition P.

Theme 5: How will the Navy involve the community during the design of the selected remedy?

Upon final approval of the Parcel E-2 ROD, the Navy will develop a written plan to identify what is necessary to accomplish the selected cleanup solution. This plan, known as a Remedial Design, will be available for public comment, and the Navy will hold Community Meetings to discuss the document with interested community members.

Theme 6: How will the Navy ensure that the selected remedy will protect people and wildlife in the long-term?

Cleanup Alternative 5 includes several monitoring and maintenance activities that will be in effect to protect human health and the environment. Every year, inspections will be made to ensure that the solutions are working properly. In addition, the Navy is required to conduct reviews every five years to evaluate the performance of the entire remedy.

To view the complete Responsiveness Summary included in the Draft ROD, visit one of the Information Repositories or the HPNS website listed below.

Information Repositories

City of San Francisco
Main Library
100 Larkin Street, 5th Floor
Government Information Ctr.
San Francisco, CA 94102
(415) 557-4400

Hunters Point
Naval Shipyard Site Trailer
(near HPNS security entrance)
690 Hudson Avenue
San Francisco, CA 94124

Navy Website
www.bracpmo.navy.mil

Program Contacts

Matt Robinson
HPNS Community Involvement Manager
(415) 295-4645
info@sfhpns.com

Keith Forman
BRAC Environmental Coordinator
(415) 308-1458
keith.s.forman@navy.mil

HNPS Info Hotline: (415) 295-4742

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Exhibit 6-2

Parcel E-2 Remedial Design
Fact Sheet, Part 1 – Hot Spot Excavations and Underground Barriers

FACT SHEET
Hunters Point Naval Shipyard
Parcel E-2 Remedial Design

February 2014

This fact sheet provides a summary of two of the seven cleanup activities planned for Parcel E-2 at Hunters Point Naval Shipyard (HPNS), as presented at the December 18, 2013 HPNS Community Meeting. Parcel E-2 consists of 47 acres in the southwest portion of HPNS. The Parcel was created between the 1940's and the 1960's by filling the area along the edges of the bay with artificial fill materials.

This fact sheet focuses on the Hot Spot excavation activities and installation of underground barriers (also known as "slurry walls") at Parcel E-2. Future fact sheets will discuss other elements of the cleanup, including the landfill cover, landfill gas collection system, shoreline stabilization, wetlands creation, and long-term management of the cleanup at Parcel E-2. Figure 1 shows the location of Parcel E-2.

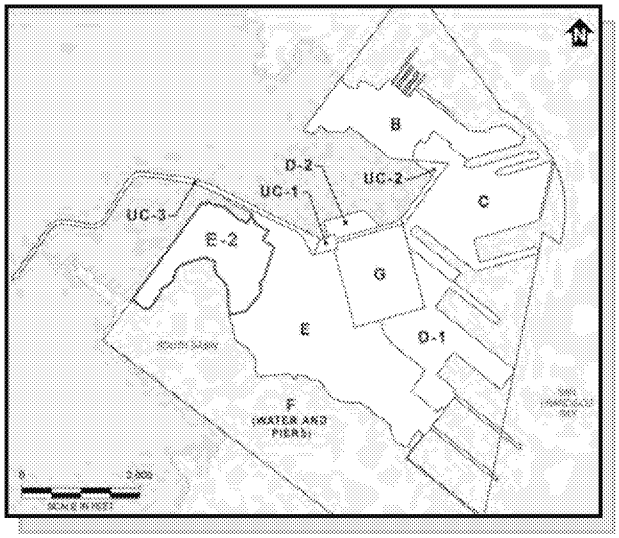

Figure 1: Location of Parcel E-2

Hot Spot Excavation Areas in Parcel E-2

Some soil and sediment at Parcel E-2 contains polychlorinated biphenyls, commonly known as PCBs, as well as metals, petroleum, and solvents that may pose a risk to human health or the environment if left uncovered. PCBs are chemicals that were widely used as an insulating fluid in electrical transformers and capacitors until they were banned in the United States in 1979. Areas with these contaminants were identified in isolated underground "Hot Spots" located outside of the landfill within Parcel E-2.

To date, the Navy has already excavated and removed more than 6,000 truckloads of soil from Hot Spot areas in Parcel E-2. Twenty additional Hot Spots from 3 to 16 feet deep that span approximately 2 acres will be excavated beginning in the Fall of 2014. The Navy estimates about 1,400 additional truckloads of contaminated soil will be removed from these Hot Spots. Locations of the Hot Spots are shown in Figure 2.

Cleanup crews use water trucks during excavation for continuous dust control

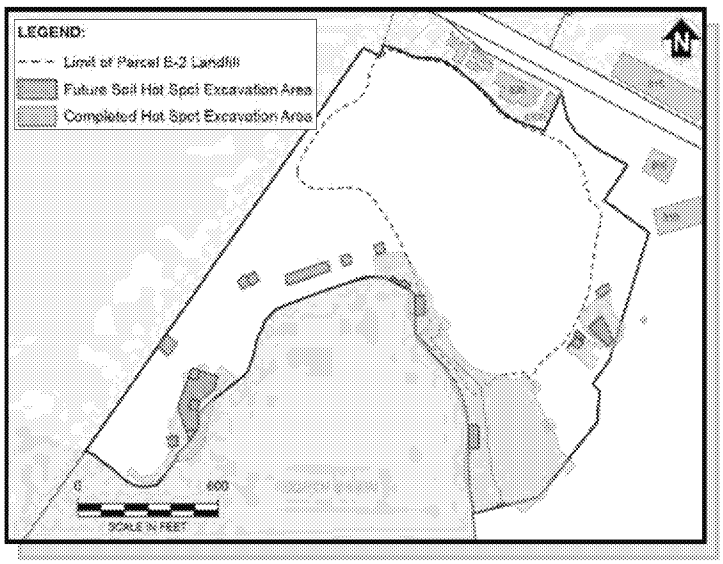

Figure 2: Hot Spot Excavation Areas at Parcel E-2

Underground Barriers at Parcel E-2

To reduce the flow of contaminated groundwater from one location to another, the Navy will build two vertical barriers (similar to underground dams) below the ground surface at Parcel E-2 (Figure 3). These underground barriers, known as "slurry walls," are constructed by placing wet clay mixed with soil and cement into large trenches. As shown in Figure 4, two slurry walls will be built underground at Parcel E-2.

The near shore slurry wall will be built along the shoreline and will extend more than 1,200 feet. This barrier will minimize the amount of groundwater that flows from the landfill to the Bay and prevent contamination from the site from entering the Bay.

The upland slurry wall will cover 550 feet along the western property boundary. This barrier will reduce the amount of groundwater flowing into the landfill. To support the creation of new freshwater wetlands at Parcel E-2 after the cleanup, the Navy will install a gravel drain (also referred to as a "French drain") above the upland slurry wall to divert freshwater flowing onto the property and into the new wetlands.

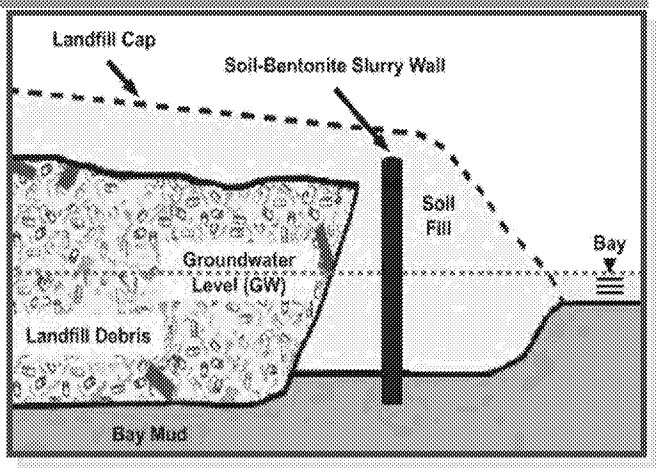

Figure 3: Illustration of an Underground Slurry Wall

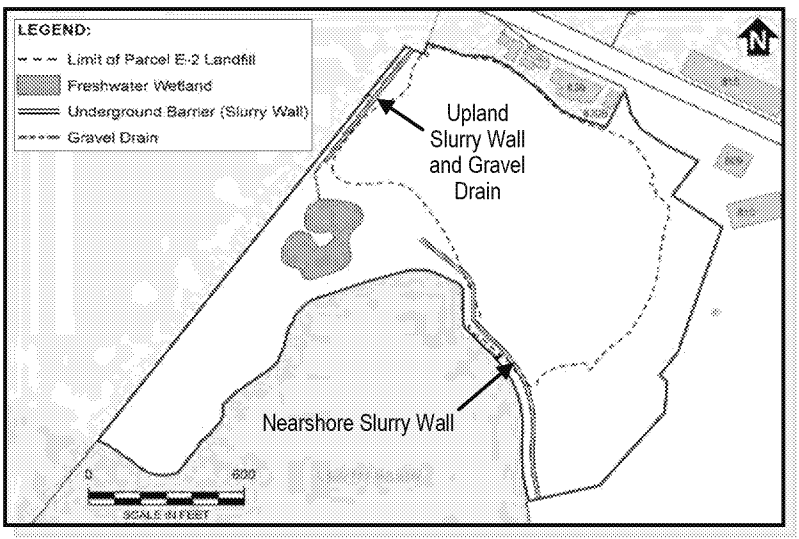

Figure 4: Locations of Underground Slurry Walls at Parcel E-2

Next Steps

During the summer of 2014, the Navy will submit the draft final design for cleanup at Parcel E-2 to the regulatory agencies for review. Excavation of the Hot Spots is planned to begin in the Fall of 2014. The Navy will discuss other elements of the Parcel E-2 cleanup at upcoming community meetings.

Slurry walls are constructed by first digging a long, deep trench

Information and Resources

Program Information

For information on cleanup at HPNS contact:

Keith Forman
BRAC Environmental Coordinator
(415) 308-1458
keith.s.forman@navy.mil

To be added to the HPNS mailing list or for additional information, call or email the HPNS cleanup team:

Email: info@sfhpns.com

HPNS Info Line: (415) 295-4742

Reports Are Available For Review

City of San Francisco Main Library
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Government Information Center
San Francisco, CA 94102
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Hunters Point Naval Shipyard Site Trailer
(near HPNS security entrance)
690 Hudson Avenue
San Francisco, CA 94124

Navy Website
www.bracpmo.navy.mil

⇒ Click on "BRAC Bases"
⇒ Click on "California"
⇒ Select "Former Naval Shipyard Hunters Point"

Exhibit 6-3

Parcel E-2 Remedial Design
Fact Sheet, Part 2 – Soil Cover and Landfill Gas Collection System

Example of an established tidal wetland

limit Bay water washing over the revetment during extreme high tides, storm events, or future sea level rise.

6. Wetlands

Wetlands, made up of land with wet soil and vegetation that is frequently flooded, provide habitat for various birds and other wildlife. The Navy will build two new wetlands at Parcel E-2 to replace existing wetlands that contain contaminated sediment and will be damaged or removed during the cleanup process. The *Freshwater Wetland* is planned for 1.59 acres and will consist of a pond that receives water from a below-ground gravel drain and surface runoff. The edge of the pond will be planted with native species to enhance the area's natural plant and wildlife communities. The *Tidal Wetland* is an area next to the Bay that will be planted with native species. The Bay waters will flood the Tidal Wetland during high tides, promoting growth and regeneration of the wetland area. Figure 5, page 2 shows the location of the wetlands at Parcel E-2.

7. Long-term Management of the Remedy

To ensure that the remedy remains protective, the Navy will professionally monitor and manage the site through implementation of a comprehensive monitoring program, inspection and maintenance of all parts of the remedy, and inspection and enforcement of Institutional Controls. The monitoring program includes collection of groundwater samples and landfill gas samples; collection of stormwater samples, as well as visual monitoring during non-storm events to ensure no unauthorized discharge has entered the Bay; and wetlands monitoring to observe soil conditions, water levels, and plant and animal life.

The Navy will perform regular inspection and maintenance of all parts of the remedy, including the soil cover and shoreline revetment, as well as special inspections and maintenance following an unexpected event, such as an earthquake or major storm. In addition, bilingual warning signs will be posted to inform the public of potential hazards associated with digging below the soil cover and revetment. Inspection and enforcement of Institutional Controls will ensure that future land use remains as open space, and that future activities do not affect the function of the remedy.

Example of a warning sign for Parcel E-2

Information and Resources

Program Information

For information on cleanup at HPNS contact:

Melanie Kito
BRAC Environmental Coordinator
(619) 532-0787
melanie.kito@navy.mil

To be added to the HPNS mailing list or for additional information, call or email the HPNS cleanup team:

Email: info@sfhpns.com
HPNS Info Line: (415) 295-4742

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San Francisco, CA 94124

Navy Website
www.bracpmo.navy.mil

⇒ Click on "BRAC Bases"
⇒ Click on "California"
⇒ Select "Former Naval Shipyard Hunters Point"

FACT SHEET
Hunters Point Naval Shipyard
Parcel E-2 Remedial Design

April 2014

This fact sheet provides a summary of the seven cleanup activities planned for Parcel E-2 at Hunters Point Naval Shipyard (HPNS), as presented at the December 18, 2013, February 23, 2014, and April 26, 2014 HPNS Community Meetings. Parcel E-2 consists of 47 acres in the southwest portion of HPNS. The Parcel was created between the 1940's and the 1960's by filling the area along the edges of the San Francisco Bay (Bay) with artificial fill materials. Figure 1 shows the location of Parcel E-2.

This fact sheet describes the (1) Hot Spot excavation activities, (2) installation of underground barriers (also known as "slurry walls"), (3) the soil covers, (4) landfill gas control system, (5) shoreline stabilization, (6) wetlands creation, and (7) long-term management of the cleanup at Parcel E-2.

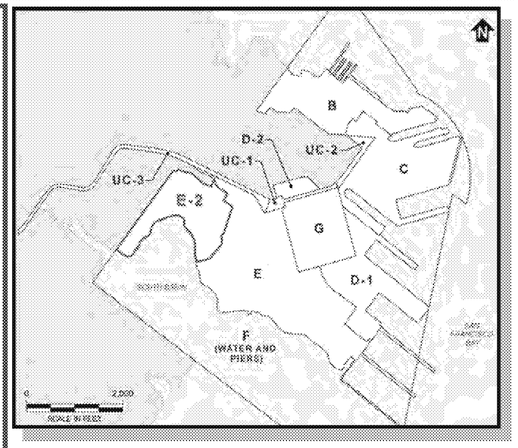


Figure 1: Location of Parcel E-2

1. Hot Spot Excavations in Parcel E-2

Some soil and sediment at Parcel E-2 contains polychlorinated biphenyls, commonly known as PCBs, as well as metals, petroleum, and solvents that may pose a risk to human health or the environment. PCBs are chemicals that were widely used as an insulating fluid in electrical transformers and capacitors until they were banned in the United States in 1979. Areas with these contaminants were identified in isolated underground "Hot Spots" located outside of the landfill within Parcel E-2.

To date, the Navy has already excavated and removed more than 6,000 truckloads of soil from Hot Spot areas in Parcel E-2. Twenty additional Hot Spots from 3 to 16 feet deep that span approximately 2 acres will be excavated beginning in the Fall of 2014. The Navy estimates about 1,400 additional truckloads of contaminated soil will be removed from these Hot Spots. Locations of the Hot Spots are shown in Figure 2.

Cleanup crews use water trucks during excavation for continuous dust control

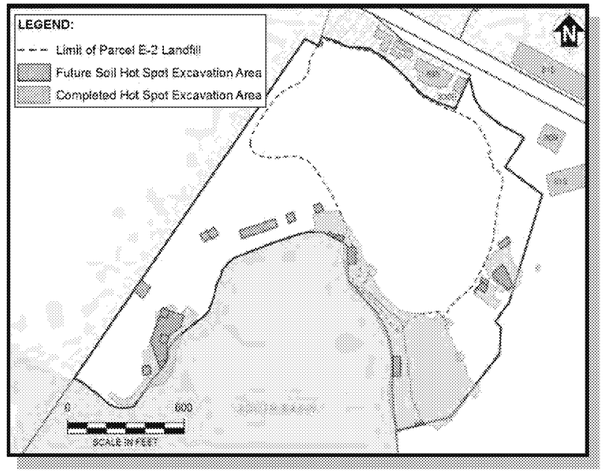


Figure 2: Hot Spot Excavation Areas at Parcel E-2

2. Underground Barriers at Parcel E-2

To reduce the flow of contaminated groundwater from one location to another, the Navy will build two vertical barriers (similar to underground dams) below the ground surface at Parcel E-2 (Figure 3). These underground barriers, known as "slurry walls," are constructed by placing wet clay mixed with soil and cement into large trenches. As shown in Figure 4, two slurry walls will be built underground at Parcel E-2.

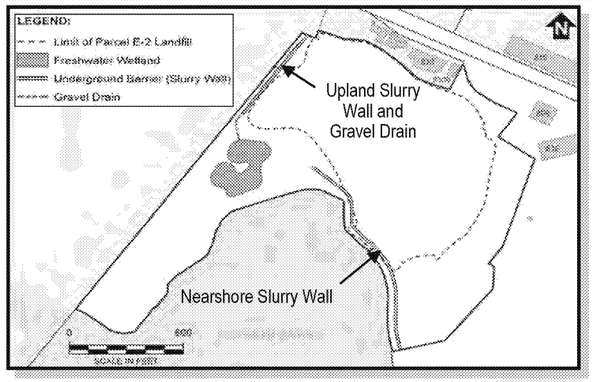


Figure 4: Locations of Underground Slurry Walls at Parcel E-2

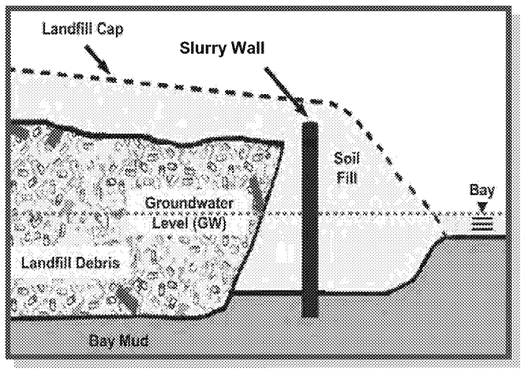
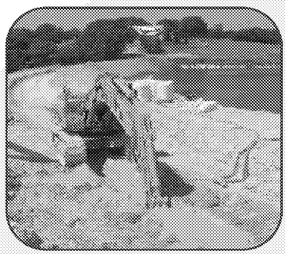


Figure 3: Illustration of an Underground Slurry Wall

The nearshore slurry wall will be built along the shoreline and will extend more than 1,200 feet. This barrier will minimize the amount of groundwater that flows from the landfill to the Bay and prevent contamination from the site from entering the Bay.



Slurry walls are constructed by first digging a long, deep trench

The upland slurry wall will cover 550 feet along the western property boundary. This barrier will reduce the amount of groundwater flowing into the landfill. To support the creation of new freshwater wetlands at Parcel E-2 after the cleanup, the Navy will install a gravel drain (also referred to as a "French drain") above the upland slurry wall to divert freshwater flowing onto the property and into the new wetlands.

3. Soil Cover and Protective Liner in Parcel E-2

One component of the cleanup solution at Parcel E-2 is the construction and installation of a soil cover. The landfill cover has been designed with multiple layers to remain stable during a major earthquake. Following any earthquake, the Navy will inspect all parts of the landfill area and fix any damage that may have occurred.

Clean soil is placed over a protective liner. Orange fabric and metallic tape provide a warning not to disturb the area below the liner.

To prepare the site for the soil cover, the underlying soil will be excavated from some areas of the parcel and graded to construct new wetlands and a shoreline rock wall (known as a "revetment").

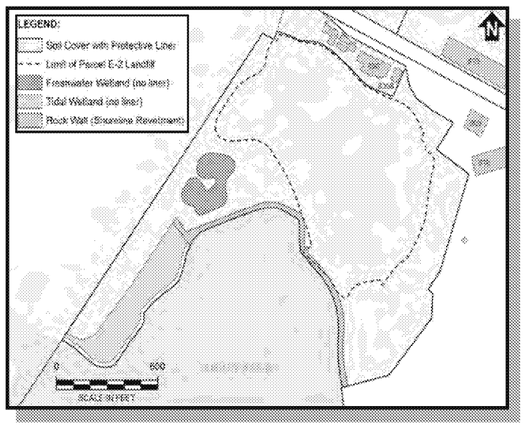
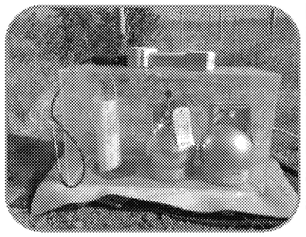


Figure 5: Locations of Soil Cover, Wetlands, and Revetment at Parcel E-2

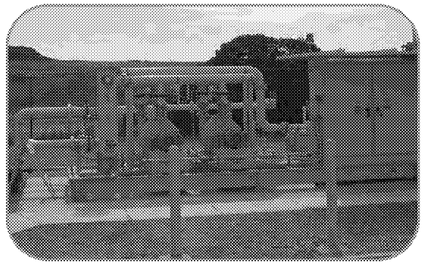
The Navy will install two different types of soil covers. In most areas, a multi-layer protective liner system will be installed and will consist of 2 feet of clean soil placed over a plastic liner. In the wetland areas, 3 feet of clean soil will be placed over a fabric liner that will allow water to flow through and help the wetlands to function normally. Figure 5 (page 2) shows the locations of the soil cover, wetlands and revetment at Parcel E-2.

4. Landfill Gas Control System at Parcel E-2

Landfill gas is created when buried debris (such as wood and paper) naturally decomposes. The Navy has performed several landfill gas investigations throughout the site. Landfill gas contains methane and other gases, including carbon dioxide, nitrogen, and oxygen. Landfill gas at Parcel E-2 also contains small amounts of chemicals, including acetone and benzene. The Navy is required by law to remove harmful levels of chemicals in landfill gas before it can be safely released to the air.



Specialized sampling equipment at temporary soil gas probe



Typical mechanical equipment for landfill gas extraction

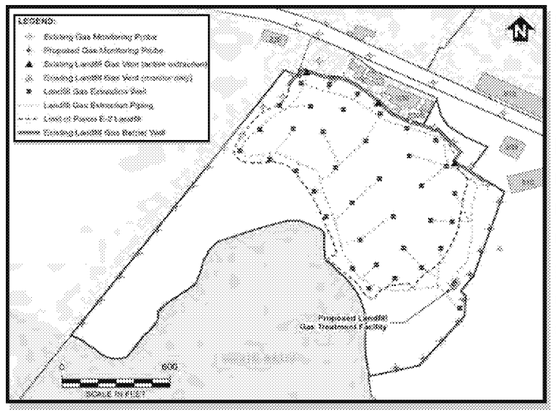


Figure 6: Locations of Landfill Gas Control System at Parcel E-2

In 2003, the Navy installed an interim gas control system to collect and treat landfill gas in the northern portion of Parcel E-2. The existing system will be integrated into a new landfill gas control system, which will include a network of 39 new gas extraction wells connected to underground piping (Figure 6). In addition, a new landfill gas treatment facility will use charcoal filters to remove chemicals and an enclosed flare to eliminate the release of methane gas into the air.

5. Shoreline Rock Wall (Revetment)

A rock wall, also known as a "revetment," will be built along the Parcel E-2 shoreline (see Figure 5, page 2). The purpose of the revetment is to prevent human exposure to contaminated soil or sediment and to prevent erosion of the completed soil cover, protective liner, and nearshore slurry wall.

To achieve its purpose, the revetment will be constructed along 1,800 feet of the shoreline. The revetment will be 35 feet wide and will extend from 0 to 9 feet above mean sea level. In addition, the Navy is constructing a 3-foot-high sea wall on top of the revetment as a preventative measure to

Example of a shoreline revetment with a seawall

Attachment 7

Low-level Radiological Materials Cleanup

Attachment 7
Low-level Radiological Materials Cleanup

The radiological contamination at the Shipyard has been extensively studied for over 10 years. The Final Historical Radiological Assessment (HRA)[15] documented the history of the use of radioisotopes and radiological contamination. The Navy is currently remediating all radiologically impacted structures and radiological contamination associated with the sewer and storm drain system. The Navy is disposing of radiologically impacted soil and materials off-site and is in the process of seeking an unrestricted use designation for structures and areas where it has completed radiological remediation associated with the sewer and storm drain system. OCII will not accept property for transfer until the Navy has completed radiological surveys, investigations, and radiological cleanup as approved by Federal and State regulatory agencies.

This radiological history is not typical at most Brownfields sites; however the levels of radiological contamination that have been found in the investigations and testing are at low levels despite this unique history. Since the publication of the HRA, the Navy has spent over $300 million on radiological surveys, removing the sewers and storm drains, and removing residual radiological contamination. They have also spent over $31 million excavating the shoreline areas of Parcel E-2. The testing protocols have involved spreading out the excavated soil and testing it in six-inch lifts – a depth to which the radiation detectors can easily scan the soil. In addition, they confirm the scans by taking soil samples and testing them for radiation in the on-site laboratory with quality control samples analyzed at an off-site laboratory. All sewer and storm drain areas that may have been radiologically impacted have been or will be removed by the Navy. More detail on the Navy's radiological program is presented in Exhibit 7-1.

In addition to the storm drain and sewer system and structures identified as radiologically impacted, there are areas containing fill that the Navy has identified as containing or potentially containing radionuclides in soil. These areas are in Parcel B in the IR 7/18 areas, in the shoreline area of Parcels E and the majority of Parcel E-2.

For IR7/18, soil samples did not identify any radioactive contamination. However, because the Navy cannot prove that there is no radiological contamination, they must conservatively assume that some contamination remains. The Navy has scanned the surface of this area to verify that there is no radiological contamination at or near the surface that could injure humans. Once these scans were complete, the site was determined to be safe for future residents and workers. However, to further ensure undetected subsurface contamination is not someday unearthed through excavation, the Navy installed a demarcation layer beneath three feet of clean soil and will require deed restrictions that will not allow digging below the demarcation layer in this area unless detailed work plans are submitted and approved by the Navy, USEPA, DTSC, RWQCB,

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[15] US Department of the Navy, 2004. Hunters Point Shipyard Final Historical Radiological Assessment History of the Use of General Radioactive Materials 1939–2003. August.

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and CDPH. These deed restrictions will be monitored by the SFDPH and the Regulatory Agencies. The CDPH has scanned the surface following cover placement to verify that health risks have been mitigated. The cover will be monitored as required by an Operation and Maintenance Plan and groundwater will be monitored to verify that radionuclides are not present. The IR-7/18 area is designated as open space and no pile-supported structures will be built within this area. A revetment wall was also constructed along the shoreline to prevent any erosion of IR-7/18 fill materials into the Bay; the revetment wall design took into account projected sea level rise.

For the E-2 landfill and the shoreline areas of Parcel E (see yellow areas on Figure 23-1, in Attachment 23), it is not feasible to locate and, therefore, remove all additional radium painted (glow-in-the-dark) dials or other materials of the type already removed that are suspected to remain in the subsurface. The Navy will scan the surface areas to verify that there is no radiological contamination at or near the surface that could injure humans. Once these scans are completed, the surface will be safe from radiological contamination and will be safe for residents and workers to walk on and engage in recreational activities. However, to be absolutely sure that no one will accidentally dig up any buried contamination (that is not detectable at the surface and is not currently impacting the surface), the Navy will build a cap of several feet of clean soil and several protective layers (e.g. geotextiles and liners). The Navy and regulators will record deed restrictions and environmental restrictive covenants that will restrict land use to open space and preclude disturbing the engineered cap. These deed restrictions and environmental restrictions will be monitored by the San Francisco Health Department and the Regulatory Agencies. The end result will be an area that will be suitable for open space and recreational uses.

So while the history for these areas is unique, the end result for the areas cleaned of all radiological contamination is similar to other Brownfields sites with only residual chemical contamination (or no contamination for clean areas). For the IR7/18, Parcel E-2 landfill and Parcel E shoreline areas that will require an engineering cap, these areas are similar to other Brownfield developments that are built on top of landfills that have engineered caps and land use restrictions in place to protect public health and the environment. These areas will be suitable for their intended use as parks and recreational areas.

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Exhibit 7-1

Fact Sheet
Hunters Point Naval Shipyard Radiological Program, August 2014

FACT SHEET
Hunters Point Naval Shipyard Radiological Program

August 2014

This fact sheet provides information regarding the Hunters Point Naval Shipyard (HPNS) Radiological Program; offers an overview about what radiation is, how radiation is measured, and why radiation is found at HPNS; and provides an update on the Radiological Program investigations and cleanup at HPNS.

What is Radiation?

Radiation is energy given off by atoms as rays, waves, or particles. It can be in the form of light, sound, or heat. Humans are exposed to radiation every day from natural sources, such as the sun, X-rays, and smoke detectors.

How is Radiation Measured?

Exposure to radiation is measured in a unit called the "rem". A rem is the dosage for the biological effects of ionizing radiation for humans. Since radiation doses are normally very small, they are usually recorded in millirem (mrem), or one-thousandth of a rem. People in the United States receive an average of 624 millirems (mrem) of radiation per year from man-made and naturally occurring radiation sources (National Council of Radiation Protection and Measurements [NCRP] 160). Some everyday activities that include low-level exposure to radiation include the following:

- Watching television (1 mrem per year)
- Roundtrip flight from Los Angeles to New York City (3.7 mrem per trip)
- Getting a dental X-ray (1.5 mrem per X-ray)
- Exposure to the sun (40 to 50 mrem per year)

The following standards (called dose levels) have been established for public health and cleanup purposes. The Navy's standard for cleanup of sites at HPNS is well below these regulatory standards:

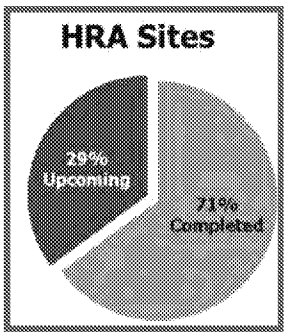
- Nuclear Regulatory Commission (NRC) standard for members of the public (100 mrem annually)*
- NRC standard for cleanup sites (25 mrem annually)*
- United States Environmental Protection Agency (USEPA) standard for cleanup sites (15 mrem annually)*

**Indicates dose level above naturally occurring radiation. These materials are called naturally occurring radiation because they are not from a man-made source and naturally exist in the environment.*

Why is There Radiation at HPNS?

From 1939 through 1974, the Navy used HPNS for ship repair and maintenance. These activities had the potential to utilize radioactive deck markers or luminescent dials, gauges, and signs, which were in common use during this timeframe. Additionally, HPNS was home to the Naval Radiological Defense Laboratory (NRDL) from 1948 to 1969.

NRDL developed instrumentation and evaluated the effects of radiation on living organisms and equipment, including the decontamination of ships involved in atomic testing.



A Historical Radiological Assessment (HRA) was completed in 2004. The HRA investigated radiological operations at HPNS and identified over 90 potentially contaminated sites.

Cleanup of Radiological Sites at HPNS

The Navy has been evaluating and cleaning up sites with possible radiological contamination at HPNS since 2004. Cleanup areas include buildings, sanitary sewer and storm drain lines, former disposal areas, piers, and ship berths and primarily consist of surveying and removal.

USS Ranger, Hancock, and Coral Sea docked at HPNS

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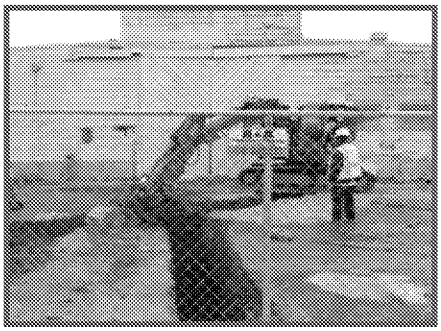
Occasionally, radiologically contaminated soil and materials cannot be removed. In these cases, the Navy ensures the contaminated soil or material is contained to protect the surrounding area.

When Is a Site Free from Radiation?



Removal of sanitary sewer and storm drain lines

A site is free from radiation when all the non-naturally occurring radiological material is removed from an area. The Navy uses the term "Unrestricted Free-Release" to describe when a site is free from the non-naturally occurring radiological contamination. When a site receives Unrestricted Free-Release, the land is available for any future use without restrictions. Steps to achieve Unrestricted Free-Release include the following:

- Characterizing sites by performing surveys and laboratory testing
- Review of site results and an onsite inspection by USEPA and the California Department of Public Health (CDPH)
- Submission of a letter from CDPH to the California Department of Toxic Substances Control (DTSC) approving the site for Unrestricted Free-Release

In some cases, the Navy uses radiological controls such as covers (containment) or land use controls to prevent people from coming into contact with low-level radiological contamination that cannot be removed.

These areas will obtain "Restricted Release," which means that certain land uses (e.g., residential) and activities (e.g., digging below certain depths) will be restricted at the site to ensure the containment remedy remains protective.

What Is the Status of Radiological Cleanup at Hunters Point?

The Navy's Radiological Cleanup Program at HPNS has made significant progress at the former shipyard, including removal of approximately 7,800 truckloads of soil (156,000 cubic yards [CY]) with potential radiological contamination, removal of approximately 29 miles (155,500 linear feet) of sanitary sewer and storm drain lines, and Unrestricted Free Release for 44 buildings and sites investigated for radiological contamination.

Radiological Cleanup Steps

Perform surveys at radiologically contaminated buildings and sites to determine if radiological contamination exceeds cleanup goals at HPNS.

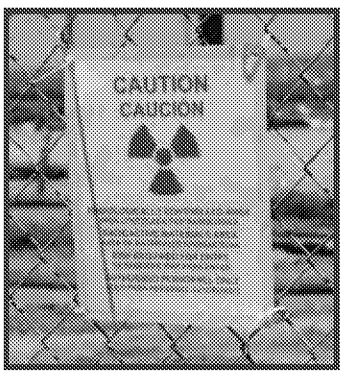
If found, remove radiological contamination and separate it for disposal as radiological waste.

Resurvey the cleaned areas to make sure that all radiological contamination has been removed and that cleanup goals have been met.

Ship contaminated materials as radiological waste to a licensed disposal facility.

Write the final reports that summarize the radiological surveys, describe the material removed during the cleanup process, and document that the site has been cleaned up.

Protecting Public Safety



Warning signs are posted outside of radiological work

The Navy is taking numerous safety measures to protect onsite workers, tenants, and the surrounding communities. The Navy posts signs around the perimeter of the radiological work areas to notify the public of the ongoing work (see right); their presence does not mean unacceptable exposure to radiation is occurring for people who are outside of these secured areas. Onsite workers wear personal dosimeters to measure their cumulative exposure to radiation while working in known radiation areas for multiple days. The dosimeters measure radiation exposure and are used regularly to ensure workers are not exposed to unsafe amounts of radiation.

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Other safety measures include dust control; daily air monitoring; collection of soil and building material samples from contaminated sites; proper disposal of radiologically contaminated waste; passing all materials leaving a cleanup site through a radiation monitor; and controlling access to, and posting public notices along, the perimeter of radiation work areas. The Navy conducts weekly radiation surveys around the perimeter of the work areas to confirm no radiologically contaminated material is present outside of the controlled work area.

Dust Control

Navy contractors are required to follow the HPNS Base-wide Dust Control Plan for all earth-moving activities.

Misting system to help control worksite dust

The plan includes the following requirements:

- Use of a misting system to wet down work areas and roadways.
- Stockpiles of soil are coated with a biodegradable polymer that controls windblown dust.
- Trucks hauling soil are required to be covered when entering and leaving HPNS.
- A 15-mile-per-hour speed limit is enforced for all vehicles onsite, and a 5-mile-per-hour speed limit is enforced in work areas.
- Rumble strips (raised strips to vibrate truck tires and loosen soil caught in the tire treads) at the exits of the work areas and a tire wash station help remove excess dirt and dust from truck tires as they leave the site.

Soil samples being collected for testing

Radiation Testing

During the cleanup process, all materials, including soil and liquids, in radiologically contaminated areas are surveyed and/or sampled to determine the levels of radiation present. Potentially radiologically contaminated soil is placed in 6-inch lifts on a Radiological Screening Yard (RSY). RSYs consist of several 1,000-square-meter screening pads constructed to prevent cross-contamination with the ground beneath. A radiation scan is conducted over 100 percent of the soil surface, and soil samples are collected.

Areas with radiological contamination are separated and placed in specialized radiological disposal bins for disposal at a licensed landfill outside of California. Following removal of the contaminated material, the screening process is repeated in those areas on the RSY pad to ensure all radiological contamination was removed.

Radiological scanning of building floor

Radiological scanning of building walls

Thousands of soil samples have been analyzed for radiological contamination at HPNS. Radiation air monitoring samples are collected and analyzed daily. Every air sample has been below action levels.

Personnel, Equipment, and Material Inspections

All radiological work areas are secured with in a Radiologically Controlled Area or "RCA." These areas are under strict access and procedural controls that include screening equipment and workers as they exit the area to ensure they are free of radiological contamination.

Truck Inspections

Trucks hauling non-radiological material off base are required to go through a portal monitor to protect against the inadvertent shipment of radioactive material. The portal monitor is one of several measures the Navy has to ensure

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radiologically contaminated material is properly disposed. The portal alarm will sound if radiation levels exceed the established criteria. An alarm could be due to naturally occurring radiation from the material in the truck or, potentially, from radiological contamination in the truck. If the portal monitor indicates that there are elevated radiation levels, then the truck is sent for a more thorough evaluation that consists of a contractor manually scanning the material with the radiation monitoring equipment. If the manual scan fails, then the truck is directed back to the area where the material originated for a detailed evaluation.

Radiological Waste Transportation and Disposal

- Radiological waste is sealed in hard top-covered, water-tight steel bins for storage and transportation to disposal sites outside of California that are licensed to accept this waste.
- The bins are properly marked and labeled stating they contain radioactive material, and strict Department of Transportation (DOT) regulations for transportation of radioactive material are followed.
- More than 4,300 bins of low-level radiological waste (soil, piping, and construction debris) have been removed from HPNS.

How Does the Public Know That the Land at HPNS is Free of Radiation?

The Navy wants to make sure that the HPNS community is confident that the radiological cleanup at HPNS has been successful, and there is no unacceptable risk to human health or the environment. To accomplish this goal, several federal and state regulatory agencies participate in the radiological cleanup process at HPNS.

USEPA, CDPH, DTSC, and the San Francisco Regional Water Quality Control Board have actively participated in the radiological investigations and removal actions at HPNS. Agency participation includes evaluating and approving cleanup goals and investigative strategies, and providing technical advice and oversight. NRC also provides oversight and annual inspections of the HPNS Radiological Program and radiological contractors working on the base.

Additionally, CDPH collects its own confirmation samples from many of the radiological cleanup sites and independently verifies that the area is clean before it issues a Unrestricted Free-Release letter.

Where Can I Get More Information About Radiation and Hunters Point Naval Shipyard?

American Nuclear Society
www.ans.org

Health Physics Society: Specialists in Radiation Safety
www.hps.org

U.S. Environmental Protection Agency
www.epa.gov

U.S. Nuclear Regulatory Commission
www.nrc.gov

World Health Organization
www.who.int

Radiation Answers
www.radiationanswers.org

American Council on Health and Science
www.acsh.org

Program Information:

For information on cleanup at HPNS contact:

Keith Forman
BRAC Environmental Coordinator
(415) 308-1458
keith.s.forman@navy.mil

To be added to the HPNS mailing list or for additional information, call or email the HPNS cleanup team:

Email: info@sfhpns.com

HPNS Info Line: (415) 295-4742

Reports Are Available For Review:

City of San Francisco Main Library
100 Larkin Street, 5th Floor
Government Information Center
San Francisco, CA 94102
(415) 557-4400

Hunters Point Naval Shipyard Site Trailer
(near HPNS security entrance)
690 Hudson Avenue
San Francisco, CA 94124

Navy Website
www.bracpmo.navy.mil

⇒ Under "BRAC BASES", select "California" from the drop-down menu

⇒ Click on "Former Naval Shipyard Hunters Point"

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Attachment 8

Naturally Occurring Asbestos

Attachment 8
Naturally Occurring Asbestos

The area surrounding the Shipyard contains serpentinite, chert, and basalt bedrock typical of the Franciscan Complex. Serpentinite, which is the state rock and located in 44 of the 58 of counties in California, can contain naturally occurring asbestos, which is identified as a potential health hazard requiring control measures. Serpentinite bedrock is present in Parcel A, Parcel B, a portion of Parcel C, and a small area of Parcel G. Many other areas of the Shipyard are known to contain some serpentinite because material used to fill in the Bay to create the Shipyard included serpentinite bedrock cut from the surrounding hillsides.

Due to the health concerns about naturally occurring asbestos, the vicinity of Parcel A was monitored for asbestos that may have become airborne due to soil-disturbing activities (e.g., grading and infrastructure installation) from August 2006 through August 2012. During the current vertical construction phase that started in the summer of 2013, the asbestos dust monitoring was continued and will continue as long as earth disturbing activities are conducted at the Shipyard. This monitoring program was carried out in accordance with an Asbestos Dust Mitigation Plan, which was approved by the BAAQMD, and a Dust Control Plan (DCP), which was approved, and compliance monitored by SFDPH. During redevelopment of areas that contain naturally occurring asbestos, dust control and monitoring programs are implemented in accordance with the DCP.

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Attachment 9

Abrasive Blast Material

Attachment 9
Abrasive Blast Material

Abrasive Blast Material, also referred to as sandblast grit (ABM), was historically used at the Shipyard to prepare ship hulls for repainting and other repairs. Wet sandblasting is also specifically mentioned as a method used for decontamination of irradiated ships involved in Operation Crossroads in the late 1940s and early 1950s, as documented in the HRA (see Attachment 7).

The ABM used to sandblast a ship is generally a non-cohesive, granular material and typically may have a characteristic green or black color. Granulated ABM made by all manufacturers is chemically inert; therefore, it does not have hazardous waste characteristics of flammability, corrosivity, or reactivity. Historically, silica sands were commonly used as ABM. Other common ABMs used at Naval facilities included Green Diamond®, a ferro-nickel slag produced as a byproduct of nickel production from lateritic ore, and Black Beauty®, a coal slag abrasive.

Historically, after a sandblasting operation, there was a large quantity of used ABM. This used material was sometimes stockpiled and then reused. Anecdotal evidence suggests that ABM was sometimes used at the Shipyard as bedding, aggregate, or backfill material (e.g., for pipelines, former fill areas, roadways, and driveways). Typically, the Navy did not keep records documenting the placement locations, so the exact locations and quantities of ABM are not known. However, ABM has been encountered during site characterization and remediation activities.

As indicated by the activities described above, three types of contamination issues arise from reuse of spent ABM. First, ABM can contain elevated levels of metals from the paint on ships, particularly lead, chromium, copper, nickel, and zinc. Second, the coal slag that is used to manufacture ABM sometimes contains low levels of naturally-occurring radionuclides (radium and its daughter products), which may be concentrated during the ABM manufacturing process. Third, spent ABM may be associated with the decontamination of ships used during atomic weapons testing in the South Pacific. Issues two and three may have resulted in ABM with elevated radiation levels.

Fortunately, ABM is readily distinguishable from natural soils or other backfill used at the Shipyard. ABM materials have specific physical characteristics such as grain size, uniformity of material, and color. These characteristics allow visual observations to be used to determine when the ABM is encountered in the subsurface.

Limited quantities of buried ABM have been removed from Parcels B and G. Remedial actions have removed ABM identified in portions of Parcel B. Between 1991 and 1995, approximately 90 tons of ABM was removed from IR Site 44 in Parcel G (formerly Parcel D) and recycled.

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Despite these discoveries, there is no evidence that backfilling with spent ABM was a routine practice at the Shipyard and the regulatory agencies have required no further investigation of this issue. Though there is no reason to suspect a significant amount of ABM at the Shipyard, there is a possibility that it, like other unknowns, might be found. Under federal Superfund law, at the time of transfer of any property, the Navy will covenant that any additional remedial action found to be necessary after the date of transfer shall be conducted by the United States.

Because it specifically requires protocols for responding to unknown conditions, such as ABM, Article 31 of the San Francisco Health Code will provide an added level of protection. Contractors will be required, under Article 31, to submit an Unknown Contaminant Contingency Plan to address ABM and other potential contaminants. In addition to requirements under Article 31, the Risk Management Plan (RMP) (see Attachment 19) includes an Unexpected Condition Response Plan approved by the FFA signatories that will be adhered to for all Shipyard Parcels subject to the RMP. The RMP requires specific notification and response actions that must be followed should ABM, or other unexpected conditions, be encountered during development. Thus, if ABM is disturbed during construction activities, it will be properly identified and handled in accordance with all laws.

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Attachment 10

Naturally Occurring Metals

Attachment 10
Naturally Occurring Metals

Concerns have been raised regarding naturally occurring metals in soils. Much of the land that the City and County of San Francisco occupies, including part of the Shipyard, and in particular the Parcel A hill, contains serpentinite, chert and basalt bedrock typical of the Franciscan Complex. The Franciscan Complex is the predominant bedrock unit in the California Coast Ranges. Elevated levels of arsenic, iron, manganese and nickel are naturally found in these rock formations, and therefore found in soil in any area of the City that overlays these rock formations. Since there are no known man-made sources of these metals or these sources have been remediated, the Navy and regulators have concluded that elevated detections of these metals that the Navy found and any similar levels found in the future are most likely due to these natural rock sources being cut for use as fill material and therefore may remain. These metals are not part of a "spill" or "release" of contaminants, but rather reflect metals concentrations normally associated with Franciscan Formation bedrock and/or reflect metals concentrations normally associated with the type and quality of soil used during the period the Shipyard was filled. Because of the ubiquitous or ambient nature of these metals and their various concentrations, based on the risk evaluation conducted by the Navy, the regulators concluded that potential risks associated with slightly-elevated metals should be managed by minimizing exposure through placing and maintaining durable covers. These durable covers (i.e. physical barriers) will be placed over existing soil through the use of new building foundations, roads, sidewalks, parking lots and/or placement of clean soil in open space areas.

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Attachment 11

Lead-Based Paint

Attachment 11
Lead-Based Paint

As with the majority of buildings constructed prior to 1978, a number of buildings at the Shipyard were painted with LBP. The deeds for future transfers of land at the Shipyard will contain a deed notice and restriction concerning LBP, just as they did for the transfer of Parcel A. The LBP notice will provide information about the hazards of lead paint on residential dwellings built before 1978 and a notice that lead poisoning is a particular risk for young children and pregnant women who ingest LBP. The LBP restriction will prohibit the reuse of existing structures with LBP for residential use and occupancy of new residential structures until LBP hazards are abated in accordance with all applicable laws and, as a result, these populations will not be exposed. The notice further provides that any subsequent owner of the property will be responsible for managing LBP in compliance with all applicable federal, state, and local laws and regulations.

San Francisco Building Code, Chapter 34, Section 3407, establishes requirements for projects that disturb LBP on the exterior of buildings or steel structures. It is implemented by the Department of Building Inspection (DBI). The ordinance contains performance standards, including a requirement to establish containment barriers during disturbance of LBP that are at least as effective at protecting human health and the environment as those in the most recent *Guidelines for Evaluation and Control of Lead-Based Paint Hazards* promulgated by the US Department of Housing and Urban Development.

For Hilltop and Hillside areas of Parcel A, under the requirements of *San Francisco Health Code Article 31*, all LBP in soil hazards were assessed and remediated prior to, during and after demolition of the Navy structures so there are no further LBP hazards on those parcels. For former buildings on Parcel A and, once transferred, the buildings on other parcels, the OCII is and will be required to follow all applicable laws for managing LBP hazards in the buildings as prescribed in the deed restrictions. If it is necessary to demolish buildings in the future, the LBP in soil hazards will need to be assessed under the requirements in Article 31. This assessment could include submittal of a LBP in Soil Sampling Report to analyze and, if found above action levels, remediate LBP in soil.

It is anticipated that the deeds for parcels that transfer in the future will prohibit the use of existing structures containing LBP for residential or child-occupied facilities. No such use is planned. All residential and childcare facilities will be in new structures that are built in the future. It is anticipated that these transfers will also require the OCII, if it decides to reuse the existing Navy buildings for uses other than residential or child-occupied facilities, to follow all applicable laws for managing LBP hazards as prescribed in the deed restrictions. When the OCII demolishes the existing Navy buildings containing LBP hazards, it will be required to follow all applicable laws as described in

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the deed restrictions and provide proof to the SFDPH under requirements in Article 31 that it has complied with those restrictions.

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Attachment 12

Pile Driving Through Contaminated Soil

Attachment 12
Pile Driving Through Contaminated Soil

Deep foundations may be required to support some new buildings and structures at the Shipyard including the Yosemite Slough Bridge and other structures near the Bay where soft sediments are present near the ground surface. The foundations for these structures may extend below the soft sediments into competent soil or bedrock to provide adequate support.

As described in Attachment 4, Parcel-by-Parcel Summary and Expected Transfer Dates, there are ongoing remediation programs related to former Navy operations. The Navy is conducting soil and groundwater cleanup to reduce chemical concentrations to meet cleanup levels approved by federal and state regulatory agencies. Residual chemicals in soil, largely consisting of certain metals which are associated with the rock and soil that were historically used to fill in the Bay to expand the Shipyard, may remain. These chemicals are not part of a "spill" or "release" of contaminants, but rather reflect metals concentrations normally associated with Franciscan Formation bedrock that was used as a source of fill material during the period when portions of the Shipyard was filled. In some areas, residual TPH and PAHs remain in place under land use and activity restrictions.

Therefore, the majority of construction on the Shipyard should not present any concern of cross-contamination or "releasing" substances beyond the naturally occurring sources that regularly appear at construction sites throughout the Bay Area. However, should low levels of contamination be identified beneath construction sites at the Shipyard, piles could be installed using methods that include installation of a casing through the contaminated zone and allow the pile installation through the casing without adversely impacting the environment or spreading the contamination to deeper subsurface layers. Evaluation of potential impacts related to installation of foundation or utility support piles and mitigation measures will be performed prior to issuance of any building permits. Specifically, in 2010, Article 31 of the Health Code was amended to address this issue to require contractors to submit for approval to SFDPH a Foundation Pile Installation Plan for projects located in former Shipyard parcels. The plan must explain how the contractor will drill pilot boreholes or an equivalent process that will be used so that piles will be installed to prevent potentially contaminated fill materials from being pushed into underlying sediment or groundwater. Additionally, if contaminants were encountered in a location where piles are to be installed, the CRUPs and Deeds will refer to a RMP, which in addition to requirements in Article 31 and FEIR mitigation measures, specifies procedures in the Unexpected Condition Response Plan to address previously unexpected contamination.

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Attachment 13

Public Participation and Notification

Attachment 13
Public Participation and Notification

The Navy is required to prepare and implement a Community Involvement Plan under the FFA. This plan provides for a number of activities designed to inform neighbors and other members of the public about the status of Shipyard cleanup activities. Community relations and public information requirements may also be incorporated into the requirements of cleanup decision documents, leases and transfer documents imposed on the City and other subsequent purchasers and tenants.

The Community Involvement Plan provides detailed information on community participation and documents interests, issues, and concerns raised by the community regarding ongoing investigation and cleanup activities at the Shipyard. Community outreach activities at the Shipyard include public meetings, public information repositories, newsletters and fact sheets, public notices, site tours and the Navy's Shipyard website.

The Navy has held periodic meetings and conducted bus tours of the Shipyard to better inform interested community members on the status of cleanup activities. Documents and relevant information relied upon in the remedy selection process are made available for public review in the public information repositories or on the IR Program website. With the increasing use of the internet, the Navy provided a variety of resources online to reach out to the community. This includes emailing progress reports, fact sheets and calendar of outreach events, and setting up a more user-friendly website through the Navy website.

Community participation is also solicited through public mailings, including newsletters, fact sheets, public notices, and proposed plans, which are designed to broadly disseminate information throughout the local community. Public mailings for the Shipyard are sent to more than 2,000 groups and individuals that have added their names to the community mailing list, including residents in the local Hunters Point-Bayview community; city, state, and federal officials; regulatory agencies; and other interested groups and individuals. Previous updates and fact sheets have included general program information such as the status of environmental investigations and cleanup activities at each parcel.

A complete index of all Navy Shipyard documents is available at the following information repositories:

San Francisco Main Library
100 Larkin Street
Government Information Center, 5th Floor
San Francisco, California 94102
Phone: (415) 557-4500

HPNS Office Trailer
690 Hudson Street
San Francisco, California 94124

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Prior to transferring ownership of any property at the Shipyard, the Navy will prepare and circulate for public comment a document called a FOST. These documents will include detailed information about the nature and extent of contaminants and the measures taken to address contamination, including any restrictions that will be imposed on the use of, or activities that may be conducted at, the property, and any notices required to be provided such as notices and notice requirements regarding the existence of LBP and ACM. Such restrictions will also be set forth in both the deed and a separate land use covenant, both of which will be legally recorded, and will also be provided to tenants and any subsequent property owner. General statutory and common law requirements applicable to transfers and leases of real property provide for disclosures of hazardous conditions, including releases of contaminants and hazardous materials to purchasers and tenants.

Following transfer, notices of new discoveries of unexpected conditions are addressed in the Unexpected Conditions Response Plan which is part of the RMP and includes appropriate notification and site control procedures. The CRUP and Deed recognize the RMP.

The DCP for the Project is anticipated to include establishing a hotline for surrounding community members who may be affected by dust and requiring the contact person to take corrective action within 48 hours. The hotline number will be provided to adjacent residents, schools and businesses.

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Attachment 14

Monitoring and Enforcement of Environmental Restrictions

Attachment 14
Monitoring and Enforcement of Environmental Restrictions

Article 31 of the San Francisco Health Code establishes an administrative process specifically related to Hunters Point Shipyard development requiring the San Francisco Department of Public Health (SFDPH) to verify compliance with FEIR mitigation measures and other environmental restrictions and plans prior to issuance of construction or grading permits by the Department of Building Inspection (DBI) or the Department of Public Works. Following permit issuance, the SFDPH continues to monitor and enforce compliance.

In addition to being enforceable by the SFDPH, the hazardous material-related restrictions, notices and other requirements imposed as institutional controls pursuant to the environmental cleanup and property transfer process will be redundantly incorporated into two separate legally enforceable documents: the recorded deeds conveying ownership of the property and recorded CRUPs. Violations of deed restrictions by a subsequent property owner are legally enforceable by the Navy and by any other predecessor owner in the chain of title such as the City, the developer, or parties to whom portions of the property are conveyed. Violations of recorded CRUPs are enforceable by USEPA and DTSC.

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Attachment 15

Asbestos Containing Materials

Attachment 15
Asbestos Containing Materials

Due to the presence of Asbestos Containing Materials (ACM) in structures at Shipyard Parcels, a deed to include a notification and other requirements pertaining to ACM will be required. The deed notice will state that ACM is present in the buildings and structures on the Parcel, that the location and condition of known ACM is documented in specific reports, and the deed will prohibit the use of these structures. In the covenant regarding ACM, future owners and developers will be responsible for managing ACM and for complying with all applicable federal, state, and local laws relating to ACM, including when demolishing or handling buildings or utilities containing ACM.

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Attachment 16

Superfund Sites

Attachment 16
Superfund Sites

Superfund is the common name for CERCLA, the federal law designed to clean up abandoned hazardous waste sites. Superfund provides broad federal authority to clean up releases or threatened releases of hazardous substances (contaminants) that may endanger public health or the environment. The law authorized the USEPA to identify parties responsible for contamination of sites and compel the parties to clean up the sites. By the beginning of the 21st century, cleanups at more than 750 sites had been completed. Superfund sites are a category Brownfields sites. The attached Table 16-1 illustrates that the types of chemicals found at the Shipyard: metals, PCBs, PAHs, and VOCs; are typical Superfund contaminants found at many sites. The Shipyard is similar to a number of the Superfund sites listed in the type of contamination, cleanup remedies selected, end use, and risk management measures. The contamination present at a Superfund site can vary by:

- Media affected (soil, sediment, groundwater)
- Extent of that affected media (shallow to deep soils and shallow to deep aquifers)
- Types and levels of contaminants.

At the Shipyard, the media affected and contamination present are commonly found at many Superfund sites. In fact, Shipyard contamination levels and distribution are less than many Superfund sites.

The Shipyard differs from some of these sites in that a source of drinking water has not been impacted and there are no large-scale significant or fast-moving groundwater plumes at the Shipyard. Shallow groundwater at the Shipyard is not and will not be considered a drinking water source due to its natural characteristics. In addition, the extent of groundwater contamination is limited to certain areas, and in these limited areas there are no large-scale significant or fast moving groundwater plumes. While this situation is not unique to the Shipyard, there are cases of Superfund sites where the groundwater contamination covers/covered a large area and contamination affected or had a high possibility of affecting potential drinking water sources. The Parcel E-2 landfill and adjacent areas that previously impacted the Bay (Attachment 2) have been extensively excavated and contamination removed. Additional contaminant removal actions are being conducted by the Navy. Groundwater results show that leaching from landfill has the potential to continue to impact the Bay and the Parcel E-2 ROD has selected containment remedies to mitigate these potential impacts.

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Table 16-1
Superfund Sites Environmental Management Summary

Site[1]	State	City	Former Use(s)	Contaminants[2]	Land Use Covenants, Institutional Controls, Engineering Controls[3,4,5]	Cleanup and Risk Management	Current/Planned Use(s)
Williams Air Force Base	AZ	Chandler	Military - Air Force flight training school	VOCs, OCPs, PCBs, TPH and radiological wastes	ICs and ECs	ICs include: land use restrictions and restriction of excavation activities ECs include: soil excavation, removal of drums, USTs, and radiological materials, installation of soil and cement and permeable river rock caps, and long term groundwater monitoring	Current - commercial (portion transferred for reuse by Phoenix-Mesa Gateway Airport and Arizona State University); cleanup is ongoing
Concord Naval Weapons Station	CA	Concord	Military - Army ammunition transshipment port	PAHs, PCBs, OCPs, dioxins/furans and metals	ICs and Ecs	ICs include: land use restrictions ECs include: soil excavation, multi-layer cap.	Current - cleanup is ongoing Planned - City is currently searching for a "master developer" to implement the Concord Reuse Project Area Plan
March Air Force Base	CA	Riverside	Military - Air Force maintenance and repair facility	VOCs, jet fuel, PAHs, landfill wastes, and metals	ICs and ECs	ICs include: restrictions to prohibit groundwater use and land use restrictions ECs include: landfill closure, including cap, removal of USTs, soil excavation, SVE, bioventing, removal of free-product from groundwater, groundwater extraction and treatment	Current - approximately two-thirds of the Site has been turned over to BRAC (Air Force office); remaining third has been retained and renamed March Air Reserve Base; Cleanup is ongoing
Denver Radium Site	CO	Denver	Areas where radioactive soil and debris from ore processing for radium (1920's) was left in place or used for fill or paving materials	Radium, thorium, uranium, metals and radon gas	ICs and ECs	ICs include: Restrictions to prohibit disturbance of caps, restrictions to prohibit groundwater use, special zoning ordnances, and limitations on excavation in areas where contaminants were left in place with the exception of removal of contamination under city streets as part of routine street maintenance ECs include: historical soil excavation and disposal, on-site stabilization and solidification, capping contaminated soils, and installation of ventilation systems for radon gas	Current - EPA is evaluating the potential for energy projects on these properties; cleanup is ongoing
Durham Meadows	CT	Durham	Industrial manufacturing	DNAPL, VOCs, SVOCs	ICs and ECs	ICs include: restrictions to prohibit groundwater use, restrictions to prohibit excavation, restrictions to protect monitoring wells ECs include: extension of public water supply, soil excavation, groundwater plume monitoring, potential installation of a groundwater extraction system	Current - commercial and residential land-use; cleanup is ongoing

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Table 16-1
Superfund Sites Environmental Management Summary

Site[1]	State	City	Former Use(s)	Contaminants[2]	Land Use Covenants, Institutional Controls, Engineering Controls[3,4,5]	Cleanup and Risk Management	Current/Planned Use(s)
Landia Chemical	FL	Lakeland	Industrial Pesticide blending and formulating	VOCs, SVOCs, OCPs and metals	ICs and ECs	ICs include: land use restrictions, restrictions to prohibit groundwater use, and maintenance of engineering barriers ECs include: soil excavation, cap, chemical oxidation, and bioremediation	Current - industrial land uses (warehouses); cleanup is ongoing
Fairfield Coal Gasification Plant	IA	Fairfield	Industrial (utility) Coal gasification plant	VOCs, PAHs, cyanide, and metals	ICs and ECs	ICs include: restrictions to prohibit groundwater use ECs include: groundwater extraction and treatment, excavation and thermal destruction of contaminated soil, and excavation of coal tar	Current - industrial land uses (electrical substation); Site has received close-out; groundwater extraction is ongoing
Agriculture Street Landfill	LA	New Orleans Orleans Parish	Municipal Landfill	PAHs and metals	ICs and ECs	ICs include: groundwater at the Site is not available as a drinking water source. ECs include: soil excavation and cap	Current - single-family homes and the electrical substation on 47 acres of site; remaining 48-acres remain undeveloped. Planned - a Reuse Plan is underway
Aircraft Components (D&L Sales)	MI	Benton Harbor	Industrial/ Commercial Plating, airplane parts resale	Radium-226, VOCs, SVOCs, OCPs and metals	ICs and ECs	ICs include: land use restrictions, restrictions to prohibit groundwater use, restriction of excavation activities, and incorporating protective measures into the construction and design of the buildings ECs include: removal and off-site disposal of radioactive airplane gauges and associated debris, initial radiological decontamination of buildings followed by building demolition, excavation and off-site disposal of Radium-226 affected soil, excavation and off-site disposal of metal and/or pesticide contaminated soil, substrate injection into groundwater to promote degradation of VOCs	Current - redeveloped as part of a golf course Planned - development of residential condominium complex
Griffiss Air Force Base	NY	Rome	Military - Air Force 416th Combat Support Group	VOCs, SVOCs, PCBs, petroleum, and metals	ICs and ECs	ICs include: land use restrictions, restrictions to prohibit groundwater use, and restrictions to prohibit relocation of contaminated soils ECs include: extension of public water supply, soil excavation, removal of sumps, USTs, landfill cap, and groundwater treatment	Current - designated for base realignment under BRAC 93; Five early transfer areas have been approved by EPA and the State, with appropriate restrictions; industrial/ commercial (manufacturing/ airfield and related services) use

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Table 16-1
Superfund Sites Environmental Management Summary

Site[1]	State	City	Former Use(s)	Contaminants[2]	Land Use Covenants, Institutional Controls, Engineering Controls[3,4,5]	Cleanup and Risk Management	Current/Planned Use(s)
Navy Ships Parts Control Center/ Naval Support Activity (NSA)	PA	Mechanics-burg	Military - Navy Global management of repair parts for Navy ships, management of conventional ammunition, metal ore repository	VOCs, PCBs, OCPs, PAHs, DNAPL, and metals	ICs and ECs	ICs include: land use restrictions ECs include: soil excavation; chemical oxidation; stream stabilization	Current - active Naval installation Planned - proposed future use is industrial/commercial; however, the possibility of eventually cleaning the Site up to residential levels and encouraging residential growth in the future has not been ruled out
Naval Air Station (NAS)	WA	Whidbey Island	Military - Navy Ault Field and the Seaplane Base	VOCs, SVOCs, OCPs, PCBs, PAHs, dioxin, and metals	ICs and ECs	ICs include: restrictions to prohibit groundwater use ECs include: extension of public water supply, soil excavation, landfill and ditch capping, groundwater extraction and treatment, and oil skimming and bioventing	Current - active Naval Air Station; cleanup is ongoing

Notes
1. Site - The sites listed are representative of the United States Environmental Protection Agencies (USEPA) ten regions.
2. Contaminants listed are the predominant ones found at a site, but are not an exhaustive list of all contaminants present.
3. LUCs - Land Use Covenants incorporate the land use restrictions into environmental restrictive covenants that run with the land and that are enforceable by DTSC against future transferees.
4. ICs - Institutional Controls are legal and administrative mechanisms used to implement land use and access restrictions that are used to limit the exposure of future landowner(s) and/or user(s) of the property to hazardous substances and to maintain the integrity of the remedial action until remediation is complete and remediation goals have been achieved. This is not necessarily an exhaustive list of ICs planned or implemented, but rather the main ones.
5. ECs - Engineering Controls are physical controls. Examples of these controls include: the use of building foundations, walkways, parking garages/lots, and import soil to "Cap" the site and limit the exposure of future landowner(s) and/or user(s) of the property to hazardous substances. Maintenance protocols for ECs can be found in site management plans, deed restrictions and LUCs. This is not necessarily and exhaustive list of ECs planned or implemented, but rather the main ones.
BRAC - Base Realignment and Closure
OCPs - Organochlorinated Pesticides
PAHs - Polycyclic Aromatic Hydrocarbons
PCBs - Polychlorinated Biphenyls
SVE - Soil Vapor Extraction
SVOCs - Semi-volatile Organic Compounds
TPH - Total Petroleum Hydrocarbons (can be quantified as gasoline, diesel, motor oil, and jet fuel)
UST - Underground Storage Tank
VOCs - Volatile Organic Compounds

Following are two example sites with more significant residual chemicals than the Shipyard:

The Montrose Chemical Corporation and Del Amo Superfund Sites

The Montrose Chemical Corporation (Montrose) and Del Amo Superfund sites are located in Los Angeles County, California. Portions of the sites are within the boundaries of the City of Los Angeles and adjacent to the City of Torrance. The sites were addressed in a joint ROD (1999) because they are adjacent and contamination had co-mingled. More than 30 hazardous substances or Contaminants of Potential Concern (COPCs) have been detected at the joint site. Through sampling and analysis, it was determined that contamination in groundwater from Montrose had migrated vertically through five successive aquifers and laterally the migration had formed a plume approximately 1.3 miles long by 0.75 miles wide. The USEPA was concerned that groundwater contamination would continue to spread and eventually reach locations where it could be drawn into wells used for drinking and potable water. Cleanup and investigation activities currently underway at the sites include, but are not limited to, construction of a groundwater treatment plant, soil vapor extraction, and completion of a vapor intrusion screening evaluation.

Otis Air National Guard Base/Camp Edwards Site

The Otis Air National Guard Base/Camp Edwards, more commonly known as the Massachusetts Military Reservation, covers approximately 22,000 acres in Barnstaple County, Massachusetts. Contaminated areas are the result of historic chemical/fuel spills, fire training activities, landfills, and drainage structures. Additionally, effluent from the former sewage treatment plant was historically discharged into sand beds where it seeped into the groundwater. In 1984, the U.S. Geological Survey detected contaminants in monitoring wells downgradient of this former plant. In 1983 and 1984, the Air Force detected VOCs in onsite monitoring wells near the Base Landfill and a Fire Training Area. Monitoring had also detected VOCs in several hundred private wells (all of which are now on municipal water) and in one town well (which is shut down). The groundwater was contaminated with VOCs, including trichloroethene, tetrachloroethylene, ethylene dibromide (EDB), carbon tetrachloride, and dichloroethylene. EDB has been found to be upwelling in two separate locations, outside the property boundaries, within cranberry bogs in Mashpee and Falmouth. People could be at risk if they accidentally drink or come into direct contact with contaminated groundwater. A number of plume areas have been identified at the Site. Cleanups have included numerous remediation projects addressing both the soil and groundwater contamination at MMR have been implemented since the mid- to late 1990's. Currently there are numerous treatment plants in place which treat approximately 18 million gallons a day of contaminated groundwater. All treated groundwater is returned to the aquifer or discharged to surface water. A Preliminary Close-out Report was issued in

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December 2009. Treatment plants will be operated and maintained until cleanup levels are met.

Site specific LUCs, deed restrictions, institutional controls and ECs are part of the process in reusing a Superfund site, are a standard in many cases, and have been used many times at sites with similar contaminants and issues as the Shipyard, as illustrated by the following example:

Aircraft Components, Inc. (D&L Sales) Superfund Site

The 17-acre Aircraft Components, Inc. (ACI) site is located in Benton Township, Berrien Country, Michigan. Constructed in the 1910s, the main buildings were used by various manufacturing concerns, including a plating facility, until the mid-1950s. ACI, a mail-order airplane parts resale business, then occupied the property until the site was sold to D&L Sales, Inc. in the early 1990s. Aircraft Components bought and sold World War II-era military aircraft gauges and other components and used the ACI site as a warehousing, storage, and shipping center. Some of the aircraft gauges are marked with luminescent paint containing radium-226. The non-radioactive contaminants of concern in soil included the heavy metals, mercury and selenium, and to a lesser extent, lead. Other COPCs in site soil included VOCs, SVOCs and OCPs. Contaminants of concern in groundwater included VOCs. ECs at the Site included removal and off-site disposal of radioactive airplane gauges and associated debris, initial radiological decontamination of buildings followed by building demolition, excavation and off-site disposal of Radium-226 affected soil, excavation and off-site disposal of metal and/or pesticide soil and sediment, and substrate injection into groundwater to promote degradation of VOCs. Institutional controls include implementing restrictions on land use and incorporating protective measures into the construction and design of the buildings. USEPA is working closely with the developer to ensure that all applicable state and federal regulations are followed and that reuse of the site is compatible with cleanup levels. The Site is part a community-wide, 530-acre redevelopment project that will include a marina, golf course, residential homes, and condominium complexes. Site reuse includes part of the golf course and a potentially responsible party is interested in developing a portion of the site into a residential area.

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Attachment 17

Bay Area Brownfields Sites

Attachment 17
Bay Area Brownfields Sites

The term "Brownfields" has been defined by both the USEPA and the Cal-EPA DTSC as:

"real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant."

Many cities and industrial areas are Brownfields and many have been successfully cleaned up and reused for multi-use developments. The cleanup and reuse of these lands is now common and provides economic, environmental and public health benefits for the area.

Much of downtown San Francisco and the eastern neighborhoods on the Bay from Mission Bay down through Islais creek have been Brownfields since the 1906 earthquake when these neighborhoods were created by filling in the Bay with earthquake rubble. The fact that this rubble contained chemical contamination was recognized long before the word Brownfields became fashionable. The San Francisco Health Department established the "Maher" ordinance in 1986 (now Article 22A of the Health Code) to deal with these fill areas and the contamination associated with them. In addition to the concerns about chemical contamination associated with earthquake rubble, additional industrial activities, such as the railroad yards in Mission Bay, contributed contamination to these areas.

The Shipyard was established as part of the war effort in the 1940's when the Bay was filled to increase the size of the Shipyard. Industrial activities for shipbuilding contributed to the soil and groundwater contamination at the site. With the exception of the radiological contamination, discussed below, the chemicals used at the Shipyard and the contamination that resulted are similar to other large industrial sites throughout the Bay Area and other Brownfields that have been or are being redeveloped. In particular, once the Navy has prepared the land for transfer, engineering or institutional controls will be similar to other Brownfields in the Bay Area.

The attached Table 17-1 illustrates that the types of chemicals found at the Shipyard other than radiological materials: metals, PCBs, PAHs, and VOCs, are typical Brownfields contaminants found at many sites. The Shipyard is similar to a number of the Brownfields listed in the type of contamination, cleanup remedies selected, end use, and risk management measures. The low-level radiological materials found in specific areas of the Shipyard are not typical of other Bay Area Brownfields sites. However, these areas with low-level radiological materials will require an engineering cap, which will be very similar to other Brownfield developments that are built on top of landfills that have engineered caps and land use restrictions in place to protect public health and the environment. See Attachment 7 for more information regarding low-level radiological materials cleanup, planned end use, and risk management measures at the Shipyard.

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Table 17-1
Bay Area Brownfields Environmental Management Summary

Site	City	Former Use(s)	Contaminants[1]	Land Use Covenants Institutional Controls Engineering Controls[2,3,4]	Cleanup and Risk Management	Current or Planned Use(s)
America Center	San Jose	Class III Landfill	Methane	Deed restrictions[5], LUCs, ICs and ECs	Landfill Cap and Methane Mitigation System per CCR Title 276	Commercial office building
Bay West Cove	South San Francisco	US Steel Facility & Ship Building	Petroleum hydrocarbons, lead, PCBs	LUCs, ICs, ECs	Excavation of petroleum impacted soil, soil fixation to stabilize lead, contaminated sediment dredging and cover, onshore soil cover	Commercial, hotel, research and development
5600 Third Street	San Francisco	Industrial and Office	Metals	Deed restrictions, ICs, and ECs	Capping with concrete, building foundations, pavement and soil	Residential
Emeryville Redevelopment Projects	Emeryville	Various commercial/ industrial activities	VOCs, petroleum hydrocarbons, metals, PCBs, SVOCs	Deed restrictions, LUCs, ICs, and ECs	Numerous sites use risk assessments and remedial action work plans to determine level of effort to remediate (if necessary) and ECs and/or ICs prior to redevelopment	Mixed - residential, light industrial, commercial
Mandela Gateway	Oakland	Military housing, low-income housing and equipment and building material storage	Metals, Pesticides, Petroleum Hydrocarbons	Deed restrictions, ICs, and ECs	Issuance of a deed restriction which includes ECs including capping with concrete and soil, guidance on cap maintenance, conditions and restrictions on capped area disturbance. ICs include the prohibition of installation of domestic water supply wells at the site	Mixed - residential, commercial
Mare Island	Vallejo	Military (Naval Shipyard) - repair and maintenance of military vessels, warehouses, training areas, barracks, post services. Civilian Shipyard - repair and maintenance of vessels, warehouses	Metals, PCBs, SVOCs, petroleum hydrocarbons	Deed restrictions, LUCs, ICs, and Ecs	Issuance of deed restriction (2002) and subsequent LUCs; deed restriction restricts the reuse of certain areas to uses including research and development, office, industrial, light industrial, commercial and educational	Mixed - residential, industrial/light industrial and commercial
Mission Bay	San Francisco	Industrial/commercial	Metals, VOCs, petroleum hydrocarbons, asbestos	Risk Management Plan (RMP), ICs, and ECs	RMP lists ECs include capping with buildings, parking lots, roads sidewalks and soil, guidance on cap maintenance, conditions and restrictions on capped area disturbance. ICs include prohibition of installation of domestic, industrial or irrigation wells	Mixed - residential, industrial/light industrial, commercial, educational, open space
Myers Drum	Emeryville	Industrial/commercial and recreational (shooting range)	Metals, pesticides, VOCs, SVOCs, petroleum hydrocarbons, hydrogen sulfides	Deed restrictions, ICs, and ECs	Issuance of a deed restriction; deed restriction restricts residential reuse to floors at least one floor above the ground floor restricts the reuse of certain areas to uses including industrial, light industrial, and commercial/commercial; lists EC	Mixed - residential, industrial, light industrial and commercial

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Table 17-1
Bay Area Brownfields Environmental Management Summary

Site	City	Former Use(s)	Contaminants[1]	Land Use Covenants Institutional Controls Engineering Controls[2,3,4]	Cleanup and Risk Management	Current or Planned Use(s)
North Beach Hope VI	San Francisco	Industrial, commercial, office, residential	Metals, Petroleum Hydrocarbons, PAHs, cyanide	ICs and ECs	ECs including capping with concrete, building foundations, walkways or the parking garage; capping planter bases with geotextile fabric. ICs include domestic water supply to continue under San Francisco Public Utilities Commission, no use of site groundwater	Mixed - residential, commercial, and parking garages
Former Oakland Army Base	Oakland	Military (Army Base) - industrial processes, fuel storage, waste management, cleaning operations, trucking, wharf, and warehousing operations	Metals, VOCs, SVOCs, PAHs, PCBs, and petroleum hydrocarbons	Deed restrictions and Ics	Issuance of a deed restriction; deed restriction restricts any reuse of the site for residences, hospitals, schools, daycare facilities, hospitals or hospices; lists ICs including prohibiting construction of groundwater wells or using groundwater at the site	Oakland Global Trade & Logistics Center: rail manifest and rail yard, wharehousing and logistics space, recycling center, intermodal terminal, truck parking and ancillary
Oakland Uptown Development	Oakland	Commercial, residential, parking, vacant parcels	Metals, VOCs, and petroleum hydrocarbons	Deed restrictions, ICs and Ecs	ECs including capping with concrete, building foundations, parking garages, pavement and soil. ICs include domestic water supply to continue under East Bay Municipal Utilities District, no use of site groundwater for residential supply	Commercial, residential, parking, and open space
Ohlone College	Fremont	Agricultural	Pesticides	Deed restrictions and ICs	Issuance of a deed restriction. The deed restriction restricts any reuse of the site for residences, hospitals, public or private schools for persons under 21 years of age, or daycare facilities. The deed restriction lists ICs including prohibiting activities that disturb soil beneath the site	Mixed- Educational (college) and agricultural land
Oyster Point	South San Francisco	Class III Municipal Waste Landfill	Methane, petroleum hydrocarbons, metals and VOCs	Post-closure Land Use Plan, ICs and ECs	Landfill cap and methane mitigation system per CCR Title 27 and potential additional ICs	Commercial, flex-industrial; biotech campus; public marina, boat launch, ferry terminal, yacht club, boat sales building, and small office and hotel complex
The Plant	San Jose	Engine manufacturing plant	VOCs	LUCs and ECs	ECs include soil and groundwater cleanup systems and vapor intrusion mitigations systems	Retail (Mega Mall)
Sierra Point	Brisbane and South San Francisco	Class III Landfill	Methane	Deed restrictions, LUCs and ECs	Landfill cap and methane mitigation system per CCR Title 27	Commercial

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Table 17-1
Bay Area Brownfields Environmental Management Summary

Site	City	Former Use(s)	Contaminants[1]	Land Use Covenants Institutional Controls Engineering Controls[2,3,4]	Cleanup and Risk Management	Current or Planned Use(s)
Stockton Event Center	Stockton	Shipbuilding, steel manufacturing, auto repair, and railroads	Metals and Petroleum Hydrocarbons	Deed restrictions, LUCs and ICs	ICs in place covered by the Site Mitigation Plan (SMP)	Recreation and retail
Hunters Point Shipyard Parcel A	San Francisco	Naval Shipyard Housing and Administration	Lead-based paint in soil and Naturally Occurring Asbestos	Deed restrictions, LUCs and ICs	San Francisco Health Code Article 31A requires certain activities be completed before issuance of building and grading permits and is monitored by the San Francisco Department of Public Health	Residential
Hunters Point Shipyard Parcels B and G	San Francisco	Naval and Commercial Shipyard	Metals, VOCs, SVOCs, PAHs, PCBs, and petroleum hydrocarbons	RMP, ICs, and ECs	In addition to the RMP, will also be covered by an addition to Article 31 or a similar process	Mixed-use, Commercial, Residential, Open Space

Notes:

1. Contaminants listed are the predominant ones found at a site, but are not an exhaustive list of all contaminants present.

2. LUC - Land Use Covenant incorporates the land use restrictions into environmental restrictive covenants that run with the land and that are enforceable by DTSC against future transferees.

3. ICs - Institutional Controls are legal and administrative mechanisms used to implement land use and access restrictions that are used to limit the exposure of future landowner(s) and/or user(s) of the property to hazardous substances and to maintain the integrity of the remedial action until remediation is complete and remediation goals have been achieved.

4. ECs - Engineering Controls are physical controls. Examples of these controls include: the use of building foundations, walkways, parking garages/lots, and import soil to "Cap" the site and limit the exposure of future landowner(s) and/or user(s) of the property to hazardous substances. Maintenance protocols for EC's can be found in site management plans, deed restrictions and LUCs.

5. Deed restriction - A form of LUC that usually includes site specific ECs and instructions for future practices associated with the site. The deed restrictions include the identical land use restrictions in the LUCs that run with the land and are enforceable against future transferees.

6. Barclays Official California Code of Regulations (CCR Title 27) - Environmental Protection

PCBs - Polychlorinated Biphenyls

PAHs - Polycyclic Aromatic Hydrocarbons

RMP - Risk Management Plan

SMP - Site Mitigation Plan

VOCs - Volatile Organic Compounds

SVOCs - Semi-volatile Organic Compounds

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Brownfields development typically includes cleanup of contamination for the intended property reuse (residential, commercial/industrial or recreational) and the use of Land Use Covenants, deed restrictions, engineering and institutional controls to protect human health and the environment.

In the case of groundwater plumes in areas like the Shipyard, where the groundwater is not used for drinking water, the groundwater plumes are treated and monitored. Very low levels of residual volatile contaminants are typically too difficult to completely remove from the groundwater and the enhanced natural processes (post-treatment) over several years' time can just be monitored to verify that the levels are decreasing. The installation of vapor barriers to cut off exposure of building occupants to the residual volatile vapors is the usual regulatory requirement for these areas. Typically, the building construction itself would act as a barrier to residual vapors and the requirement for vapor barriers is an extra level of protection that ensures that occupants are completely safe.

Comparison to other Brownfields

After completion of a FOST, the Shipyard parcels will be substantially like the examples below - Mission Bay or Emeryville properties that have been cleaned up through removing contaminants and remaining health risks managed through engineering and institutional controls.

Mission Bay

Mission Bay is a typical urban Brownfield. It was an area of Bay Fill that was used for rail yards and miscellaneous dumping. After extensive testing, it was decided to redevelop the area, but to prevent exposure to contaminants, single family homes with private yards are prohibited (example of an institutional control) and there is a requirement for the final end use to require an impervious cover or clean topsoil (example of an engineering control). Additionally, due to organic material in the Bay Fill and underlying native material, methane is sometimes detected in soil gas and if present above action levels, methane gas mitigation systems must be designed and installed during building construction. Most of the ground floor uses include research, commercial office space, retail and parking with occasional subsurface uses, typically as parking garages and electrical/mechanical rooms. Once the buildings are constructed, this reduces the need to excavate in the existing soils except for occasional utility repairs.

Emeryville

Located in the heart of the San Francisco Bay Area, Emeryville is a geographically small city bisected by four freeways, two state highways, and the Union Pacific Railroad line. Emeryville was a former hub of industrial activities due to its proximity to San Francisco and Oakland. As large industries began to contract and relocate to other cities in the 1970s, they left behind properties with toxins that had to be cleaned up before other

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businesses could use them. In 1996, the USEPA selected Emeryville for a pilot program of Brownfields cleanup and has granted $5.8 million to the City of Emeryville for this purpose. The City of Emeryville encourages the remediation and reuse of smaller industrial and commercial sites by providing grants and low-interest loans for site assessments and low- or no-interest loans for the cleanup of smaller properties that are often significantly more difficult to redevelop than larger Brownfields sites. The program has helped to stimulate economic growth, create jobs, increase local revenues, encourage cleanup of contaminated properties, and revitalize urban areas. Many properties in Emeryville have been redeveloped using the Brownfields model of evaluating risk and implementing engineering and institutional controls. Emeryville has rapidly developed into a commercial and residential community with a diverse population that is growing at a rate more than 1.5 times the rate of surrounding Alameda County (US Census Bureau, 2010-2013). The city is focusing on development of additional housing and creation of park and recreational facilities including the Emeryville Greenway. Retail development successes include Ikea's, the South Bay Front Area near Interstate 80/Powell Street exit; and the Bay Street regional center with 400,000 square feet of retail, 340 units of residential and parking structures. Sites are served by a regional bus system and local city shuttle bus system linking site to BART and Capitol Corridors train systems.

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Attachment 18

Environmental Mitigation Measures and the MMRP
(From Candlestick Point/Shipyard Phase II Development Plan FEIR)

Attachment 18

Environmental Mitigation Measures and the MMRP

The City certified the FEIR and approved redevelopment plans for Phase 2 of the Shipyard, together with Candlestick Point in the summer of 2010. After the transfer of land from the Navy to the OCII and the concurrence of the various regulatory agencies that the property can safely be used under the City's redevelopment plans, construction on the Shipyard will be required to comply with a variety of applicable federal, state and local environmental laws. These laws will be enforced both through provisions in those laws and through mitigation measures that are part of the MMRP that were adopted as part of the findings during the California Environmental Quality Act (CEQA) approvals in the summer of 2010. A general description of the MMRP and a summary of the mitigation measures from the MMRP for Hazards and Hazardous Materials and Geology and Soils are presented below.

The Environmental MMRP was prepared pursuant to Section 21081.6 of the *California Environmental Quality Act*, known as CEQA (Public Resources Code Section 21000 et seq.), to provide for the monitoring of mitigation measures required of the Candlestick Point–Shipyard Phase II Development Plan (Project), as set forth in the FEIR prepared for the Project. The MMRP is kept on file in the offices of the OCII the Successor Agency to the San Francisco Redevelopment Agency located at One South Van Ness Avenue, Fifth Floor, San Francisco, CA, 94103 and at the City Planning Department (City), 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103.

Prior to the issuance of building permits, while detailed development plans are being prepared for approval by OCII and/or City staff, OCII and/or City staff will be responsible for ensuring compliance with mitigation monitoring applicable to the project construction, development, and design phases. OCII and/or City staff will prepare or cause to be prepared reports identifying compliance with mitigation measures. Once construction has begun and is underway, monitoring of the mitigation measures associated with construction will be included in the responsibilities of designated OCII and/or City staff, who shall prepare or cause to be prepared reports of such monitoring no less than once a month until construction has been completed. Once construction has been completed, the OCII and/or City will monitor the project as deemed necessary.

Any substantive change in the monitoring and reporting plan made by OCII and/or City staff shall be reported in writing to the City Environmental Review Officer. Reference to such changes shall be made in the monthly/yearly Environmental Mitigation Monitoring Report prepared by City staff. Modifications to the mitigation measures may be made by City staff subject to one of the following findings, documented by evidence included in the record:

a. The mitigation measure included in the Final EIR and the MMRP is no longer required because the significant environmental impact identified in the Final EIR has been found not to exist, or to occur at a level which makes the impact less than significant as a result of changes in the project, changes in conditions of the environment, or other factors.

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OR

b. The modified or substitute mitigation measure to be included in the MMRP either provides corrections to text without any substantive change in the intention or meaning of the original mitigation measure, or provides a level of environmental protection equal to or greater than that afforded by the mitigation measure included in the FEIR and the MMRP; and the environment in addition to or greater than those which were considered by the responsible hearing bodies in their decisions on the FEIR and the proposed project; and The modified or substitute mitigation measures are feasible, and the City, through measures included in the MMRP or other City procedures, can assure their implementation.

Findings and related documentation supporting the findings involving modifications to mitigation measures will be maintained in the project file with the MMRP and will be made available to the public upon request.

The mitigation monitoring matrix on the following pages extracts the Hazards and Hazardous Materials (HZ) and Geology and Soils (GE) mitigation measures for which monitoring is required under the MMRP, the time frame for monitoring, and the responsible implementing and monitoring agencies.

If any mitigation measures are not being implemented, the OCII and/or City may pursue corrective action. Penalties that may be applied include, but are not limited to, the following: (1) a written notification and request for compliance; (2) withholding of permits; (3) administrative fines; (4) a stop-work order; (5) criminal prosecution and/or administrative fines; (6) forfeiture of security bonds or other guarantees; and (7) revocation of permits or other entitlements.

For purposes of this summary, the following definitions are used:

- **City's Environmental Review Officer**—The Environmental Review Officer at the San Francisco Planning Department, referred to herein as "ERO."
- **Developer**—An individual who or business that prepares raw land for the construction of buildings or causes to be built physical building space for use primarily by others. This includes contractors of an individual or business that is a developer.
- **Development/Construction Phases**—During construction, three major phases of activities would be expected: abatement and demolition, site preparation and earthwork/grading, and building construction. Within each of these phases are sub-phases generally identified by area. For each parcel, a lot application would be required and individual building permits.
- **Project Applicant**—A Developer.

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Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance

SOURCE:
Candlestick Point-Hunters Point Shipyard
Phase II Development Plan EIR
SFRA File No. ER 06.05.07
Planning Department Case No. 2007.09 46E

MMRP HZ HAZARDS AND HAZARDOUS MATERIALS

MM HZ-1a Article 22A Site Mitigation Plans. Not included because Applies only to Candlestick Point.

MM HZ-1b Compliance with Requirements Imposed by Cleanup Decision Documents and Property Transfer Documents. (Applies only to HPS Phase II) Prior to obtaining a grading,	Project Applicant	Prior to obtaining a grading, excavation, site, building or other permit from the City	OCII/DPH	OCII/DPH	DPH to determine Project Applicant's compliance with Cleanup Decision

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
excavation, site, building or other permit from the City for development activity at HPS Phase II involving subsurface disturbance, the Project Applicant shall submit documentation acceptable to the San Francisco Department of Public Health that the work will be undertaken in compliance with all notices, restrictions and requirements imposed pursuant to a CERCLA ROD, Petroleum Corrective Action Plan, FOST, FOSET or FOSL, including notices, restrictions and requirements imposed in deeds, covenants, leases, easements, and LIFOCs, and requirements set forth in Land Use Control Remedial Design Documents, Risk Management Plans, Community Involvement Plans and health and safety plans. Such restrictions, imposed by federal and state regulatory agencies as a condition on the Navy transfer of the property to the OCII, will ensure that the property after transfer will be used in a manner that is protective of the environment and human health. The OCII may choose to implement this measure by requiring these actions as part of amendments to San Francisco Health Code Article 31, which currently sets forth procedural requirements for development in HPS Phase I, or through an equivalent process established by the City or OCII.		for development activity at HPS Phase 2 involving subsurface disturbance			Documents and Property Transfer Documents
MM HZ-2a.1 Unknown Contaminant Contingency Plan. (Applies to Candlestick Point, HPS Phase II, and off-site improvements.) Prior to obtaining the first site, building or other permit for development activities involving subsurface disturbance, the Project Applicant shall prepare and the San Francisco Department of Public Health shall approve a contingency plan to address unknown contaminants encountered during development activities. This plan, the conditions of which shall	Project Applicant	Prior to obtaining the first site, building or other permit for development activities involving subsurface disturbance	OCII/DPH	OCII/DPH	DPH to approve contingency plan

	Responsibility for	Mitigation	Enforcement	Monitoring	Monitoring Action/ Verification of
be incorporated into the first permit and any applicable permit thereafter, shall establish and describe procedures for implementing a contingency plan, including appropriate notification to nearby property owners, schools and residents and appropriate site control procedures, in the event unanticipated subsurface hazards or hazardous material releases are discovered during construction. Control procedures would include, but would not be limited to, further investigation and, if necessary remediation of such hazards or releases, including off-site removal and disposal, containment or treatment. In the event unanticipated subsurface hazards or hazardous material releases are discovered during construction, the requirements of this unknown contaminant contingency plan shall be followed. The contingency plan shall be amended, as necessary, in the event new information becomes available that could affect the implementation of the plan. This measure shall be implemented for HPS Phase II through additions to Article 31 or through an equivalent process established by the City or OCII as explained in MM HZ-1b.					
MM HZ-2a.2 Site-Specific Health and Safety Plans. (Applies to Candlestick Point, HPS Phase II, and off-site improvements.) Prior to obtaining the first site, building or other permit for the Project from the City for development activities involving subsurface disturbance, the Project Applicant shall prepare and submit to SFDPH a site-specific health and safety plan (HASP) in compliance with applicable federal and state OSHA requirements and other applicable laws to minimize impacts to public health and the environment. development of the plan shall be required as a condition of any applicable permit. The plan shall include	Project Applicant	Prior to obtaining the first site, building or other permit for the Project from the City for development activities involving subsurface disturbance	OCII/DPH	OCII/DPH	DPH to approve HASP.

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Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
identification of chemicals of concern, potential hazards, personal protective equipment and devices, and emergency response procedures. The HASP shall be amended, as necessary, in the event new information becomes available that could affect the implementation of the plan. This measure shall be implemented for HPS Phase II through additions to Article 31 or through an equivalent process established by the City or OCII as explained in MM HZ-1b.					
MM HZ-5a Foundation Support Piles Installation Plan. (Applies to Candlestick Point and HPS Phase II.) Prior to obtaining a permit from the City that authorizes installation of deep foundation piles, the Project Applicant shall prepare and submit a plan acceptable to the City stating that pilot boreholes for each pile would be drilled through the artificial fill materials so the piles can be installed without damage or misalignment and to prevent potentially contaminated fill materials from being pushed into the underlying sediments or groundwater. This measure shall be implemented for Candlestick Point through implementation of mitigation measure MM HZ-1a. This measure shall be implemented for HPS Phase II through additions to Article 31 or through an equivalent process established by the City or OCII as explained in MM HZ-1b.	Project Applicant/ OCII/DBI	Prior to obtaining a permit from the City that authorizes installation of deep foundation piles	OCII/DBI/DPH	OCII/DBI/DPH	DPH/DBI to approve plan
MM HZ-9 Navy-approved workplans for construction and remediation activities on Navy-owned property. (Applies only to the portions of HPS Phase II on Navy-owned property). Construction activities and remediation activities conducted on behalf of the OCII or the Project Applicant, on Navy-owned property shall be	Project Applicant/OCII/City	Prior to construction and remediation activities on Navy-owned property.	City/OCII	City/OCII	Navy to approve construction and remediation activities workplan. Construction Contractor to submit quarterly report of

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
conducted in compliance with all required notices, restrictions, or other requirements set forth in the applicable lease, easement, or license or other form of right of entry and in accordance with a Navy-approved workplan. This mitigation measure also requires that such activities be conducted in accordance with applicable health and safety plans, dust control plans, stormwater pollution prevention plans, community involvement plans, or any other documents or plans required under applicable law. The OCII will access Navy property through a lease, license, or easement. The City/OCII shall not undertake any activity or approve any Project Applicant activity on Navy-owned property until the Navy and other agencies with approval authority have approved a workplan for the activity. The requirement to comply with the approved work plans shall be incorporated into and made a condition of any OCII approvals related to activities on Navy property. This measure shall be implemented for HPS Phase II through a process established by the City or OCII as explained in MM HZ-1b.					compliance activity, until deemed complete by OCII.
MM HZ-10b Regulatory OCII–Approved Workplans and Permits for Shoreline Improvements. Prior to undertaking any shoreline improvement activities that would affect sediment at HPS Phase II, the OCII or its contractor or Project Applicant shall prepare appropriate design documents and submit to US EPA, DTSC, RWQCB, and, if necessary, the Navy and CDPH for approval. A Dredged Material Management Office (DMMO) permit shall be obtained. The design documents shall incorporate the necessary shoreline improvements required for each specific area (e.g., including, but not limited to, rock buttressing, pile replacement, backfilling, riprap, or	Project Applicant/Construction Contractor/OCII	Prior to undertaking any shoreline improvement activities that would affect sediment at HPS Phase II	OCII	US EPA, DTSC, RWQCB, and, if necessary, the Navy and CDPH	Appropriate regulatory agencies to approve f design documents.

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
installation of natural-looking shoreline protection using fill and ACB mats) such that remediation (removal of sediment and any necessary dredging) and structural improvements are performed under the same regulatory approvals and permits.					
Prior to undertaking any shoreline improvement activities that could affect contaminated sediments left in place and covered or capped with a Navy-installed remedial measure, or that would involve pile replacement in such areas, the OCII or its contractor or Project Applicant shall prepare appropriate design documents that: (1) describes how the cover or cap would be inspected to determine whether proposed shoreline improvements would adversely affect the cover or cap; and (2) describes how construction activities would be performed to mitigate environmental risk and to restore the cover or cap. The design documents shall be submitted to US EPA, DTSC, RWQCB, and, if necessary, the Navy and CDPH for approval. A DMMO permit shall be obtained, as applicable.					
Prior to undertaking any shoreline improvements that could encounter contaminated sediments, the OCII or its contractor or Project Applicant shall comply with all requirements incorporated into the design documents, work plans, health and safety plans, dust control plans, and any other document or plan required under the Administrative Order of Consent. This includes all restrictions imposed pursuant to a CERCLA ROD, Petroleum Corrective Action Plan, FOSET, including restrictions imposed in deeds, covenants, and requirements set forth in Land Use Control Remedial Design Documents, Risk Management Plans and health and safety plans. Prior to obtaining a grading, excavation, site, building, or other permit from the City that					

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
authorizes remedial activities, SFDPH shall confirm that the work proposed complies with the applicable plans required by the Administrative Order of Consent. This measure shall be implemented through additions to Article 31 or through an equivalent process established by the City or OCII as explained in MM HZ-1b.					
MM HZ-12 Compliance with Administrative Order on Consent at Early Transferred Parcels. (Applies only at HPS Phase II.) Prior to undertaking any remediation activities at HPS Phase II on property that the Navy has transferred to the OCII as part of an early-transfer, the OCII or its contractor or Project Applicant shall comply with all requirements incorporated into remedial design documents, work plans, health and safety plans, dust control plans, community involvement plans, and any other document or plan required under the Administrative Order on Consent. This includes all notices, restrictions, and requirements imposed pursuant to a CERCLA ROD, Petroleum Corrective Action Plan, FOSET, including restrictions imposed in deeds, covenants, and requirements set forth in Land Use Control Remedial Design Documents, Risk Management Plans, community involvement plans, and health and safety plans. Prior to obtaining a grading, excavation, site, building, or other permit from the City that authorizes remedial activities, SFDPH shall confirm that the work proposed complies with the applicable plans required by the Administrative Order on Consent. This measure shall be implemented through a requirement in the potential additions to Article 31 imposing requirements to parcels other than Parcel A or through an equivalent process established by the City or OCII.	Project Applicant/ OCII	Prior to obtaining a grading, excavation, site, building, or other permit from the City that authorizes remedial activities	OCII/DPH	OCII/DPH	DPH to determine compliance with Administrative Order on Consent.

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
MM HZ-15 Asbestos Dust Mitigation Plans and Dust Control Plans. Prior to obtaining a grading, excavation, site, building or other permit from the City that includes soil disturbance activities, the Project Applicant shall obtain approval of an Asbestos Dust Mitigation Plan (ADMP) from BAAQMD for areas over 1 acre that potentially contain naturally occurring asbestos and approval of a Dust Control Plan (DCP) from SFDPH for all areas at HPS Phase II and for areas over 0.5 acre at Candlestick Point. Compliance with the ADMP and DCP shall be required as a condition of the permit. The ADMP shall be submitted to and approved by the BAAQMD prior to the beginning of construction, and the Project Applicant must ensure the implementation of all specified dust control measures throughout the construction Project. The ADMP shall require compliance with the following specific control measures to the extent deemed necessary by the BAAQMD to meet its standard: • For construction activities disturbing less than one acre of rock containing naturally occurring asbestos, the following specific dust control measures must be implemented in accordance with the asbestos ATCM before construction begins and each measure must be maintained throughout the duration of the construction Project: > Limit construction vehicle speed at the work site to 15 miles per hour > Sufficiently wet all ground surfaces prior to disturbance to prevent visible dust emissions from crossing the property line > Keep all graded and excavated areas around soil improvement operations, visibly dry unpaved roads, parking and staging areas wetted at least three times	Project Applicant	Prior to obtaining a grading, excavation, site, building or other permit from the City that includes soil disturbance activities. Ongoing throughout construction activity	BAAQMD/DPH	BAAQMD/DPH	BAAQMD and DPH to approve site specific DCP and ADMP and to monitor compliance throughout construction activity

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Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
per shift daily with reclaimed water during construction to prevent visible dust emissions from crossing the property line. Increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour					
> Adequately wet all storage piles, treat with chemical dust suppressants, or cover piles when material is not being added to or removed from the pile					
> Wash down all equipment before moving from the property onto a paved public road					
> Clean all visible track out from the paved public road by street sweeping or a HEPA filter equipped vacuum device within 24 hours					
• For construction activities disturbing greater than one acre of rock containing naturally occurring asbestos, construction contractors are required to prepare an ADMP specifying measures that will be taken to ensure that no visible dust crosses the property boundary during construction. The plan must specify the following measures, to the extent deemed necessary by the BAAQMD to meet its standard:					
> Prevent and control visible track out from the property onto adjacent paved roads. Sweep with reclaimed water at the end of each day if visible soil material is carried out from property					
> Ensure adequate wetting or covering of active storage piles					
> Hydroseed or apply non-toxic soil stabilizers to disturbed surface areas and storage piles greater than ten cubic yards					

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Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
or 500 square feet of excavated materials, backfill material, import material, gravel, sand, road base, and soil that will remain inactive for seven days or more. > Control traffic on on-site unpaved roads, parking lots, and staging areas—including a maximum vehicle speed of 15 miles per hour or less > Control earth moving activities > Provide as much water as necessary to control dust (without creating run-off) in any area of land clearing, earth movement, excavation, drillings, and other dust-generating activity > Control dust emissions from off-site transport of naturally occurring asbestos containing materials > Stabilize disturbed areas following construction If required by the BAAQMD, air monitoring shall be implemented to monitor for off-site migration of asbestos dust during construction activities, and appropriate protocols shall be established and implemented for notification of nearby schools, property owners and residents when monitoring results indicate asbestos levels that have exceeded the standards set forth in the plan. The DCP shall be submitted to and approved by the SFDPH prior to the beginning of construction, and the site operator must ensure the implementation of all specified dust control measures throughout the construction Project. The DCP shall require compliance with the following specific mitigation measures to the extent deemed necessary by the SFDPH to achieve no visible dust at the property boundary:					

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Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
• Submission of a map to the Director of Health showing all sensitive receptors within 1,000 feet of the site. • Keep all graded and excavated areas, areas around soil improvement operations, visibly dry unpaved roads, parking and staging areas wetted at least three times per shift daily with reclaimed water during construction to prevent visible dust emissions from crossing the property line. Increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour • Analysis of wind direction and placement of upwind and downwind particulate dust monitors. • Record keeping for particulate monitoring results. • Requirements for shutdown conditions based on wind, dust migration, or if dust is contained within the property boundary but not controlled after a specified number of minutes. • Establishing a hotline for surrounding community members who may be potentially affected by Project-related dust. Contact person shall respond and take corrective action within 48 hours. Post publicly visible signs around the site with the hotline number as well as the phone number of the BAAQMD and make sure the numbers are given to adjacent residents, schools, and businesses. • Limiting the area subject to construction activities at any one time. • Installing dust curtains and windbreaks on windward and downwind sides of the property lines, as necessary. Windbreaks on windward side should have no more than 50% air porosity					

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Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
• Limiting the amount of soil in trucks hauling soil around the job site to the size of the truck bed and securing with a tarpaulin or ensuring the soil contains adequate moisture to minimize or prevent dust generation during transportation. • Enforcing a 15 mph speed limit for vehicles entering and exiting construction areas. • Sweeping affected streets with water sweepers at the end of the day. • Hiring an independent third party to conduct inspections for visible dust and keeping records of those inspections. • Minimizing the amount of excavated material or waste materials stored at the site. • Prevent visible track out from the property onto adjacent paved roads. Sweep with reclaimed water at the end of each day if visible soil material is carried out from property For all areas, this measure shall be implemented through Article 22B (areas over one half acre) or for HPS Phase II through a requirement in the potential additions to Article 31 imposing requirements to parcels other than Parcel A or through an equivalent process established by the City or OCII.					
MMRP GE GEOLOGY AND SOILS					
MM GE-2a Mitigation to Minimize Dewatering Impacts during Construction. Prior to the issuance of any permit for a construction activity that would involve dewatering that could affect structures on adjacent or nearby properties, the Applicant shall, in compliance with Section 1803.1 of the *San Francisco Building Code* (SFBC), include in the permit application methods and techniques to	Project Applicant	Prior to the issuance of any permit for a construction activity that would involve dewatering that could affect structures on adjacent or nearby properties	DBI	DBI	Approval of permit applications

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
ensure that dewatering would not lower the water table such that unacceptable settlement (as determined by a California Certified Engineering Geologist [CEG] or California Registered Geotechnical Engineer [GE]) at adjacent or nearby properties would occur. Such methods and technologies shall be based on the specific conditions at the construction site and could include, but are not necessarily limited to, the following: • Excavating below the groundwater table in confined areas with steel sheet piling driven below the base elevation of the proposed excavation, installation of bracing to support the excavation walls as required and, if necessary, underpinning the foundations of adjacent structures. Subsequently, the excavation would be carried out and seepage that enters the dammed area would be pumped out. • Perform dewatering using methods such as wellpoint systems, drainage ditches, and sump pumps.					
The excavation or dewatering methods shall be monitored to detect ground settlement and to monitor individual dewatering activities in the vicinity of an excavation. Monitoring results shall be submitted to the San Francisco Department of Building Inspection (DBI). In the event of unacceptable ground movement, as determined by DBI inspections and/or the review of monitoring results, all excavation work shall cease and corrective measures (including, for example, different dewatering methods and/or ground stabilization methods) shall be determined by the Project CEG or GE and reviewed and approved by DBI. No construction permit involving dewatering	Project Applicant	During excavation and dewatering activities	DBI	DBI	Approval of corrective measures. Ongoing throughout construction activity

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Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
would be issued until the Project CEG or GE and DBI have approved dewatering and/or ground stabilization methods. The Project CEG or GE shall implement the corrective measures and continue monitoring activities.					
MM GE-3 Mitigation to Minimize Rock Fragmentation Impacts during Construction. Prior to the issuance of any permit for a construction activity that would involve controlled rock fragmentation that could cause settlement or lateral movement of structures on adjacent or nearby properties, the Applicant shall, in compliance with Section 1803.1 of the *San Francisco Building Code* (SFBC), include in the permit application methods and techniques to ensure that controlled rock fragmentation would not cause unacceptable vibration and/or settlement or lateral movement of structures at adjacent or nearby properties. Such methods and technologies shall be based on the specific conditions at the construction site such as, but not limited to, the following: • Pre-excavation surveying of potentially affected structures. • Underpinning of foundations of potentially affected structures, as necessary.	Project Applicant	Prior to the issuance of any permit for a construction activity that would involve controlled rock fragmentation	DBI	DBI	Approval of permit applications
The excavation plan shall include a monitoring program to detect ground settlement or lateral movement of structures in the vicinity of an excavation. Monitoring results shall be submitted to DBI. In the event of unacceptable ground movement, as determined by DBI inspections, all excavation work shall cease and corrective measures shall be implemented. The controlled rock fragmentation program and ground stabilization measures shall be reevaluated and approved by the DBI.		During controlled rock fragmentation activities	DBI	DBI	Approval of corrective measures. Ongoing throughout controlled rock fragmentation activities

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Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
MM GE-4a.1 Site-Specific Geotechnical Investigation with Seismic Analyses. Prior to the issuance of any building permits for the Project site: • The Applicant shall submit to the San Francisco Department of Building Inspection (DBI) for review and approval a site-specific, design-level geotechnical investigation prepared by a California Certified Engineering Geologist (CEG) or California Registered Geotechnical Engineer (GE), as well as project plans prepared in compliance with the requirements of the San Francisco Building Code (SFBC), the Seismic Hazards Mapping Act, and requirements contained in CGS Special Publication 117A "Guidelines for Evaluating and Mitigating Seismic Hazards in California." In addition, all engineering practices and analyses of peak ground accelerations and structural design shall be consistent with SFBC standards to ensure that structures can withstand expected ground accelerations. The CEG or GE shall determine and DBI shall approve design requirements for foundations and all other improvements associated with the permit application.	Project Applicant	Prior to issuance of construction site permit	DBI	DBI	Approval of design requirements for foundations and all other improvements associated with the permit application. Ongoing throughout construction activity
• DBI shall employ a third-party CEG and California Registered Professional Engineer (Civil) (PE) to form a Geotechnical Peer Review Committee (GPRC), consisting of DBI and these third-party reviewers. The GPRC shall review the site-specific geotechnical investigations and the site-specific structural, foundation, infrastructure, and other relevant plans to ensure that these plans incorporate all necessary geotechnical mitigation measures. No permits shall be issued by DBI until the	DBI	Prior to approval of site-specific geotechnical investigations	DBI	DBI	Approval of site-specific geotechnical investigations. Ongoing throughout construction activity.

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
GPRC has approved the geotechnical investigation and the Project plans, including the factual determinations and the proposed engineering designs and construction methods. • All Project structural designs shall incorporate and conform to the requirements in the site-specific geotechnical investigations. • The Project CEG or GE shall be responsible for ensuring compliance with these requirements.					
MM GE-4a.2 Seismic Design Compliance Documentation. Prior to the issuance of building permits for the replacement of the Alice Griffith Public Housing site, the Applicant shall submit any and all seismic design compliance documentation to the HUD, as required by that agency. The Project Developer shall confirm, by copy of all documents submitted, including transmittal, compliance with this requirement to DBI. The Project California Certified Engineering Geologist (CEG) or California Registered Geotechnical Engineer (GE) shall be responsible for verifying Project compliance with this requirement.	Project Applicant	Prior to the issuance of building permits for the replacement of the Alice Griffith Public Housing site	DBI/HUD	DBI	Approval of site-specific geotechnical investigations for the replacement of the Alice Griffith Public Housing site.
MM GE-4a.3 Site-specific Seismic Analyses to Ensure Safety of Bridge Design. Prior to the issuance of any building permits for the Project site, the California Certified Engineering Geologist (CEG) or California Registered Geotechnical Engineer (GE) for the Project shall confirm that the design-level geotechnical investigation for the Yosemite Slough bridge is based on Caltrans specifications (*Bridge Design Specifications*, Section 20 of *Bridge Memos to Designers*, *Seismic Design Criteria* as previously described) and meets the San Francisco Department of Public Works Bureau of Engineering (BOE) requirements. The	Project Applicant	Prior to the issuance of building permits for the Yosemite Slough bridge	DPW	DPW	Approval of site-specific geotechnical investigations for the Yosemite Slough bridge

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
Project CEG or GE and California Registered Structural Engineer (SE) shall approve bridge design. No building permits shall be issued until the CEG or GE and SE verify that the Project's bridge design complies with all Caltrans specifications and BOE requirements.					
MM GE-5a Site-Specific Geotechnical Investigation with Analyses of Liquefaction, Lateral Spreading and/or Settlement. Prior to issuance of building permits for the Project site:	Project Applicant/Project Geologist	Prior to issuance of building permits for the Project site	DBI	DBI	Approval of site-specific geotechnical investigations
• The Applicant shall submit to the San Francisco Department of Building Inspection (DBI) for review and approval a site-specific, design-level geotechnical investigation prepared by a California Certified Engineering Geologist (CEG) or California Registered Geotechnical Engineer (GE), as well as project plans prepared in compliance with the requirements of the San Francisco Building Code (SFBC), the Seismic Hazards Mapping Act, and requirements contained in CGS Special Publication 117A "Guidelines for Evaluating and Mitigating Seismic Hazards in California." In addition, all engineering practices, and analyses of structural design shall be consistent with SFBC standards to ensure seismic stability, including reduction of potential liquefaction hazards.					
• DBI shall employ a third-party CEG and California Registered Professional Engineer (Civil) (PE) to form a Geotechnical Peer Review Committee (GPRC), consisting of DBI and these third-party reviewers. The GPRC shall review the site-specific geotechnical investigations and the site-specific structural, foundation, infrastructure, and other relevant plans to ensure that these plans incorporate all	DBI	Prior to approval of site-specific geotechnical investigations	DBI	DBI/GPRC	Approval of site-specific geotechnical investigations

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
necessary geotechnical mitigation measures. No permits shall be issued by DBI until the GPRC has approved the geotechnical investigation and the Project plans, including the factual determinations and the proposed engineering designs and construction methods. • All Project structural designs shall incorporate and conform to the requirements in the site-specific geotechnical investigations. • The site-specific Project plans shall incorporate the mitigation measures contained in the approved site-specific geotechnical reports to reduce liquefaction hazards. The engineering design techniques to reduce liquefaction hazards shall include proven methods generally accepted by California Certified Engineering Geologists, subject to DBI and GPRC review and approval, including, but not necessarily limited to: > Structural Measures ○ Construction of deep foundations, which transfer loads to competent strata beneath the zone susceptible to liquefaction, for critical utilities and shallow foundations ○ Structural mat foundations to distribute concentrated load to prevent damage to structures > Ground Improvement Measures ○ Additional over-excavation and replacement of unstable soil with engineering-compacted fill ○ Dynamic compaction, such as Deep Dynamic Compaction (DDC) or Rapid Impact Compaction (RIC), to densify loose soils below the groundwater					

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
table ○ Vibro-compaction, sometimes referred to as vibro-floatation, to densify loose soils below the groundwater table ○ Stone columns to provide pore pressure dissipation pathways for soil, compact loose soil between columns, and provide additional bearing support beneath foundations ○ Soil-cement columns to densify loose soils and provide additional bearing support beneath foundations • The Project CEG or GE shall be responsible for ensuring compliance with these requirements.					
MM GE-6a Site-Specific Geotechnical Investigation with Landslide Risk Analyses. Prior to issuance of building permits for the Project site: • The Applicant shall submit to the San Francisco Department of Building Inspection (DBI) for review and approval a site-specific, design-level geotechnical investigation prepared by a California Certified Engineering Geologist (CEG) or California Registered Geotechnical Engineer (GE), as well as project plans prepared in compliance with the requirements of the San Francisco Building Code (SFBC), the Seismic Hazards Mapping Act, and requirements contained in CGS Special Publication 117A "Guidelines for Evaluating and Mitigating Seismic Hazards in California." In addition, all engineering practices, and analyses of structural design shall be consistent with SFBC standards to ensure seismic stability, including reduction of potential landslide hazards.	Project Applicant	Prior to issuance of building permits for the Project site	DBI	DBI	Approval of site-specific geotechnical investigations

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Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
• DBI shall employ a third-party CEG and California Registered Professional Engineer (Civil) (PE) to form a Geotechnical Peer Review Committee (GPRC), consisting of DBI and these third-party reviewers. The GPRC shall review the site-specific geotechnical investigations and the site-specific structural, foundation, infrastructure, and other relevant plans to ensure that these plans incorporate all necessary geotechnical mitigation measures. No permits shall be issued by DBI until the GPRC has approved the geotechnical investigation and the Project plans, including the factual determinations and the proposed engineering designs and construction methods. • All Project structural designs shall incorporate and conform to the requirements in the site-specific geotechnical investigations. • The site-specific Project plans shall incorporate the mitigation measures contained in the approved site-specific geotechnical reports to reduce landslide hazards. The engineering design techniques to reduce landslide hazards shall include proven methods generally accepted by California Certified Engineering Geologists, subject to DBI and GPRC review and approval. The design-level geologic and geotechnical studies shall identify the presence of landslides and potentially unstable slopes and shall identify means to avoid the hazard or support the design of engineering procedures to stabilize the slopes, as required by Chapter 18 (Soils and Foundations) of the SFBC, as well as the procedures outlined in CGS Special Publication 117A. SFBC Sections 1803 through 1812 contain the formulae, tables, and graphs by which the	DBI	Prior to approval of site-specific geotechnical investigations	DBI	DBI/GPRC	Approval of site-specific geotechnical investigations

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Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
Project engineer shall develop the Project's slope-stability specifications, including the appropriate foundation designs for structures on slopes and which would be used by DBI to verify the applicability of the specifications. If the presence of unstable slopes is identified, appropriate support and protection procedures shall be designed and implemented to maintain the stability of slopes adjacent to newly graded or re-graded access roads, work areas, and structures during and after construction, and to minimize potential for damage to structures and facilities at the Project site. These stabilization procedures, including, but not necessarily limited to, the following: > Retaining walls, rock buttresses, screw anchors, or concrete piers > Slope drainage or removal of unstable materials > Rockfall catch fences, rockfall mesh netting, or deflection walls > Setbacks at the toe of slopes > Avoidance of highly unstable areas • The Project CEG or GE shall be responsible for ensuring compliance with these requirements.					
MM GE-10a Site-Specific Geotechnical Investigation with Expansive Soils Analyses. Prior to issuance of building permits for the Project site: • The Applicant shall submit to the San Francisco Department of Building Inspection (DBI) for review and approval a site-specific, design-level geotechnical investigation prepared by a California Certified Engineering Geologist (CEG) or California Registered Geotechnical Engineer (GE), as well as project	Project Applicant	Prior to issuance of building permits for the Project site	DBI	DBI/GPRC	Approval of site-specific geotechnical investigations

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
plans prepared in compliance with the requirements of the San Francisco Building Code (SFBC). In addition, all engineering practices, and analyses of structural design shall be consistent with SFBC standards to ensure soils stability, including reduction of potential soil expansion hazards.					
• DBI shall employ a third-party CEG and California Registered Professional Engineer (Civil) (PE) to form a Geotechnical Peer Review Committee (GPRC), consisting of DBI and these third-party reviewers. The GPRC shall review the site-specific geotechnical investigations and the site-specific structural, foundation, infrastructure, and other relevant plans to ensure that these plans incorporate all necessary geotechnical mitigation measures. No permits shall be issued by DBI until the GPRC has approved the geotechnical investigation and the Project plans, including the factual determinations and the proposed engineering designs and construction methods. • All Project structural designs shall incorporate and conform to the requirements in the site-specific geotechnical investigations. • The site-specific Project plans shall incorporate the mitigation measures contained in the approved site-specific geotechnical reports to reduce expansive soils hazards. The engineering design techniques to reduce expansive soils hazards shall include proven methods generally accepted by California Certified Engineering Geologists, subject to DBI and GPRC review and approval. The design-level geologic and geotechnical studies shall identify the presence of expansive soils and potentially unstable soils and shall identify	DBI	Prior to approval of site-specific geotechnical investigations	DBI	DBI/GPRC	Approval of site-specific geotechnical investigations

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
means to avoid the hazard or support the design of engineering procedures to stabilize the soils, as required by Chapter 18 (Soils and Foundations) of the SFBC. SFBC Sections 1803 through 1812 contain the formulae, tables, and graphs by which the Project engineer shall develop the Project's soil-stability specifications, including the appropriate foundation designs for structures on expansive soils and which would be used by DBI to verify the applicability of the specifications. If the presence of expansive soils is identified, appropriate support and protection procedures shall be designed and implemented to maintain the stability of soils adjacent to newly graded or re-graded access roads, work areas, and structures during and after construction, and to minimize potential for damage to structures and facilities at the Project site. • The Project CEG or GE shall be responsible for ensuring compliance with these requirements.					
MM GE-11a Site-Specific Geotechnical Investigation with Corrosive Soils Analyses. Prior to issuance of building permits for the Project site: • The Applicant shall submit to the San Francisco Department of Building Inspection (DBI) for review and approval a site-specific, design-level geotechnical investigation prepared by a California Certified Engineering Geologist (CEG) or California Registered Geotechnical Engineer (GE), as well as project plans prepared in compliance with the requirements of the San Francisco Building Code (SFBC). In addition, all engineering practices, and analyses of structural design	Project Applicant	Prior to issuance of building permits for the Project site	DBI	DBI/GPRC	Approval of site-specific geotechnical investigations

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
shall be consistent with SFBC standards to ensure soils stability, including reduction of potential hazards from corrosive soils.					
• DBI shall employ a third-party CEG and California Registered Professional Engineer (Civil) (PE) to form a Geotechnical Peer Review Committee (GPRC), consisting of DBI and these third-party reviewers. The GPRC shall review the site-specific geotechnical investigations and the site-specific structural, foundation, infrastructure, and other relevant plans to ensure that these plans incorporate all necessary geotechnical mitigation measures. No permits shall be issued by DBI until the GPRC has approved the geotechnical investigation and the Project plans, including the factual determinations and the proposed engineering designs and construction methods.	DBI	Prior to approval of site-specific geotechnical investigations	DBI	DBI/GPRC	Approval of site-specific geotechnical investigations
• All Project structural designs shall incorporate and conform to the requirements in the site-specific geotechnical investigations.					
• The site-specific Project plans shall incorporate the mitigation measures contained in the approved site-specific geotechnical reports to reduce potential hazards from corrosive soils. The engineering design techniques to reduce corrosive soils hazards shall include proven methods generally accepted by California Certified Engineering Geologists, subject to DBI and GPRC review and approval. The design-level geologic and geotechnical studies shall identify the presence of corrosive soils and shall identify means to avoid the hazard, as required by Chapter 18 (Soils and Foundations) of the SFBC. SFBC Sections 1803 through 1812 contain the formulae, tables, and graphs by which the					

Mitigation Measure	Responsibility for Implementation	Mitigation Timing	Enforcement Responsibility	Monitoring Responsibility	Monitoring Action/ Verification of Compliance
Project engineer shall develop the Project's structural design specifications, including the appropriate foundation designs for structures on corrosive soils and which would be used by DBI to verify the applicability of the specifications. If the presence of corrosive soils is identified, appropriate protection procedures shall be designed and implemented to minimize potential for damage from corrosive soils to structures and facilities at the Project site. • The Project CEG or GE shall be responsible for ensuring compliance with these requirements.					

Attachment 19

Risk Management Plan

Attachment 19
Risk Management Plan

The Navy and OCII contemplate that land at HPS will be transferred in discrete parcels over time. Transfer would occur only after: (1) the remedy is in place, (2) the FFA Signatories have approved the Remedial Action Completion Report, and (3) the FFA Signatories have concurred on the FOST which means that the land is suitable for the intended use. At the moment of transfer, the Navy will enter into a CRUP with DTSC specifying restrictions applicable to each Parcel.

As many of the parcels transfer from the Navy to the OCII, they will have restrictions imposed on them that preclude subsurface activities unless regulators approve specific work plans. The Risk Management Plan (RMP) is a document called for by the LUC RDs, which provide that, "*A RMP will set forth certain requirements or protocols that, if followed, will allow certain activities that are otherwise restricted to be performed without additional approval by FFA signatories.*" The RMP complies with this provision of the LUC RDs by specifying circumstances and conditions under which certain Restricted Activities may be performed without additional FFA Signatory approval (hereafter referred to as Restricted Activities Authorized with Conditions). The FFA Signatories have approved an RMP that identifies certain limited restricted activities that may be conducted provided the RMP protocols are followed. In addition to providing the manner in which Restricted Activities Authorized with Conditions must be performed, the environmental procedures and protocols set forth in this RMP are intended to provide a basis for the future property owner to prepare activity-specific work plans for FFA Signatory approval. Such activity plans may include dust control plans, health and safety plans, vapor mitigation plans, and groundwater management plans. The RMP is a living document prepared by the OCII, in conjunction with its developer, CP Development Co., LP, (CP DevCo) and in consultation with the Navy and regulators.

The RMP states that for all other restricted activities, the developer must prepare a Restricted Activities Work Plan for regulatory approval, which sets forth protocol by which the restricted activities can be conducted. The protocol in the Restricted Activities Work Plan will be very similar to those specified in the RMP. The risk management measures in the RMP or Restricted Activities Work Plan are designed to ensure the integrity of the implemented remedies. The RMP is intended for use by future property owners to ensure protection of the Navy's remedy and for use by the OCII, FFA Signatories and SFDPH to assist in ensuring that future property owners comply with the applicable restrictions in CRUPs and Deeds. The CRUPs and Deeds recognize the RMP.

A summary of the Restricted Activities Authorized with Conditions[16] from the 2015 version of the RMP are:

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[16] This is a summary only. Anyone performing restricted activities must refer to the current version of the RMP for the exact details.

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- Any activity occurring on land that is less than one (1) acre in size (contiguous area) and involves movement of soil to the surface from below the surface of the land, or penetrates the Durable Cover, including, but not limited to excavation, grading, or other movement of soil.
- Excavation of soil from one location and placement at any other location so long as it is placed beneath an FFA Signatory approved Durable Cover (e.g., 2 feet of clean fill, asphalt cover, sidewalk, street, building foundation, etc.), subject to the some limitations.
- After dedication and acceptance of public rights-of-way by the City, excavation in the public rights-of-way for purpose of installing, repairing, and maintaining the public rights-of-way, utilities and surface/subsurface facilities that are connected to the utilities and related appurtenances.
- Demolition or removal of "hardscape" (e.g., concrete or asphalt roadways, parking lots, building foundations, sidewalks, etc.) for a contiguous area less than one (1) acre in size. Following completion of hardscape removal, an FFA Signatory approved Durable Cover must be re-installed.
- Vertical development in an area in which horizontal development has been completed, and in which the horizontal development completion report specifies that a separate work plan for vertical development is not required.

As described in the RMP, risk management measures required during Restricted Activities Authorized with Conditions, include, but are not limited to, specific protocols and requirements related to:

- construction worker health and safety
- removal and replacement of durable covers
- soil management
- soil stockpile management
- dust control
- off-site disposal of soil and wastes
- unexpected conditions
- soil import
- groundwater management
- soil vapor management
- storm water management
- groundwater monitoring
- access control during construction and maintenance activities
- shoreline improvements

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As the RMP is updated, it will be made available in the HPS information repositories (see Attachment 13) and on the SFDPH HPS Redevelopment website.

The RMP is not required for Parcel A or Parcel D-2 because those Parcels are not subject to a CRUP. In addition, the RMP is not applicable to the HPS areas where the remedy includes a demarcation layer below several feet of clean imported soil and deed restrictions that prohibit digging below the demarcation layer. For these areas certain land uses (e.g., residential) and activities (e.g., digging below certain depths) will be restricted at the site to ensure the containment remedy remains protective. A portion of the IR Site 7/18 on Parcel B, the shoreline area of Parcel E, and the majority of Parcel E-2 are currently anticipated to have demarcation layers. A separate work plan will be written for construction of parks and open space facilities in these areas.

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Attachment 20

City Permitting and City Maintenance of Public Property

Attachment 20
City Permitting and City Maintenance of Public Property

This attachment explains the City permit process that will apply to all development at the Shipyard and the role the City will have in maintaining public property once development is complete.

Overview

Prior to transfer of property from the Navy to the City at the Shipyard, the Navy will complete the remedial action plan for the property under CERCLA (Attachment 3), place environmental restrictions on the property through the recording of deed restrictions and enter into a CRUP with the DTSC. Through these documents, the environmental restrictions will run with the land and bind all future property owners. It is expected that these restrictions will, among other requirements, prohibit disturbance of the durable covers (i.e. hardscape or two feet of clean imported fill) placed on the property by the Navy and prohibit extraction of groundwater unless undertaken in a manner that complies with procedures approved by the FFA Signatories. Under some circumstances, such as disturbance of less than an acre of soil during the grading and infrastructure phase or potentially larger areas of vertical development in previously graded areas, it is anticipated that property owners would be authorized to perform subsurface work if done in accordance with procedures in the RMP (see Attachment 19) approved by the FFA Signatories and incorporated into the CRUP. In other circumstances, it is anticipated that the FFA Signatories will approve Restricted Activities Work Plans submitted by the party wishing to undertake the work.

Complementing the regulatory scheme established by the FFA, deed restrictions and CRUP, the City requires anyone who disturbs soil or the durable cover placed on the property by the Navy as part of its CERCLA remedial action plan to provide proof that construction plans comply with the environmental restrictions before obtaining a subsurface work permit from the City of San Francisco (Health Code Article 31, Health Code Section 804, Health Commission Regulations Under Article 31, Building Code Section 106A.3.2.5, S.F. Public Works Code Section 2.3.1, and Subdivision Code Sections 1645 and 1646). Once permits are issued, the City has authority to enforce the permit requirements. Before closing out the permits, the City has a process for assuring that the structures or public improvements were constructed in accordance with code requirements, which assure that any building foundations, streets, parks or other "soil covers" also satisfy the cover requirements that apply under the environmental restrictions. Finally, at the conclusion of the development, the City will own all streets and sidewalks and most public open space areas, which it will maintain. These City mechanisms will assure an additional level of oversight during any development activities that will complement the oversight provided by the Navy and Regulatory Agencies.

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City Construction Permit Process

Permit Application Review and DPH Oversight Once Approved

During the development process at the Shipyard, a developer, contractor, property owner, or other person developing a site is required by the San Francisco Building, Public Works, and Health Codes to obtain permits to engage in subsurface work and to satisfy the SFDPH that the work will be done in accordance with the environmental restrictions placed on the property through the CERCLA process. Persons wishing to develop property at the Shipyard are required to apply for:

1. A permit at the Department of Building Inspection (DBI) to build a structure or to excavate or grade a site for a structure that requires a building permit under the San Francisco Building Code[17] or;

2. A permit at the Department of Public Works (DPW) to excavate , grade or construct in any current or proposed public right of way area (e.g. proposed streets, sidewalks and parks) under the San Francisco Public Works Code and San Francisco Subdivision Code or;

3. A permit at SFDPH to install an underground storage tank or to install a groundwater well (i.e., for construction dewatering) under the San Francisco Health Code.

Under Article 31 of the Health Code, permitted activities described above involving the disturbance of soil at the Shipyard require the permit applicant (Applicant) to obtain approval of various plans under Article 31 to assure that environmental restrictions and conditions are appropriately taken into account during the permitted activities. Only after the Applicant receives approval of the required plans and meets all other permit requirements, will the Applicant receive approval to begin the building, grading or other permitted activity.

Health Code Article 31 and Health Commission implementing regulations specify details for the required plans and reports, including the preparer's qualifications. The following required evaluations, plans, and reports are specified in the ordinance and regulations and will be required for Shipyard property with a durable cover restriction:

- Site Evaluation Report containing project description information;
- Evaluation of areas within a thousand feet of the Parcel E-2 landfill
- Dust Control Plan;
- Disposal Plan for removal of soil or other material from the site;
- HASP for worker health and safety;

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[17] Only construction of a few types of structures do not require a permit, such as a fence not more than 6 feet tall and a small storage shed.

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- Soil Importation Plan, if applicable;
- An Unknown Contaminant Contingency Plan containing information about what to do in the event of the discovery of unknown contamination or unexpected conditions;
- A Foundation Support Piles Installation Plan for areas where piles will be driven into artificial fill materials (this would apply to all areas that are not on bedrock);
- Closure Report confirming implementation of the required plans;
- Proof of compliance with the specific institutional controls listed in any transfer document that may contain institutional controls such as the deeds, Land Use Control Remedial Design (LUC RD), RMP, or CRUP.

Under Health Code Article 31, if a RMP for the property has been approved that includes an approved DCP, HASP, or Soil Importation Plan, then the Applicant can submit copies of those plans and approval letters from EPA to meet the submittal requirement for those plans. If the EPA approved DCP does not include specifics about particulate monitoring then the Director can require that information to be submitted.

For Parcel A and D-2 that are designated by the Navy as suitable for unrestricted residential reuse with no durable cover requirement, there are a few additional items and/or plans required to be submitted, as applicable, prior to obtaining a permit or closure of permit. These Parcel A and D-2 specific requirements are:

- In most cases, areas on Parcel A and D-2 may meet a 50 cubic yard soil disturbance exclusion because the area is suitable for unrestricted residential use.
- If demolition of LBP impacted structures is planned, then the Applicant is required to submit a Scope of Work to Collect Additional Information related to the potential concern about LBP in soil. Proof of implementation of the approved plan is also required as part of the Closure Report process.
- Submittal of a Serpentinite Cover Plan to address the requirement for one foot of clean fill, vegetative cover that holds soil in place or hardscape over areas containing serpentinite fill (which is presumed to contain NOA).
- Additional information may need to be included in a Site Evaluation Report if the area of soil disturbance does not have a previously approved Closure Report that included an approved Serpentinite Cover Plan unless concerns about NOA have been addressed. The additional information required for the Site Evaluation Report may include a site history, data evaluation, sampling, or additional characterization information.

Once the applicable plans are approved the Applicant is required to implement the plans during their work. In the case of some plans, like the Soil Importation Plan, the implementation is relatively simple. Prior to bringing imported soil or sand to the site the applicant tests the material to verify that it passes the import criteria. By contrast the

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implementation of the DCP on Parcel A requires daily control and monitoring activities. Some of the activities include watering work areas prior to and during excavation, running particulate monitors, submitting the daily particulate record to SFDPH and noting if any particulate was recorded above an action level or if there are any problems with the particulate monitoring. DPH reviews these records to verify proper implementation and to determine if there are any dust control problems. In the case of Parcel A, DPH also receives the airborne asbestos monitoring results and reviews those results.

City Enforcement during Permitted Activity

While the grading, excavation or construction is in progress and prior to issuance of certificates of occupancy or completion, SFDPH, DBI and DPW have many enforcement mechanisms at their disposal.

Department of Public Health

SFDPH has enforcement authority under Article 31 of the Health Code. SFDPH can respond to community complaints and conduct inspections to verify that the Applicant is complying with its approved plans. In addition, since proof of compliance with the institutional controls for the property (such as compliance with the RMP) is included as a requirement under Article 31, SFDPH can use its enforcement authority under Article 31 for RMP requirements too. In addition to responding to complaints and conducting inspections, SFDPH can issue Notices of Violation, require the Applicant to stop work for a specified period of time, require the Applicant to attend a Director's Hearing, issue cleanup and abatement orders, impose administrative civil penalties or ask the City Attorney to pursue injunctive relief.

As an example, SFDPH employed all of the following enforcement mechanisms during the mass grading project at Parcel A:

- Responded to community complaints by conducting inspections;
- Conducted random unannounced inspections ranging from monthly to weekly to daily;
- For a certain period of time, conducted continuous daily inspections;
- Issued Notices of Violation for DCP violations with requirements for increased control, mitigation, monitoring or reporting;
- Required the Applicants to stop work for a specified period of time to identify and implement additional dust mitigation measures.

Departments of Building Inspection and Public Works

Because the SFDPH approvals are incorporated as part of the DBI and DPW permit, SFDPH can ask DBI and DPW to use their enforcement authority or DBI and DPW can act in their own capacity. The enforcement mechanisms for DBI and DPW include

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responding to community complaints, conducting inspections, issuing Notices of Violation, imposing penalties for permit violations, requiring the Applicant to stop work for a specified period of time until violations are corrected or requiring the Applicant to attend a Director's Hearing.

City Process for Closing Permits

In the case of building permits, when the work is complete and the relevant departments verify that their requirements are met, DBI issues a temporary certificate of occupancy or a final occupancy permit. Before DBI will issue a certificate of occupancy for any building, the departments that were required to review the permit for applicable code requirements and sign the permit prior to DBI permit issuance are asked to verify that all permit requirements were met.

To construct public improvements, developers typically will obtain a DPW street improvement permit. When DPW issues such permits, it consults with any interested department and once the construction is done, the departments that imposed requirements will inspect the improvements to confirm that the requirements are satisfied before DPW will issue a notice of completion. DPW also oversees the subdivision mapping process and approves infrastructure requirements, including public improvement agreements, which will set out the specific public improvements required to be constructed to support a particular subdivided area.

In the case of SFDPH's authority under Article 31, SFDPH will not approve closure of a DPW permit or certificate of occupancy for a DBI permit or until it has approved the related Article 31 permitted activity. For instance, in the past SFDPH was asked to sign off on closure of DBI permits for demolition of LBP impacted structures on Parcel A. In that process, SFDPH verified that closure reports related to soil sampling for LBP had been approved by SFDPH. For final closure of DPW and DBI permits, Article 31 and its implementing regulations require the closure report submitted by the Applicant to include:

- proof of compliance with institutional controls listed in the deed, CRUP or RMP to the extent that the institutional controls apply to the activities authorized by the permit;
- proof of implementation of all approved plans (listed above) and any changes made during implementation of the plans;
- certification by a registered professional that has overseen the compliance with approved plans.

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City Acceptance of Streets and Parks in the Candlestick Point-Shipyard Project

If the City is going to own public improvements constructed by a developer it must accept them as having satisfied the requirements for public improvements under the Subdivision Code. The City follows a formal acceptance process by adopting an ordinance to accept improvements or property containing the improvements. If the public improvements are to be in new public right of way areas, the approving ordinance will specify the nature of the public right of way and designate the area as such. Under the Subdivision Map Act and the Shipyard Subdivision Code, the Developer will be required to post a bond for the improvements and that bond security will not be released until the work is completed and approved by the City. The City will not accept public improvements until it confirms that the improvements have been constructed in accordance with code requirements and approved plans.

Subsequent Permitting Once Initial Construction is Complete

Once the Shipyard site is developed with new structures, streets, sidewalks and parks, alterations to property might be undertaken, such as modifying or building new structures or excavating in streets or parks. These kinds of activities will require following the DBI or DPW permit process and, if soil is being disturbed, following the SFDPH Article 31 process. All property under DPW permit jurisdiction (e.g. public right of way) would be required to obtain DPW permits for any excavation.

After initial redevelopment construction is complete, all subsequent activities that require subsurface disturbance will require City permits with the exception of minimal landscaping activities on private property (or other property not under the jurisdiction of DPW) that would not involve construction of any structure under DBI jurisdiction.

City Property Maintenance

At the conclusion of initial redevelopment, the City would expect to own and maintain all of the major public parks and all streets, sidewalks and utilities in street areas classified as retail streets, boulevard park streets or local streets in the Shipyard Design for Development. In the case of accepted City street areas, the City maintains the street and adjacent property owners are responsible for maintaining sidewalks, for which permits for work are required. Generally, adjacent owners are also responsible for maintaining street trees; removal and replacement of street trees also are subject to City permit requirements. The Design for Development identifies some additional public amenities that are required that would be open to the public but held in private ownership and maintained by the private owner of the property. These include mid-block breaks (public easements over private property used as pedestrian mews or vehicular alleyways) and public plazas and pocket parks in specified areas.

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Summary

As part of the initial development, the developer will have to comply with many environmental restrictions during construction that involves subsurface disturbance through permits issued and overseen by DBI, DPW and SFDPH. Work that does not involve subsurface disturbance but involves construction of structures will additionally be overseen by DBI.

During subsequent rounds of construction, any construction of new or modification of old structures will require permits from DBI and any excavation of public right of way areas (expected to include all streets, sidewalks and parks) will require permits from DPW. In either case, subsurface excavations would be subject to the Health Code Article 31 process and oversight by SFDPH.

Once construction is complete, the City will own and maintain accepted public streets and sidewalks and all of the major public parks. Only mid-block breaks, small plazas and small pocket parks will be held privately.

Therefore, the activities that are subject to public agency oversight are:

- Construction and maintenance activities that require SFDPH, DBI or DPW permits;
- All activities carried out on public property (streets, sidewalks, parks), including long term maintenance.

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Attachment 21

Summary of Prior Dust Issues

Attachment 21
Summary of Prior Dust Issues

Between 2006 and 2010, concerns were expressed about dust and asbestos fibers generated during grading and infrastructure construction at Parcel A. The SFDPH and its outside consultants have carefully studied the potential health impacts of the dust particulates and naturally occurring asbestos disturbed during grading activities on Parcel A. As explained in a memorandum dated February 1, 2007, from Dr. Rajiv Bahtia, the medical director of SFDPH's Environmental Health Section (Exhibit 21-1), SFDPH consulted the Chief of the Epidemiological Investigations Unit at the California Department of Health Services (DHS) to determine appropriate investigations to assess the impacts on area residents of exposure to the construction dust generated on Parcel A. SFDPH also retained an independent environmental consultant (Langan Treadwell Rollo) and an industrial hygiene expert (Acumen Industrial Hygiene) to address the same issues (Exhibit 21-2). All of these expert sources confirmed SFDPH's conclusion that, given the limited exposure periods and low levels that could have occurred at the Shipyard, it is highly unlikely that exposure to naturally occurring asbestos from the grading operations on Parcel A posed an endangerment to human health. This conclusion applies even if "worst case" assumptions are made about the period when Lennar's air monitors were not functioning during the summer of 2006.

SFDPH also sought guidance from CDPH as to whether there were any medically accepted tests that could address community concerns. CDPH confirmed SFDPH's assessment that non-invasive testing (e.g., x-rays, blood tests) for asbestos in humans does not exist and invasive testing (e.g., lung biopsy) is not routinely available or recommended. In addition, SFDPH consulted with the ATSDR and they too confirmed that there are no tests for asbestos in humans and that adequate air monitoring is the recommended method to assess exposure (Exhibits 21-3 and 21-4).

On October 29, 2007, the BAAQMD held a hearing on the Shipyard dust issue. Although the BAAQMD Board instructed staff to consider fining Lennar for violations related to the failure of Lennar's monitors in the Summer of 2006 (BAAQMD later did fine Lennar for this monitoring failure), the BAAQMD reiterated that the "action" levels set for the Shipyard are "conservative and health protective and provide a significant margin of safety" and that the risk from estimated exposures at the Shipyard are less than 3 in 1,000,000, well within BAAQMD's health standards. A copy of BAAQMD's presentation is attached as Exhibit 21-5.

The analyses of several independent experts have provided further support of the judgments of the SFDPH, CAL/OSHA and BAAQMD that the construction work on Parcel A did not represent a significant long-term health risk to the community or workers.

In September 2007, one of the country's leading public health experts on issues related to asbestos exposures and other environmental health matters, Dr. John Balmes of the University of California at San Francisco, concluded that he "agreed[d] with SFDPH that

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it is unlikely that exposure to naturally occurring asbestos from grading operations on Parcel A will create a significant risk to human health in the community." Dr. Balmes based his conclusion, in part, on the fact that the shut-down (or "exceedance") levels set by BAAQMD were set so low as to be "designed to be health protective and ensure a low risk even assuming a person would be exposed to certain levels of asbestos on a continual and ongoing basis for 70 years (emphasis added). Here by contrast, the grading period was less than eighteen months and the air monitoring data shows that the average level of asbestos was significantly lower than the amount that is thought to pose a risk of long-term injury." Dr. Balmes presented his findings at workshop hosted by the CAC in September 2007 and a copy of his report is attached as Exhibit 21-6.

The ATSDR, working with the CDPH, also completed its analysis of the dust issue at the Shipyard in September 2007. The CDPH performed the substantive analysis in the report and concluded that "even a 7-year exposure to the levels of asbestos measured around the excavation was estimated to have risks that, on a personal level, would be considered low. When one considers that the exposures [at the Shipyard] have occurred over the course of a year or two, the estimated risk would be even lower." The report also concluded that individual medical testing, including blood and radiological testing, is not warranted or recommended. A copy of the CPDH's substantive report is attached as Exhibit 21-3.

The CDPH report did, however, stress that as a matter of good public health policy, less dust is better, and, thus, the CDPH made a series of recommendations to further improve dust control at the site. Those recommendations included additional independent oversight, and public outreach. The City agreed with CDPH's focus on further minimizing dust and implemented many of CDPH's recommendations. A copy of SFDPH's 2007 response letter to the ATSDR and CDPH outlining the City's plans to implement those recommendations is attached as Exhibit 21-7. In 2009, USEPA conducted a data review of the construction and the airborne asbestos monitoring. USEPA also conducted a reanalysis of 34 of the airborne asbestos samples that were collected at the site. The reanalysis included several of the highest airborne asbestos readings that have ever been detected at the site. The reanalysis took into consideration the types and lengths of asbestos fibers found in the samples. USEPA issued a final report of their work in June 2010 which is attached as Exhibit 21-8. Their analysis was biased to the highest detections of airborne asbestos at the site since the majority of the samples analyzed from the site have detected no airborne asbestos or much, much lower levels than the 34 samples that were reanalyzed. Their conclusion is that the Dust Monitoring Program and the BAAQMD monitoring procedures are operating in an effective manner in minimizing dust generation and limiting asbestos exposure.

In summary, the following agencies have reviewed the dust and airborne asbestos monitoring and control systems in place at the Shipyard Parcel A Redevelopment:

- San Francisco Department of Public Health (SFDPH)

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- Bay Area Air Quality Management District (BAAQMD)
- California Department of Public Health (CDPH)
- Agency for Toxic Substances and Disease Registry (ATSDR)
- United States Environmental Protection Agency (USEPA)

These Agency reviews suggested improvements to the dust monitoring and control and the majority of these suggestions were implemented. None of these agencies recommended shutting down the construction or suggested that the prior grading or excavation work created a substantial or long-term health risk. As the attached letter from the CAC states, the conclusions of these regulators and health experts at this point in time should be considered "definitive" (Exhibit 21-9).

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Exhibit 21-1

Informational Memorandum to SFRA regarding Monitoring the Enforcement of Dust Control Measures and the Evaluation of Health Concerns Related to Phase I Construction, from SFDPH, February 2007

San Francisco City and County
Department of Public Health
Environmental Health Section

Gavin Newsom, *Mayor*
Mitchell H. Katz, *,Director of Health*

Rajiv Bhatia, *M.D.,M.P.H.*
Director of Environmental Health

INFORMATIONAL MEMORANDUM

DATE: February 1, 2007

TO: Marcia Rosen, Executive Director, San Francisco Redevelopment Agency

FROM: Rajiv Bhatia, Medical Director, Environmental Health Section

PURPOSE OF INFORMATION

The San Francisco Redevelopment Agency Commission has expressed an interest in closely monitoring the enforcement of dust control measures and the evaluation of health concerns related to the Hunters Point Shipyard Phase I construction. This memo provides an update on the San Francisco Department of Public Health (SFDPH) activities related to these issues.

Overall SFPDH has two priority objectives

- Ensuring effective compliance with required dust control plans in order to prevent resident exposure to both particulate matter and specific constituents in dust.
- Responding to community concerns regarding the safety of development activities via public communication, assessment of environmental hazards, and individual health assessments.

SFDPH is currently involved is several related activities to achieve the above objectives. Updates on each of these activities are provided below.

Enhancing Dust Control Plan Compliance Activities

Over the course of the Parcel A Phase I redevelopment project, SFDPH has responded to public complaints about the dust control issues at the site. These complaint inspections have involved inspecting the site, working with Lennar to correct the source of the complaint and citing Lennar when the problem was a violation of the DCP. In addition, because of the problems that have occurred with dust control, SFDPH has conducted regular random compliance inspections to verify Lennar's compliance with their DCP.

As a result of continued community concerns, SFDPH has initiated a new program of daily unannounced compliance inspections to monitor Lennar's

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compliance with their DCP. These inspections are scheduled at two independent random times per day. These formal inspections are in addition to the regular random compliance inspections that were occurring and will continue to occur when the on-site SFDPH inspector drives to and from his Shipyard office during the course of his other daily activities.

Enhancing the Dust Control Plan

SFDPH has informed Lennar verbally and in writing on a number of occasions that their dust control efforts needed improvement. SFDPH has proposed revisions to the DCP to enhance clarity and specificity of roles and required actions. We intend to finalize the revisions to the DCP no later than the week of February 12. As a public document, copies of the revised plan will be sent to interested parties.

Facilitating BAAQMD Oversight for Community Monitoring Locations

On Tuesday, January 23, 2006, SFDPH received an email from the Bay Area Air Quality Management District (BAAQMD) stating that the community monitoring locations would not be subject to BAAQMD enforcement authority. These community monitoring locations were voluntarily installed by the Agency's consultant, Treadwell and Rollo, with the intent of being used by Lennar as part of their asbestos air sampling network subject to the work suspension requirements. Lennar has consistently directed their subcontractor to suspend work when the community monitoring locations have exceeded the work suspension number.

In the interest of having all monitoring locations subject to the same enforcement procedures, SFDPH sent a letter on January 25, 2007 to BAAQMD asking that the community monitoring locations be added to Lennar's required asbestos monitoring sites subject to BAAQMD enforcement. SFDPH also requested that BAAQMD specifically review the data from Wednesday, January 10 and take appropriate enforcement action. BAAQMD has acknowledged receipt of these requests.

Responding to Health Concerns of Students and Staff of the Muslim University of Islam School (the "School")

SFDPH believes that direct communication with concerned individuals is an important component of response to community concerns about environmental hazards. SFPDH maintains its willingness to meet with parents, students and staff of the School; however, School staff has not responded to continued offers by SFDPH to schedule such a meeting.

Conducting Health Evaluations of Students from the School

At the January 3, 2007 meeting, attended by the San Francisco Redevelopment Agency (the "Agency"), the School and two Agency Commissioners, representatives from SFDPH made a commitment to conducting scientifically appropriate health evaluations of any individual who had health concerns related to exposure at the School. Subsequently, Dr. Rajiv Bhatia sent a draft protocol for assessing the children's health to Dr. Alim Muhammad on January 9, 2007. Dr. Muhammad acknowledged his receipt of the draft protocol today and has indicated he will send a detailed response in the next week or so. SFDPH is willing to implement this protocol but will need the assistance of the School to identify concerned parents and children. Delay in implementing the protocol may adversely affect the ability of the evaluation to assess the relationship between health concerns and the exposure concerns.

Dr. Bhatia has contacted the Chief of the Epidemiological Investigations Unit at the California Department of Health Services ("DHS"), Environmental Health Investigations Branch for advice and recommendations as to the components of a health assessment. SFDPH specifically asked what tests might be appropriate and provide useful information in this exposure context. DHS did not recommend any biological, laboratory, or radiological testing. They also felt that it is unlikely that risk assessments would yield useful results due to the limited duration of the exposure.

Conducting an Assessment of Exposures at the School to Airborne Naturally Occurring Asbestos (NOA) Generated during Grading Activity

At the January 3, 2007 meeting with the School's administrators, SFDPH agreed to review all the asbestos air sampling and particulate monitoring data collected from Parcel A and the School and use this information to estimate an upper limit of likely exposures to NOA at the School for the period covering April 25, 2006 through August 2, 2006. While definitive conclusions are difficult for the time period with no data, it is possible to use existing data to try and make an educated scientific guess about the upper limit to the possible NOA exposures. DPH is currently working with Treadwell and Rollo, the Agency's environmental consultants, on an internal draft of this assessment. A draft for public review will be available no later than the week of February 12.

Notifying the School of all Exceedances of NOA Work Suspension Thresholds

SFDPH made a commitment to communicate all NOA exceedances to the School. Ms. Brownell from SFDPH has telephoned and emailed Dean Leon Muhammad whenever Lennar has had an exceedance of the asbestos air sampling work suspension level and informed him of the required work suspension. She has also continued to work with him on any complaints or questions that he has had about Lennar's work.

Exhibit 21-2

Memorandum to All Interested Parties regarding Assessment of Exposure to Airborne Asbestos at Parcel A, from SFDPH, February 2007

San Francisco City and County
Department of Public Health
Environmental Health Section

Gavin Newsom, *Mayor*
Mitchell H. Katz, *Director of Health*

Rajiv Bhatia, *M.D., M.P.H.*
Director of Environmental Health

DATE: February 15, 2007

TO: All Interested Parties

FROM: Rajiv Bhatia, Medical Director

SUBJECT: Assessment of Exposure to Airborne Asbestos at Hunters Point Shipyard Parcel A' Lennar BVHP Redevelopment Project

Attached is an assessment conducted by Treadwell and Rollo on behalf and in close consultation with staff of the San Francisco Department of Public Health. This assessment evaluates airborne asbestos exposure for residents, students and workers adjacent to the Hunters Point Shipyard Parcel A' Lennar BVHP Redevelopment Project. Naturally occurring serpentinite rock on the project site contains naturally occurring asbestos. Asbestos air samples were required to be collected during the mass grading of this project to monitor the levels of naturally occurring asbestos. Due to a problem with Lennar's asbestos air sampling, there are no verifiable asbestos air samples for the project from April 25 (the start of mass grading) through August 2, 2006. Asbestos air samples have been reliably collected since August 3, 2006 on days when excavation activities have been conducted. The attached analysis was conducted to assess the possible exposure to airborne asbestos during the gap in sampling at the beginning of the project and throughout the life of the project.

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MEMORANDUM

This memorandum presents Treadwell & Rollo, Inc. and Acumen Industrial Hygiene's comments on the potential for community exposure to airborne asbestos related to grading and excavation work conducted by Lennar contractors at Parcel A' in areas where serpentinite rock containing naturally occurring asbestos (NOA) is present.

Memorandum Summary

To evaluate the potential for community exposure to airborne asbestos near the Parcel A' grading operations, Treadwell & Rollo completed the following:

- Reviewed the Asbestos Hazard Emergency Response Act (AHERA) methodology for air sampling;
- Compared the AHERA and worker personal monitoring methodology;
- Reviewed and compared the existing particulate and asbestos monitoring data;
- Estimated a possible "worst-case" exposure to asbestos; and
- Compared the worst case exposure to existing health based standards.

The AHERA methodology used for the ambient air asbestos sample collection was developed for use in clearing school buildings for rehabitation following asbestos abatement work. Under AHERA, the affected areas of a school can be reoccupied if results for air samples collected within the buildings are 20,000 structures per cubic meter or do not exceed results for samples collected outside the buildings.

Workers represent the population who experience the greatest and most direct hazards from the activity of concern due to the higher concentration of NOA and longer duration of exposures. Although results from the AHERA method and the phase contrast microscopy (PCM) method used to analyze worker personal samplers are not comparable, there have been no exceedances of worker asbestos criteria for Lennar's worker personal sampler results.

No correlation was found to exist between the asbestos and particulate data sets, i.e. high dust levels do not correlate to high asbestos levels and vice versa. Thus, particulate measurements can not be used to derive airborne asbestos levels for a period when there is no asbestos sampling data.

Based on the analysis of the asbestos air sampling data, the predicted worst case average asbestos air concentration for individuals at the Muhammad University of Islam School is 6,609 structures per cubic meter (sampling location HV-5) and the worst case average asbestos air concentration for any adjacent resident, student or worker is 5,403 structures per cubic meter. This exposure can be compared to the Bay Area Air Quality

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Management District (BAAQMD) work suspension level of 16,000 structures per cubic meter which predicts an increased risk for asbestos cancers of one in ten thousand if exposed continuously for 70 years.

Background

The grading work occurring on Parcel A' is regulated by three agencies: the San Francisco Department of Public Health (SFDPH) has authority over dust control per Health Code Article 31; the Bay Area Air Quality Management District (BAAQMD) has authority over asbestos in air via the Asbestos Dust Mitigation Plan (ADMP) and by requiring a conservative work suspension level for air sampling results; and the California Occupational Health and Safety Administration (Cal OSHA) regulates worker protection. The BAAQMD asbestos work suspension level of 16,000 structures per cubic meter (s/m^3) is based on the increased likelihood of getting asbestos cancers (asbestosis, lung cancer, and mesothelioma) if an individual is exposed to this level continuously for a 70-year period. Work suspension based on exceedance of this level is intended to prevent resident exposure to asbestos for a significant duration of time.

Significant earthwork began on 25 April 2006. Lennar's environmental consultant began monitoring particulates in air for dust control on 28 June 2006. Lennar monitored asbestos in air for BAAQMD compliance from the beginning of the project; however Lennar's consultant CH2MHill discovered problems with the asbestos air monitoring data through 2 August 2006. Therefore, verifiable asbestos air monitoring data are only available starting 3 August 2006.

Because of these problems with lack of asbestos air monitoring data for three months, enhanced community monitoring protocols were developed to provide independent monitoring of Lennar's activities. In mid-September, SFDPH and the San Francisco Redevelopment Agency's (SFRA) environmental outreach consultant, ArcEcology, proposed the following protocols to Lennar:

- Independent monitoring at three new in-neighborhood community air sampling stations;
- Establish one additional monitoring station on the Shipyard near Building 101/110; and
- Acceptance of a protocol where exceedances at community monitoring locations would trigger a work suspension.

Lennar began monitoring at the additional locations on 5 December 2006. SFRA's consultant, Treadwell & Rollo, began monitoring at the additional community locations on 21 December 2006. Asbestos and particulate monitoring locations are shown on the attached Figure 1. All available verifiable data from all asbestos and particulate monitoring locations were evaluated in this exposure assessment.

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Asbestos Hazard Emergency Response Act (AHERA) Methodology

The Asbestos Hazard Emergency Response Act (AHERA) method using transmission electron microscopy (TEM) is used for the asbestos air sample collection and analysis. The AHERA method was developed for asbestos abatement carried out in schools and is subject to regulations under the AHERA rule of 1986. The AHERA rule (40 CFR Part 763) specifies a bifactorial process for determining when an asbestos abatement site is clean enough for the primary containment barriers to be removed. The process consists of a thorough visual inspection of surfaces for debris, residue, or dust to establish that a "no dust criterion" has been achieved. After the abatement site has passed a thorough visual inspection, air samples are collected under aggressive sampling conditions; i.e., air blowers are used to dislodge fibers from surfaces and circulating fans keep the fibers suspended during sampling. The air samples are analyzed by TEM. If no visible debris, residue, or dust is detected by the unaided eye, the site is more likely to pass the TEM clearance air test specified in the AHERA rule. Clearance for re-habitation of the building is given if results for samples collected within the building are not statistically above levels outside the containment or building (using a z-test) or the fiber loading is less than or equal to 70 structures per square millimeter (s/mm^2) of filter area. The TEM AHERA method could pass clearance with levels of 20,000 s/m^3 (0.02 s/cc), inside a school, based on the minimum sample volume of 1,200 liters and fiber loading of 70 s/mm^2. The CARB Modified AHERA method uses a much larger volume (~3,000 liters) for the ambient air to reach the required analytical sensitivity of 1,000 s/m^3 (0.001 s/cc), and the work suspension level is 16,000 s/m^3 (0.016 s/cc)

Asbestos Air Sampling and Worker Personal Monitoring Data Comparison

The AHERA TEM and phase contrast microscopy (PCM) methods are very different. The PCM method is used to analyze worker personal samples using a much smaller volume (~400 liters) and the limit of detection would be about 0.1 fibers per cubic centimeter (f/cc) or 100,000 fibers per cubic meter (f/m^3). PCM also uses a Light Microscopy to identify fibers greater than 5 microns which may or may not be asbestos fibers, whereas the TEM AHERA method uses a larger volume (~3,000 liters) for the ambient air samplers to identify small structures down to 0.5 microns. Because the AHERA method uses TEM, it identifies actual asbestos; however the AHERA method counts fibers that are bound to particles, whereas PCM would not. Although not every regulatory agency agrees, the >5 micron fiber length represents current scientific consensus that attributes cancer-causing potential to long (>5 microns) fibers.

Although the worker and ambient air results are not directly comparable, there have been no exceedances of worker protection criteria for PCM results from the Lennar worker personal samplers. Worker exposure is relevant to the assessment of exposures adjacent to the site because workers represent a population who experience the greatest and most direct hazards from the activity of concern, both in terms of concentration of NOA and duration of exposures.

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Asbestos Air Sampling and Particulate Sampling Data Comparison

Due to problems with the initial asbestos air sampling, there are no verifiable asbestos air sampling data from the start of grading 25 April through 2 August 2006. There is particulate data for part of this time period from 28 June through 2 August and there is both asbestos air sampling and particulate monitoring data available from August through the present day. If a relationship exists between particulate and asbestos air sampling data then asbestos levels during the time period from 28 June to 2 August 2006 could be estimated based on the particulate measurements.

The correlation coefficient is a statistical measure of the relationship between two sets of data. The calculations were performed using Microsoft®Excel™ which takes the covariance of the two data sets and divides by the product of their standard deviations. Correlation is a bivariate (two variables) measure of association (strength) of the relationship between two variables. It varies from 0 (random relationship) to 1 (perfect linear relationship) or -1 (perfect negative linear relationship). It is usually reported in terms of its square (r^2), interpreted as a percent of variance. For instance, if r^2 is 0.25, then the independent variable is said to explain 25% of the variance in the dependent variable.

For this site, three of the data sets evaluated are relatively large, with between 73 and 76 pairs of data, while three other data sets are smaller, with between 14 and 19 pairs of data. The correlation analysis was performed for the following six pairs of data:

- Asbestos levels at HV-1 and particulate levels at the Haul Road;
- Asbestos levels at HV-1 and particulate levels at the Hilltop;
- Asbestos levels at HV-5 and particulate levels at the Hillside;
- Asbestos levels at HV-5 and particulate levels at the School;
- Asbestos levels at HV-6 and particulate levels at the Hillside; and
- Asbestos levels at HV-6 and particulate levels at the School.

The calculated correlation coefficient (r^2) for five out of six data pairs is zero, indicating that there is no relationship between particulate (i.e., dust) levels and airborne asbestos levels in these areas at Parcel A'. For one of the smaller data sets, the value of r^2 is 0.22, which a very low value and, particularly in light of the results for the five other data pairs, is likely attributable to mere chance. Thus, elevated dust levels measured at the particulate monitoring locations at this site do not correspond to the elevated asbestos levels measured at the asbestos air sampling locations. Conversely, an elevated airborne asbestos level may be occurring at a time when particulate levels are relatively low. Therefore, it appears that soil-disturbing construction activities resulting in releases of airborne particulates (dust) do not appear to correlate to elevated asbestos levels in the air at the perimeter of Parcel A'. Hence, dust measurements at the perimeter of the site can

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not be used to predict levels of airborne asbestos at the perimeter of the site during the time period of missing asbestos data.

Estimated Average Worst Case Exposure Levels

Because construction activities started on 25 April 2006, but adequate daily asbestos air monitoring only began on 3 August 2006, a gap of 100 days exist with no asbestos air monitoring data. Thus, the potential time period when unknown exposures to NOA occurred is relatively short (100 days).

The 95% Upper Confidence Limit (UCL) for the asbestos data was developed using the U.S. EPA software ProUCL Version 3.00.22, which evaluates the distribution of the data, identifies the optimum method for estimating the 95% UCL, and then estimates the actual value.

95% UCL values were developed for the available data, incorporating the following assumptions:

- The available data included samples collected at HV1, HV2, HV4, HV5, HV6, HV7, HV8, HV9, HV10, and HV11. Samples were only collected Monday through Friday of each week.
- The total structures per m^3 concentration for each sample was used.
- All available data, including duplicates (samples collected by MACTEC, CH2MHill, and Treadwell & Rollo/Acumen) were included as individual data points.
- Results reported as not detected were assumed to be a value of ½ the detection limit (consistent with U.S. EPA and Cal EPA guidance).
- Results reported as Not Available or Not Detected, but with no detection limit, were excluded from the data set.
- 95% UCL concentrations were developed for the entire data set, as well as for the data individually collected at HV1, HV2, HV4, HV5 and HV6. Insufficient data (less than 15 data points each) were available for HV7, HV8, HV9, HV10, and HV11 and most of those data points were reported as not detected.

Based on these assumptions and methods the worst case average exposure levels at each location are:

- HV-1 = 9,786 structures per m3
- HV-2 = 7,133 structures per m3
- HV- 4 = 7,219 structures per m3
- HV-5 = 6,609 structures per m3
- HV-6 = 4,744 structures per m3
- Total for all data = 5,403 structures per m3

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Estimates of asbestos exposure were developed based on the available air monitoring data for samples collected between 3 August 2006 and 24 January 2007. In accordance with U.S. EPA guidelines, an upper bound estimate of the average concentration was used to evaluate the overall potential asbestos exposures. U.S. EPA considers the average concentration as the most representative of the concentration that would be contacted at a given site over time. The 95 percent (%) Upper Confidence Limit (UCL) of the average concentration is a statistical upper bound estimate of the average concentration that takes into account the relative distribution of the data.

Short-term Exposure and Existing Health Based Standards

The 95% UCL concentrations, for data from the individual monitors as well as for the data combined, were all less than the BAAQMD work suspension level of 16,000 structures per m^3. As stated previously, the BAAQMD work suspension level of 16,000 structures per m^3 is based on an exposure duration assumption of 70 years. Any evaluation of potential excess cancer risks for the Parcel A' construction activities would be for less than one year. The Office of Environmental Health Hazard Assessment (OEHHA) of Cal EPA has indicated that "short –term high exposures are not necessarily equivalent to longer-term lower exposures even when the total dose is the same. OEHHA therefore does not support the use of current cancer potency factors to evaluate cancer risk for exposures of less than 9 years." Therefore, estimating cancer risk based on one year of exposure is not recommended and has not been developed for the 95% UCL values.

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Approximate Prevailing Wind Direction

Hi-Vol-8
Griffith & Navy

Hi-Vol-6
Reardon Cul-de-Sac

Hi-Vol-7
School/ Community Center

Navy Road

Hi-Vol-5
La Salle/Earl

Parcel A' Hillside

Crisp Avenue

Hi-Vol-4
Trailer

Donahue Road

Galvez Avenue

Hi-Vol-9
Donahue Condos

Friedell Street

Jerrold Avenue

Coleman Street

Hi-Vol-2
Water Tank

Parcel A' Hilltop

Hi-Vol-1
Hilltop

Robinson Street

Hi-Vol-10
Robinson & Fisher

Hi-Vol-11
Galvez & Horne

Hill Drive

Horne Avenue

Parcel A

Parcel A

Spear Avenue

LEGEND

- BAAQMD Required Monitoring Location
- Community Asbestos Monitoring Location
- Parcel A' Boundary
- Parcel B' Boundary
- Buildings
- Buildings Numbers
- Community Asbestos Monitoring Location Results do not trigger work shut down

0 300 600 Feet
Approximate scale

Source: CH2MHill, 9/2006.

PARCEL A' PHASE 1 DEVELOPMENT PROJECT
HUNTERS POINT SHIPYARD
San Francisco, California

ASBESTOS MONITORING LOCATIONS

Date 02/13/07	Project No. 3848.02	Figure 1

Treadwell&Rollo

Exhibit 21-3

Letter to SFDPH from ATSDR, September 2007, and Letter to ATSDR from CDPH, September 2007, regarding Recommendations Related to Parcel A Development Activities

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

September 20, 2007

Rajiv Bhatia, M.D., M.P.H.
Director of Occupational and Environmental Health
1390 Market Street
Suite 910
San Francisco, California 94102

Dear Dr. Bhatia:

On July 17, 2007, you requested that the Agency for Toxic Substances and Disease Registry (ATSDR) respond to concerns related to grading operations at Hunters Point Shipyard (HPS) Parcel A in San Francisco. As you know, ATSDR funds the California Department of Public Health (CDPH), Site Assessment Section (SAS), to assist us with work within the State of California. The CDPH provided a written evaluation of your request on September 10, 2007. This evaluation is enclosed.

ATSDR concurs with the essential findings, conclusions, and recommendations made by CDPH regarding asbestos and dust levels. There was clear evidence that levels of asbestos exceeded mandated thresholds at both the fence line and in the community. The concentrations of dust could not be interpreted because of the sampling methods. It is reasonable to conclude that levels of dust and asbestos were similar during the months when sampling did not occur. The exposures did result in some increased risk for community residents, although it is not possible to quantify this risk. Medical follow-up or screening is not recommended because there are no valid tests to identify current exposures or predict developing future disease.

Public health follow-up should focus on effective efforts to further reduce exposures and to monitor and verify that these reductions occur. These steps are outlined in the CDPH letter.

You and the Bay Area Air Quality Management District have taken many steps to protect the public from the dust and asbestos generated during work activities at HPS Parcel A. ATSDR and CDPH support your efforts and are committed to helping you address the issues we have raised.

Please feel free to contact CAPT Susan Muza at (415) 947-4316; via email at Muza.Susan@epamail.epa.gov or me at (404) 498-0004; via email at TSinks@cdc.gov if you have comments or concerns.

Sincerely,

Thomas Sinks

Thomas Sinks, Ph.D.
Deputy Director, National Center for Environmental Health/Agency for Toxic Substances and Disease Registry

Enclosure:
Letter from CDPH

cc:
Dr. Rick Kreutzer, CDPH
Ms. Karen Henry, USEPA, Region 9
Mr. Clancy Tenley, USEPA, Region 9
Dr. Tina Forrester, ATSDR, Division of Regional Operations (DRO)
CAPT Susan Muza, ATSDR, DRO

State of California—Health and Human Services Agency
California Department of Public Health

MARK B HORTON, MD, MSPH
Director

ARNOLD SCHWARZENEGGER
Governor

September 10, 2007

Captain Susan L. Muza
Agency for Toxic Substances and Disease Registry
75 Hawthorne Street, Suite 100, HHS-1
San Francisco, CA 94105

Dear Captain Muza:

As part of our cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the Site Assessment Section (SAS), within the California Department of Public Health (CDPH), is sending this letter to assist you with addressing concerns related to grading activities occurring on Parcel A in the Hunters Point district of San Francisco.

On July 17, 2007, the San Francisco City and County Department of Public Health (SFDPH) formally requested assistance from ATSDR to perform the following: 1) review and interpret available air monitoring data for residents living adjacent to Hunters Point Shipyard (HPS) Parcel A development activities and the significance of data gaps; 2) evaluate the assessment and judgments made by SFDPH on the significance of exposure and health impacts on residents and other sensitive uses adjacent to HPS Parcel A development activities; and 3) make recommendations for additional appropriate dust and exposure control and monitoring necessary to protect health of residents.

HPS Parcel A is approximately 75 acres and is located in a geologic area where Naturally Occurring Asbestos (NOA) has been identified. CDPH is aware that the community is divided over the plans to develop this site. Many steps have been taken to address the dust and naturally occurring asbestos issues at this site already (some of which are summarized in this letter).

Since July 17, 2007, the SAS, with ATSDR, has gathered technical information about Parcel A, conducted outreach to the Hunters Point community, and communicated with SFDPH to clarify details of their request and to share a preliminary draft of findings for fact verification.. Here, we provide recommendations for reducing dust/asbestos air levels from on-going and future grading/soil disturbing activities at Parcel A. These recommendations are based upon our review of the plans in place for monitoring dust and asbestos emissions from the site and review of the available monitoring data. Because grading operations are nearing an end, there was some urgency to share these findings with the hope that future dust and asbestos levels could be made even lower.

CDPH Recommendations

CDPH recommends the following actions occur to assure greater confidence, among those living near the excavation, in the safety of activities on Parcel A. These recommendations build on actions SFDPH and other agencies are already conducting at the parcel (the agencies that have authority to implement the recommendation are noted in parentheses). Information that forms the basis for these recommendations is provided in this letter and is referenced at the end of each recommendation:

- Because the contractor has exceeded the Bay Area Air Quality Management District (BAAQMD) asbestos action level that triggers work stoppage on 13% of excavation days, and because there have been complaints about dust, which may cause other health concerns, SFDPH should assign a person to continuously monitor dust production and dust abatement activities during working hours. This is an important way to prevent both dust and asbestos exposures. Essential to this recommendation is that the assigned person not only observes but has the authority to alter activity on the site based on his/her observations. Please see **Overview of Current Dust and Asbestos Monitoring Plans.**

- The assigned person should promptly report to the public what is observed and what is done as a result of the above-mentioned monitoring activities. Please see **Overview of Current Dust and Asbestos Monitoring Plans.**

- Explore additional dust control procedures such as misting at the fence line, tarping the fence, adding an on-site meteorological station, stopping activity that generates dust if winds are 15 miles per hour or more, or tarping grounds where no activity is occurring for seven days or more. It is recommended that the developer engage someone with expertise in dust control to specifically define additional mechanisms to achieve better mitigation and dust suppression. This recommendation is based upon findings in the **CDPH Review of Environmental Data** section.

- Air monitoring equipment on-site and in the community should be used to evaluate the effectiveness of added measures. If ongoing exceedances occur, then more measures should be adopted. Please see **Overview of Current Dust and Asbestos Monitoring Plans.**

- To assist the SFDPH assigned inspector in evaluating the current Dust Control Plan, the contractor should conduct real-time dust monitoring using appropriate equipment for respirable dust (PM-10) at several locations, co-located with asbestos sampling (SFDPH and BAAQMD). SFDPH should use information from monitors during the day to identify activities which are generating PM 10 and alter activity to reduce its generation. As explained below, there are validity problems with the currently used monitoring equipment. Please see **Overview of Current Dust and Asbestos Monitoring Plans.**

- Include the community monitors, especially HV-7, HV-8, and HV-9, in the official asbestos monitoring plan, as regulated by the BAAQMD. These monitors, along with the on-site monitors, create better coverage of the perimeter of such a large parcel (BAAQMD). Please see **Overview of Current Dust and Asbestos Monitoring Plans.**

- Explore ways to reduce the time lag between measuring elevated levels of naturally occurring asbestos and altering parcel activities by returning to 12-hour sampling (when samples often resulted in results the next day). Or, collect from 7 p.m. to 7 p.m., which would similarly mean a result may be available the next day. (BAAQMD for the on-site monitors; SFDPH for the community monitors). As a matter of principle, public agencies should try to be as timely in their feedback as possible. These sampling strategies will advance this goal. Please see **Overview of Current Dust and Asbestos Monitoring Plans** and **CDPH Review of Environmental Data.**

Overview of Current Dust and Asbestos Monitoring Plans

The Asbestos and Dust Control Plans required by BAAQMD and SFDPH call for air monitoring and outline steps the contractor should implement to keep dust from leaving the site perimeter. Mass grading/earthmoving activities began on Parcel A on April 25, 2006.

According to a SFDPH memorandum dated June 2007, there were complaints about dust from the very beginning of the grading activities. The memo notes that, in response to specific complaints, SFDPH would evaluate the adequacy of the dust control measures. In 2006, SFDPH issued three Notices of Violation to the developer concerning the generation of visible dust.

Under SFDPH oversight of the implementation of Article 31, consultants for the developer have conducted real-time monitoring for total dust (primarily 10 micron and smaller) since June 2006. As described in the Parcel A Dust Control Plan, an action level of 0.5 milligrams per meter cubed was established as an action level for total dust (PM 10). The monitors (two downwind and one upwind) record minute by minute readings of PM 10; however, the dust data is not reviewed as it is recorded. It may be reviewed at the end of the day or later. According to the Dust Control Plan, "if dust is generated from on-site soil disturbance or excavation activities and dust levels from these activities are recorded above the action level, the work will stop until additional controls are implemented to reduce dust generation from the specific work area causing the problems."

On August 20, 2007, SFDPH issued a Notice of Violation to the developer of Parcel A for observations that occurred on August 17 related to dust crossing the property boundary and visible dust occurring for over 90 minutes, which was observed by the SFDPH inspector from 2:45 to 4:30 p.m. In issuing the Notice of Violation, they ordered the developer to cease all dust generating activities for 48 hours in order for the developer to "establish work practices that will prevent future recurrences." SFDPH asked the developer to "review the incident for the causes of compliance failure and training of all relevant employees and subcontractors on the requirements

of the Dust Control Plan." In the Notice of Violation letter, SFDPH indicated to the developer that they will be providing a monitor (a person) who will be supervised by SFDPH staff, with costs billed to the developer. In the letter, they state that "through this monitor, SFDPH will independently verify that the dust control is meeting all Dust Control Plan requirements and assist the developer in adhering to plan requirements."

At this time, CDPH has reviewed the equipment being used to monitor dust and a limited set of the dust data. According to the manufacturer, the instrument that has been used to monitor dust at Parcel A is designed for personal/breathing zone monitoring, plant walk-through surveys, remediation site worker exposure monitoring, and indoor air quality. The instrument being used is sensitive to moisture and is a passive sampler. Dust monitors that are approved for PM 10 ambient air standards by the California Air Resources Board are all active samplers. Further, there are dust monitors available that are designed for outdoor applications where moisture is present. Due to the novel application of the equipment for fence line monitoring, CDPH is not able to interpret whether dust exposures in the community occurred that would explain some of the community health complaints such as headaches, bloody noses, adult onset asthma, respiratory symptoms, nausea, and vomiting. We recommend using dust monitors that have been certified for fence line monitoring.

Since there is naturally occurring asbestos at the site, the BAAQMD required consultants for the developer to conduct asbestos air monitoring around the perimeter of the parcel since April 2006. The SFDPH further requested air monitors for asbestos in the neighborhood. The asbestos ambient air action level that would "trigger an immediate on-site evaluation to determine if dust mitigation measures are still effective" was set at 1,600 TEM (Transmission Electron Microscope) structures/m^3. This level corresponds to a 1 in 100,000 increased cancer risk for a 70-year exposure. The ambient air asbestos action level at which grading operations are shut down was set at 16,000 structures/m^3. This level corresponds to a 1 in 10,000 increased cancer risk for a 70-year exposure. Asbestos samples have been collected daily using a vacuum pump that feeds to a filter cassette. The filter cassettes were sent to a laboratory for analysis, typically with a two-day turn around time for results. The two-day lag time delays detecting exceedances of action levels and taking actions to reduce them.

We understand that in the past, staff from SFDPH and BAAQMD have visited the site. In recent months, BAAQMD staff has visited for approximately one hour to two hours every day.

Additionally, the developer hired local community members from Young Community Developers to act as the community's "eyes and ears on the ground" to make sure the construction dust is being properly managed. ATSDR, CDPH, and SFDPH have no detailed information about the training these individuals received or the power these community members have to alter activities on-site.

CDPH Review of Environmental Data

CDPH reviewed the asbestos monitoring data collected between August 3, 2006, and August 19, 2007. There are no asbestos monitoring data available for the first few months of grading (April 25, 2006 – August 2, 2006), due to operator error and equipment malfunctions. Asbestos samples were collected for 12-hour periods starting August 3, 2006, typically from 7 a.m. to 7 p.m. Starting on October 18, 2006, samples were collected for 24 hours, from approximately 7 a.m. to 7 a.m.

The asbestos data has been plotted in a calendar format and color coded to reflect the asbestos measurements while grading activities were occurring relative to the corresponding action levels (see attached). When a recording of greater than 16,000 structures/m^3 occurred, the monitoring station that recorded that level is indicated in parenthesis. A map with names of the monitoring stations and the location of the monitoring stations is also attached. A narrative summary of these findings is also attached.

- Asbestos levels exceeded 1,600 structures/m^3 (the level that triggers an immediate determination of the adequacy of dust mitigation measures) 166 out of 200 days (83%) when grading was occurring on the site. This does not include days of non-operation.

- Asbestos levels exceeded 16,000 structures/m^3 (the level at which grading operations are shut down) 26 out of 200 days (13%) when grading was occurring on the site. This does not include the days of non-operation or of other activities on the property.
    - Exceedances of 16,000 structures/m^3 do not seem to follow a geographical pattern:
        - Exceedances of 16,000 structures/m^3 occurred at stations located along the perimeter of the project where residences or community buildings are located (HV-2, HV-4, HV-5, HV-6, HV-8) 19 times on 16 days of the 200 days. On seven of these days, there were also exceedances at monitoring stations (HV-1, HV-10, HV-11, or HV-12) on the eastern side of the "hilltop" Parcel A away from residences and the community.
        - Exceedances of 16,000 structures/m^3 occurred only at monitoring stations located on the eastern border of the "hilltop" Parcel A away from residences and the community (HV-1, HV-10 (prior to January 26, 2007), HV-11) 20 times on 10 days of the 200 days.
        - There has never been an exceedance of 16,000 structures/m^3 at the monitor on the Muhammed University of Islam School (HV-7) when grading was occurring on Parcel A. The first data from HV-7 occurred on December 5. On February 7, HV-7 recorded 17,800 structures/m^3 on a day when work was being done on the Stormwater Pollution Plan.
    - Exceedances of 16,000 structures/m^3 occurred to a lesser extent last winter during the rainy season, but otherwise do not show a temporal pattern:

        - The following is a listing of the number of exceedances of 16,000 structures/m^3 by month starting in August 2006: 5,2,2,1,1,3,0,0,1,1,3,5,2 (data are not complete for this month).
        - The following is the number of occurrences at the monitoring stations located near the community before and after December 30, 2006:
            - HV-2 5/0
            - HV-4 3/1
            - HV-5 3/3
            - HV-6 1/1
            - HV-8 0/2
    - Wind pattern data are not available for Parcel A. The nearest wind pattern monitoring station is San Francisco Airport, located approximately 10 miles away. This data can not accurately predict conditions at Parcel A.

- Between August 3 and August 10, 2006, asbestos levels exceeded 16,000 structures/m^3 on three days (no measurement reported three of the seven days), with a maximum level of asbestos measured at 24,400 structures/m^3. Grading did not occur on the two weekends during this period. Grading occurred on August 7, August 9, August 11, and August 14; however, no monitoring occurred. (Because of the prior non-detect results from April to June, the developer, as per provisions of the Naturally Occurring Dust Protocol, opted on June 24 to reduce the number of days they would monitor for asbestos to 2 days per week.) On August 15, 16, 17, and 18, no grading occurred because of the exceedances occurring earlier in the month. Apparently the asbestos results for the beginning of August were not received until August 14. This is a gap of 11 days between the first exceedance and the official ceasing of operations due to the exceedance.

- The delay in reporting asbestos levels meant that exceedances of 16,000 structures/m^3 could occur two days in a row: This happened on August 22 and 23, 2006, on January 15 and 16, June 28 and 29, and July 11 and 12, 2007. In all cases, work was stopped two days after the first exceedance.

- Exceedances of 16,000 structures/m^3 occurred on August 30, September 27, October 18, December 18, 2006, and on January 10 and 22, April 12, and July 14 and 24, 2007; work was stopped two days later. There were no exceedances of 16,000 structures/m^3 in the day between the exceedance and shutdown.

- On September 13, 2006, an exceedance of 16,000 structures/m^3 occurred; work was stopped at 11 a.m. the next day due to the exceedance.

- On October 12, 2006, an exceedance of 16,000 structures/m^3 occurred; grading operations were shut down on the afternoon of the following day, October 13.

- On November 30, 2006, asbestos levels exceeded 16,000 structures/m^3, with a maximum level of asbestos measured at 55,700 structures/m^3; grading operations were shut down four days later.

- On February 7, 2007, an exceedance of 16,000 structures/m^3 occurred in a community monitor while work on the Sediment Control Plan of the Stormwater Pollution Prevention Plan was occurring. Although no grading was occurring, this activity involved moving soil on the parcel.

- On Friday, May 4, 2007, an exceedance of 16,000 structures/m^3 occurred. Grading occurred on Saturday with no exceedances. No activity occurred on Sunday, which was the second day after the exceedance. Levels were still high on Monday, May 7. On May 9, work was stopped for the exceedance on Monday, May 7.

- On Friday, June 1, 2007, an exceedance occurred; no work occurred over the weekend. Work was shut down on Monday, June 4 and Tuesday, June 5 because of exceedances on June 1.

- On Friday, July 17, 2007, an exceedance occurred; no work occurred on the weekend because of the exceedances.

- On Friday, July 27, 2007, an exceedance occurred; no work occurred over the weekend. Work was shut down on Monday, July 30 and Tuesday, July 31 because of exceedances on July 27.

- On January 29, 30, 31, February 1 and 6, April 23 and 30, May 24, June 27, July 2, 13, 18, 20, 23, and August 8 and 9, 2007, asbestos levels exceeding 16,000 structures/m^3 were collected from two monitors (HV-10 and HV-12) located in an area believed to be influenced by another source of asbestos other than Parcel A grading operations (see attached figure). As a result, the developer was not required to shut down operations.

Summary of Findings

CDPH evaluated available monitoring data collected from 10 monitoring locations to determine whether the asbestos control measures specified in the Naturally Occurring Asbestos Dust Mitigation Control Plan, dated August 2005, are adequate to maintain compliance with air levels set by the BAAQMD. In addition, CDPH reviewed the Dust Control Plan dated February 2007.

As described in the above bullets, the operations on the Parcel A property have resulted in levels of asbestos above mandated thresholds being measured at the fence line and in the community. These elevations have required work stoppages. The two day delay in reporting air level elevations has often prevented changing the operations in a timely way to reduce these levels.

Our recommendations above are intended to build upon existing efforts to control dust and asbestos migration off-site and to decrease the likelihood of elevations above the level set by the BAAQMD.

The BAAQMD mandated threshold action levels are based on numbers derived from studies of long-term (many years) exposure to high (higher than the levels being measured at and around the parcel) levels of asbestos resulting in mesothelioma to workers. However, there are studies in the scientific literature in which long term lower level/non-occupational exposures (from take home exposure and other areas of the world where naturally occurring asbestos occurs) caused a low but epidemiologically detectable excess risk of mesothelioma. For example an ecological study in California suggests an association between residential proximity to naturally occurring asbestos and mesothelioma. There are technical difficulties in estimating risk from exposures as brief as a year, using techniques that were developed for life-long exposures. Nonetheless, even a 7-year exposure to the levels of asbestos measured around this excavation was estimated to have risks that, on a personal level, would be considered low. When one considers that the exposures have occurred over the course of a year or two, the estimated risk would be even lower. Regardless, site conditions warrant the monitoring and careful dust abatement measures recommended above.

Based on CDPH scientists' review of previous studies, they would not expect to find X-ray changes as a result of the kinds of exposures that have occurred during excavation. Since X-rays carry their own risks, CDPH would not recommend them. Furthermore, there are no known blood tests for asbestos exposures.

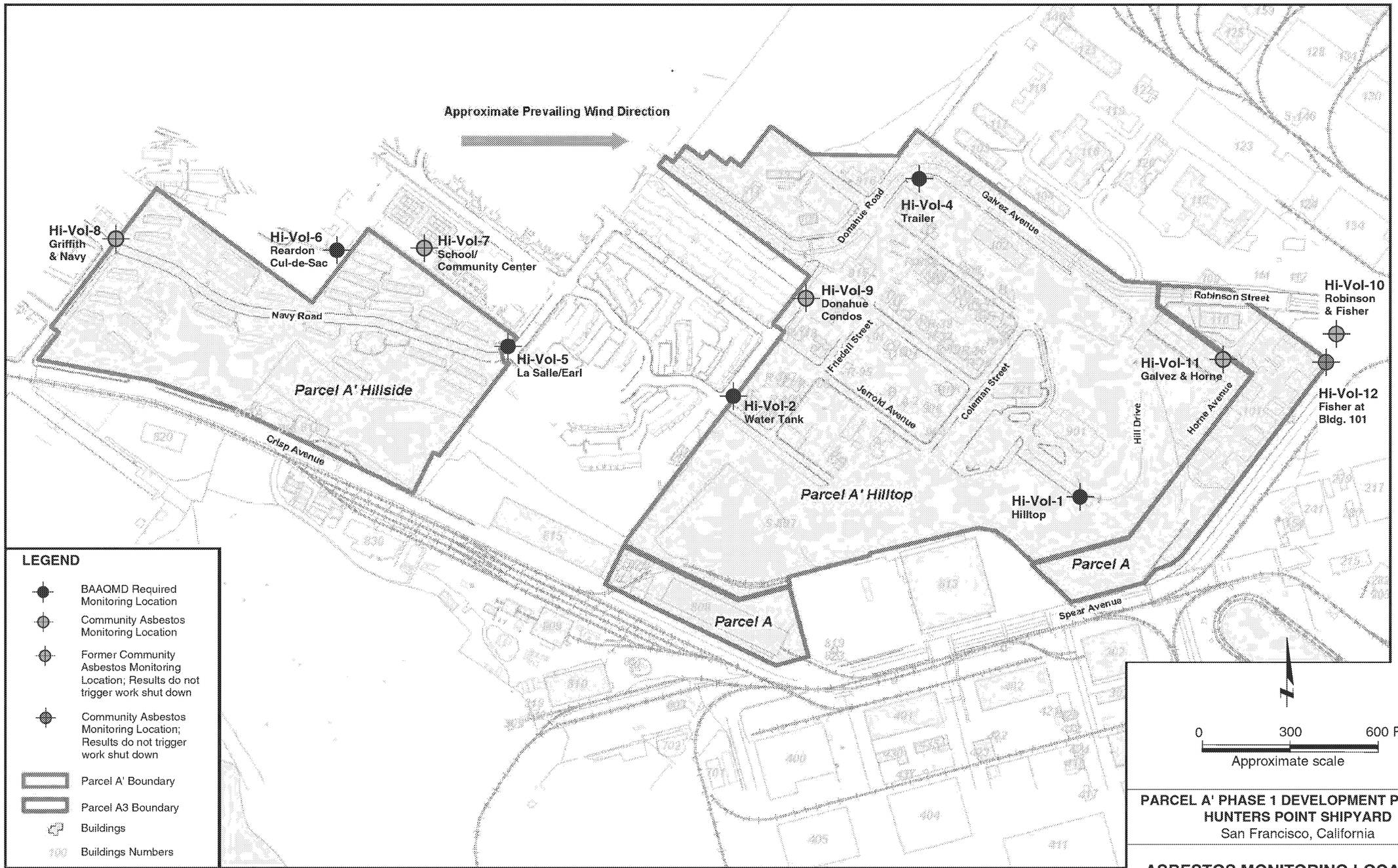
We note that public health concerns and subsequent regulations to control the movement of naturally occurring asbestos dust have only recently arisen, e.g., on July 29, 2002, the state (California Air Resources Board) issued the regulation for asbestos airborne toxic control measures for construction, grading, quarrying, and surface mining operations, as guidance to the local Air Quality Management Districts. Guidelines and their implementation are new and will undoubtedly undergo improvements over time, in part based upon healthy discussion in communities like Bayview Hunters Point.

We look forward to working with you and the other agencies to address the recommendations. If you have any questions, please contact me at (510) 620-3620.

Sincerely,

Rick Kreutzer, M.D., Chief
Environmental Health Investigations Branch

Enclosure



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Source: CH2MHill, 9/2006.

PARCEL A' PHASE 1 DEVELOPMENT PROJECT
HUNTERS POINT SHIPYARD
San Francisco, California

ASBESTOS MONITORING LOCATIONS

Date 05/10/07	Project No. 3848.02	Figure 1

Treadwell&Rollo

Asbestos Monitoring Results at Parcel A, August 2006

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3 5/5 6,600; 15,800; 5,700; 7,500; 1,900	4 5/5 [illegible]	5
6	7 Grading No monitoring*	8 5/5 [illegible]	9 Grading No monitoring*	10 5/5 [illegible]	11 Grading No monitoring*	12
13	14 Grading No monitoring*	15 5/5 7,500; 1,000; 2,000; 3,800; 900	16 2/4 1,900; 1,900	17 4/5 900; 900; 1,900; 2,800	18 3/4 7,600; 4,700; 9,500	19 3/5 9,500; 900; 900
20 0/5	21 4/4 5,700; 2,800; 3,800; 9,500	22 5/5 [illegible]	23 5/5 [illegible]	24 4/5 15,200; 13,300; 3,800; 1,900	25 3/5 1,900; 5,700; 2,800	26 5/5 900; 900; 5,700; 900; 900
27 4/5 900; 2,800; 1,900; 900	28 2/4 1,900; 1,900	29 4/5 4,700; 3,800; 7,700; 4,700	30 5/5 8,500; 12,300; 9,500; 12,200; 5,700	31 5/5 5,700; 4,700; 9,500; 9,500; 8,500		

Asbestos Monitoring Results at Parcel A, September 2006

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 1/5 900	2
3	4	5 5/5 6,800; 9,400; 2,300; 6,600; 8,600	6 5/5 7,600; 12,300; 7,600; 9,500; 4,700	7 4/5 4,700; 7,500; 900; 8,600	8 4/5 900; 2,800; 2,800; 900	9
10	11 5/5 12,300; 6,700; 3,000; 7,600; 2,000	12 5/5 14,200; 10,300; 15,400; 7,500; 5,800	13 5/5 [illegible]	14 5/5 5,700, 1,900; 12,300; 6,600; 3,800	15 3/5 900; 1,900; 900	16 2/5 900; 2,800
17 2/5 900; 900	18 5/5 5,000; 10,400; 7,600; 8,500; 3,800	19 5/5 3,900; 2,800; 4,700; 2,400; 8,500	20 5/5 4,700; 7,600; 8,500; 11,400; 4,700	21 5/5 13,300; 6,600; 7,600; 12,200; 2,800	22 4/5 4,700; 3,800; 3,800; 4,700	23
24	25 5/5 1,900; 900; 2,800; 5,000; 4,800	26 5/5 3,800; 6,700; 1,000; 1,900; 1,000	27 [illegible]	28 4/5 3,900; 1,900; 1,000; 12,600	29 3/5 11,000; 1,900; 5,500	30 3/5 4,900; 3,900; 1,000

Grading: Asbestos measurements over 16,000 structures/m³

Grading: Asbestos measurements over 1,600 structures/m³ and below 16,000 structures/m³

No grading (Weekend)

10/10 Fraction indicates number of asbestos detections / number of samples

Grading shut down due to exceedances

Action levels: 1,600 structures/m³ indicate a measurement that triggers an immediate on-site evaluation to determine if dust mitigation measures are still effective; 16,000 structures/m³ indicate a measurement that triggers an immediate shut-down of construction and/or grading operations.
Blank days indicate no information was provided.
*Under the developer's approved Dust Mitigation Plan, if results showed consistently low results, the monitoring frequencies could be reduced. On June 27, 2006, the developer reduced the monitoring frequencies to two days a week, based on no detection of asbestos since the monitoring had begun on April 25. As was discovered later, the non-detects were not credible.

Asbestos Monitoring Results at Parcel A, October 2006

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 5/5 6,400; 5,500; 1,600; 7,300; 1,300	3 5/5 2,800; 3,700; 3,700; 5,500; 1,800	4 5/5 2,900; 1,800; 4,700; 2,800; 2,900	5 1/5 6,700	6 1/5 2,800	7 0/5
8	9 5/5 11,900; 6,500; 3,600; 4,900; 900	10 5/5 6,600; 4,700; 9,400; 3,400; 3,800	11 5/5 3,800; 1,800; 6,400; 3,900; 1,800	12 [illegible]	13 3/5 1,800; 5,500; 1,500	14 3/5 1,900; 2,000; 900
15	16 4/5 7,700; 2,300; 6,400; 900	17 [illegible]	18 5/5 6,700; 5,500; 7,300; 12,800; 11,300	19 5/5 5,400; 4,600; 6,400; 5,800; 2,800	20 5/5 3,600; 13,100; 7,300; 2,900; 1,800	21 5/5 4,600; 12,600; 11,900; 5,600; 2,600
22	23 5/5 1,700; 3,700; 5,500; 2,800; 900	24 5/5 5,500; 5,000; 3,700; 1,900; 1,900	25 5/5 13,500; 2,900; 12,500; 3,900; 2,900	26 5/5 14,900; 7,300; 2,800; 6,400; 900	27 3/5 1,900; 2,600; 2,800	28 2/5 900; 2,800
29	30 4/5 4,900; 3,700; 5,800; 3,700	31 4/5 1,000; 3,100; 2,100; 13,600				

Asbestos Monitoring Results at Parcel A, November 2006

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 4/5 4,700; 11,400; 2,100; 500	2 0/5	3 1/5 900	4 1/5 1,900
5	6 3/5 900; 1,600; 4,900	7 2/5 900; 3,800	8 3/5 7,400; 3,700; 2,800	9 3/5 7,400; 4,600; 10,000	10 3/5 1,800; 2,600; 5,900	11
12	13 2/4 1,000; 1,000	14	15 3/4 6,600; 1,900; 1,000	16 3/5 2,800; 1,000; 1,000	17 1/5 1,900	18 1/5 3,500
19	20 0/5	21 3/5 11,100; 1,900; 900	22 3/5 7,700; 4,000; 1,000	23	24	25
26	27 0/5	28 1/5 900	29 0/5	[illegible]		

No grading (Weekend)

Grading: Asbestos measurements over 1,600 structures/m³ and below 16,000 structures/m³

Grading: No measurements over 1,600 structures/m³

Grading: Asbestos measurements over 16,000 structures/m³

Grading shut down due to exceedances

10/10 Fraction indicates number of asbestos detections / number of samples

Action levels: 1,600 structures/m³ indicate a measurement that triggers an immediate on-site evaluation to determine if dust mitigation measures are still effective; 16,000 structures/m³ indicate a measurement that triggers an immediate shut-down of construction and/or grading operations.
Blank days indicate no information was provided.

Asbestos Monitoring Results at Parcel A, December 2006

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 3/6 900; 5,900; 4,900	2 3/6 1,000; 1,000; **3,100**
3	4 2/6 1,800; 6,900	5 3/9 3,900; 2,800; **8,500**	6 6/9 2,500; 11,900; 1,800; 1,100; **1,800; 3,000**	7 3/9 2,400; **1,000; 3,000**	8	9
10	11 3/9 2,700; **10,400; 1,000**	12	13	14	15	16
17	18 [illegible] [illegible]	19 5/9 10,700; **1,000; 3,000; 4,600; 7,600**	20 8/9 900; 3,900; 1,900; 3,600; **1,000; 3,900; 1,000; 17,400 (HV-10)**	21 4/9 **1,000; 1,000; 1,000; 900**	22 3/9 2,000; **1,000; 2,900**	23
24	25	26 2/3 **2,900; 8,900**	27	28	29	30

Asbestos Monitoring Results at Parcel A, January 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2 5/8 2,900; 2,900; **1,000; 3,800; 2,900**	3 3/5 1,800; 3,900; 4,000	4	5 3/8 5,600; **500; 1,400**	6 0/5
7	8 6/8 900; 4,600; 13,900; 900; **1,900; 4,900**	9 7/8 1,900; 1,900; 1,000; 1,900; **4,900; 1,900; 2,900**	10 [illegible] [illegible]	11 8/9 2,000; 2,000; 4,800; 900; **1,000; 1,900; 14,500; 3,900**	12 8/9 1,000; 900; 14,100; 2,800; 900; **1,000; 1,900; 1,900**	13 1/8 **1,000**
14 2/4 **1,900; 1,000**	15 7/9 3,900; 1,000; 1,900; **3,900; 3,900; 19,400 (HV-10); 9,700**	16 [illegible] [illegible]	17 5/9 2,000; 2,900; **5,900; 14,200; 4,000**	18 5/9 2,000; **1,000; 900; 13,400; 3,800**	19 4/10 **1,900; 1,000; 6,800; 3,900**	20 1/8 **4,400**
21	22 [illegible] [illegible]	23 5/9 1,900; 1,800; 9,500; **11,000; 8,900**	24 8/9 4,700; 6,900; 2,000; 900; **7,600; 61,200; 40,700; 18,400**	25 5/9 1,000; 3,000; **2,900; 14,200; 2,900**	26 5/9 8,700; **5,900; 6,900; 13,300; 1,000**	27
28	29 6/9 900; 8,600; 900; 1,000; **17,500 (HV-10); 4,000**	30 4/10 3,800; **1,000; 33,200 (HV-10); 3,900**	31 5/9 2,900; 7,900; **13,800; 39,900 (HV-10); 13,100**			

Grading: Asbestos measurements over 1,600 structures/m³ and below 16,000 structures/m³

No grading (Weekend)

Grading shut down due to exceedances

Grading: Asbestos measurements over 16,000 structures/m³

Grading: No measurements over 1,600 structures/m³

Grading: Asbestos measurements over 16,000 structures/m³ attributed to a source other than Parcel A grading operations; asbestos above 1,600 structures/m³ at stations related to Parcel A; work shutdown was not required.

10/10 Fraction indicates number of asbestos detections / number of samples

Action levels: 1,600 structures/m³ indicate a measurement that triggers an immediate on-site evaluation to determine if dust mitigation measures are still effective; 16,000 structures/m³ indicate a measurement that triggers an immediate shut-down of construction and/or grading operations.
Blank days indicate no information was provided. Bold values indicate asbestos measurements taken from monitors not located on Parcel A.

Asbestos Monitoring Results at Parcel A, February 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 7/9 2,000; 900; 6,500; **1,000; 14,800; 34,400 (HV-10); 14,400**	2 2/9 4,700; **2,900**	3 2/3 **1,000; 1,900**
4	5 3/9 900; **3,700; 5,600**	6 6/9 11,500; 3,800; **1,000; 10,500; 36,500 (HV-10); 1,000**	7 5/5 **17,800 (HV-7); 4,800; 1,900; 8,800; 28,000 (HV-11)**	8	9 0/4	10 2/5 2,000; 1,900
11	12 4/9 3,000; **1,000; 6,600; 1,000**	13 4/9 2,000; **3,000; 12,900; 3,800**	14	15	16	17
18	19	20 5/9 900; 900; **1,900; 6,600; 2,900**	21	22	23	24
25	26	27	28			

Asbestos Monitoring Results at Parcel A, March 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7 2/6 1,000; **7,800**	8 5/8 1,000; **7,800; 4,800; 8,700; 1,000**	9 4/9 5,600; **1,000; 1,900; 1,000**	10
11	12 6/9 1,000; 900; 1,000; **5,500; 15,000; 13,800**	13 6/9 2,800; 1,900; 1,900; **2,800; 12,900; 1,900**	14 6/9 5,900; 900; 1,000; **1,000; 11,600; 2,900**	15 3/5 6,700; 1,000; 16,500	16 7/10 5,900; 3,700; **1,000; 1,900; 2,900; 7,800**	17
18	19 4/9 1,900; 11,600; **4,800; 2,000**	20 0/4	21 0/5	22 5/9 900; 7,700; 900; **1,000; 7,700**	23 3/10 **1,000; 2,000; 1,000**	24
25	26 2/5 6,800; 1,500	27 2/5 1,000; 2,000	28 2/10 1,900; **2,000**	29 2/5 12,400; 16,900	30 2/9 1,000; 2,000	31 0/9

Grading: Asbestos measurements over 16,000 structures/m³ attributed to a source other than Parcel A grading operations; asbestos above 1,600 structures/m³ at stations related to Parcel A; work shutdown was not required.

Grading: Asbestos measurements over 1,600 structures/m³ and below 16,000 structures/m³

No grading (Weekend)

No grading. SWPPP (Sediment Control Plan of the Storm Water Pollution Prevention Plan) work only. Stabilization of the construction entrance; installation of gravel pads to prevent track-out.

Grading shut down due to exceedances

No grading. Drilling on Hilltop only.

Grading: No measurements over 1,600 structures/m³

10/10 Fraction indicates number of asbestos detections / number of samples

Action levels: 1,600 structures/m³ indicate a measurement that triggers an immediate on-site evaluation to determine if dust mitigation measures are still effective; 16,000 structures/m³ indicate a measurement that triggers an immediate shut-down of construction and/or grading operations.
Blank days indicate no information was provided. Bold values indicate asbestos measurements taken from monitors not located on Parcel A.

Asbestos Monitoring Results at Parcel A, April 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 4/9 4,700; 900; **2,000; 2,900**	3 3/9 7,600; 12,200; **1,000**	4 4/9 7,500; 900; **4,900; 2,900**	5 2/5 3,800; 900	6 2/9 900; 900	7 3/10 900; 1,000; 900
8	9 7/9 7,800; 1,000; 900; 2,800; **4,000; 9,600; 3,700**	10 5/10 12,500; 5,700; **3,800; 5,800; 5,700**	11 3/9 **1,000; 5,800; 2,000**	12 [illegible] [illegible]	13 2/9 5,800; 11,400	14 0/5
15	16 6/9 1,000; 900; 1,000; **4,300; 7,700; 3,900**	17 4/9 6,500; **1,000; 1,900; 2,000**	18 4/10 900; 900; **1,900; 5,900**	19 6/10 2,600; 6,400; 1,900; **5,900; 5,900; 8,700**	20 4/9 2,000; 1,000; **1,900; 1,000**	21 5/9 1,000; 1,800; 1,000; **1,000; 3,000**
22	23 3/9 **1,900; 17,500 (HV-10); 5,700**	24 4/9 1,000; 900; **8,700; 1,000**	25 4/9 1,000; **2,000; 11,800; 15,000**	26 6/9 3,900; 1,000; **2,900; 1,900; 5,800; 6,800**	27 6/10 2,000; 2,800; 1,000; 1,000; **2,000; 3,800**	28 5/9 900; 2,800; **4,900; 12,500; 1,900**
29	30 4/9 900; **3,000; 39,400 (HV-10); 5,900**					

Asbestos Monitoring Results at Parcel A, May 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 7/10 1,000; 900; 2,700; 3,600; 7,900; **10,700; 2,900**	2 3/9 **1,000; 2,900; 1,000**	3 5/9 1,000; 3,000; **4,800; 8,600; 5,800**	4 [illegible]	5 3/9 **3,800; 14,600; 2,000**
6	7 8/10 4,600; 5,500; 1,000; **6,600; 900; 15,100; 14,200; 8,900**	8 7/9 11,700; 3,700; 12,000; 1,800; **4,800; 1,900; 6,700**	9 4/9 5,700; 5,700; **5,600; 13,000**	10 3/9 **2,900; 7,700; 9,900**	11 3/9 1,900; **1,000; 1,000**	12
13	14 3/9 900; 900; **2,900**	15 2/9 **1,900; 5,800**	16 4/9 **1,000; 1,900; 3,800; 4,800**	17 6/9 1,000; 12,900; 2,200; **1,900; 4,900; 6,700**	18 4/10 2,900; **1,000; 1,900; 1,800**	19
20	21 4/9 2,800; **1,000; 1,900; 1,900**	22 8/9 900; 900; 1,000; 2,800; **1,000; 900; 1,900; 8,000**	23 4/9 900; 900; **6,800; 10,400**	24 2/10 **1,900; 17,000 (HV-12)**	25 4/9 **1,000; 1,900; 1,900; 10,900**	26
27	28	29 5/10 **1,000; 900; 1,900; 6,900; 5,300**	30 5/9 1,000; **3,900; 1,000; 11,800; 7,800**	31 4/9 **1,900; 7,700; 2,900; 13,600**		

No grading (Weekend)

Grading: Asbestos measurements over 1,600 structures/m³ and below 16,000 structures/m³

Grading: Asbestos measurements over 16,000 structures/m³

Grading shut down due to exceedances

No grading. Drilling on Hilltop only.

Grading: Asbestos measurements over 16,000 structures/m³ attributed to a source other than Parcel A grading operations; asbestos above 1,600 structures/m³ at stations related to Parcel A; work shutdown was not required.

10/10 Fraction indicates number of asbestos detections / number of samples

Action levels: 1,600 structures/m³ indicate a measurement that triggers an immediate on-site evaluation to determine if dust mitigation measures are still effective; 16,000 structures/m³ indicate a measurement that triggers an immediate shut-down of construction and/or grading operations.
Blank days indicate no information was provided. Bold values indicate asbestos measurements taken from monitors not located on Parcel A.

Asbestos Monitoring Results at Parcel A, June 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 [illegible]	2
3	4 4/9 1,000; **2,000; 2,800; 10,600**	5 2/9 3,700; **2,500**	6 7/10 6,900; 900; 2,500; 5,900; **1,000; 1,000; 12,300**	7 6/9 1,000; 12,300; **1,000; 1,000; 4,800; 7,500**	8 4/9 900; 3,500; 1,900; **2,000**	9
10	11 3/10 **1,900; 2,800; 11,900**	12 7/9 1,000; 5,300; 1,900; **1,000; 2,000; 5,000; 7,500**	13 5/9 1,900; 900; **1,000; 12,200; 14,900**	14 4/9 2,500; 2,800; 2,600; **8,700**	15 4/9 1,000; 2,500; **3,000; 11,800**	16
17	18 2/8 **1,000; 3,000**	19 6/9 1,000; 900; 800; **8,700; 1,000; 7,500**	20 2/8 **1,000; 11,900**	21 3/8 **1,900; 9,500; 5,900**	22 3/10 **1,000; 6,700; 4,900**	23
24	25 4/9 1,900; **1,000; 5,700; 9,900**	26 4/9 900; 4,900; **2,000; 4,000**	27 4/10 12,500; 1,100; **9,700; 18,100 (HV-12)**	28 [illegible]	29 [illegible]	30 1/9 **1,000**

Asbestos Monitoring Results at Parcel A, July 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 0/5	2 6/9 51,500; 900; 2,500; 900; **14,400; 26,600 (HV-12)**	3 1/10 4,800	4 2/9 **7,600; 5,000**	5 4/9 6,600; 4,500; **7,600; 10,800**	6 4/9 5,600; 1,000; **9,500; 12,700**	7 0/5
8	9 4/9 12,800; 1,900; **11,300; 10,800**	10 3/9 **1,000; 2,900; 3,900**	11 [illegible]	12 [illegible]	13 5/9 3,900; 1,900; 5,700; **3,800; 16,300 (HV-12)**	14 2/4 **1,000; 2,000**
15	16 4/9 6,500; **1,000; 7,600; 10,400**	17 3/9 6,800; **1,000; 2,000**	18 4/9 2,800; **3,900; 2,000; 25,500 (HV-12)**	19 [illegible]	20 5/10 3,700; 6,500; **11,900; 12,800; 30,000 (HV-12)**	21
22	23 3/9 13,300; **3,900; 28,900 (HV-12)**	24 [illegible]	25 4/9 3,700; 2,900; **8,500; 11,400**	26 2/9 **6,700; 6,900**	27 [illegible]	28
29	30 4/9 2,000; **1,900; 4,800; 10,700**	31 3/9 3,700; **4,800; 9,900**				

Grading: Asbestos measurements over 16,000 structures/m³

Grading: Asbestos measurements over 1,600 structures/m³ and below 16,000 structures/m³

No grading (Weekend)

Grading: Asbestos measurements over 16,000 structures/m³ attributed to a source other than Parcel A grading operations; asbestos above 1,600 structures/m³ at stations related to Parcel A; work shutdown was not required.

Grading shut down due to exceedances

10/10 Fraction indicates number of asbestos detections / number of samples

Action levels: 1,600 structures/m³ indicate a measurement that triggers an immediate on-site evaluation to determine if dust mitigation measures are still effective; 16,000 structures/m³ indicate a measurement that triggers an immediate shut-down of construction and/or grading operations.
Blank days indicate no information was provided. Bold values indicate asbestos measurements taken from monitors not located on Parcel A.

Asbestos Monitoring Results at Parcel A, August 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 4/10 1,300; **1,000; 5,900; 10,500**	2 3/9 1,900; **3,900; 14,800**	3 6/9 3,800; 3,900; 5,900; 2,000; **1,000; 3,000**	4
5	6 3/10 12,700; **7,500; 14,300**	7 5/9 8,100; 6,200; 900; **3,900; 10,900**	8 4/9 **1,000; 4,000; 2,000; 27,400 (HV-12)**	9 4/9 1,900; **1,000; 8,500; 55,000 (HV-12)**	10 7/9 1,900; 3,900; 900; **2,900; 1,000; 4,900; 4,800**	11 2/9 **2,000; 3,800**
12	13 5/9 1,600; 900; **1,900; 2,900; 12,900**	14 [illegible] [illegible]	15 8/9 1,600; 2,900; 11,700; 1,800; **1,000; 1,900; 9,600; 11,500**	16 7/10 1,000; 8,900; 3,000; **4,800; 1,000; 33,200 (HV-11); 53,200 (HV-12)**	17 [illegible] [illegible]	18 6/10 900; 2,900; **10,900; 1,000; 9,000; 3,000**
19 1/5 2,800	20	21	22	23	24	25
26	27	28	29	30	31	

Grading: Asbestos measurements over 1,600 structures/m³ and below 16,000 structures/m³

No grading (Weekend)

Grading: Asbestos measurements over 16,000 structures/m³ attributed to a source other than Parcel A grading operations; asbestos above 1,600 structures/m³ at stations related to Parcel A; work shutdown was not required.

Grading: Asbestos measurements over 16,000 structures/m³

Grading shut down due to exceedances

10/10 Fraction indicates number of asbestos detections / number of samples

Action levels: 1,600 structures/m³ indicate a measurement that triggers an immediate on-site evaluation to determine if dust mitigation measures are still effective; 16,000 structures/m³ indicate a measurement that triggers an immediate shut-down of construction and/or grading operations.
Blank days indicate no information was provided. Bold values indicate asbestos measurements taken from monitors not located on Parcel A.

Exhibit 21-4

Letter to SFDPH regarding Tests for Asbestos Exposure, from ATSDR
June 2007

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

June 29, 2007

Rajiv Bhatia, M.D., M.P.H.
Director, Occupational and Environmental Health
San Francisco Department of Public Health
Assistant Clinical Professor of Medicine
UCSF 1390 Market Street
Suite 822
San Francisco, California 94102

Dear Dr. Bhatia:

Thank you for the opportunity to discuss the exposure issues related to construction activities of Lennar BVHP, LLC on Parcel A at Hunter's Point. During this conversation, you requested that the Agency for Toxic Substances and Disease Registry (ATSDR) provide you with information regarding tests for asbestos exposures.

ATSDR conducted an expert panel to review the state of scientific knowledge on asbestos biomarkers. A summary report is enclosed. The discussion of the panel centered on analysis of fiber burden in the lung from living humans or autopsy samples; fiber content of sputum samples; fiber content of bronchoalveolar lavage; fiber analysis of sentinel animals; asbestos bodies counts; use of blood proteins or blood tests; and use of clinical tests such as spirometry or x-ray or CT scan for pathological change.

The panel concluded that none of the techniques are currently adequate to assess asbestos exposures or disease risk. Because of this finding, ATSDR has concluded that the best approach to assess community exposure is to conduct adequate air monitoring to confirm asbestos exposure.

If we can be of further assistance on this issue, please contact CDR Susan Muza, ATSDR Region 9, telephonically at (415) 947-4316 or via email at muza.susan@epa.gov.

Sincerely,

Tom Sinks

Thomas Sinks, Ph.D.
Deputy Director, National Center for Environmental/
Health/Agency for Toxic Substances and Disease
Registry

Enclosure

Exhibit 21-5

BAAQMD Presentation – Lennar Bay View Hunters Point, Parcel A, Naturally Occurring Asbestos, Asbestos Dust Mitigation Plan, October 2007

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Stationary Source Committee Meeting

AGENDA: 4

Lennar Bay View Hunters Point Parcel A Naturally Occurring Asbestos Asbestos Dust Mitigation Plan

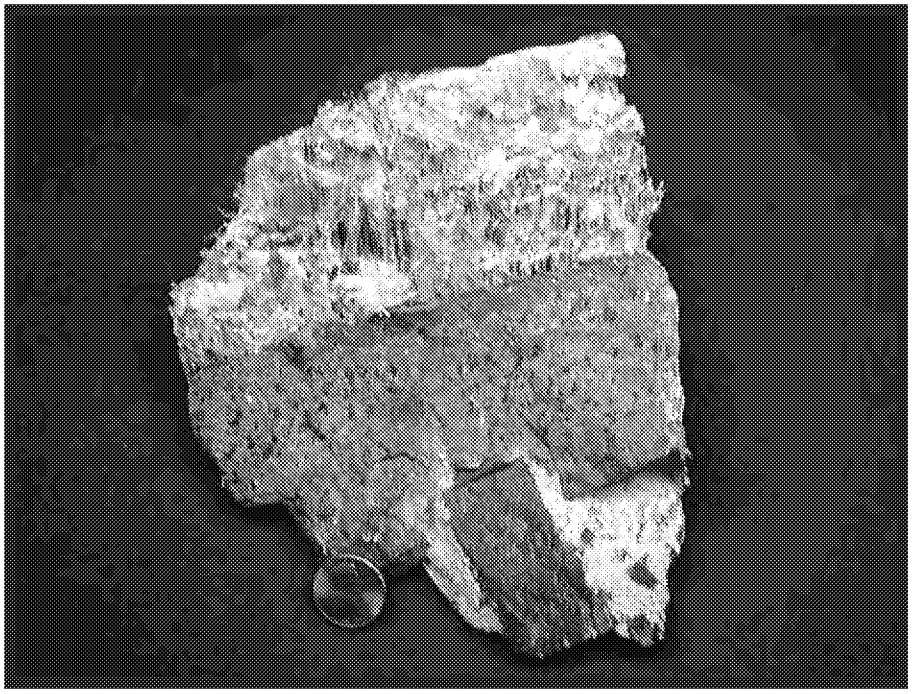
Kelly Wee
Director of Enforcement
October 29, 2007

Lennar BVHP Parcel A Project

- Redevelopment project on Parcel A at BVHP comprises 75 acres in NE portion of Hunters Point Shipyard.
- Lennar BVHP plans to construct 1600 attached single family homes on the site.
- Asbestos Dust Mitigation Plan (ADMP) received from Lennar in May 2005, as required by the statewide Air Toxic Control Measuring for Naturally Occurring Asbestos (ATCM).
- The Air Pollution Control Officer required that an ambient air monitoring plan be included due to nearby sensitive receptors.

Naturally Occurring Asbestos (NOA)

- Naturally occurring mineral found in Serpentinite rock
- Serpentine is the California State Rock
- NOA found in soil in 44 of California's 58 counties



Regulatory Background

- California Air Resources Board developed an Air Toxic Control Measure (ATCM) for NOA.
- The ATCM established notification and work practice requirements that reflect best dust mitigation measures.
- The ATCM was adopted into California law in July 2002. (Title 17 CA Code of Regulations Section 93105)
- Air District implemented its regulatory program in November 2002.

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NOA ATCM Requirements

- Operators of large construction projects (> 1 acre) must prepare an Asbestos Dust Mitigation Plan (ADMP) subject to local air district approval.
- The plan must specify measures that will ensure dust control.
- Air monitoring is optional, based on sensitive receptors and is at the discretion of the local District.
- There are no ambient standards in the ATCM.

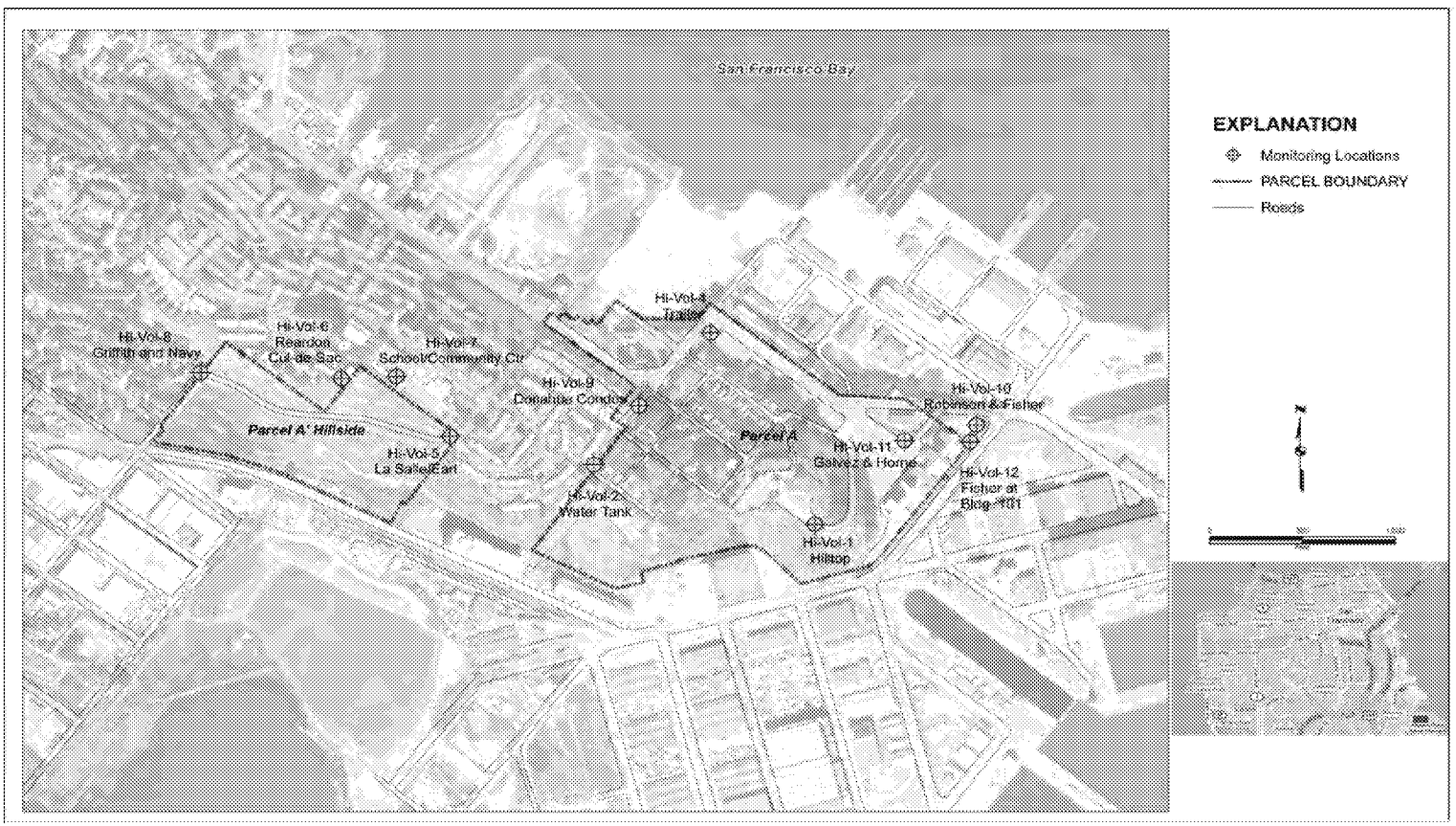
Lennar BVHP ADMP

Final ADMP approved October 2005

- Track–out Prevention and Control
- Cover and Water Surface Areas and Storage Piles
- Dust Mitigation for Unpaved Roads, Parking Lots, and Staging Areas
- Dust Control for Earth Moving Activities
- Control Dust from Vehicle Transport
- Upwind/downwind/perimeter air monitoring
- Post Construction Stabilization (cover with clean fill and re-plant)

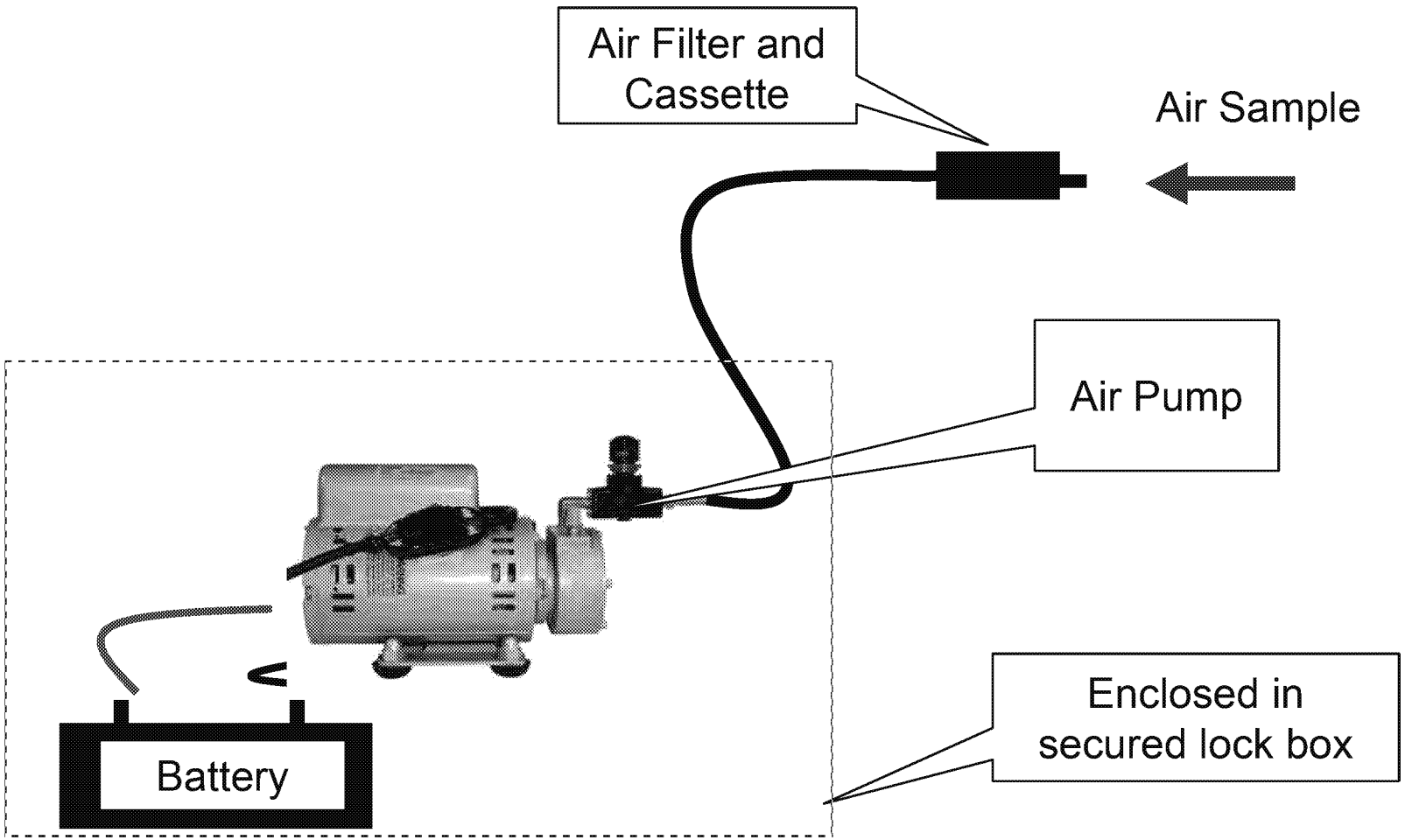
Monitoring Locations

Parcel A' Phase 1 Development Project
Hunter's Point Shipyard
San Francisco, California



Source: MACTEC

Asbestos Monitoring Apparatus



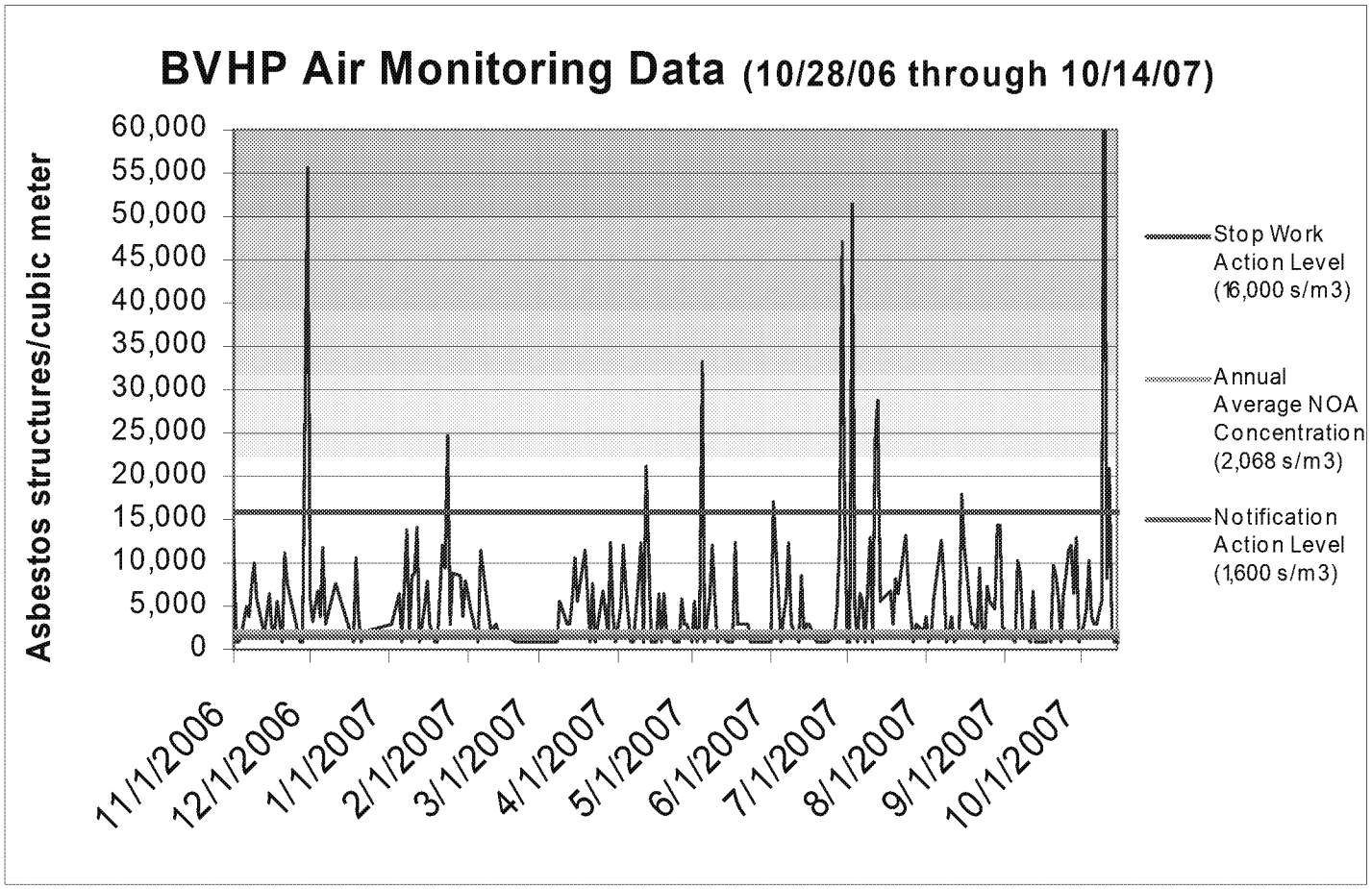
Public Health Protection

- In order to protect Public Health at the Parcel A development, the Air District set two action levels.
- The action levels are Conservative and Health Protective and provide a significant Margin of Safety.

Action Levels

- At 1,600 asbestos structures per cubic meter, project operators must notify Air District and implement more stringent dust controls.
- At 16,000 asbestos structures per cubic meter, project operators must stop work until levels decline.

Air Monitoring Results



Air Monitoring Comparisons

Monitoring Location	Sampling Dates	Number of Samples Collected	Average Concentration (s/m3)
El Dorado County[1]	Various months during 1998, 1999, 2000, and 2001	387	5,700
El Dorado County - Near Potential Source[2]	October 1998	110	13,600
Placer and Nevada Counties[3]	July 1998	37	3,200
Monterey County[4]	June 2001	98	2,800
Santa Clara County (Gilroy)[4]	July 2001 and September 2001	98	13,600
Bay View Hunters Point Parcel A[5]	**October 28, 2006 to October 14, 2007**	**1,207**	**2,068**

[1]Projects included background monitoring at four various locations throughout the County, including public buildings and schools.
[2]Samples collected near serpentine quarry.
[3]Background and road constructions samples.
[4]Background and grading samples.
[5]Grading samples.

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Health Risks

- Health risk is within District Guidelines using established risk assessment protocols developed by the Office of Environmental Health Hazard Assessment (OEHHA) at the monitoring locations sited by the District at Parcel A.

- Risks are less than 3 in a million.

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Compliance Assurance

- Air District staff conducts surveillance at the Parcel A site on a daily basis, making sure Lennar follows measures in the ADMP.
- During inspections, two violations were documented for which Lennar was cited. Two additional under review.
- A Notice of Violation was issued in October 2006 for non-compliance with the ADMP.

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Summary

- Major grading is completed and project is moving into utility installations (trenching, foundations)
- Regular compliance inspections will continue and the Air District will continue to require stringent dust controls until the project no longer disturbs NOA.
- Asbestos ambient monitoring will continue with expansion of the network.
- The Air District is requiring ADMP enhancements.

Bay View Hunters Point & CARE

Community Air Risk Evaluation Program

- BVHP is a focus area under CARE.
- Air District will continue to look at the air pollution impacts to Bay View Hunters Point.
- Stationary Sources and Mobile Sources (Diesel PM) are included.
- Additional monitoring, outreach, and mitigation may be in the future.

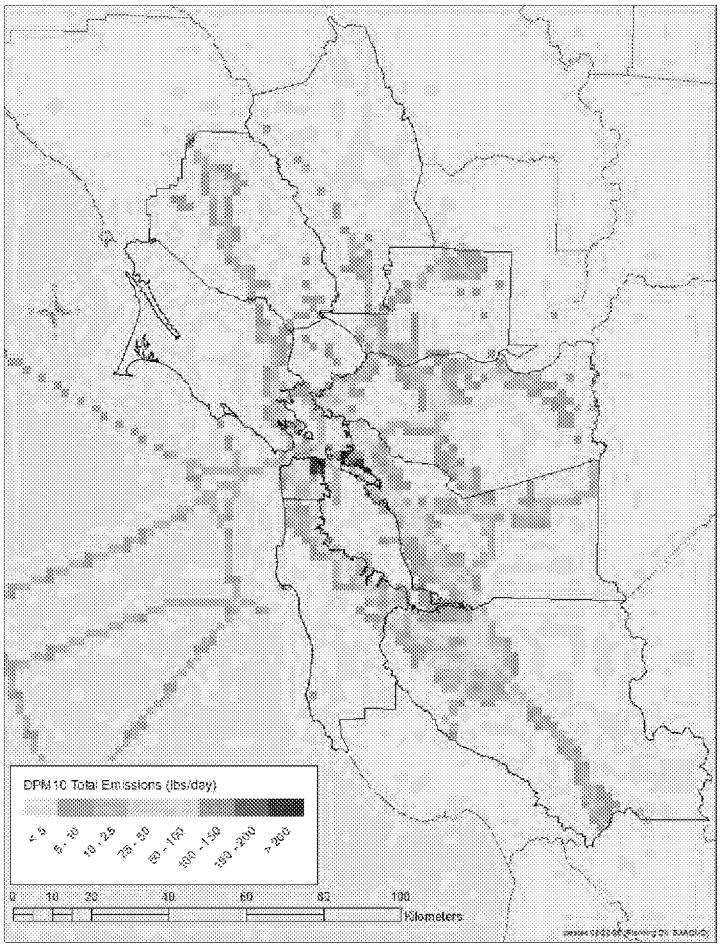

Exhibit 21-6

Letter to the Bayview-Hunters Point Community Regarding Assessment of Health Issues Related to Construction Activities at Parcel A, from John R. Balmes, MD, Professor of Medicine at University of California, San Francisco, and Chief of Occupational and Environmental Medicine at San Francisco General Hospital, September 2007

To the Bayview-Hunters Point Community:

We recognize the very real health concerns that many of you face every day. That is why we are pleased to announce the findings of Dr. John Balmes, Professor of Medicine at the University of California and Chief of Occupation and Environmental Medicine at San Francisco General Hospital. After a review of relevant data, Dr. Balmes has concluded that the construction at Hunters Point Shipyard does not pose a significant risk of long-term health problems.

In particular, Dr. Balmes agrees with the San Francisco Department of Public Health that it is highly unlikely that exposure to naturally occurring asbestos found at the Shipyard poses a danger to human health.

Dr. Balmes has also concluded that a variety of symptoms reported by some residents cannot be tied to asbestos in construction dust generated at the Shipyard. "I believe that the many health concerns that the community is experiencing are likely caused by events and circumstances that are unrelated to Lennar's construction activities at Hunters Point Shipyard," he writes in his report. "Many of these health concerns predate construction and involve symptoms that are not associated with exposure to naturally occurring asbestos.

As we informed you in a letter last week, Dr. Balmes conducted his investigation at our request but his time and expenses were paid for by Lennar. However, his analysis has been objective and not influenced by the company. We are grateful for his thorough work on the community's behalf. A copy of his full findings is attached with this letter.

Finally, and most importantly, we believe that Dr. Balmes' findings will help facilitate a broader discussion of health and environmental issues in Bayview-Hunters Point. You have our promise to make these long-standing issues a priority so that health officials more aggressively pursue solutions that result in a safer and healthier community for all of us. We look forward to working with as many of you as possible to make that dream a reality.

Sincerely Yours,

African American Community Revitalization Consortium

Rev. Arelious Walker
True Hope of Christ in God Church

Rev. Joesiah Bell
The Church at San Francisco

Pastor George Lee
Shilo Gospel Church

Rev. Gary Banks

Marketplace Fellowship Church

San Francisco African American Chamber of Commerce

Bayview Merchants Association

The Tabernacle Development Group

Aboriginal Blackmen Union

Individual members of the Hunters Point Shipyard Citizens Advisory Committee and Hunters Point Project Area Committee

And scores of Bayview-Hunters Point residents

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DIVISION OF OCCUPATIONAL AND ENVIRONMENTAL MEDICINE

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September 5, 2007

Dr. Arelious Walker
True Hope Church of God in Christ
950 Gilman Ave.
San Francisco, California 94124

Dear Dr. Walker:

It was a pleasure meeting with you last month. I wanted to provide you with a status report on my efforts to date, including my initial assessment of the health issues that have been raised by the community about Lennar's construction work at Hunters Point Shipyard Parcel A.

As you know, I am a Professor of Medicine at the University of California, San Francisco, and Chief of the Division of Occupational and Environmental Medicine at San Francisco General Hospital. At your request, I have agreed to provide advice and guidance to you and other leaders of the Bayview-Hunters Point community regarding health issues, including whether naturally occurring asbestos in dust from the construction site poses a health risk.

Also at your request, Lennar has agreed to pay for my time and expenses because, as I understand it, there are no other resources to support my involvement. I agreed to this arrangement only with the express understanding that I will provide you with an objective assessment that will be independent of Lennar and the many competing interests that have dominated the health debate to date. I committed to telling you my opinion regardless of what others, including Lennar, might think.

My work to date has included reviewing the available data, reports from the San Francisco Department of Public Health (DPH) and other relevant information. Additionally, I have reached out to the government agencies looking at the site, including the DPH and the Environmental Health Investigations Branch of the California Department of Health Services (EHIB), and spoken with Lennar's own experts, Dr. Mark Utell, who is a pulmonologist and Professor of Medicine and Environmental Medicine at the University of Rochester, and Dr. Robert Scofield, a toxicologist and risk-assessor employed by ENVIRON International Corporation.

I. OBSERVATIONS

My current assessment of the health issues is consistent with the determination reached by the San Francisco Department of Public Health that Lennar's construction activities do not appear to present a significant long-term risk to public health, including to the residents of Bayview-Hunters Point.

On August 18, I had the opportunity to tour the Parcel A construction site to examine the field conditions, monitoring stations and dust abatement measures. Immediately following the tour, I was able to speak with Dr. Rick Kreutzer of the EHIB, who is consulting with the federal Agency for Toxic Substances and Disease Registry (ATSDR). Based on the information I have reviewed to date, the tour of the site and review of the dust abatement measures, combined with the available monitoring data, the site does not appear to present a significant long-term health risk to the community. In support of my preliminary assessment, I wanted to share with you and the community the following observations:

A. Grading Is Complete

I understand that the grading work is almost done and that the site will be capped to reduce any potential for future dust exposure. The end of grading will greatly reduce, if not eliminate, any potential for exposure to naturally occurring asbestos from activities at the site.

B. Asbestos Monitoring Data

I agree with DPH that it is highly unlikely that exposure to naturally occurring asbestos from grading operations at Parcel A will create a significant risk to human health in the community. The work stoppage level set by the responsible government agency -- the Bay Area Air Quality Management District -- was designed to be health-protective and ensure a low risk even assuming a person would be exposed to certain levels of asbestos on a continual and ongoing basis for 70 years. Here, by contrast, the grading period was less than eighteen months and the air monitoring data show that the average level of asbestos was significantly lower than the amount that is thought to pose a risk of long-term injury.

C. Community Health Issues

I am acutely aware that the Bayview-Hunters Point community has long been plagued by health problems, such as high rates of asthma in children, that predate Lennar's activities at the site. And I am aware that the community is concerned that these health problems may relate to exposures to airborne pollutants or other agents in the neighborhood environment.

While it is important that we remain mindful of and responsive to community health concerns, and their possible link to the neighborhood environment, it is also important that we not improperly attribute the cause of these health concerns to the recent grading activities at the Shipyard. I believe that the health problems that the community is experiencing are likely caused by events and circumstances that are unrelated to Lennar's construction activities at Hunters Point Shipyard. Many of the health concerns predate construction and involve symptoms that are not associated with exposure to naturally occurring asbestos.

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II. CONSULTATION WITH STATE AND FEDERAL AGENCIES

As I believe you are aware, DPH is working with ATSDR and EHIB to conduct a public health consultation regarding certain issues relating to construction activities at the shipyard site. I have spoken with these agencies and plan on meeting with them to share information and analysis, although a date for a meeting has not yet been set. I believe that such a meeting will be helpful for the agencies, for my assessment and for the community.

I hope that you find this status report helpful. I will continue to keep you advised of my analysis and assessment as we move forward. Please do not hesitate to contact me with any questions or concerns that you might have.

Sincerely,

John R. Balmes, MD
Professor of Medicine, UCSF
Chief, Division of Occupational and Environmental Medicine,
San Francisco General Hospital

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Exhibit 21-7

Letter to CDPH in response to Recommendations for Asbestos and Nuisance Dust Control at Parcel A, from SFDPH, October 2007

San Francisco City and County
Department of Public Health
Environmental Health Section

Gavin Newsom, *Mayor*
Mitchell H. Katz, *Director of Health*

Rajiv Bhatia, *M.D., M.P.H.*
Director of Environmental Health

October 9, 2007

Dr. Rick Kreutzer
Chief Environmental Health Investigations Branch
Division of Environmental and Occupational Disease Control
California Department of Public Health
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804

Dear Dr. Kreutzer:

On September 20, 2007, the San Francisco Department of Public Health received your assessment of hazards associated with development at Hunters Point Shipyard Parcel A in a letter from California Department of Public Health (CDPH) to the Agency for Toxic Substances Disease Registry (ATSDR). At the same time, we also received ATSDR's concurring letter.

The Department of Public Health deeply appreciates your agency's detailed review of the available air monitoring data as well as the many supportive recommendations for optimizing control of airborne dust and asbestos. We share your frank assessment of the limitations of human exposure and risk assessment in this situation, yet we are also heartened by your judgment that the risks of serious asbestos-related health impacts for community residents from development at Parcel A are likely to be low on a personal level even if those exposures were to have occurred over seven years. We also concur with your conclusions that radiological testing of residents for asbestos exposures is not recommended and blood tests for asbestos exposures do not exist.

Most important, we agree that the primary goal for environmental health is preventing exposure to hazards. We believe that the pro-active regulatory controls established by the Bay Area Air Quality Management District (BAAQMD) and the San Francisco Department of Public Health (SFDPH) both for naturally occurring asbestos and nuisance dust were developed to achieve precautionary and environmental justice ends. When adopted, these regulations clearly recognized asbestos from natural sources as a potential health hazard. We take very seriously our responsibility to critically review and optimize our pro-active regulatory scheme on an ongoing basis. The recommendations you have provided to us in this regard will be invaluable.

1390 Market Street, Suite 210, San Francisco, Ca 94102
Phone (415) 252-3800, Fax (415) 252-3875

As you know, major earthmoving activities at Parcel A have ceased, and the soil on a large section of the parcel is now stabilized. Still, SFDPH has begun to move forward with a number of the CDPH recommendations anticipating ongoing development activities at the Shipyard.

At this point, we would like to share an early status report on all the CDPH recommendations (See attached table). You will note that we have already implemented some of the recommendations CDPH made in whole or part. In the near future, we would hope to take advantage of your expertise on specific technical questions.

Again, please accept my personal thanks for all of the efforts you and your staff have made on behalf of the health of San Francisco residents. Do not hesitate to contact me at 415-252-3931 if you would like to discuss the status of our efforts or if you have additional recommendations to provide.

Sincerely,

Rajiv Bhatia, MD, MPH
Medical Director, Occupational and Environmental Health

Cc: Tom Sinks, ATSDR
Susan Muza, ATSDR
Amy Brownell, SFDPH
Mitch Katz, SFDPH
John Balmes, UCSF

Attachment

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Status of California Department of Public Health Recommendations for Asbestos and Nuisance Dust Control at Parcel A at Hunters Point Shipyard

CDPH recommendation (September 20th, 2007):	Status (October 9, 2007)
SFDPH should assign a person to continuously monitor dust production and dust abatement activities during working hours. This is an important way to prevent both dust and asbestos exposures. Essential to this recommendation is that the assigned person not only observes but has the authority to alter activity on the site based on his/her observations.	**We agree with benefit of direct agency observation of regulatory compliance.** SFDPH routinely conducts regular unannounced random site inspections to verify compliance with the Dust Control Plan, and inspectors have had the power to alter activity and stop work at the site if they observe violations of the Dust Control Plan. A recent violation of the plan resulted in a two day suspension of work activities. SFPDPH has not observed dust plan violations in the vast majority of observations in the current year and no current year dust complaints from the public have been verified on inspection. Nevertheless, because continuous SFDPH presence might provide some benefit over random inspections, SFDPH will explore the mechanisms available to us for employing a full-time dust inspector while Lennar is conducting dust generating activities.
The assigned person should promptly report to the public on what is observed and what is done as a result of the above-mentioned monitoring activities.	**We agree with the need for more timely public communication.** SFDPH has created a website for Hunters Point development that includes: frequently asked questions; resources and referral information; the dust control plan; and Notices of Violation. Future plans are to update the status of development activities on a weekly or monthly basis. The SFDPH Hunter's Point website is accessible at: http://www.dph.sf.ca.us/eh/hunterspoint/Index.htm

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Explore additional dust control procedures such as misting at the fence line, tarping the fence, adding an on-site meteorological station, stopping activity that generates dust if winds are 15 miles per hour or more, or tarping grounds where no activity is occurring for seven days or more. It is recommended that the developer engage someone with expertise in dust control to specifically define additional mechanisms to achieve better mitigation and dust suppression.	**We agree that all of the listed dust control methods merit consideration and evaluation.** Lennar has maintained an on-site meteorological station since the inception of the project. (See: http://clients2.engeo.com/weather/hunterspoint/) In addition, Lennar as already installed misting systems and tarping of the fence line for many areas of the site - including many, if not all, the areas adjacent to residents. We will verify these efforts and whether additional areas would merit misting or tarping. We will explore the other listed dust control procedures. Finally, SFDPH recently obtained a complete copy of historical data (temperature, humidity, wind direction, wind speed and other parameters) from the weather station and we are conducting an analysis to determine if there are any correlations between meteorological data and asbestos results at the site.
Air monitoring equipment on-site and in the community should be used to evaluate the effectiveness of added measures. If ongoing exceedances occur, then more measures should be adopted.	**We agree with this recommendation.** We have used in the past and will continue to use the air monitoring equipment to evaluate dust control measures. We have also, in the past, revised our dust control plans and requirements for the developer based on regulatory history. We expect to continue to use this adaptive approach in the future.
To assist the SFDPH assigned inspector in evaluating the current Dust Control Plan, the contractor should conduct real-time dust monitoring using appropriate equipment for respirable dust (PM-10) at several locations, co-located with asbestos sampling (SFDPH and BAAQMD). SFDPH should use information from monitors during the day to identify activities which are generating PM 10 and alter activity to reduce its generation. As explained	**We agree with the recommendation about co-locating dust and asbestos monitoring equipment.** According to our records, several of the particulate dust monitors are already co-located with several of the asbestos sampling stations. We will evaluate co-locating some of the other sampling stations. Our consultants reviewed your concerns about use of the particulate monitoring equipment and concluded the current equipment was appropriate for perimeter monitoring. We

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below, there are validity problems with the currently used monitoring equipment.	are considering installation of alternative monitoring equipment on an experimental basis in order to do a side by side comparison with the current monitors. We will also investigate further with the BAAQMD and other experts to see if there is agreement on the optimal choice of equipment.
Include the community monitors, especially HV-7, HV-8 and HV-9, in the official asbestos monitoring plan, as regulated by the BAAQMD. These monitors, along with the on-site monitors, create better coverage of the perimeter of such a large parcel (BAAQMD).	**We agree with this recommendation.** In January 2007, SFPDH made the same request to BAAQMD. We will follow-up with them to review this issue again.
Explore ways to reduce the time lag between measuring elevated levels of naturally occurring asbestos and altering parcel activities by returning to 12-hour sampling (when samples often resulted in results the next day). Or, collect from 7 p.m. to 7 p.m., which would similarly mean a result may be available the next day. (BAAQMD for the on-site monitors; SFDPH for the community monitors). As a matter of principle, public agencies should try to be as timely in their feedback as possible. These sampling strategies will advance this goal.	**We agree with this recommendation.** SFDPH will be meeting with BAAQMD to review the pros and cons of 12 hour vs. 24 hour sampling and the possibility of changing the pickup time of the samples so that results can be received in time to influence the next day's activities. Please note that the samples are currently collected at 7 am and results are reported by the lab no later than 5 pm that day.

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Exhibit 21-8

USEPA Review of Dust/Naturally Occurring Asbestos Control Measures and Air Monitoring at the Former Shipyard, June 2010

U.S. EPA Review of Dust/Naturally Occurring Asbestos Control Measures and Air Monitoring At the Former Hunters Point Naval Shipyard

June 9, 2010

Executive Summary

At the request of several groups from the Bayview Hunters Point community, the U.S. Environmental Protection Agency (EPA) Region 9 reviewed the dust control measures and possible exposures to dust and naturally occurring asbestos near the development at Parcel A of the former Hunters Point Naval Shipyard. EPA also evaluated the dust control measures and air monitoring for naturally occurring asbestos, radiation and metals at the Navy cleanup sites at the former Shipyard.

Parcel A was originally used by the Navy primarily for housing, and as such, there were only small amounts of contamination on the property. The Navy completed environmental cleanup work at Parcel A to residential standards and transferred it to the City of San Francisco in 2004. Development work at Parcel A began in 2006. The Navy plans to finish its work on Parcels B and G this year and transfer those parcels to the City in 2011. The remaining parcels will follow in the next few years.

Many regions of California, including areas in San Francisco such as Hunters Point, sit on soil containing naturally occurring asbestos. Because naturally occurring asbestos in construction dust is a widespread concern in California, the State of California requires that all large construction projects in such areas work under an Asbestos Dust Mitigation Plan (ADMP) enforced by the local Air District. The goal is to control the dust in order to minimize possible exposure to asbestos. EPA reviewed the ADMP for the Parcel A development and found that strict best management practices for dust and asbestos monitoring and mitigation are in place to protect the community and keep exposure to asbestos in dust within acceptable levels. The current practice of daily inspections by the Bay Area Air Quality Management District ("Air District") and the City of San Francisco Department of Public Health provide appropriate oversight and enforcement.

The Air District requires air monitoring for asbestos as part of the ADMP for the Parcel A development project to provide feedback on the effectiveness of the dust mitigation efforts. While the Air District did not intend the asbestos air monitoring program to be used to evaluate exposure or health risk in the neighborhood, EPA calculated potential risk using the daily air monitoring data as a screening evaluation of what is in the air directly at the monitoring stations. The results were within EPA's defined acceptable risk range of between a one-in-one-million and one-in-ten-thousand chance of developing an asbestos related cancer.

The daily analysis of asbestos at the site is done by the method required by the California Air Resources Board (CARB), which counts all asbestos fibers. EPA re-analyzed 34 asbestos monitoring filters using a different method that provides a specific count of the longer asbestos fibers that correlate with asbestos health effect studies. EPA found lower levels of the "long" asbestos fibers. The results confirm previous conclusions by the Air District, the San Francisco

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Department of Public Health, and the California State Department of Public Health that the daily monitoring results are within acceptable risk levels.

While EPA's analysis focused primarily on naturally occurring asbestos, some community groups also asked EPA to evaluate whether metals and radiation might be in the dust at Parcel A and the Navy portion of the Shipyard. The monitoring data indicate that naturally occurring metals in dust at Parcel A and the Navy portion of the Shipyard do not pose an unacceptable risk. The radiation measured at all Navy excavations is below levels set for residential exposure. The Navy completed its cleanup at Parcel A to EPA's unrestricted residential standards, so the development work is not releasing Navy-related chemicals, metals or radiation to the community.

EPA will continue to coordinate with the Air District to ensure that both the developer and the Navy meet all the requirements of their Dust Mitigation Plans and that any releases of dust, asbestos and other possible contaminants remain at acceptable levels.

Introduction

Parcel A at the former Hunters Point Naval Shipyard is located in the Bayview Hunters Point neighborhood of San Francisco and covers approximately 75 acres (see Figure 1). Parcel A is being developed by the City of San Francisco and its developer, and the construction involves excavating and grading large amounts of soil and bedrock. The rock and soil in the Bayview neighborhood is partially comprised of the mineral serpentine, which contains naturally occurring asbestos and metals such as manganese and arsenic. Construction projects larger than one-acre in size in areas with naturally occurring asbestos are required to file an Asbestos Dust Mitigation Plan (ADMP) with the Air District under a state law called the Airborne Toxics Control Measure.

Review of the Asbestos Dust Mitigation Plan for Parcel A

EPA reviewed the ADMP for Parcel A prior to its reauthorization by the Air District in 2009. EPA found that the plan contained strict dust control measures, including requirements for wetting work areas, controlling soil stockpiles, covering truck loads, controlling dirt track out (e.g., washing wheels), and cleaning streets. The goal of the plan is to allow no visible dust to leave the site and no dirt track out onto neighborhood streets. This is in line with lessons learned from other sites with naturally occurring asbestos -- the best way to minimize exposure is to minimize dust generation. The plan is enforced through daily inspections by the Air District and separately by the City Department of Public Health under a city ordinance (Article 31).

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Review of Dust and Asbestos Monitoring Plans and Practices at Parcel A

As part of the ADMP, the Air District required the developer to install five stationary air monitors on and around the site (Figure 2). The locations of the Air District monitors (HV-1, 2, 4, 5 and 6) were determined by geophysical modeling based on terrain and meteorological information to present the best locations to evaluate asbestos levels at the fence line.

Samples are generally collected for each 24 hour period on work days. The monitors work by pumping air in through a filter, which catches the asbestos fibers. The filters are collected in the morning and sent to an independent certified laboratory which counts the fibers using an electron microscope.

The Air District established a trigger level of 16,000 total asbestos structures per cubic meter (s/m^3) of air. Under the ADMP, a reading at any monitor above the trigger level requires that the developer stop work for the day and subsequent days until all monitors are below the trigger level. The purpose of the work stoppages is to decrease asbestos releases by forcing the developer and Air District to re-evaluate procedures and methods to reduce dust and asbestos levels before work resumes. It is important to note that the trigger level established by the Air District for this project is not a legal standard and that results above the trigger level do not constitute a violation. The monitors and the trigger level are part of the specific ADMP for the development project and are intended to help minimize generation of asbestos from construction activities, not as a method to assess health risks in the community.

Due to concerns from the community about the problems with the monitors in the early summer of 2006, the City required the developer to install an additional five monitors. The filters are analyzed using the same protocol as the Air District monitors. Three of the City monitors (HV-7, 9, and 11) are generally sampled every work day. Similar to the Air District, the City required that work stop on days that results are above the trigger level. HV-8 is located upwind of the project and is sampled one day per week at random, though its results are also compared to the trigger level and used in the stop work process. HV-12 is located the furthest distance from the project and is sampled on work days. It was originally included in the stop work process, but because HV-12 is located on a dirt shoulder adjacent to a roadway and its results do not correlate with grading and excavating activities, the City now simply collects the data for informational purposes. The Air District formally added City monitors HV-7, 8, 9, and 11 to the ADMP in the latest update, finalized in August 2009.

The City Department of Public Health also requires continuous measurements for dust, with a minimum requirement that there be one dust monitor upwind of the project and two downwind. Currently, the City requires dust monitoring at five stations (HV-1, 2, 5, 7, and 11).

EPA found that the asbestos and dust monitors are the appropriate types of equipment for the project and provide the necessary information to monitor and control the worksite.

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General Analytical and Risk Calculation Methods for Asbestos in Air

Asbestos hazard assessments are based on epidemiological studies conducted several decades ago on occupational exposures to asbestos. The best method available at that time for measuring asbestos was phase contrast microscopy (PCM) which uses a magnification of 400X. The epidemiological studies correlated risk with asbestos fibers measured with the PCM method, which was able to measure fibers longer than 5 micrometers (μm) and with an aspect ratio (length divided by width) greater than 3. Such fibers are called the PCM equivalents.

The current method used to count asbestos fibers is transmission electron microscopy (TEM) which has a magnification of 20,000X. TEM can resolve fibers as small as 0.5 μm in length, as well as definitively determine the asbestos type and provide a more accurate fiber size distribution. However, the specific asbestos fiber type and size associated with disease is not known, therefore the PCM equivalents are used as a surrogate for exposure. This leads to a problem with utilizing the newer data in risk assessments since TEM can resolve both the short and long fibers, but the epidemiological data are based only on the longer fibers.

One approach to work around this problem is to convert the total fiber counts from the current TEM measurements back to the original epidemiologic measures. This is the approach that the California Air Resources Board (CARB) requires in their asbestos regulations. CARB utilizes a modified version of the procedures outlined in the Asbestos Hazard Emergency Response Act (AHERA) published in 1987 in response to asbestos material in schools. The CARB procedure counts all the fibers greater than 0.5 μm in length, then converts the total count to PCM equivalents by applying a conversion factor of 320 total fibers/1 PCM equivalent. This is based on observations that with chrysotile asbestos, a common commercial mineral form, the fiber distribution is heavily weighted to fibers shorter than 5 μm in length. However, site specific conversion factors may vary in situations with naturally occurring asbestos.

EPA prefers to use the International Organization for Standardization (ISO) 10312 method published in 1995. This method also uses TEM but provides a count of both the total number of fibers as well as a count of the strict PCM equivalents. The PCM equivalents count can then be used directly in the risk calculations. Another significant difference between the CARB and the EPA procedures is in how individual fibers are categorized and tabulated. The ISO 10312 method allows the analyst to identify and tabulate any distinguishable fiber that meets the dimensional requirements regardless of the complexity, while the CARB procedure counts a complex of fibers as a single entry. This means that the CARB method reports a clump of fibers as one, while the EPA method attempts to count all the fibers in the clump. Both the CARB method and the ISO 10312 method use similar sample collection methods, preparation, instrumentation and resolution. However, the fiber dimensions of concern are different and the procedures for how individual fibers or complexes are tallied can result in differences in the totals based on the complexity of the asbestos structures and size distribution. Therefore, the results from the two methods cannot be directly correlated.

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Analysis of Air Asbestos Data at Parcel A

In the health studies that form the basis for evaluating potential health effects from asbestos exposures, cancer was correlated with cumulative average lifetime exposure. Since the perimeter sampling is designed to assess the level of airborne asbestos at the fence line and not represent a continuous individual exposure, it is not appropriate to calculate an overall risk number. However, as a screening measure, EPA calculated a potential risk number at each of the monitoring stations using the 7,000 plus data points collected and analyzed by the CARB method from mid-2006 through 2009. The result at each monitoring station is below a one-in-one-hundred-thousand potential risk. This calculation was based on exposure beginning in infancy to provide the most conservative estimate. Again, this does not represent the risk in the community, but rather is a measure of what is in the air directly at the fence line monitoring stations.

More than half of the filters originally analyzed by the CARB method over the life of this project were non-detect -- that is, no asbestos fibers were measured in 4,153 out of 7,278 filters. In the original CARB analysis, approximately two percent of the filters had results above the trigger level.

EPA oversaw the re-analysis of 34 filters – including at least one from each monitoring station that had results above the detection limit. EPA selected filters over the complete range of detected fiber concentrations and with a majority representing filters with high counts from the CARB method. EPA's re-analysis employed both the CARB and EPA procedures and fiber counting rules and definitions. The filters available for selection were from days between December 2008 and August 2009.

The monitor locations and dates are shown in the table below, along with the original CARB result and the PCM equivalents re-analysis results. The results in bold denote filters whose original CARB results were above the trigger level of 16,000 structures/m^3.

Monitor	Date	Original CARB Total (s/m^3)	PCM Equivalents (EPA re-analysis) (s/m^3)
HV-4	2/27/2009	non-detect	non-detect
HV-2	4/2/2009	800	non-detect
HV-1	5/7/2009	800	non-detect
HV-8	3/2/2009	900	non-detect
HV-5	5/15/2009	900	non-detect
HV-9	4/9/2009	1,000	non-detect
HV-11	5/5/2009	2,000	non-detect
HV-7	3/10/2009	2,800	non-detect
HV-1	4/21/2009	2,900	non-detect
HV-4	3/20/2009	2,900	non-detect
HV-2	5/1/2009	2,900	non-detect
HV-9	6/5/2009	3,900	non-detect
HV-1	5/1/2009	4,800	non-detect
HV-11	4/13/2009	5,900	non-detect

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HV-12	5/15/2009	7,700	non-detect
HV-12	4/20/2009	9,700	non-detect
HV-11	4/29/2009	12,800	980
HV-4	6/5/2009	13,800	non-detect
HV-4	7/17/2009	14,100	non-detect
HV-4	5/6/2009	14,400	non-detect
HV-4	**5/29/2009**	**17,100**	**920**
HV-12	**3/10/2009**	**20,000**	**3,800**
HV-4	**5/18/2009**	**20,400**	**970**
HV-11	**4/14/2009**	**23,200**	non-detect
HV-12	**4/14/2009**	**23,200**	**990**
HV-4	**5/5/2009**	**31,100**	non-detect
HV-12	**3/12/2009**	**32,300**	non-detect
HV-09	**4/21/2009**	**33,400**	**2,900**
HV-4	**5/14/2009**	**41,500**	non-detect
HV-09	**5/21/2009**	**43,500**	non-detect
HV-4	**5/15/2009**	**45,300**	**920**
HV-11	**4/21/2009**	**52,000**	**1,900**
HV-12	**12/29/2008**	**95,300**	non-detect
HV-11	**12/29/2008**	**192,000**	non-detect

Seventy-four percent of the filters re-analyzed by the EPA method did not have any detectable PCM equivalents fibers, even though the CARB method results for these filters were frequently above the trigger level. The data indicate that a high CARB result may or may not correlate with the presence of PCM equivalents fibers, but a low CARB result does correlate with low PCM equivalents results.

A true risk calculation cannot be done with only 34 data points and with so many non-detects. However, as a point of reference, the highest value measured by EPA, 3,800 structures/m^3, corresponds to a potential risk of one-in-ten-thousand if that were the concentration that a person was continuously exposed to. All of the PCM equivalents data in the above table were either non-detect or below this level indicating that the risk is at acceptable levels. In addition, we can conclude that if the trigger level were based on the PCM equivalents fiber counts, the result would be far fewer shut-down days than required using the CARB method.

Malfunctioning Monitors Around Parcel A in 2006

There was a period of approximately three months at the beginning of earthmoving activity in 2006 when the perimeter asbestos air monitors were not functioning properly. The Air District assessed a penalty for this violation and the problem was fixed in early August of 2006. The only data available from this time period are several worker safety monitors worn by equipment operators on Parcel A and Navy monitors located downwind near Navy excavations on Parcels B-G. The asbestos levels measured in worker safety monitors at Parcel A and at Navy monitors during this time period are below limits set for worker exposure. The measurements for the worker safety monitors use different methods than the perimeter monitors and thus may not be directly compared or averaged with the perimeter monitors for risk analysis. EPA believes that

the three plus years of data taken daily at the perimeter monitors since 2006 provide the best representation of conditions at the site and thus used this data in our assessment.

Radionuclides and Metals Dust at Parcel A and the Navy Portion of the Shipyard

EPA, California EPA and the Air District enforce a similar Dust Mitigation Plan for the Navy's Shipyard remediation work as the Air District requires at Parcel A. In addition to asbestos and dust, the Navy also monitors for radiation, manganese and lead immediately adjacent to all of its work sites at the Shipyard.

The average monitoring result for radiation is 10^{-13} microcuries/milliliter of air for both alpha and beta activity. These reported levels include both potential Navy sources and naturally occurring sources native to the soil. This corresponds to a dose less than EPA's limit of 5 millirems per year for residential exposure. Thus, EPA sees no elevated risk to the community from radioactivity related to Navy cleanup activities. At Parcel A, EPA scanned the entire surface of the parcel prior to transfer and found no radiation above natural background levels. Thus, the construction activity at Parcel A should also pose no threat to the community from radionuclides.

For metals, manganese poses the highest potential risk of the naturally occurring metals and lead poses the highest potential risk of possible Navy contaminants. Other metals, such as arsenic, chromium, nickel, etc., are present in the soil at concentrations with lower potential risks than manganese and lead. The following table shows that the concentrations for these two metals measured in airborne dust adjacent to Navy excavations are less than the EPA Schools Air Toxics screening levels.

Metal	Average Navy Measurement (micrograms/m^3)	Schools Air Toxics Screening Level (micrograms/m^3)
Lead	0.0076	0.15
Manganese	0.028	0.05

Because the San Francisco Department of Public Health and the Air District only require monitoring for dust and asbestos at Parcel A, EPA compared the dust levels measured at Parcel A with dust levels measured by the Navy. The dust measurements are of particulates with a diameter smaller than 10 micrometers, called PM-10. Since the soil type is the same at both sites, the concentrations of naturally occurring metals in dust would be expected to also be the same. The average dust concentration measured by the Navy is 35 micrograms/m^3. The annual averages at the five dust monitors at Parcel A are in this same range, typically between 30 and 60 micrograms/m^3. Therefore, we expect that the concentrations of metals in dust at Parcel A are below the screening criteria. Finally, EPA's national standard for PM-10 is 150 micrograms/m^3 in ambient air, meaning the general air in a region. The dust concentrations directly at the construction site at Parcel A are below this level.

Minimizing Exposure to Dust and Asbestos

Because naturally occurring asbestos is found throughout Bayview Hunters Point, it is important to minimize all potential exposure pathways. EPA will continue to work with the Air District and the City Department of Public Health on improving the dust mitigation efforts. However, there are also a number of non-construction activities that can release asbestos. Based on research in other locations with naturally occurring asbestos, EPA has developed recommendations for how individuals can minimize their exposure. The recommendations include:

- Cover areas of rock and soil with clean soil, rock, vegetation, or other material
- Pave over unpaved walkways, driveways, or roadways containing naturally occurring asbestos (NOA)
- Landscape areas with vegetation and add a layer of organic mulch or NOA-free soil
- Water garden areas before digging
- After gardening or other activities in the dirt, remove boots and gloves outside and take dirty clothes directly to the laundry
- Keep windows and doors closed on windy days
- Limit track-in by using door mats, and wipe down pets before they enter buildings to reduce the amount of soil tracked indoors
- Allow children to play in outdoor areas only if the area has a ground covering, such as wood chips, mulch, sand, pea gravel, grass, asphalt, shredded rubber, or rubber mats
- Relocate outdoor activities to areas that do not contain NOA. Walk, run, hike, and bike only on paved trails
- Avoid dusty areas, especially in windy conditions

Conclusion

The Air District effectively oversees and regulates the developer's construction activities at Parcel A under the Asbestos Dust Mitigation Plan. Dust generation is minimized by the dust mitigation measures and the monitoring and inspection procedures, thus keeping asbestos and metals exposures within acceptable risk levels. At the same time, EPA, California EPA and the Air District oversee the Navy's dust and asbestos mitigation efforts. Navy monitoring results for metals, radiation and asbestos are all below health based screening levels.

Additional Resources

EPA factsheet on naturally occurring asbestos:
http://www.epa.gov/superfund/health/contaminants/asbestos/noa_factsheet.pdf

EPA website on the former Hunters Point Naval Shipyard Superfund site:
http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/db29676ab46e808188257426007437 34/23b69b19b13d34c488257007005e9421!OpenDocument

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San Francisco Department of Public Health webpage with fact sheets and a spreadsheet with the daily asbestos monitoring data: http://www.sfdph.org/dph/EH/HuntersPoint/default.asp

Navy webpage with dust data and documents related to Navy remediation at the Shipyard: http://www.bracpmo.navy.mil/basepage.aspx?baseid=45&state=California&name=hps

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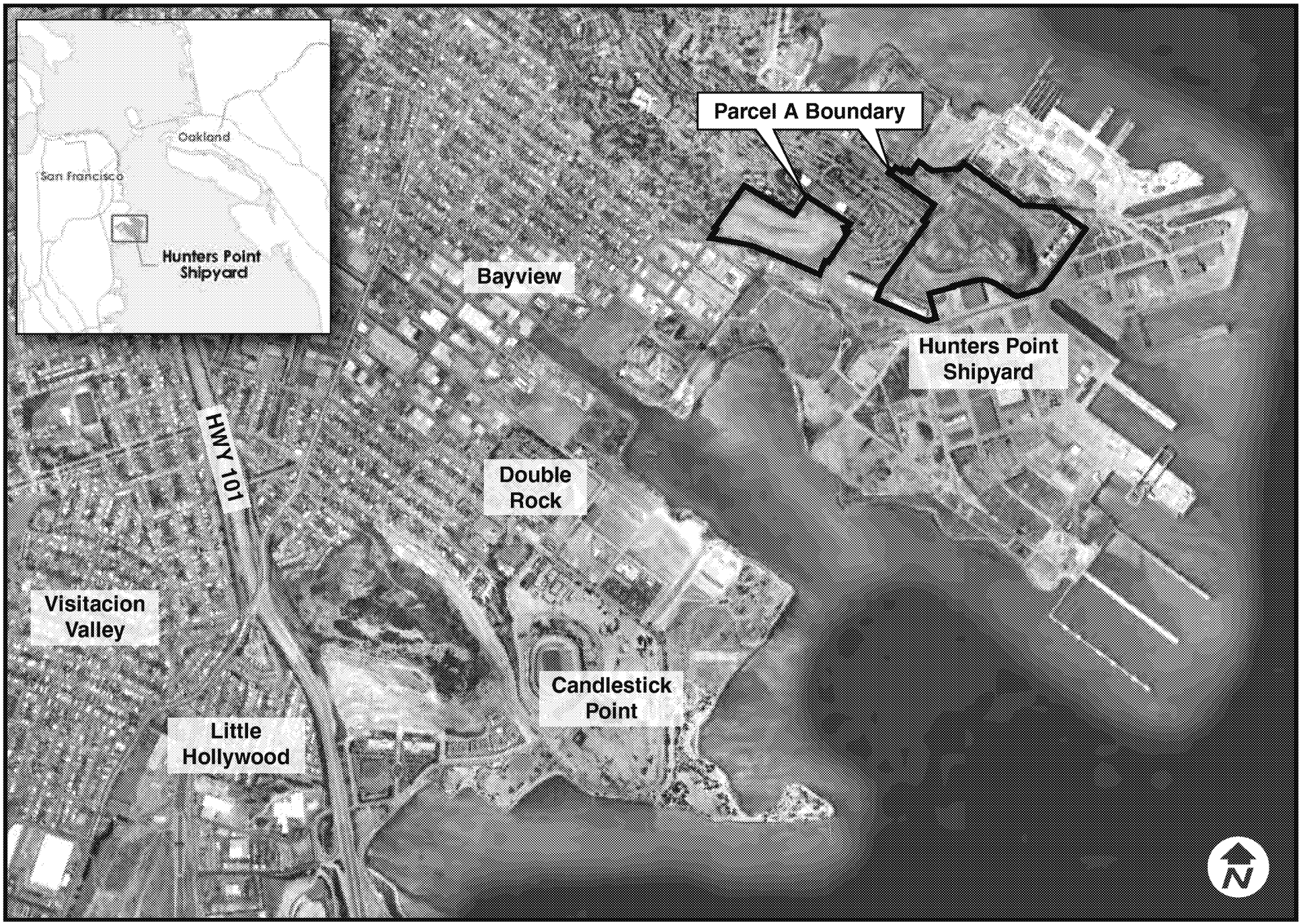

Figure 1: Location Map of Hunters Point

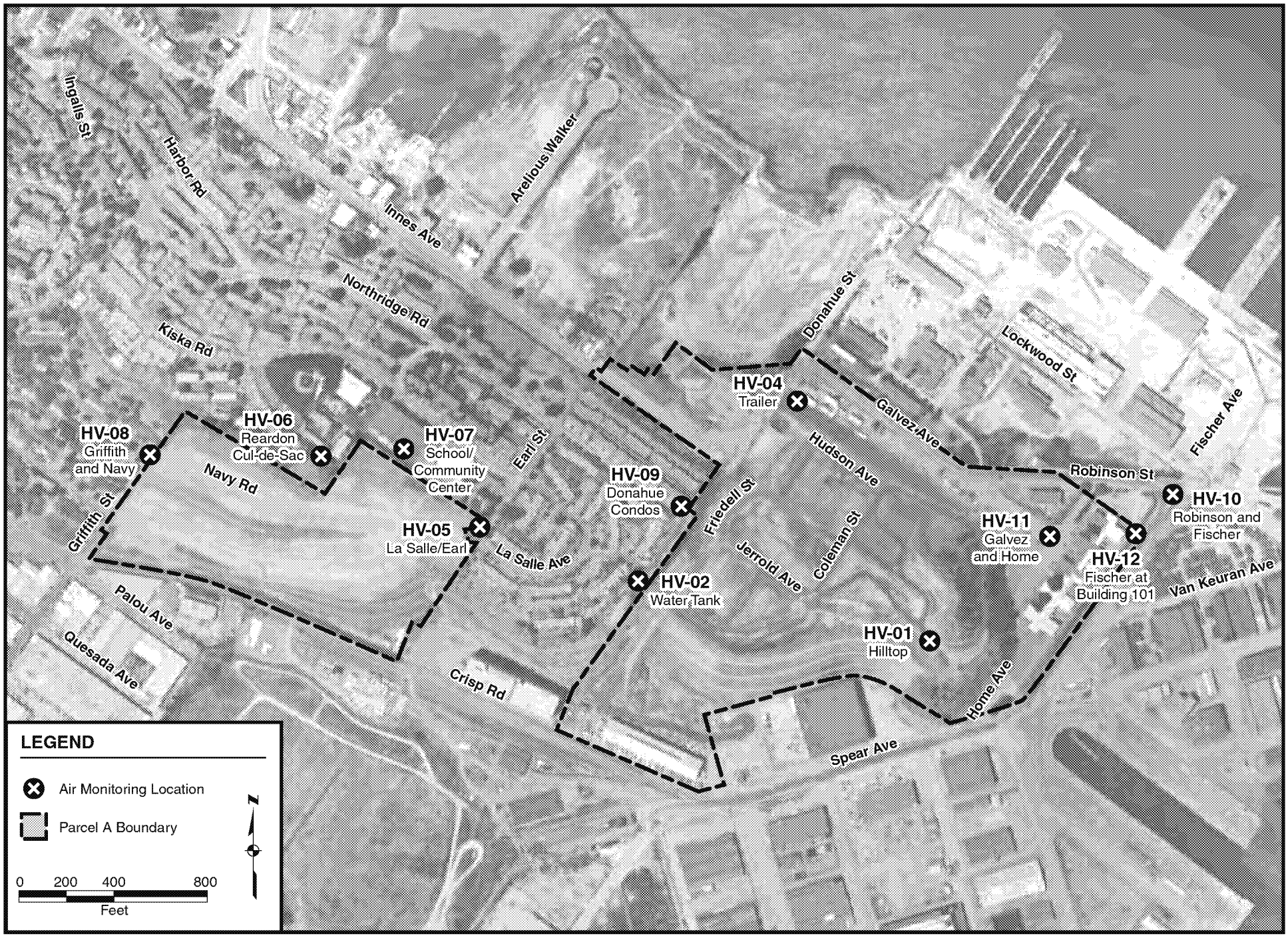

Figure 2: Asbestos Air Monitor Locations Around Parcel A

U.S. EPA Response to Comments from the
Technical Assistance Services for Communities (TASC) Independent Contractor
on the
"Draft Technical Summary of EPA's Analysis of Hunters Point
Air Monitoring Filters for Asbestos, December 22, 2009"

The comments below were received in a report from E^2 Inc., which provided independent technical assistance to the community under EPA's TASC program. Comments from E^2 were developed based on input from Dr. James Millette of MVA Scientific Consultants, a national expert on asbestos, and on input from community groups.

Note that in finalizing the report, EPA changed the title from "Draft Technical Summary of EPA's Analysis of Hunters Point Air Monitoring Filters for Asbestos" to "U.S. EPA Review of Dust/Naturally Occurring Asbestos Control Measures and Air Monitoring at the former Hunters Point Naval Shipyard" to better reflect the new content.

Comments included in the body of the text of the TASC Report:

Comment 1: The Draft Technical Summary does not specifically address dust generation.

***Response*:** The comment is correct; EPA did not specifically address dust in the draft report. EPA added a discussion on dust to the final report and clarified the differentiations between dust and asbestos.

Comment 2: During the site visit on March 1, Sample Site HV-8 equipment was not present, suggesting that no sampling is taking place at HV-8. The EPA Draft Technical Summary lists this monitor as being sampled one day per week at random. It is uncertain if sampling is not taking place at this site at all or if the equipment is moved when not actively sampling. Examination of the 68 results from the HV-8 monitor (12/05/06 – 2/26/10) shows the same trends as the other sets of monitor data. Most of the time, no asbestos was detected. A few times the level was above the trigger level, but below the EPA risk level for continuous exposure.

Response: HV-8 has been present during every EPA inspection. HV-8 is located within a fenced perimeter and is not easily visible from outside the site.

Comment 3 (related to Recommendation 3 below): The EPA Draft Technical Summary did not attempt to address the exposure to the community between April and August 2006 when mass grading/earthmoving activities occurred on Parcel A. There are no perimeter monitoring data from that period. It may be possible to estimate exposures with other data or by use of a modeling study. There are several different approaches that could be used for modeling. A combination of approaches may also be appropriate. Three approaches are:

> **a. Data extrapolation:** There is some perimeter data collected on August 17, 2007 during work activities similar to those occurring during the April-August 2006 period.

The perimeter air sampling values for that day (8/17/07) were 0.0019, 0.0010, 0.0029, 0.0057, 0.0009, <0.0010, 0.0460, <0.0010, <0.0010, and 0.0038 structures per cubic centimeter.

***Response*:** The comment suggests looking at data from a day when monitoring was functional and field operations were out of compliance (the commenter suggests a specific day with an inspection that led to a Notice of Violation). As the comment notes, nine out of ten monitors were well below the trigger level on that day, and one monitor was at three times the trigger level. While this may qualitatively suggest that monitoring results are not necessarily high on dusty days, it only represents a single day and risk should be estimated from exposure measurements over a long time period. EPA prefers to focus on the three plus years of existing data. There is no way to recreate the missing data, but the monitoring during the last three years of construction activity are the best estimate of what conditions may have been like during the early summer of 2006.

b. Data calculation: It may be possible to use a modeling study to estimate the community exposures during that period at the site. A key parameter needed to perform this calculation is the amount of asbestos released by the grading/earth moving and truck related activities during the time period of interest. There is some data from personal monitoring at the site that was conducted in May 2006 that can be assumed to reflect the levels of fibers released during the grading/earth moving activities. The highest values from the personal samples were (all in fibers per cubic meter):

- Scraper moving dirt: 30,000
- Blade operator: 40,000
- Compactor: 50,000

All of the fibers in these samples are longer than five micrometers. These are Phase Contrast Microscopy (PCM) data which may contain some non-asbestos fibers.

***Response*:** The data from the worker safety monitors ranges from non-detect to the highest levels noted in the comment. Also, as noted in the comment, the worker PCM data includes non-asbestos fibers so the results should not be correlated with the perimeter monitoring results. Modeling could be done to estimate the dispersion and dilution as the fibers move from the source area out into the neighborhood. However, that is beyond the scope of EPA's assessment of ongoing operations and exposure. However, the levels measured at the worker source area are within worker safety limits and would be lower at the project boundary. Also, as stated in the response above, EPA believes that the three plus years of perimeter monitoring data collected during construction are the best indicators of conditions at the site.

c. Collect new or research similar activity samples: There is a database of information about activity-based asbestos fiber release from naturally occurring asbestos (NOA). Eldorado Hills, Clear Creek, Garden Valley, and Slow Dusty Road are sites that have been studied. An investigation into whether any of the data collected for those sites is applicable to Hunters Point grading/earth moving and truck related activities

undertaken between April and August 2006 should be undertaken. If these data are not applicable, an activity-based sampling of grading/earth moving and truck related activities on another part of the Hunters Point site should be considered if the activities and soil/rock characteristics are similar to the situation in Parcel A.

***Response*:** EPA and the State of California have done research in the past at the sites listed in the comment and lessons learned about dust mitigation and asbestos monitoring were used in developing the dust and asbestos control measures at Hunters Point. However, each site has unique work conditions, geology and weather. Thus, the data from those sites are not as applicable to an evaluation of conditions at Hunter Point as the three plus years when grading, excavating and earth moving activities were occurring with proper monitoring.

Comment 4: Asbestos fibers are not connected to the community health outcomes reported, such as headaches, bloody noses, adult onset asthma, respiratory symptoms, nausea and vomiting. In 2007 the California Department of Public Health (CDPH) stated the following in a public health report (CDPH, September 10, 2007):

> "CDPH has reviewed the equipment being used to monitor dust and a limited set of the dust data. According to the manufacturer, the instrument that has been used to monitor dust at Parcel A is designed for personal/breathing zone monitoring, plant walk-through Hunters Point Asbestos Technical Advisor Report 4 surveys, remediation site worker exposure monitoring, and indoor air quality. The instrument being used is sensitive to moisture and is a passive sampler. Dust monitors that are approved for PM 10 ambient air standards by the California Air Resources Board are all active samplers. Further, there are dust monitors available that are designed for outdoor applications where moisture is present. Due to the novel application of the equipment for fence line monitoring, CDPH is not able to interpret whether dust exposures in the community occurred that would explain some of the community health complaints such as headaches, bloody noses, adult onset asthma, respiratory symptoms, nausea, and vomiting. We recommend using dust monitors that have been certified for fence line monitoring."

***Response*:** EPA called the manufacturer of the dust monitoring equipment and the equipment is appropriate for outside use at this site. The only effect of moisture would be to make the equipment report a result that is higher than the true value. This is because the dust monitoring equipment uses a light beam to measure changes in opacity due to incoming particulates, and moisture would increase the opacity. Thus, the only error would lead to more protective and conservative results. EPA agrees with the comment that asbestos would not be expected to cause any of the effects claimed by several members of the community.

Comment 5: It is uncertain whether additional air monitoring was performed for dust or other non-asbestos contaminants. The community has shared metal concentrations analyzed from wipes reportedly taken near the site in 2007. Some of the metals concentrations are above the reporting limits listed on the data sheets. Data for these and other contaminants might explain the health consequences reported by community members.

***Response*:** The TASC contractor provided results to EPA from a community supplied wipe sample taken from a car parked near Parcel A. EPA has no information what process was followed to collect the samples. The samples were analyzed by Micro Analytical Laboratories, which is a certified lab. EPA developed screening criteria for evaluating home wipe sampling as part of the 9/11 response. The comparison below shows that all of the results from the Hunters Point wipe sample except lead are far below EPA's health screening criteria. The lead in this sample is not likely to be related to development work because lead concentration in the soil is much lower than several other metals such as arsenic and nickel, and those metals are present in the wipe sample at concentrations less than the lead concentration. The lead is also not likely to be related to Navy excavations because the Navy monitors airborne dust at all excavations for lead and the results are below health based screening criteria. The Detection Limit listed in the Table represents the lowest concentration that the laboratory is capable of detecting and is not related in any way to a health based screening level. Note that EPA has changed the term Reporting Limit from the comment to Detection Limit.

Analyte	Analysis Results ug/sq. ft	Detection Limit ug/sq. ft.	EPA Screening Criteria ug/sq. ft
Arsenic	<5.0	5.0	36
Barium	24	5.0	10,219
Chromium	7.9	5.0	437
Copper	19	2.5	5,825
Nickel	11	2.5	2,917
Lead	14	2.5	2.3
Silver	4.5	1.3	728
Vanadium	2.7	0.5	938
Zinc	81	10	43,664
Mercury	0.07	0.05	42

Specific Recommendations from the TASC Report:

Recommendation 1: Further investigate community concerns regarding work stoppages not occurring when exceedence alarms were triggered. The failure to follow and implement the protocols established in the Asbestos Dust Mitigation Plan could limit its effectiveness and seriously impacts the community's perceptions about the effectiveness.

***Response*:** EPA confirmed with the Air District inspector that the work stoppages are enforced when samples results are above the trigger level. To clarify the process: The asbestos filters are in place collecting asbestos for 24 hours. They are collected daily and sent to an off-site laboratory for analysis. The results then come back one day after the measurement. EPA has investigated shortening this timing but because of the complexity of measuring asbestos, there is no way to speed this process. Work stops when the results above the trigger level come back from the lab and may not start again until there is a day when all monitoring stations in the Asbestos Dust Mitigation Plan are below the trigger level. Even though the work stoppage occurs after the event, the sampling still serves the intended function of enforcing the Asbestos

Dust Mitigation Plan by providing feedback on the effectiveness of the dust mitigation efforts and providing a strong incentive for compliance. As a side note, there are no alarms on any of the monitors.

Recommendation 2: Review the monitoring frequency for each station to ensure that the mitigation plan is being followed. Whether monitoring should take place during periods when no official work is being done on the site (including weekends) should also be reviewed.

***Response*:** Nine out of the ten stations are monitored daily during work activities. One station, HV-8, is monitored one day per week on a random basis. This is specified in the Asbestos Dust Mitigation Plan because HV-8 represents up-wind conditions. The data tables show that the monitors are operating on the required days. EPA agrees with the Air District that monitoring is appropriate during work days and is not necessary on non-work days. Even on work days, the vast majority of results are non-detect and 98% of the results are below the trigger level. EPA's expectation is that non-work days would have a lower possibility of dust and asbestos generation. While there is no monitoring on non-work days, the requirements for soil management such as stockpile control are still the same as on work days.

Recommendation 3: Using one of the procedures outlined above (community air sampling, modeling or extrapolation), estimate asbestos fiber release from the grading/earth moving and truck related activities that occurred between April and August 2006.

***Response*:** EPA believes that use of the three and a half years of existing data to represent the three month data gap is the most representative of conditions at the site. See the Response to Comment 3 above for additional detail.

Recommendation 4: Revise the conclusions of EPA's Draft Technical Summary (last paragraph) to more specifically reflect what is supported by the analysis.

***Response*:** Agreed, this comment is addressed in the final version of the Report.

Recommendation 5: Investigate asthma and nosebleed concerns raised by local residents and determine whether these health issues may be related to non-asbestos contaminants (particularly metals and particulates).

***Response*:** Residents in the BVHP neighborhood experience higher rates of asthma hospitalization and emergency room visits than most other neighborhoods in San Francisco. These higher hospitalization rates have been observed for about 15 years that data have been collected and pre-date the development work at Parcel A. There are a variety of social and environmental conditions in the community outside the shipyard that contribute to these disparities. While the asthma rates in Hunters Point are relatively higher than the rest of the city, the rates have also decreased in BVHP substantially over the last fifteen years due to coordinated City asthma policy and action on clinical and environmental factors.

There are no health data available concerning nosebleeds in Hunters Point. Members of the community have asked about chromium and nosebleeds at public meetings. Workers in plating shops exposed to chromic acid mist can develop deterioration in nasal tissues. However, this effect is caused by industrial exposure to high levels of chromic acid mist and chromium in soil has not been found to cause this problem. Finally, the chromium in soil at Hunters Point is the type called Cr(III). This is much less hazardous than hexavalent chromium, or Cr(VI). The particulate concentrations measured at the work site are less than EPA's national ambient standards.

Recommendation 6: On a minor note, it is also recommended to use the same units for expressing asbestos quantities in reports. There is some confusion caused by the various ways in which the air sample data are presented. Asbestos air monitoring data is usually expressed as asbestos structures per cubic centimeter (str/cc). Exceedence reports use structures per cubic meter and the EPA Draft Technical Summary uses scientific notation. An example of the conversion is: 16,000 str/cubic meter = 0.016 str/cc = 1.6E-2 str/cc. It would be much clearer if all used the same method of expressing the data.

***Response*:** Agreed, this comment is incorporated in the final version of the Report.

Exhibit 21-9

Letter to San Francisco Board of Education regarding Health Concerns Related to the Asbestos and Dust Control Program at HPS, from Mayor's Shipyard Citizen's Advisory Committee, October 2007

THE MAYOR'S HUNTERS POINT SHIPYARD
CITIZEN'S ADVISORY COMMITTEE

BVHP Shipyard Site Office
P. O. Box 882403
San Francisco, CA 94188

Phone: 415.822.4622
Fax: 415.822.4840
Email: SanFranciscoCAC@aol.com

October 17, 2007

President Mark Sanchez
San Francisco Board of Education
555 Franklin Street Room #106
San Francisco, CA 94102

Dear President Sanchez:

I write at the direction of the Mayor's Hunters Point Shipyard Citizens Advisory Committee (CAC) to express our collective disappointment with your recent resolution regarding the purported public health hazards of shipyard redevelopment. While the Board has a responsibility to protect the health of its students and staff, we do not see how your action will do so. We believe the Board's action was taken absent the minimal homework that could and should have informed its deliberation and decision taking.

In calling for an "independent study" of the dust issue, the School Board ignored the activity of six regulatory agencies: US EPA; the Agency for Toxics Disease Registry (an arm of the U.S. Centers for Disease Control); California Dept. of Toxic Substances Control; California Dept. of Health Services; the Bay Area Air Quality Management District; and the San Francisco Department of Health. US EPA and California DTSC approved the transfer of Parcel A for residential development. The other agencies (staffed by at least four public health physicians), participated in developing the dust control and monitoring regimens, and have recently reviewed those regimens, the monitoring data and the health risks associated with the known exposures, and other possible exposures reasonably inferred where data is not 100% reliable.

Additionally, two private physicians, Dr. John Balmes and Dr. Sarah Julc, associated with the University of California and experts in the area of asbestos exposure, as well as the CAC's own environmental consultant, Arc Ecology (which has studied shipyard contamination for over 25 years), have also reviewed the environmental data. Collectively, all parties which have reviewed the monitoring regime and the data agree on the following conclusions:

1.) The threshold standard for airborne asbestos established by the Bay Area Air Quality Management District is the strictest in the State of California. To protect public health, the standard requires the halting of project work when the threshold standard is exceeded.

2.) Lennar's mandated dust/asbestos control plan is also the strictest in California and has been made more stringent over time. Off-site stations have been added to on-site air monitoring stations, plus increased watering, perimeter water misters, and on-site dust marshals.

2.) Lennar's mandated dust/asbestos control plan is also the strictest in California and has been made more stringent over time. Off-site stations have been added to on-site air monitoring stations, plus increased watering, perimeter water misters, and on-site dust marshals.

3.) Despite monitoring gaps in the first three months of activity, and intermittent problems with the maintenance of the dust/asbestos control program, overall compliance has been protective of public health with respect to dust and airborne asbestos generated by construction on Parcel A.

All of the agencies and expert advisers acknowledge and are troubled that many residents of Hunters Point Hill and the Bayview Hunters Point community suffer poor health relative to other San Francisco neighborhoods. What they challenge are scientifically unsupported, primarily anecdotal claims that dust and asbestos from Parcel A grading activity caused or significantly exacerbated these problems. The CAC is not aware of any credible medical evidence or expert opinion to confirm a causal rather than circumstantial relationship of symptoms to shipyard development.

The CAC considers the conclusions of the regulators and other experts at this point to be definitive. We would suppose that the Board, itself a public agency, would by any reasonable standard consider those Federal, State and municipal agencies to be independent, trustworthy sources of environmental technical assessment. As for the others; admittedly, the physician experts were engaged by Lennar on behalf of a group of neighborhood pastors; and Arc Ecology's consulting contract is with the Redevelopment Agency. But we think it unlikely that those respected physicians and that organization would knowingly deceive the public and thereby risk their professional credibility for a nominal consulting fee.

We further question the Board's assertion that this is a failure of environmental justice. Serpentine rock is ubiquitous throughout San Francisco and the entire state. Yet virtually no other community in this city or in California has an equivalent asbestos and dust program. Even with intermittent compliance problems this project provides far greater protection to Hunters Point Hill and Bayview residents than is afforded any other neighborhood in the City. These careful provisions result from our environmental justice concerns.

The Board's invocation of the precautionary principle here is also questionable. Halting construction pending further study will harm Bayview Hunters Point economically. 80 Bayview Hunters Point residents and 35 local service providers and contractors are at work on the project. Layoffs and demobilization will not only hurt Lennar but also cut employees' incomes by 60% (or more if they don't qualify for unemployment compensation). Even if Lennar fully paid its workforce during a lay off, as some suggest, the delay in starting housing construction would postpone hundreds of desperately needed, long awaited construction jobs for residents. We would argue that poverty and the lack of access to health care continue to be the main cause of public health problems in the neighborhood. Implementing the Board's resolution to stop the project has much greater potential to cause tangible, versus speculative, harm.

Since 1991, the CAC has been involved in every aspect of shipyard redevelopment planning and implementation. We participated in drafting the Health Code ordinance focusing precisely on Parcel A development, as well as the initial dust control procedures. We constantly review and have continuously improved the dust control plan. We have sponsored seven public workshops on such matters, the first occurring six months ahead of earthmoving and construction activity. On September 10, the CAC sponsored a community forum on the issue wherein a panel

Among members of your Board, only the author of the resolution called a CAC member to discuss this matter. The conversation, reported to have lasted about 10 minutes, occurred just hours before the Board's vote. The Board would have benefited from consulting any of several knowledgeable parties, and conducting a more thoughtful, thorough investigation, prior to voting on its well intended but misinformed resolution.

The Board's action further muddied the waters of this debate by yielding to politics where the science of public health should be deferred to. Sound science (or any proposition) can be made to seem suspect or ridiculous by selective dissection and determined rhetorical assault. The public relies on its officials and representatives to make reasoned judgments as to what are matters of facts or matters of opinion. The issue has come before both the Board of Supervisors and the Redevelopment Commission on several occasions. After weighing the science against the public testimony, heartfelt though it was, of a fraction of the community, both bodies declined to take any action on the claims of imminent peril and long term risk. Your Board, acting on what it believed to be true, did what it believed to be right. Unfortunately what you've taken to be true is completely contrary to the judgment of every expert evaluating the facts as they are known. What you've done will at best do very little about real problems. At worst it will sow more fear and mistrust, and delay the reaping of such positive benefits as shipyard redevelopment may bring to the community.

The facts were and are readily available to you, and we strongly urge you to consult them in any future action you may take on this subject. I have enclosed copies of the most recent information for your reference.

Very truly yours,

Scott Madison

Scott Madison
CAC Chairman

cc. Mr. Norman Yee, San Francisco Board of Education Commissioner
Ms. Jane Kim, San Francisco Board of Education Commissioner
Mr. Eric Mar, San Francisco Board of Education Commissioner
Ms. Kim-Shree Maufas, San Francisco Board of Education Commissioner
Ms. Hydra Mendoza, San Francisco Board of Education Commissioner
Ms. Jill Wynns, San Francisco Board of Education Commissioner
Mr. Fred Blackwell, San Francisco Redevelopment Agency, Executive Director
Mr. Michael Cohen, Director, Base Reuse and Development Mayor's Office of Economic and Workforce Development

Attachment 22

Proposition P and the Precautionary Principle

Attachment 22
Proposition P and the Precautionary Principle

Proposition P was approved by the voters of San Francisco on November 7, 2000 and called upon the Navy to remediate the Shipyard to the highest levels practical to ensure flexible reuse of the property. The Board of Supervisors subsequently passed Resolution 634-01, adopting Proposition P as official City policy and urging the Navy and USEPA to take actions to implement Proposition P. The Resolution recognizes that the unrestricted cleanup standard called for in Proposition P identifies a cleanup level acceptable to the community; urges the Navy and regulatory agencies not to rely on barriers to protect future occupants and the public from exposure to pollution, unless other remedies are technically infeasible, and urges the Navy to clean up the Shipyard in a manner fully consistent with the Reuse Plan and with remedies that do not make implementation of the Reuse Plan economically infeasible.

Proposition P is a general statement of policy for a desired result for the Navy and regulators to achieve in implementing the Shipyard cleanup. Three years after the passage of Proposition P, the Redevelopment Agency Commission approved the Conveyance Agreement with the Navy. The Conveyance Agreement is a legally binding agreement that sets forth specific cleanup standards for each parcel, and requires the Navy to obtain concurrence from the regulators that the property is safe for its intended use. The Conveyance Agreement was produced with substantial community input. The Conceptual Framework for the integrated planning adopted by the Board of Supervisors in May 2007 reaffirmed the Conveyance Agreement cleanup standards, stating, "there is an urgent need for the Navy to fulfill *its obligations under the Conveyance Agreement to remediate and convey this land to the City as quickly as possible in a condition that is consistent with the City's reuse plan"* [emphasis added].

Eight years after the voters passed Proposition P related to the Shipyard, they passed Proposition G, "The Bayview Jobs, Parks and Housing Initiative," related to the redevelopment of the Project area, including the Shipyard. One of the stated objectives set forth in Proposition G is to "transform the contaminated portions of the Shipyard property into economically productive uses, or public open space, as appropriate". Proposition P was approved by 87 percent of the voters in reference to the provisions in CERCLA (Attachment 3) related to community acceptance as a criteria in selecting a cleanup remedy. While "community acceptance" is required to be factored into these cleanup decisions, Proposition P does not supersede the regulations that the Navy and regulators must follow in implementing CERCLA. These regulations are collectively referred to as the National Contingency Plan and set forth nine criteria that must be considered in selecting a cleanup remedy: two "threshold criteria" (overall protection of human health and the environment, and compliance with other applicable or relevant legal requirements); five "balancing criteria" (long-term effectiveness and permanence; reduction in toxicity, mobility or volume through treatment; short-term effectiveness; implementability; and cost) and two "modifying criteria" (state acceptance and

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community acceptance). Community acceptance is an important criterion considered in remedy selection, but it is one of nine criteria and is typically evaluated based on comments received from the public during the public comment period for the Proposed Plan. It would be appropriate for members of the public to cite Propositions P or G as evidence of community sentiment in public comments submitted to the Navy and regulatory agencies on Proposed Plans during the remedy selection process.

Precautionary Principle Policy Statement

In July 2003, the Board of Supervisors adopted Precautionary Principle Policy Statement that "the Board of Supervisors encourages all City employees and officials to take the Precautionary Principle into consideration and evaluate alternatives when taking actions that could impact health and the environment, especially where those actions could pose threats of serious harm or irreversible damage." (Chapter 1 of the San Francisco Environment Code, Section 104). The policy statement sets forth the key elements of the Precautionary Principle approach to decision-making as (1) Anticipatory Action to prevent harm; (2) Right to Know of the community about "potential human health and environmental impacts associated with the selection of products, services, operations or plans"; (3) Alternative Assessment designed to select the alternative with the least potential impact on human health and the environment; (4) Full Cost Accounting to consider all the reasonably foreseeable costs, including raw materials, manufacturing, transportation, use, cleanup, eventual disposal, and health costs; and (5) Participatory Decision Process, with decisions applying the Precautionary Principle being transparent, participatory, and informed by the best available science and other relevant information (Chapter 1 of the *San Francisco Environment Code*, Section 101).

The ordinance adopting the Precautionary Principle Policy Statement expressly provides, "This ordinance does not impose specific duties upon any City employee or official to take specific actions" (Chapter 1 of the San Francisco Environment Code, Section 104). The Precautionary Principle of the City by its terms applies only to City employees and officials and does not apply to the Navy or federal or state regulators overseeing the cleanup of the Shipyard. The "right to know" aspects of the Precautionary Principle are addressed through the notification protocols and requirements (See Attachment 13, Public Participation and Notification Requirements).

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Attachment 23

Residential Use Areas Table and Map

Table 23-1
Remediation Required for Residential versus Commercial Development

	Remediation Requirement	Required for Residential Areas	Required for Commercial Areas
Soil Remedy	Physical Barrier = Building or Street or Sidewalk or Park area cover (2' clean soil)	**Yes**	**Yes** - same as residential areas
Groundwater Remedy	Most areas - nothing required. Some small areas with vapors - special foundations for buildings	**Yes**	**Yes -** same as residential areas
Regulatory Oversight	Continues throughout project	**Yes**	**Yes -** same as residential areas

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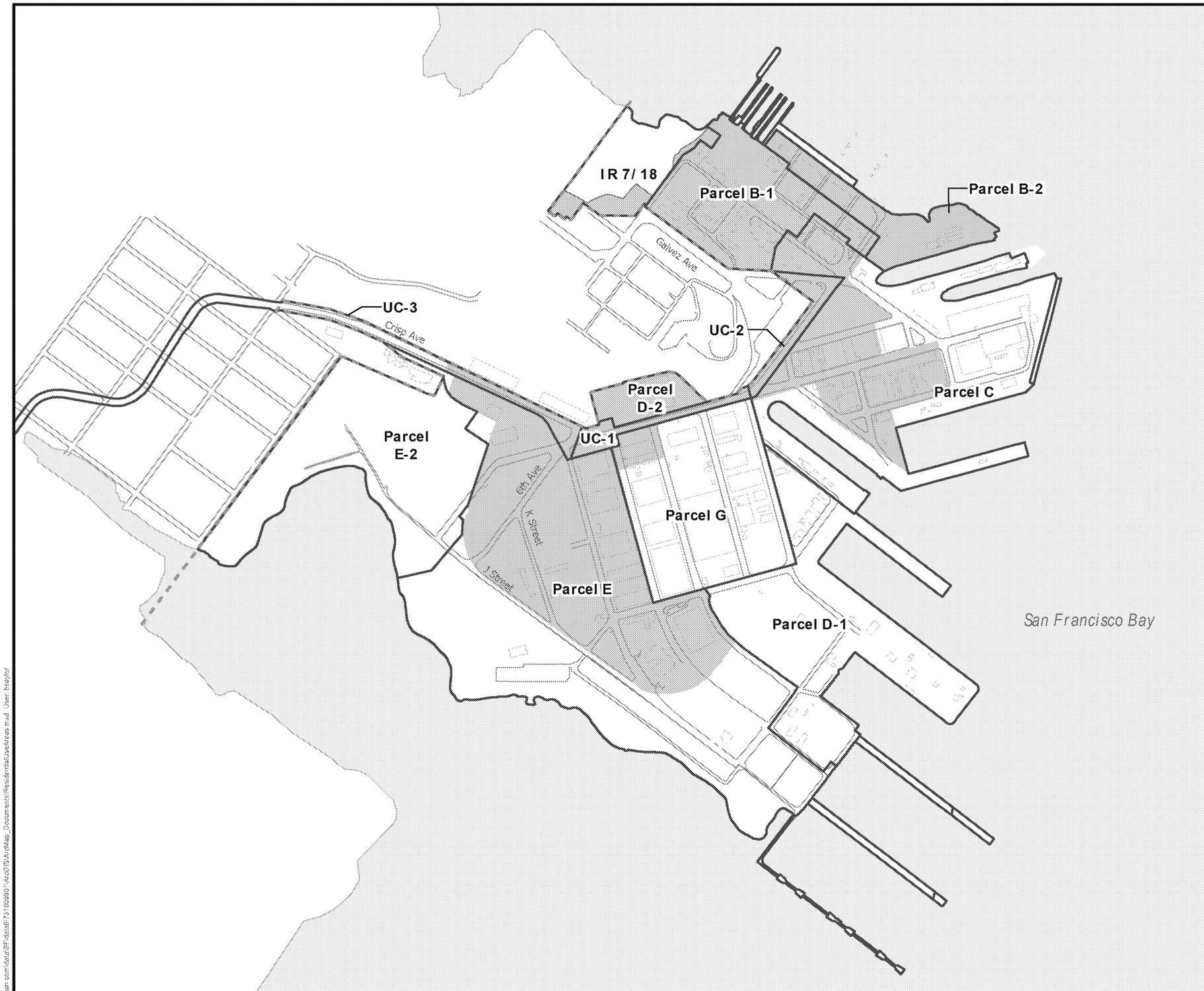

Legend

- Parcel Boundary
- Project Boundary (Phase II)
- Closure Includes Demarcation Layer
- Building

Reuse Area

- Residential Use Allowed Per Navy Approvals
- Residential Use May Be Allowed or Possible in Future with Additional Regulatory Approval

Notes:

1. Parcels boundaries are considered to be approximate; updated December 2014.
2. Data and information provided by San Francisco Department of Public Health and Kleinfelder.
3. Redevelopment plans may have different land use designations in some areas.
4. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 500 1,000 2,000
Feet

HUNTERS POINT SHIPYARD
San Francisco, California

RESIDENTIAL USE AREAS

Date 3/10/2015	Project 731609901	Figure 23-1

LANGAN TREADWELL ROLLO

Attachment 24

Sea Level Rise

Attachment 24
Sea Level Rise

Typically, the design of coastal developments is conducted per Federal Emergency Management Agency (FEMA) and local agency guidelines to set interior grades throughout a community such that the elevation of the first floor of inhabitable space would be above the present-day *Base Flood Elevation* (BFE) or 100-year return period water level. Improvements along shorelines are required only to protect structures and facilities adjacent to the shoreline against storm wave run-up and overtopping. The flood elevation along the shoreline as specified by FEMA is the *1% Annual Chance of Occurrence Event*. FEMA maps flood zones based on this present day flood stage caused by rainfall, or a combination of rainfall, tides, storm surge, and waves.

Over the past century, the National Oceanic and Atmospheric Administration (NOAA) estimates sea level rise has been approximately 8 inches and was within the allowances that traditional coastal developments included in their design. Based on climate change studies over the past two decades, the rate of sea level rise appears to be accelerating and climate change models are predicting greater rates of sea level rise in the future in response to warmer temperatures and melting ice caps.

California Executive Order S-13-08, issued on November 14, 2008, recognized the impact that sea level rise may have on coastal development in California and directed state agencies to plan for sea level rise and coastal impacts. The executive order also requested the National Research Council (NRC) to issue a report on sea level rise to advise California on planning efforts. A *State of California Sea-Level Rise Interim Guidance Document* was released from the Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT) in 2010 and the final report, *Sea-Level Rise for the Coasts of California, Oregon, and Washington*, was released from NRC in June 2012.[18,19] The *State of California Sea-Level Rise Guidance Document* was updated by CO-CAT member agencies in March 2013.[20] These reports advise California State agencies how California communities should plan for sea level rise. The 2013 report projects sea level rise of 5 to 25 inches by 2050 (using 2000 as the baseline year).

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[18] Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT), Ocean Protection Council's Science Advisory Team, and the California Ocean Science Trust, 2010. State of California Sea-Level Rise Interim Guidance Document. October. http://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20110311/12.SLR_Resolution/SLR-Guidance-Document.pdf

[19] National Research Council, 2012. Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future. June. http://www.nap.edu/catalog.php?record_id=13389

[20] Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT), Ocean Protection Council's Science Advisory Team, and the California Ocean Science Trust, 2013. State Of California Sea-Level Rise Guidance Document. March.

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In reviewing development proposals regarding public infrastructure, regional and local agencies have taken a more proactive approach. The San Francisco Bay Conservation and Development Commission (BCDC) is recommending that bayfront developments consider a 16-inch sea level rise value by 2050 (mid-term) and a 55-inch sea level rise value by 2100 (long-term)[21]. The California State Coastal Conservancy (SCC) (the "Conservancy") has issued a similar guidance policy[22], with the same mid-term and long-term values. Although no guidance policy related to sea level rise has been adopted by federal, state, or local agencies, the Shipyard development plan incorporates a variety of design and policy measures to prevent future flooding or loss of infrastructure resulting from shoreline erosion.

Approach to Address Sea Level Rise Effects on Flooding

A specific sea level rise study for the Shipyard which included an assessment of shoreline conditions was prepared to develop planning and design guidance through the various phases of the project[23]. The studies included an assessment of the existing shoreline and shoreline structures; a coastal engineering analysis of tidal, wind-wave, and storm-wave processes for the vicinity; a review of published literature on sea level rise to develop future sea level rise allowance estimates; a review of state and regional guidance and policy documents to establish design parameters for shoreline elevation and grades for development areas and open-space; and developing a strategy to address sea level rise at the Shipyard.

The primary factors which influence coastal flooding are water levels driven by tides and storm surges, and wave overtopping caused by wind waves. These factors are present at any given time and it is necessary to estimate the frequency of their combined occurrence. Tidal information was analyzed to estimate the BFE for buildings and open space within the development using methods recommended by FEMA and the Technical Advisory Committee on Flood Defense. Perimeter elevations were then developed based on allowable overtopping rates to achieve safe conditions for pedestrians during the 1% chance run-up event. Allowances for sea level rise were then added to the minimum required grades in the interior and along the shoreline, and a strategy for the future was then developed for even higher sea level rise estimates such that the level of protection provided at construction continues into the future.

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[21] BCDC (San Francisco Bay Conservation and Development Commission). 2011. Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline, Staff Report. Approved on 6 October.

[22] California State Coastal Conservancy. 2009. Policy Statement on Climate Change. Adopted at the June 4 Board Meeting. Available online at <http://www.scc.ca.gov/index.php?p=75&more=1>.

[23] Moffatt & Nichol, 2009. Candlestick Point/Hunters Point Redevelopment Project Shoreline Structures Assessment. October.

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A summary of the most commonly quoted estimates of sea level rise in the scientific and planning literature, with particular reference to California and San Francisco Bay is presented in Table 24-1.

Table 24-1
Summary of Reviewed Documents on Sea Level Rise Estimates

Document	Sea Level Rise Estimate/Projection inches	meters	Time frame (years)
California Climate Action Team (CO-CAT), 2013	17 to 66	0.42 to 1.67	2000-2010
California Climate Change Center, 2009	24 to 55	0.6 to 1.4	2000–2100
CALFED Bay-Delta Program, 2007	20 to 55	0.5 to 1.4	2100
Intergovernmental Panel on Climate Change, 2007 (AR4)	7 to 30	0.18 to 0.76	1990–midpoint of 2090–2099
Rahmstorf, 2007	20 to 55	0.5 to 1.4	1990–2100
California Climate Change Center, 2006	8 to 31	0.2 to 0.8	2000–2100
Intergovernmental Panel on Climate Change, 2001 (TAR)	4 to 35	0.09 to 0.88	1990–2100
US Environmental Protection Agency, 1995	5 to 34	14 to 86	2100
National Research Council, 1987	20, 39, and 59	0.5, 1.0, and 1.5	2100

Summary and Adopted Approach

Estimates of sea level rise vary widely, from an observed value of 8 to about 35-inches per century based on Intergovernmental Panel on Climate Change high estimates. Empirical studies and news articles have stated that sea level rise over the next 100 years could be substantially higher and could be as much as 55 inches by 2100. Through 2009, high-resolution altimetry data indicate that global mean sea level has risen at a rate close to projections that correspond to an increase in global mean sea level of around 10 inches by 2050 and 30 inches by 2100. It is clear is that the science of climate change and sea level rise is evolving, making it prudent to develop community designs that can accommodate various levels of sea level rise over the development planning horizon rather than design to a specific report or estimate.

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The strategy for the Shipyard uses mid-term (16 inches) sea level rise values for the shoreline edge and storm drainage system. For long-term planning beyond 50 years from now, the evolving nature of climate change and sea level rise science needs to be recognized and no single sea level rise value should be relied upon at this point in time. Instead, an adaptive management strategy will be put in place such that improvements for sea level rise beyond the mid-term planning horizon can be designed and implemented as sea levels rise.

Adaptive Management Strategy

For shoreline protection, it is not practical to build a high wall around the Shipyard for a condition that may not happen for several decades as it would pose a visual obstruction and limit public access. It is also not prudent to build to present sea level conditions and continue to elevate the development as sea levels rise. Therefore, an interim sea level rise estimate for the year 2050 of 16 inches, as put forth by BCDC and the Conservancy, was selected as the design criteria to use for design and initial construction. If sea level rise tracks according to current projections, these design criteria will ensure that adaptive management construction activities are not triggered until at least the year 2050. The storm drain system will be constructed with an initial sea level rise allowance of 16 inches, and will be adaptable to higher levels of sea level rise with minimal intervention. It will function as a gravity-drained system until about 2050, beyond which the Adaptation Strategy will be implemented that will consist of installing storm drain pumps using funds generated by the development.

All buildings and entrances to subterranean parking and streets would be set at an elevation that is 36 inches higher than the present day BFE and an additional 6 inches of freeboard will establish the finished floor elevations for buildings. This would ensure that even if no shoreline protection improvements are undertaken, or in the event of a slope failure along the shoreline, neither buildings nor transportation infrastructure would be flooded when water levels rise 42 inches higher than current BFE. Additionally, this allowance provides subterranean parking a minimum of approximately 36 inches between parking finish floor and present groundwater levels. This increase in elevation would provide flood protection beyond 2080 time frame according to the most aggressive sea level rise projections. Implementation of mitigation measures would require that all housing be elevated out of the floodplain by grading and fill, that the City's Interim Floodplain Maps be updated to reflect finished grade elevations, and that open space setbacks be put in place to allow protection against future sea level rise. It is important to note that due to the topography of the site and the proposed grading program to accommodate the new development program, most if not all, of the developed footprint will be constructed at elevations that will accommodate the long term projection of 55 inches in sea level rise. As a part of FEIR mitigation measures, a project-specific sea level rise Adaptive Management Plan will be implemented that will provide guidance, identify relevant stakeholders, define appropriate management actions and triggers, and establish a project-specific funding mechanism. It would be

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administered by an entity created for the Project that would have taxing authority and funding responsibility.

The strategy envisions incorporating ongoing measurements of sea level rise from the scientific community into a Monitoring Program that would guide the decision-making process for future improvements. The Monitoring Program will include protocol to compare observed changes in sea level with the as-built perimeter elevations. This would use updates of changes in sea level provided by the NOAA, National Geodetic Survey, or other appropriate agency. The monitoring program would be administered by a Geologic Hazard Abatement District (GHAD), Community Facilities District (CFD) or other public entity with similar funding responsibility. This entity would guide the decision-making process for implementation of future improvements, such as raising the perimeter.

The Adaptive Management Plan will define specific triggers for action, based on observed changes in sea level. The Plan will require 5- or 10-year updates based on observed changes in sea levels as well as any other effects of climate change (e.g., more or less extreme storm wave conditions). The initial strategy, as well as any updates, will be coordinated with relevant stakeholders including the City and County of San Francisco, State Parks, FEMA, and BCDC.

Proposed development setbacks will enable a variety of future perimeter modifications to accommodate the 55-inch long term projection. The adaptive management strategy described above is based on elevation and structural characteristics of the shoreline along the project boundaries. The varied nature of this shoreline, ranging from protected and unprotected slopes, beaches, seawalls, and wharves, may require a multitude of potential adaptive management measures.

Sea Level Rise Effects on Movement of or Exposure to Toxics

Sea level rise creates a potential for residual chemicals in the ground to interact with groundwater. As described in Attachment 4 Parcel-by-Parcel Summary and Expected Transfer Dates, there are ongoing remediation programs related to former Navy operations. The Navy is providing soil and groundwater remediation (cleanup) to reduce chemical concentrations to meet cleanup levels approved by federal and state regulatory agencies. If sea level were to rise, there was an associated rise in groundwater, and the interaction with groundwater were to present a risk to human health or the environment, then further remedial activities would be required by law. Additionally, the institutional controls placed on areas with residual contamination, would enforce action to maintain the protection to the environment and prevent human exposure.

Mitigation Measures for Other Potential Sea Level Rise Hazards

Anticipated sea level rise is being taken into account as part of the development design process to ensure that planned land uses can be achieved. Specific building designs will take the anticipated sea level rise into consideration. The Shipyard and Candlestick Point

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Design for Development documents, which establish design standards for vertical construction, require that buildings be designed for the anticipated groundwater levels to prohibit groundwater from entering basements or parking structures.

Residual chemicals that may remain in soil after cleanup will be located under a physical barrier (e.g. pavement, building, or 2 feet of clean soil) that prevents human exposure to the residual chemicals. This requirement to install a physical barrier on the entire site to prevent access to this residual contamination is a part of the Navy CERCLA cleanup documents (Attachments 3 and 4), which have been approved by the USEPA, DTSC and the RWQCB. Furthermore, the requirement to maintain a physical barrier will be a requirement of each and every landowner within the former Shipyard. Sea level rise is not expected to compromise covers and/or engineered caps that may be placed on top of an area of known or suspected residual contamination (see Figures 24-1 and 24-3). Figure 24-4 shows how these physical barriers relate to measures the project is taking to address sea level rise. Operation and maintenance plans for these covers and engineered caps will be carried out to monitor and repair potential breaches. Emergency response plans will be carried out following major flooding events, at which time engineered caps and covers will be investigated for potential breaches and repaired.

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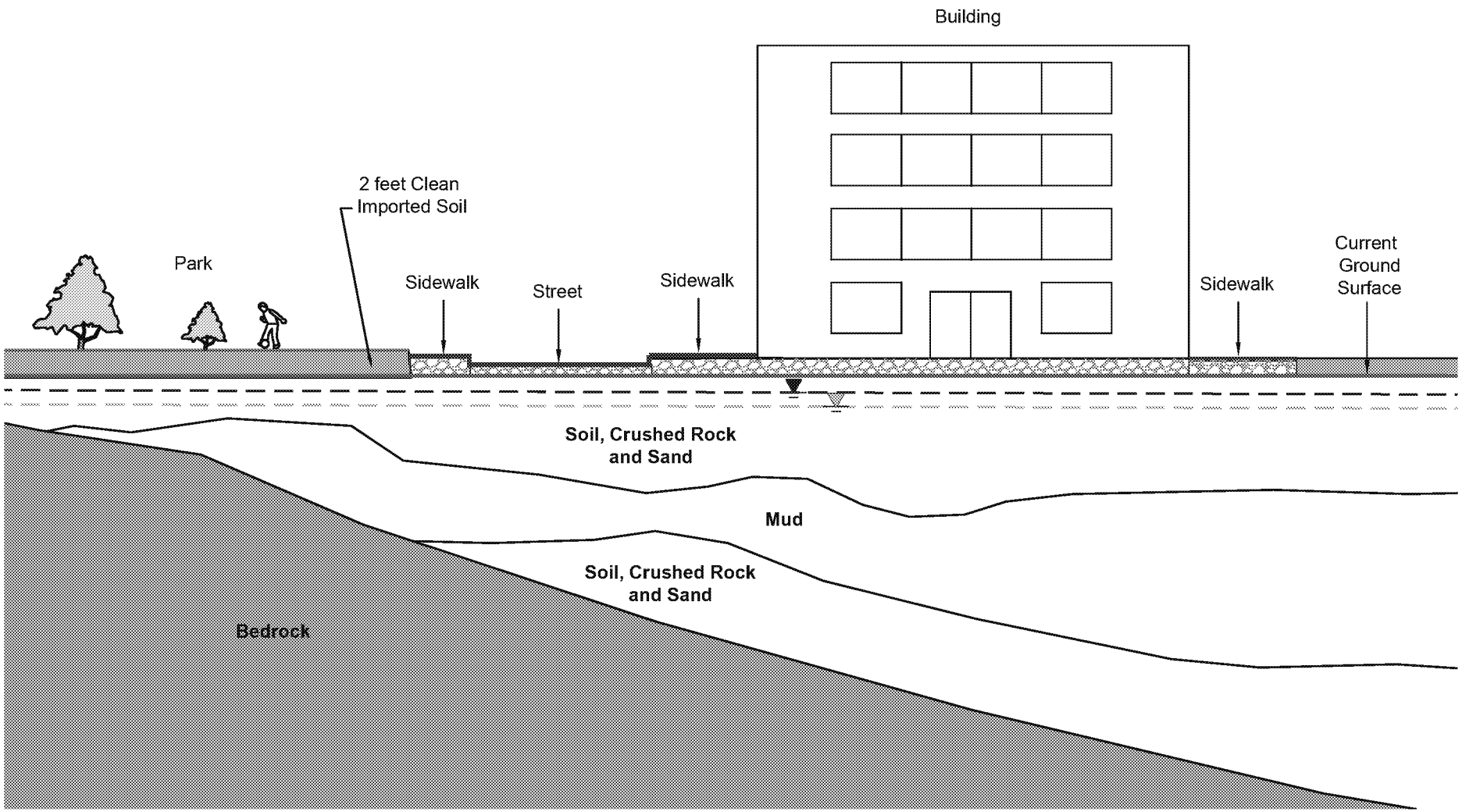

LEGEND

Groundwater Level After Sea Level Rise

Current Groundwater Table

Not to Scale

HUNTERS POINT SHIPYARD
San Francisco, California

ILLUSTRATIVE SECTION SHOWING FINISHED REMEDY AND LAND IMPROVEMENTS IN RELATION TO SEA LEVEL RISE

Date 03/10/15	Project No. 731609901	Figure 24-1

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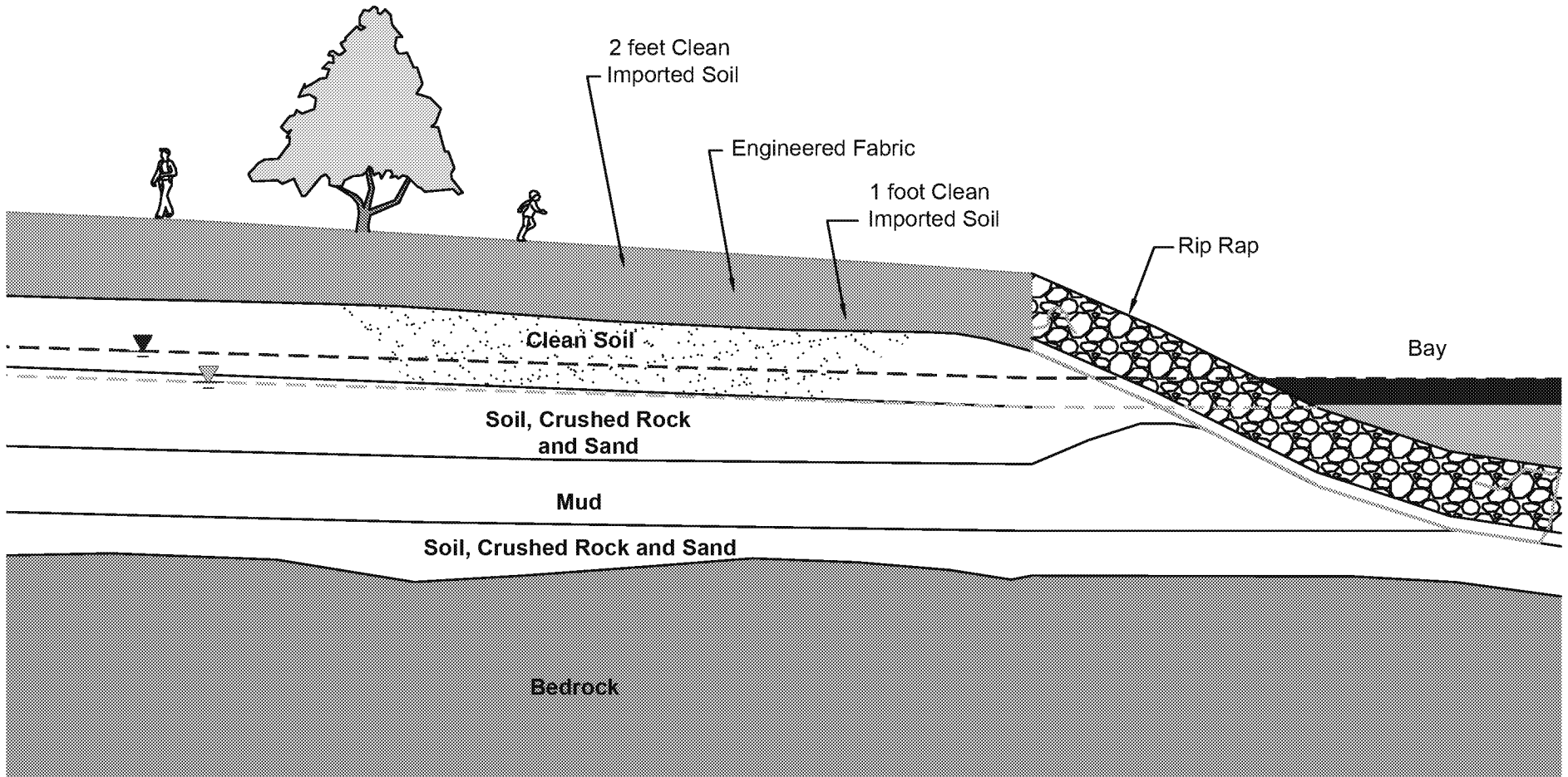

LEGEND

Groundwater Level After Sea Level Rise

Current Groundwater Table

Not to Scale

HUNTERS POINT SHIPYARD
San Francisco, California

ILLUSTRATIVE SECTION OF PARCELS IR7/18 AND E SHORELINE AND SEA LEVEL RISE

Date 03/10/15	Project No. 731609901	Figure 24-2

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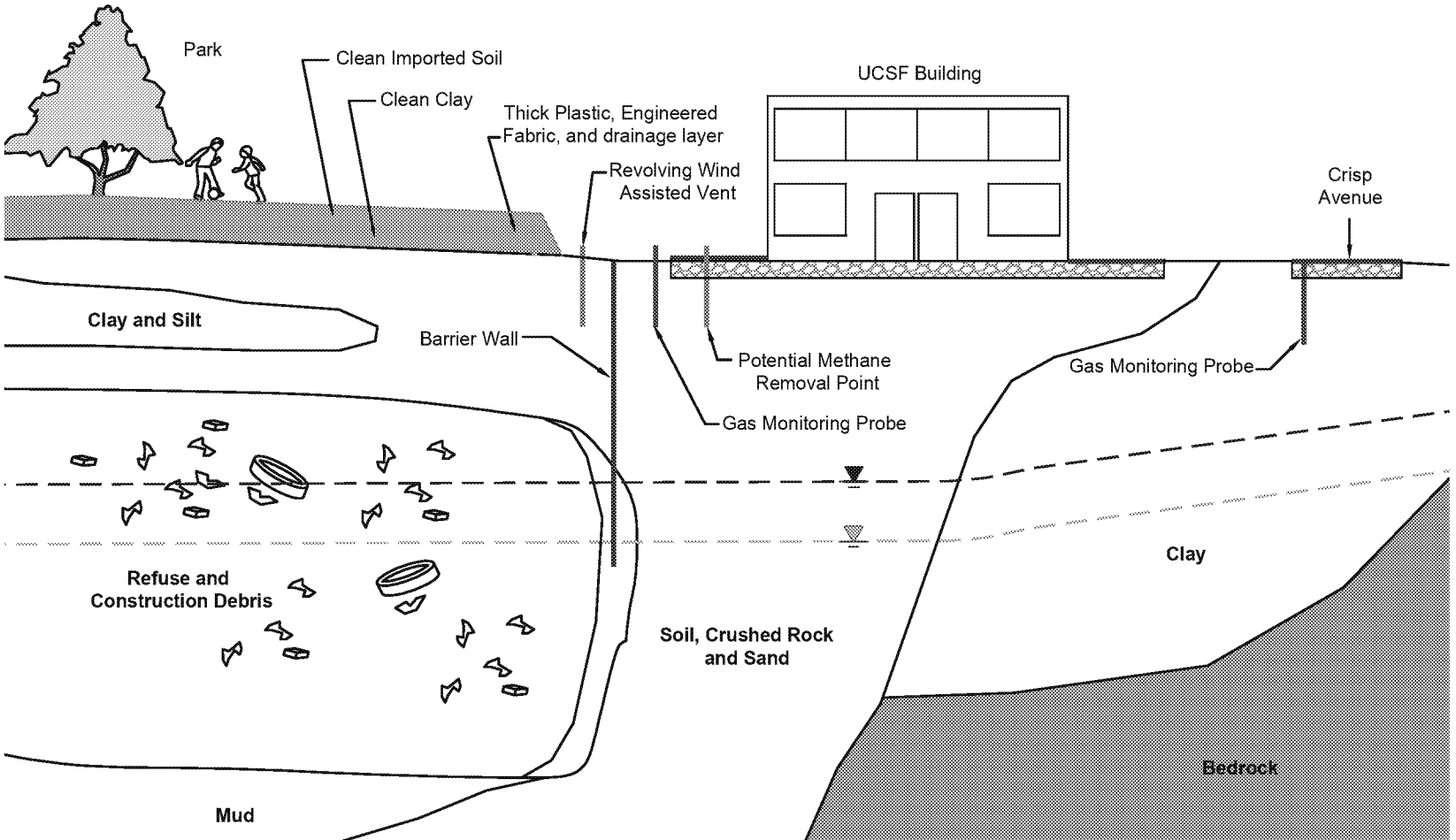

LEGEND

Groundwater Level After Sea Level Rise

Current Groundwater Table

Not to Scale

HUNTERS POINT SHIPYARD
San Francisco, California

ILLUSTRATIVE SECTION OF PARCEL E-2 AND SEA LEVEL RISE

Date 03/10/15	Project No. 731609901	Figure 24-3

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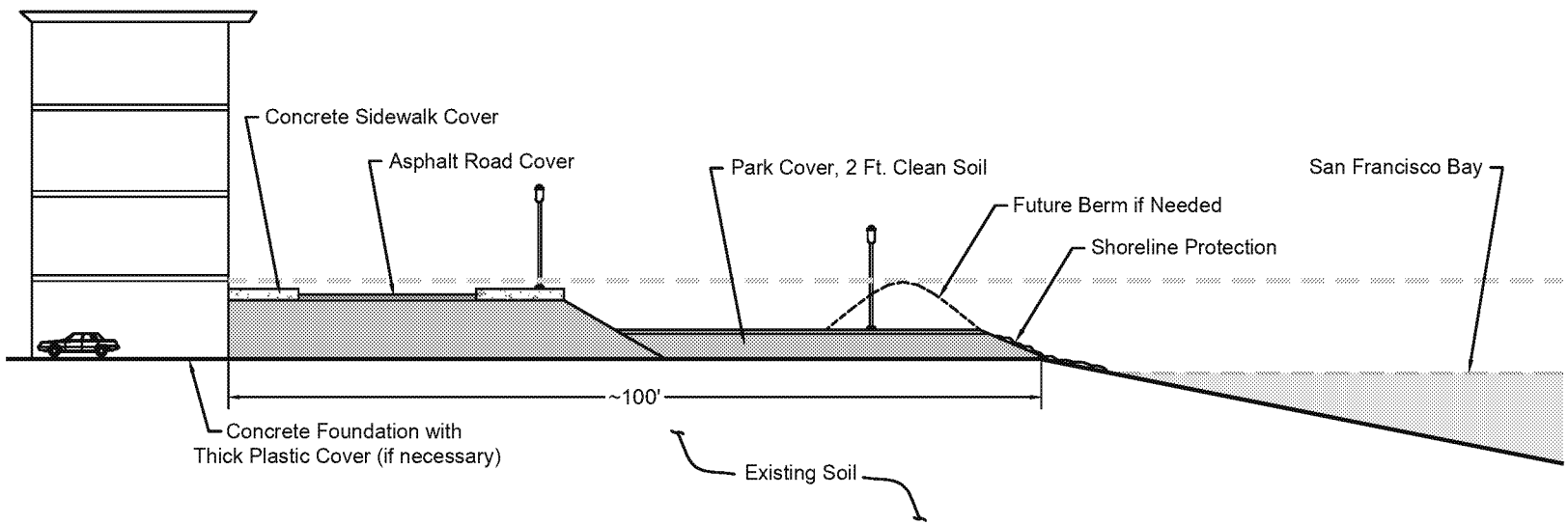

LEGEND

55-inches above 100-year flood

100-year flood level (1% annual probability)

Not to Scale

HUNTERS POINT SHIPYARD
San Francisco, California

PHYSICAL BARRIERS AND SEA LEVEL RISE

Date 03/10/15	Project No. 731609901	Figure 24-4

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Parcel E-2 Protections against Sea Level Rise

Under CCR Title 27, Section 21090, all closed landfills are required to have an engineered landfill cap if landfill materials are left onsite. The landfill cap is intended to maintain a protective seal and keep moisture and rain from penetrating the landfill waste and prevent human and environmental exposure to the disposed waste. The Navy has selected an engineered cap remedy for Parcel E-2 landfill to prevent unsafe exposures from chemicals allowed by the regulators to be left in place. Operation and maintenance plans will be developed and carried out to monitor for and repair potential breaches should they occur. Any breach of cover would be repaired so that no long-term health risks would occur. Sea level rise is not expected to compromise the landfill cap because the many layers of the cap are robust enough to endure saturation and submersion. In addition, the operation and maintenance plan will continue to require ongoing inspections and repairs will be implemented as needed (see Figure 24-3).

Sea Level Rise and Residual VOCs

Existing groundwater contamination will be remediated prior to development to levels that will allow safe reuse. After cleanup, there may still be low levels of residual VOCs in groundwater and soil that could potentially produce vapor intrusion into buildings constructed over these areas. To address this potential, the Navy will sample subsurface soil vapor to define areas where vapor intrusion may be an issue. If soil vapor sampling results indicate areas where vapor intrusion could be an issue, vapor mitigation systems will be designed and constructed within and underneath building foundations. These vapor mitigation systems are common, well tested, and protective of residential or commercial building occupants. These soil vapor sampling programs, defining areas requiring vapor controls and the design and installation of vapor mitigation systems will be overseen and further approved by the regulators (USEPA, DTSC, and RWQCB). Soil vapor mitigation systems will be subject to periodic inspection and maintenance to ensure proper operation. VOC vapors occur in soil that is not saturated with water. Therefore, if sea level were to rise and if there was an associated rise in groundwater, the volume of VOC vapors under a building might be reduced. If sea level were to rise, there was an associated rise in groundwater, and the potential for the interaction with groundwater were to present a risk to human health or the environment then further remedial activities would be required by law. Additionally, the Institutional Controls placed on areas with residual contamination would enforce action to maintain the protection to the environment and prevent human exposure.

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Attachment 25

Seismic Hazards and Liquefaction

Attachment 25
Seismic Hazards and Liquefaction

The Shipyard and the entire San Francisco Bay Area are in a seismically active region and active nearby faults could potentially generate an earthquake. As evidenced by the level of development throughout the San Francisco Bay, successful building construction is possible in a seismically active zone and can be readily accomplished even where seismic hazards exist through the implementation of appropriate structural and foundation design and/or ground improvement measures. Seismic activity associated with a large earthquake on a nearby fault could potentially result in seismic hazards at the site such as ground shaking, fault rupture, liquefaction, lateral spreading, ground settlement, ground oscillation, and seismic slope instability. These seismic hazards and their likelihood of occurring at the Shipyard are described below.

- Ground shaking is expected to occur at the Shipyard during a large earthquake on one of the nearby faults. The intensity of seismic shaking or strong ground motion during an earthquake at any particular location is dependent on a number of factors, including the distance and direction of the site from the earthquake epicenter, the earthquake magnitude, and the geologic conditions at and in the vicinity of the site. Site-specific seismic and geotechnical studies will be undertaken prior to final building design to evaluate the peak ground acceleration from an earthquake expected at the site and the structure will be designed to accommodate the anticipated ground shaking under the peak ground acceleration.
- No known active faults cross the site, rendering hazards from fault rupture at the site unlikely.
- Earthquake-induced settlement, other than that which occurs only in soil below the groundwater level, could potentially occur in areas where loose sand is present above the groundwater (differential compaction). The upper fill layer at the Shipyard has been characterized as a heterogeneous mix of gravel, sand, silt, and clay that contains varying amounts of debris (wood, glass, etc.). There could be zones of soil within this layer above the groundwater level that contain loose sand. Because of the heterogeneous nature of the fill layer, settlements resulting from differential compaction could occur both uniformly and differentially, unless mitigation measures such as ground improvement and/or structural/foundation solutions are implemented.
- Portions of the Shipyard have been mapped in a zone designated to have the potential for seismically induced landslides. Hazards associated with seismically induced landslides can be mitigated using methods generally accepted by California Certified Engineering Geologists (CEG) and California Registered Geotechnical Engineers (GE), including ground improvement and/or structural/foundation solutions.

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- Ground oscillation is a phenomenon where the surface soil layer, riding on a buried liquefied layer, is thrown back and forth by the shaking and can be severely deformed. While areas of the site have been identified as containing potentially liquefiable soils, there is no evidence of a broadly spanning buried liquefiable layer (with the possible exception of one area of the Parcel D/E shoreline area – described below) above or below the existing groundwater table on which the surface layer could be oscillated. Therefore, the potential for this hazard at the Shipyard would be considered low. Furthermore, mitigation measures, which would be implemented where liquefiable soils are identified, would also reduce the risk of damage to structures from ground deformation.

Site-Specific, Design-Level Geotechnical and Seismic Studies

The Seismic Hazard Mapping Act was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to minimize property damage caused by earthquakes. The Act requires site-specific geotechnical investigations to identify potential seismic hazards and formulate corrective measures prior to permitting of developments designed for human occupancy within the Zones of Required Investigation. The Seismic Hazard Map for the City and County of San Francisco (Figure 25-1) shows large portions of the Shipyard to be within a Zone of Required Investigation for liquefaction potential similar to the majority of the downtown SF, Mission Bay and eastern neighborhoods that are all built on fill material. For projects in a hazard zone, the DBI requires that the geologic and soil conditions of the Project site be investigated and appropriate mitigation measures, if any, incorporated into development plans. The Navy has already performed some site specific studies as part of their design studies and results indicate that there is no evidence of a broadly spanning buried liquefiable layer (with the possible exception of one area of the Parcel D/E shoreline area – described below) above or below the existing groundwater table on which the surface layer could be oscillated.

Site-specific, design-level geotechnical and seismic studies, must be performed prior to issuance of any building permits to identify the potential for seismic hazards at the Shipyard. These studies will consist of geotechnical investigations with site-specific seismic analysis and will provide ground improvement/mitigation and/or foundation design recommendations to address potential seismic hazards, should they exist. Seismic studies will evaluate the anticipated site-specific peak ground accelerations that will induce ground shaking so that the structure (foundation and superstructure) can be designed to accommodate the anticipated shaking. All structural designs will incorporate and conform to the requirements and recommendations in the site-specific geotechnical and seismic investigations. Furthermore, the City's DBI permit application, review, and inspection process ensures that structures will be designed and built to requirements contained in Title 24, Part 2 of the California Code of Regulation (California Building Code). The geotechnical engineer will review project plans and specifications and observe ground improvement and foundation installation to check for conformance to the geotechnical and seismic recommendations and requirements.

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Legend

- Hunters Point Shipyard
- Landslide Hazard Zone
- Liquefaction Hazard Zone

Notes:

1. Liquefaction & landslide hazard data provided by California Geological Survey (CGS), as of October 26, 2012. No guarantee of accuracy or completeness.
2. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 0.5 1 2
Miles

HUNTERS POINT SHIPYARD
San Francisco, California

SEISMIC HAZARD MAP FOR THE CITY AND COUNTY OF SAN FRANCISCO

Date 3/10/2015	Project 731609901	Figure 25-1

LANGAN TREADWELL ROLLO

Mitigation Measures to Address Potential Seismic Hazard

Mitigation measures to address potential seismic hazards include structural measures and ground improvement. All structures, including the foundation (below ground portion) and superstructure (above ground portion), will be designed to accommodate the anticipated ground shaking under the peak ground acceleration (as determined by the site-specific seismic study) and other potential seismic hazards, including earthquake-induced ground settlement. Foundation mitigation measures could include the construction of deep foundations, which transfer building loads to competent soil or rock below the zone where seismic densification/differential compaction could potentially occur, or use of a structural, sufficiently-reinforced mat foundation and/or a geotextile/geogrid beneath structures to distribute loads and reduce the potential for damage to the structure from earthquake-induced ground settlement. Ground improvement measures could include (1) overexcavation and replacement of soil potentially subject to earthquake-induced settlement with engineered compacted fill; (2) dynamic compaction (such as deep dynamic compaction or rapid impact compaction) to densify the loose soil; and (3) stone columns, soil-cement columns, or rammed aggregate piers to densify the loose soil and provide additional bearing support beneath building foundations.

If the design-level, site-specific geologic, seismic, and geotechnical studies identify the presence of landslides that could be triggered by an earthquake, recommendations for slope stabilization procedures will be provided and implemented. Slope stabilization procedures could include (1) use of retaining walls, rock buttresses, screw anchors, or concrete piers; (2) provision of slope drainage or removal of unstable materials; (3) provision of rockfall catch fences, rockfall mesh netting or deflection walls; (4) provision of setbacks at the toe of slopes; and/or (5) avoidance of highly unstable areas.

Amplification effects can occur when seismic waves travel through soft soils underlain by shallow bedrock. During the design-level site-specific seismic hazards assessment, appropriate attenuation relationships will be selected to account for amplification affects. All structures and improvements will be designed based on the appropriate seismic design parameters based on the seismic hazards assessment.

Liquefaction Potential and Associated Hazards

The Shipyard, like the Marina, Embarcadero, Financial District, South of Market Street, and Mission Bay neighborhoods, is in an area of San Francisco that has been designated as potentially liquefiable (Figure 25-1). However, many buildings and structures have been successfully constructed within potentially liquefiable zones through the implementation of proper foundation design and/or ground improvement.

The majority of the Shipyard is covered by artificial fill, which is a heterogeneous mix of gravel, sand, silt, and clay that contains varying amounts debris (wood, concrete, glass,

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etc.). There could be zones of soil within this layer that contain loose granular soil that may be susceptible to liquefaction. However, because of the heterogeneous nature of the fill, liquefaction within the fill is expected to occur in random layers and pockets, limiting the extent of seismically induced settlement and lateral spreading[24] to localized zones within the fill. There is a hydraulically placed sand fill in the vicinity of the southeast-facing shoreline of Parcels D and E at the Shipyard Phase II that consists of a thick unit of predominantly uniform loose, dredged sand and is, therefore, more susceptible to liquefaction. Other than this unit, the Navy has already performed some site specific studies as part of their design studies and results indicate that there is no evidence of a broadly spanning buried liquefiable layer above or below the existing groundwater table on which the surface layer could be oscillated.

Evidence of liquefaction includes: flow failure, lateral spreading, differential settlement, loss of bearing strength, ground fissures, and sand boils (see Figures 25-2 through 25-4). Based on existing data, there is little or no risk of large translational ground movements at the Shipyard as a result of liquefaction. However, should liquefaction occur, there are five common liquefaction-associated hazards, which site-specific, design-level studies should address. Mitigation measures require that structures be designed to accommodate potential liquefaction-associated hazards or ground treatment/site improvement techniques are implemented prior to construction. The specific potential liquefaction-associated hazards are (1) potential foundation bearing failure, or large foundation settlements caused by ground softening, (2) potential structural and/or site settlements, (3) localized lateral displacement; "lateral spreading" and/or lateral compression, (4) flotation of light structures with basements, or underground storage structures, and (5) hazards to lifelines (utilities critical to emergency response). The regulatory scheme that exists in California to address these liquefaction hazards and how the project will mitigate hazards is described below.

Site-Specific, Design-Level Liquefaction Studies

California Public Resources Code Division 2, Chapter 7.8 (the Seismic Hazards Mapping Act) and the California Building Code contain regulations protecting the public from geo-seismic hazards, such as liquefaction. The Seismic Hazard Mapping Act was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to minimize property damage caused by earthquakes.

The Act requires site-specific geotechnical investigations to identify potential seismic hazards and formulate corrective measures prior to permitting of developments designed for human occupancy within the Zones of Required Investigation. The Seismic Hazard Map for the City and County of San Francisco (Figure 25-1) shows large portions of the Shipyard to be within a Zone of Required Investigation for liquefaction potential.

[24] Lateral spreading is a phenomenon in which surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. Upon reaching mobilization, the surficial blocks are transported downslope or in the direction of a free face by earthquake and gravitational forces.

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The Navy has already performed some site specific studies as part of their design studies and results indicate that there is no evidence of a broadly spanning buried liquefiable layer (with the possible exception of one area of the Parcel D/E shoreline area – described above) above or below the existing groundwater table on which the surface layer could be oscillated. For projects in a hazard zone, the DBI requires that the geologic and soil conditions of the Project site be investigated and appropriate mitigation measures, if any, incorporated into development plans. Measures that can be employed, depending on the specific site conditions, include (1) over excavation and replacement of potentially liquefiable soil with engineered compacted fill, (2) compaction grouting to densify the loose, potentially liquefiable soil, (3) dynamic compaction (deep dynamic compaction or rapid impact compaction) to densify the loose, potentially liquefiable soil, (4) vibro-compaction (also known as vibro-flotation) to densify the loose, potentially liquefiable soil, (5) stone columns to provide pathways for pore pressure to dissipate in potentially liquefiable soil, thus reducing the potential for liquefaction-induced settlement, and (6) soil-cement columns to densify the loose, potentially liquefiable soil and provide additional bearing support beneath building foundations. Alternatively, if appropriate and depending on the specific site conditions, structures can be designed to accommodate the potential liquefaction-associated hazards, such as ground settlement.

Site-specific, design-level liquefaction studies will be performed prior to issuance of any building permits. These studies will consist of geotechnical investigations with site-specific seismic analysis and will provide ground improvement and/or other mitigative recommendations to address potential liquefaction-related ground hazards, should they exist. The recommendations will identify the specific recommended techniques for achieving the site-specific performance goals to mitigate liquefaction-related hazards (e.g., performance standards for specific ground improvement techniques, such as the level of densification to which the soil needs to be improved to mitigate liquefaction). Available, possible techniques include overexcavation and replacement of liquefiable soil, compaction grouting, deep dynamic compaction, vibro-compaction and stone or soil-cement columns. All project structural designs will incorporate and conform to the requirements and recommendations in the geotechnical investigations. Furthermore, the geotechnical engineer will review project plans and specifications and observe ground improvement and foundation installation to check for compliance to the geotechnical recommendations and requirements.

Seismic and Liquefaction Effects on Movement or Exposure to Toxics

As described in Attachment 4, Parcel-by-Parcel Summary and Expected Transfer Dates, there are ongoing remediation programs related to former Navy operations. The Navy is providing soil and groundwater cleanup to reduce chemical concentrations to meet cleanup levels approved by federal and state regulatory agencies. Surface covers (e.g. physical barriers) will be installed as part of the cleanup to support the development (e.g., building slabs, pavement for roads, concrete for sidewalks, 2 feet of clean soil for landscaped areas) and minimize exposure to background metals. These physical barriers will limit exposure and protect humans from long-term health risks even if breaches in

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the barriers temporarily occur. Operation and maintenance plans for these barriers will be carried out to monitor and repair any breaches. Therefore, if ground rupture were to occur, contaminants should not be released at levels presenting a concern to human or ecological health (see Figures 25-2 and 25-3). Additionally, the land use restrictions placed on these areas would enforce action to maintain protection of the environment and prevent human exposure.

Under CCR Title 27, Section 21090, all closed landfills are required to have an engineered landfill cap if landfill materials are left onsite. The engineered landfill cap is intended to maintain a protective seal and keep moisture and rain from penetrating the landfill waste and prevent human and environmental exposure to the disposed waste. In accordance with the Parcel E-2 ROD an engineered cap will be constructed on top of the Parcel E-2 landfill to prevent unsafe exposures from chemicals allowed by the regulators to be left in place, operation and maintenance plans will be developed and carried out to monitor for and repair potential breaches should they occur due to seismic events or liquefaction (see Figure 25-5). Any breach of the engineered cap would be repaired so that no long-term health risks would occur.

Sea Level Rise Effects on Liquefaction Potential

If sea level should rise in the future, it is anticipated that the groundwater table elevation would also rise. As liquefaction can only occur in saturated soils located below the groundwater table, this would cause soil not currently beneath the groundwater table to become saturated and potentially susceptible to liquefaction in the future. Site design will accommodate a future sea level rise of 36 inches. To account for the future impact of sea level rise, design-level liquefaction analysis and modeling will be based on a groundwater table elevation that assumes groundwater is 36 inches higher than present conditions. Since liquefaction occurs only in soil below the groundwater table and the groundwater table would be higher because of sea level rise, depending on the site-specific soil conditions, the thickness of the liquefiable layer and corresponding liquefaction-induced settlement could be increased. Another mitigating consideration, however, is that as the groundwater level rises, the thickness of soil that would potentially be subject to seismically induced differential compaction settlement (loose non-saturated sand above the groundwater level) would decrease. Depending on site-specific soil conditions, the settlement of soil induced by liquefaction (saturated soil below the groundwater) and the settlement of soil induced by differential compaction (non-saturated soil above the groundwater) would be expected to be of similar magnitude; therefore, the overall impact on the site from liquefaction would be unaffected or negligibly affected by sea level rise (see Figures 24-1 through 24-3). Thus, the net effect of sea level rise on seismically induced settlement (increased thickness of potentially liquefiable layer and decreased thickness of layer subject to differential compaction) is expected to be minimal.

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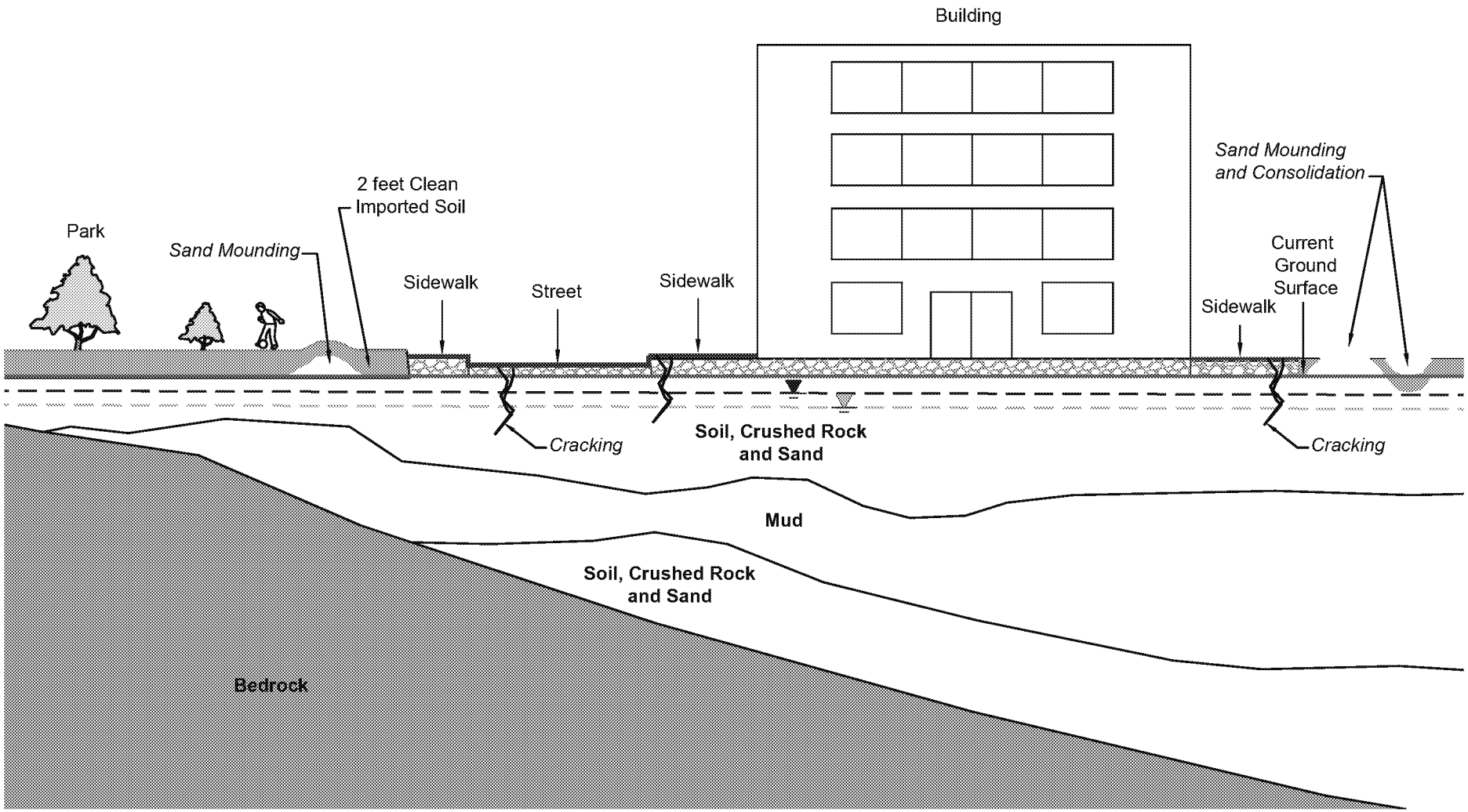

LEGEND

Groundwater Level After Sea Level Rise

Current Groundwater Table

Not to Scale

HUNTERS POINT SHIPYARD
San Francisco, California

ILLUSTRATIVE SECTION OF POTENTIAL POST-SEISMIC IMPACT

Date 03/10/15	Project No. 731609901	Figure 25-2

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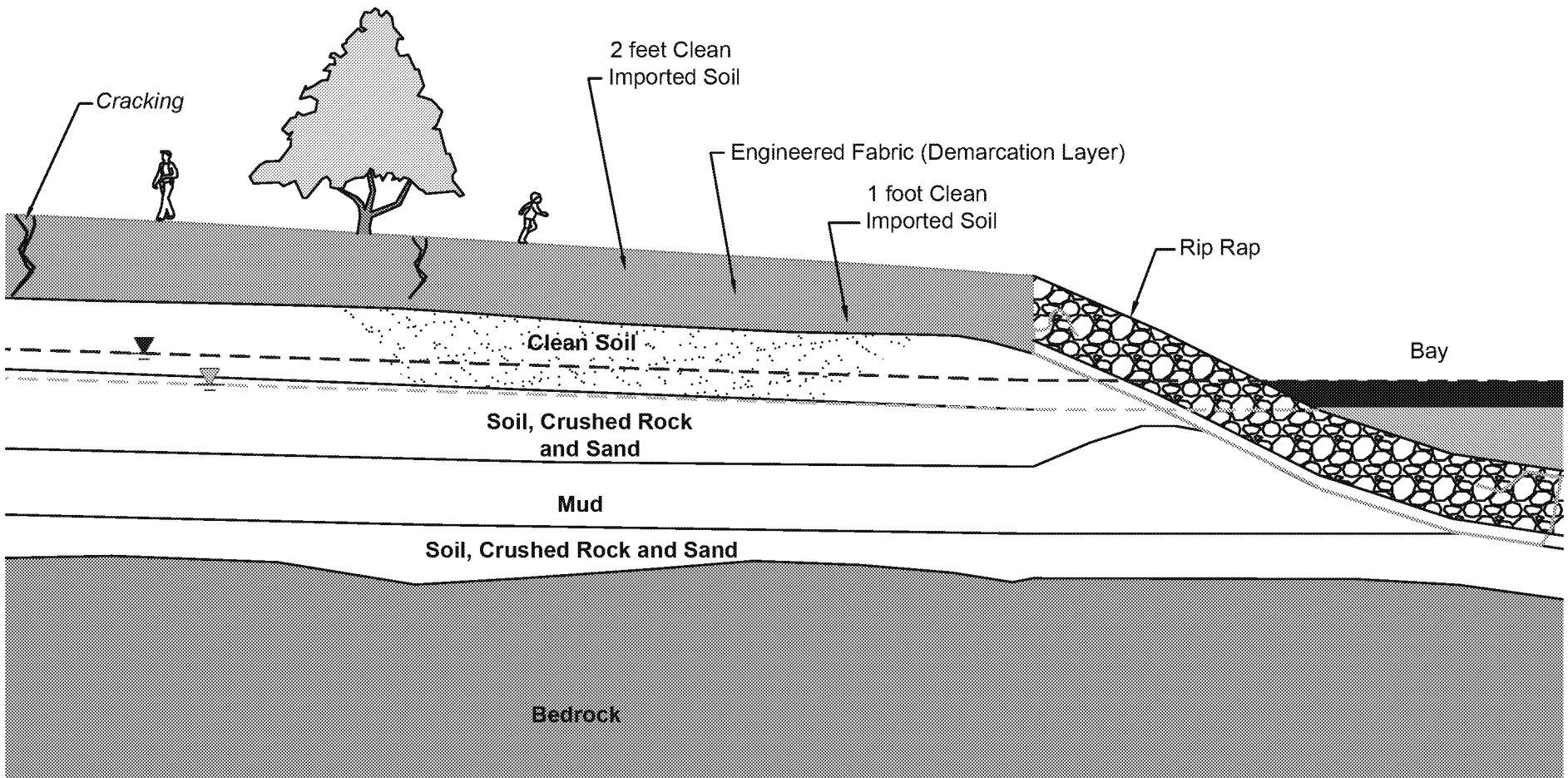

LEGEND

Groundwater Level After Sea Level Rise

Current Groundwater Table

Not to Scale

HUNTERS POINT SHIPYARD
San Francisco, California

ILLUSTRATIVE SECTION OF POTENTIAL POST-SEISMIC IMPACTS PARCELS IR7/18 AND E SHORELINE

Date 03/10/15	Project No. 731609901	Figure 25-3

LANGAN TREADWELL ROLLO

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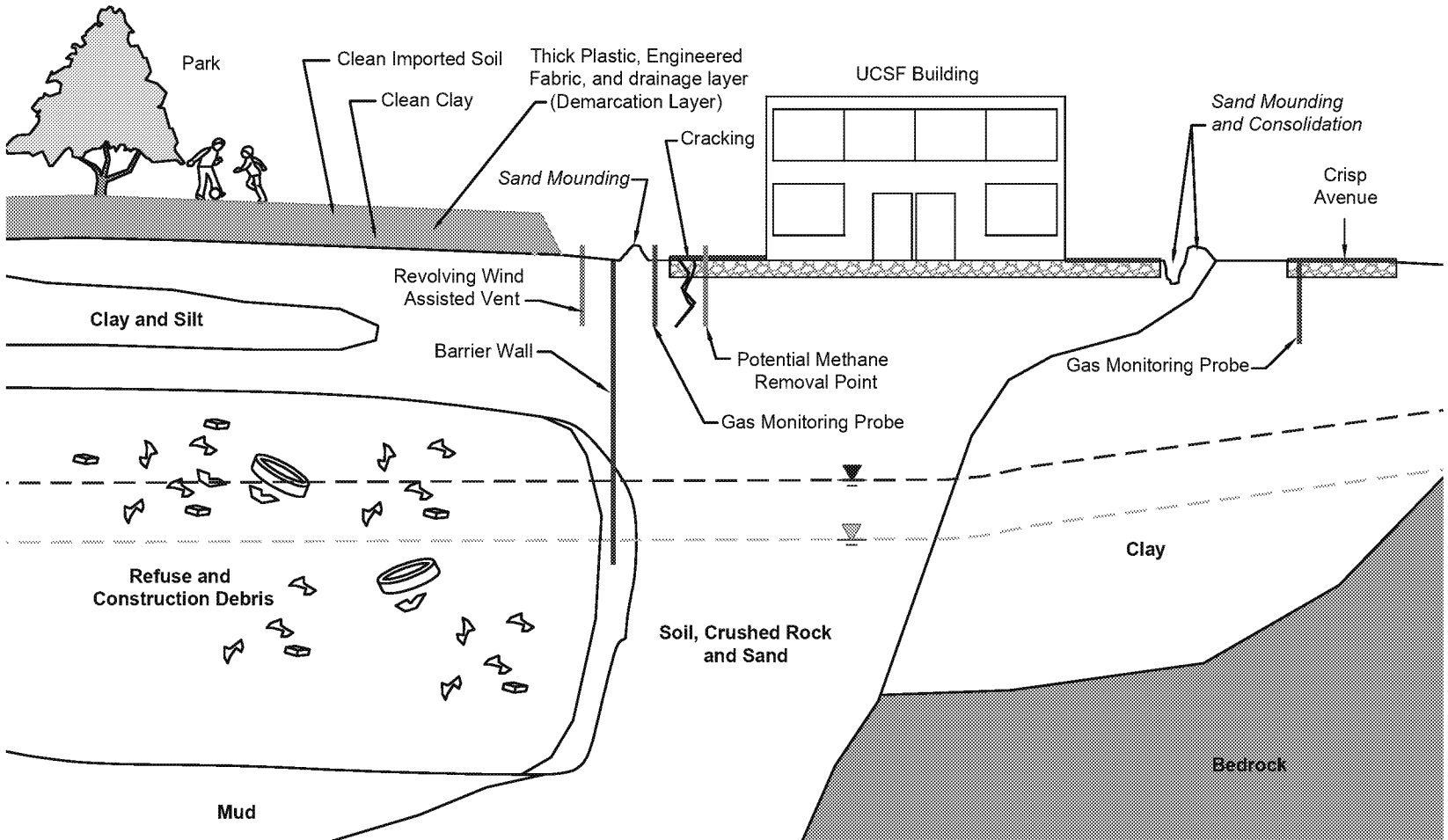

LEGEND

Groundwater Level After Sea Level Rise

Current Groundwater Table

Not to Scale

HUNTERS POINT SHIPYARD
San Francisco, California

ILLUSTRATIVE SECTION OF PARCEL E-2
POTENTIAL POST-SEISMIC IMPACTS

Date 03/10/15	Project No. 731609901	Figure 25-4

LANGAN TREADWELL ROLLO

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Mitigation Measures to Potential Liquefaction-Related Hazards

Mitigation measures can reduce or avoid potential liquefaction-related hazards and include structural measures and ground improvement methods. Structural measures could include the construction of deep foundations, which transfer building loads to competent soil or rock below the potentially liquefiable zone, or use of a structural, sufficiently reinforced mat foundation to distribute loads and reduce the potential for damage to the structure from liquefaction-induced ground settlement with flexible utility connections to allow some settlement beneath the buildings. If liquefaction estimates are such that these treatments would not address liquefaction and settlement-related impacts adequately, ground improvement measures could include (1) over excavation and replacement of potentially liquefiable soil with engineered compacted fill, (2) compaction grouting to densify the loose, potentially liquefiable soil, (3) dynamic compaction (deep dynamic compaction or rapid impact compaction) to densify the loose, potentially liquefiable soil, (4) vibro-compaction (also known as vibro-flotation) to densify the loose, potentially liquefiable soil, (5) stone columns to provide pathways for pore pressure to dissipate in potentially liquefiable soil, thus reducing the potential for liquefaction-induced settlement, and (6) soil-cement columns to densify the loose, potentially liquefiable soil and provide additional bearing support beneath building foundations. Performance standards that must be achieved are set forth in the geotechnical report recommendations specific to the site-specific ground improvement technique.

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Attachment 26

Acronym List

Acronym List

ABM	sandblast grit
ACI	Aircraft Components, Inc.
ACM	asbestos containing materials
ARICs	Areas Requiring Institutional Controls
ATSDR	Federal Agency for Toxic Substances and Disease Registry
BAAQMD	Bay Area Air Quality Management District
BCDC	San Francisco Bay Conservation and Development Commission
BFE	Base Flood Elevation
BRAC	Base Realignment and Closure
Cal-EPA	California Environmental Protection Agency
Cal/OSHA	California Occupation Safety and Health Administration
CAP	Corrective Action Plan
CDPH	California Department of Public Health
CEG	California Certified Engineering Geologists
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFD	Community Facilities District
CO-CAT	California Climate Action Team
COPC	Contaminant of Potential Concern
CRUP	Covenant to Restrict Use of Property
DBI	Department of Building Inspection
DCP	Dust Control Plan
DHS	Department of Health Services
DTSC	Department of Toxics Substances Control

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Acronym List
(Continued)

EC	Engineering Controls
EDB	ethylene dibromide
FEIR	Final Environmental Impact Report
FEMA	Federal Emergency Management Agency
FFA	Federal Facilities Agreement
FOST	Finding of Suitability to Transfer
FS	Feasibility Study
GE	Geotechnical Engineers
GHAD	Geologic Hazard Abatement District
GMP	gas monitoring probe
HASP	Health and Safety Plan
HRA	Historical Radiological Assessment
IR	Installation Restoration
LBP	lead-based paint
LUC RD	Land Use Control Remedial Design
LUCs	Land Use Covenants
MMRP	Mitigation Monitoring and Reporting Program
Montrose	Montrose Chemical Corporation
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
OCII	Office of Community Investment and Infrastructure
RI	Remedial Investigation
RMP	Risk Management Plan
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board

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Acronym List
(Continued)

SCC	California State Coastal Conservancy
SFDPH	San Francisco Department of Public Health
Shipyard	Hunters Point Shipyard
UC	Utility Corridor
USEPA	Unites States Environmental Protection Agency
VOC	volatile organic compound
ZVI	zero-valent iron

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