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TREASURE ISLAND
SSIC NO. 5090.3.A

**DEPARTMENT OF THE NAVY**
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
1455 FRAZEE RD, SUITE 900
SAN DIEGO, CA 92108-4310

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Ser BPMOW.Inl/0452
19 May 2006

VIA CERTIFIED MAIL

Mr. David Rist
California Environmental Protection Agency
Department of Toxic Substances Control
Office of Military Facilities
700 Heinz Avenue, Suite 200
Berkeley, California 94710

Dear Mr. Rist:

SUBJECT: IDENTIFICATION OF STATE "APPLICABLE" OR "REVELANT AND APPROPRIATE" REQUIREMENTS FOR THE FEASIBILITY STUDY FOR INSTALLATION RESTORATION SITE 31, FORMER SOUTH STORAGE YARD, AT FORMER NAVAL STATION TREASURE ISLAND

Pursuant to accomplishing the goals of the Naval Station Treasure Island (NAVSTA TI) Installation Restoration (IR) Program, the Department of the Navy (Navy) hereby request the California Environmental Protection Agency Department of Toxic Substances Control identify potential State chemical-specific, location-specific, and action-specific applicable or relevant and appropriate requirements (ARARs) for potential remedial actions for IR Site 31 at NAVSTA TI. State ARARs identified will be considered and evaluated during the preparation of the Feasibility Study (FS).

In addition, the Navy is requesting the State of California identify any other criteria, advisories, guidance, and proposed standards the State requests to be considered (TBCs) for IR Site 31. Please coordinate responses from all California state agencies.

Enclosure (1), the Executive Summary presented in the Draft Final Remedial Investigation Report for IR Site 31, dated May 2006, should allow you to begin to identify, with some specificity, State chemical-specific and location-specific ARARs. For action-specific ARARs, no action, institutional controls to maintain the hardscape as a protective barrier, and a combination of hot spot excavation and off-base disposal of soil are being evaluated as remedial alternatives. These remedial alternatives will be discussed in detail in the FS report.

The Navy is requesting timely identification of potential State ARARs consistent with the requirements under Section 121(d)(2)(A) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and under the National Contingency Plan (NCP), 40 *Code of Federal Regulations* (CFR) 300.400(g) and 300.515(d) & (h). Experience to date around the country has shown that failure to identify ARARs with sufficient precision, early in the FS process, can cause severe disruptions in timely implementation of a remedial action. To ensure timely and complete ARARs identification for IR Site 31, please include the following information:

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(1) A specific citation to the statutory or regulatory provisions for the potential State ARAR and the date of enactment or promulgation.

(2) A brief description of why the potential State ARAR is applicable or relevant and appropriate to IR Site 31.

(3) A description of how the potential State ARAR would apply to potential remedial action, including specific numeric discharge, effluent, or emission limitations; hazardous substance/constituent action or cleanup levels, etc.; if the State intends to take the position that the potential State ARAR includes such limitations, levels, etc.

(4) If the State believes its proposed ARAR is more stringent than the corresponding Federal ARAR, please provide the rationale and technical justification for this position.

(5) If the State determines that there is not enough information to fully respond to our request, please identify any additional information that would be required to support identification of State ARARs and their application.

Consistent with 40 CFR 300.515(h)(2), we are requesting that you send a response via first class mail to the address above, attention NAVSTA Treasure Island BRAC Environmental Coordinator and postmarked within 30 days of receipt of this request. Please direct any technical questions you may have concerning this request to Ms. La Rae Landers at (619) 532-0970 and any legal questions to Mr. Jan Whitacre, Environmental Counsel at (619) 532-0910.

JAMES B. SULLIVAN
BRAC Environmental Coordinator
By direction

Enclosure: 1. Executive Summary, Draft Final Remedial Investigation Report for IR Site 31, Former South Storage Yard, NAVSTA Treasure Island, May 2006

Copy to:
Mr. James Ricks
U.S. Environmental Protection Agency Region IX
75 Hawthorne Street, Code: SFD-8-1
San Francisco, CA 94105-3901

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Email/DTS ARARs letter.doc

## EXECUTIVE SUMMARY

The purpose of this Remedial Investigation (RI) report is to present the results of the remedial investigation for Site 31, the Former South Storage Yard, at Naval Station Treasure Island (NAVSTA TI) in partial fulfillment of the ongoing activities and responsibilities required under the U.S. Department of the Navy's (Navy) Installation Restoration (IR) Program. These activities are governed by all applicable federal and state laws and regulations as cited in the Federal Facility Site Remediation Agreement for NAVSTA TI ((Navy 1992). This agreement, formalized in 1992 between the State of California and the Navy, provides the operational framework for U.S. Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) activities conducted at NAVSTA TI.

### SITE HISTORY

NAVSTA TI is located in San Francisco Bay (Bay), midway between San Francisco and Oakland, California. The facility consists of two contiguous islands: Treasure Island (TI), which is approximately 403 acres, and Yerba Buena Island (YBI), which is approximately 147 acres. Treasure Island is a manmade island constructed of materials dredged from the Bay in 1936. The island was developed to be the site of the 1939 Golden Gate International Exposition. In response to a Navy request, in 1941, the City of San Francisco leased TI to the Navy for the duration of World War I. After the war, in 1945 the city agreed to transfer the deed for TI to the Navy in exchange for government-owned land south of San Francisco where the San Francisco International Airport was later built. Military activities at YBI date back to 1866. In 1993, NAVSTA TI was designated for closure under the Base Closure and Realignment Act of 1990. The base was closed on September 30, 1997, and is currently in the transfer process.

In 1995, the Navy conducted a basewide environmental baseline survey (EBS) to divide NAVSTA TI into EBS parcels based on like use, physical boundaries (roads, etc.), or possible future use and to update the environmental condition of property for each identified EBS parcel (ERM West 1995). Parcel boundaries are used in discussions regarding suitability for lease and transfer. Site 31 encompasses parts of both EBS Parcels T094 and T095. 11th Street divides Parcels T094 and T095. Prior to development as an elementary school in the late 1960's, the parcel was used for several purposes beginning with exhibits for the 1939-40 Golden Gate International Exposition. After the Exposition ended in 1940 and the Navy took over the island, aerial photos show that the exhibit structures were removed, and the open space was periodically used for storage, and later a fenced storage yard prior to its current use as a asphalt paved playground. During the early 1970s, the southern portion of the parcel (Site 31) was used as a storage yard (known as the South Storage Yard). The nature of operations at the South Storage Yard is unknown. In the late 1970s, Site 31 was paved over and developed as an elementary schoolyard. The elementary school and associated schoolyard were leased to the City of San Francisco under a Finding of Suitability to Lease (FOSL) signed by the Navy on May 13, 1996 (Shaw Environmental, Inc. [Shaw] 2004).

In April 2002, documentation was discovered indicating that in 1989, the Navy Public Works Center installed an 8-inch water line down the middle of 11th Street. A note on the as-built drawings for the water line project identified an "old trash dump" within the western portion of

the water line excavation along 11th Street between Avenues D and E (Shaw 2003a). Subsequent investigations were conducted in 2002 and 2003 to determine impact of previous activities at the South Storage Yard and to determine the nature and extent of the buried debris. Based on the results of these investigations, the Navy established Installation Restoration (IR) Site 31 at the Former South Storage Yard in September 2003 (Navy 2003c).

### LAND USE DESIGNATION

According to the Draft Naval Station Treasure Island Reuse Plan (hereafter referred to as the "Reuse Plan") (City and County of San Francisco [CCSF] 1996), the elementary school has been specifically identified within areas on the island planned for "Institutional Use." Although the elementary school is currently closed, projections for the redevelopment of Treasure Island show a kindergarten through 8$^{th}$ grade school could be supported by the population (Fancher 2006). Reuse of the existing school for this purpose is likely, given the cost associated with developing new educational/institutional facilities (CCSF 1996).

### GEOLOGY AND HYDROGEOLOGY

TI is a relatively flat, manmade island, approximately 403 acres, consisting primarily of sand dredged from the Bay and retained by a perimeter of rock and sand dikes. Dredging and construction of Treasure Island, directed by the U.S. Army Corps of Engineers, began in 1936 and was completed in 1937. Treasure Island was constructed on the Yerba Buena Shoals, a sand spit extending north and northwest of YBI. Treasure Island ranges in elevation from 9 to 12 feet above mean sea level based on national geodetic vertical datum of 1929. Subsurface materials can be divided into the following five units, listed from youngest to oldest:

- Fill (Dredged Sand Fill)
- Shoal Sands (Yerba Buena Shoal Sands)
- Younger Bay Mud
- Older Bay Mud
- Franciscan Assemblage

Asphalt and concrete provide surface cover at Site 31 and are underlain by dredged fill and shoal deposits predominantly consisting of fine- to medium-grained sands, with varying proportions of shell fragments, silt, and clay. The dredged fill was emplaced on top of the shoal sands during the construction of TI beginning in 1936. Younger Bay Mud consisting of interbedded sand, silt, and clay underlie the shoal sands.

Groundwater at Site 31 was encountered at approximately 5 feet below ground surface during the 2004 sampling event. Based on general NAVSTA TI hydrogeology and basewide groundwater monitoring data, groundwater at Site 31 flows in an approximately northwesterly direction towards the shoreline. Because Site 31 is located approximately 1,240 feet from the shoreline, groundwater is not influenced by tidal fluctuations.

## NATURE AND EXTENT OF CONTAMINATION - SOIL AND GROUNDWATER

This RI report presents the analytical results of four field investigations completed at Site 31, including the South Storage Yard investigation (Tetra Tech 2002a), exploratory trenching and time-critical removal action (Shaw 2003a), additional sampling at Site 31 (Shaw 2004), and the temporary groundwater microwell installation and sampling (SulTech 2004). Soil results from these investigations were compared to field screening criteria established in the associated sampling and analysis plans and agreed to by the Base Realignment and Closure Cleanup Team. These included EPA Preliminary Remediation Goals (PRG) for residential soils, benzo(a)pyrene equivalency factor for polycyclic aromatic hydrocarbons (PAH), and NAVSTA TI ambient metals values. These field screening values were used to identify areas for further investigation, as well as to determine the effectiveness of the removal action. Groundwater results were compared to NAVSTA TI groundwater screening criteria. Because groundwater at TI is not considered a suitable drinking water source (California Regional Water Quality Control Board, San Francisco Bay Region [Water Board] 2001), the NAVSTA TI groundwater screening criteria consist of values protective of ecological receptors in Bay. Data collected during these investigations were used to evaluate site conditions for the human health risk assessment (HHRA) and the ecological risk assessment (ERA).

### Soil Results

The chemicals exceeding the field screening criteria in soil at Site 31 are total petroleum hydrocarbons (TPH) as diesel, TPH as motor oil, bis(2-chloroethyl)ether, PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-CD)pyrene), Aroclor 1260, 4,4'-dichlorodiphenyldichloroethylene (4,4'-DDE), 4,4'-dichlorodiphenyldichloroethane (4,4'-DDD), 4,4'-dichlorodiphenyltrichloroethane (4,4'-DDT),arsenic, cadmium, copper, iron, lead, manganese, and polychlorinated dibenzodioxins/furans (dioxins). Although the arsenic and manganese concentrations exceed residential soil PRGs, the concentrations are consistent with NAVSTA TI ambient levels. This suggests that any release of arsenic or manganese that may have occurred has not resulted in concentrations that are significantly different than ambient levels.

The majority of the exceedances occurred in samples collected within or adjacent to Debris Areas C and D, as well as the excavation sidewall samples bordering 11th Street. A smaller number of exceedances were scattered throughout the site.

### Groundwater Results

Calcium, magnesium, and sodium were detected at concentrations above NAVSTA TI ambient levels, but no NAVSTA TI ecological screening criteria have been established. Calcium, magnesium, and sodium are considered essential nutrients and are not discussed further. Mercury was detected in one grab groundwater sample at a concentration above both its NAVSTA TI ambient value and ecological screening criterion. Mercury was not detected in the temporary monitoring well samples and is therefore not considered further. All detections of volatile organic compounds (VOC), TPH as extractable (TPH-e), and TPH as purgeable (TPH-p) were below NAVSTA TI petroleum screening criteria. Benzoic acid, an SVOC, was detected in three grab groundwater samples. It does not have an established NAVSTA TI ecological

screening criterion and was not detected in the temporary monitoring well samples; therefore, it is not discussed further. Pesticides, PCBs, and dioxins were not detected in groundwater at Site 31.

### CONTAMINANT FATE AND TRANSPORT EVALUATION

The contaminant fate and transport evaluation for soil at Site 31 was conducted for TPH, bis(2-chloroethyl)ether, PAHs, Aroclor-1260, cadmium, copper, iron, lead, and dioxin because these chemicals were found to exceed screening criteria and NAVSTA TI ambient concentrations, where applicable. The fate and transport assessment concluded that none of the identified pathways transports contaminants to exposure points at concentrations exceeding comparison criteria. Further, based on the detected concentrations, chemical properties (strong affinity to remain sorbed to soil), and lack of detections in groundwater, the expected fate of contaminants in soil at the site is that they will likely continue to remain in place. In general, chemicals exceeding screening criteria are retained strongly by soil and are not expected to leach to groundwater in sufficient quantities to migrate off-site to the Bay.

### HUMAN HEALTH RISK ASSESSMENT

A quantitative baseline HHRA was completed and is based on RI data collected at Site 31 from 2002 through 2004. Both elementary school children and adult staff were considered potential receptors to evaluate under the current exposure setting. To account for potential variances in land use from the Reuse Plan, the following hypothetical receptors were also evaluated for exposure in the HHRA: construction workers (also protective of utility workers), adult/child residents, and commercial/industrial workers. Finally, a separate, Tier 1 screening-level risk assessment (Navy 2001) protective of recreational visitors was conducted to evaluate the potential redevelopment of the southeast quadrant of the site, including Debris Area D, into a recreational area.

Under current site conditions, exposure of elementary school receptors to chemicals in soil was assumed to be complete to surface soil in unpaved areas via ingestion, dermal contact, and inhalation pathways. An additional scenario was evaluated for elementary school receptors for altered site conditions assuming the school is reopened and the schoolyard redeveloped as an unpaved play yard (for example, a sports field). Under this scenario, it was assumed the schoolyard pavement within the fenced area was removed, exposing the underlying surface soil, and that elementary school receptors would be exposed to this surface soil. Finally, construction workers, residents, and commercial/industrial workers were evaluated for alternative land use assuming paved surfaces were removed site-wide and that these receptors would be exposed to site-wide soil.

Since groundwater at Site 31 is not designated as a drinking water source, potential exposure to chemicals in groundwater is limited. Exposure would occur only through the inhalation of volatile chemicals migrating upward into air (that is, subsurface vapor intrusion to indoor or outdoor air breathing zones). Exposure to vapors migrating from groundwater or soil into indoor air was not evaluated for elementary school receptors, since Site 31 does not include any buildings, nor are there any school buildings within 100 feet from sample locations or wells

where VOCs were detected. Alternative land use receptors were assumed to be exposed to vapors migrating from groundwater or soil into hypothetical structures (residence or commercial/industrial building). Finally, exposure to groundwater via dermal contact was evaluated for construction workers engaged in excavation activities during redevelopment or "current" utility workers digging temporary trenches to repair subsurface utility lines.

To satisfy federal (Navy and EPA) and state (Department of Toxic Substances Control [DTSC]) requirements, risk estimates were prepared by two different methods in the HHRA, referred to as Method 1 (satisfying federal requirements) and Method 2 (satisfying state requirements). These two methods differed in the manner in which chemicals of potential concern (COPC) and toxicity criteria were selected.

COPCs identified in soil at Site 31 included (but were not limited to) Aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, cadmium, copper, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dioxins, indeno(1,2,3-cd)pyrene, iron, lead, and naphthalene. Complete lists of the COPCs identified in soil at Site 31 are provided in Section 6.1.2.1. The COPCs identified in groundwater at Site 31 included barium, benzene, methyl-tert-butyl ether (MTBE), and toluene.

The following potential cancer risks and noncancer hazard indices (HI) were calculated for Site 31 under the reasonable maximum exposure (RME) scenario for the receptors associated with the current exposure setting (elementary school child and adult staff):

- The cumulative potential cancer risk for the elementary school child for direct exposure to surface soil (0 to 2 feet bgs) from unpaved areas outside the schoolyard fence line (exposure under current site conditions) was $1 \times 10^{-6}$ under Method 1 and $2 \times 10^{-6}$ under Method 2.

- The cumulative potential cancer risk for the elementary school staff for direct exposure to surface soil (0 to 2 feet bgs) from unpaved areas outside the schoolyard fence line (exposure under current site conditions) was $2 \times 10^{-6}$ under Method 1 and $5 \times 10^{-6}$ under Method 2.

- The cumulative potential cancer risk for the elementary school child for direct exposure to surface soil (0 to 2 feet bgs) from inside the schoolyard fence line assuming the schoolyard pavement is removed (exposure under altered site conditions) was $1 \times 10^{-5}$ under Method 1 and $2 \times 10^{-5}$ under Method 2.

- The cumulative potential cancer risk for the elementary school staff for direct exposure to surface soil (0 to 2 feet bgs) from inside the schoolyard fence line assuming the schoolyard pavement is removed (exposure under altered site conditions) was $2 \times 10^{-5}$ under Method 1 and $4 \times 10^{-5}$ under Method 2.

- The noncancer HIs for these two scenarios were less than one under both Method 1 and Method 2. The "total" noncancer HIs for these two scenarios were also less than one.

The following potential cancer risks and noncancer HIs were calculated for Site 31 under the RME scenario for alternative use receptors:

- The cumulative potential cancer risk for the construction worker was $3 \times 10^{-6}$ under Method 1 and $5 \times 10^{-6}$ under Method 2. By comparison, the "total" cancer risk for this receptor exposure was $7 \times 10^{-6}$.

- The cumulative potential cancer risk for the resident (adult and child) for multi-pathway exposures to contaminants in soil and groundwater, including direct exposure to site-wide surface soil (0 to 2 feet bgs), was $7 \times 10^{-5}$ under Method 1 and $3 \times 10^{-3}$ under Method 2. The "total" cancer risk for this receptor exposure was also $3 \times 10^{-3}$.

- The cumulative potential cancer risk for the resident (adult and child) for multi-pathway exposures to contaminants in soil and groundwater, including direct exposure to site-wide combined surface and subsurface soil (0 foot bgs to groundwater), was $6 \times 10^{-5}$ under Method 1 and $3 \times 10^{-3}$ under Method 2. The "total" cancer risk for this receptor exposure was also $3 \times 10^{-3}$.

- The cumulative potential cancer risk for the commercial/industrial worker for multi-pathway exposures to contaminants in soil and groundwater, including direct exposure to site-wide surface soil (0 to 2 feet bgs), was $3 \times 10^{-5}$ under Method 1 and $4 \times 10^{-4}$ under Method 2. The "total" cancer risk for this receptor exposure was also $4 \times 10^{-4}$.

- The cumulative potential cancer risk for the commercial/industrial worker for multi-pathway exposures to contaminants in soil and groundwater, including direct exposure to site-wide combined surface and subsurface soil (0 foot bgs to groundwater), was $2 \times 10^{-5}$ under Method 1 and $4 \times 10^{-4}$ under Method 2. The "total" cancer risk for this receptor exposure was also $4 \times 10^{-4}$.

- Under both methods, the noncancer HIs for the construction worker were less than 1. The "total" noncancer HI for the construction worker was also less than 1.

- Under both methods, the noncancer HIs for the adult and child residents and commercial/industrial workers under these scenarios were greater than 1. The "total" noncancer HIs for these receptors were also greater than 1.

Estimated risks for the elementary school child, elementary school staff, and construction worker were within the target cancer risk management range ($10^{-6}$ to $10^{-4}$). Estimated risks for the future resident and commercial/industrial worker were within the cancer risk management range under Method 1, but above the cancer risk management range under Method 2. Noncancer hazards were below the noncancer HI threshold of 1 for all receptors except residents and commercial/industrial workers. Detections of site contaminants in groundwater did not contribute significantly to cumulative potential cancer risks or noncancer HIs.

The following "risk drivers" (chemicals posing a cancer risk greater than or equal to $1 \times 10^{-6}$) in soil were identified for Site 31 for the receptors evaluated under each RME scenario:

- Elementary school children and staff – 4,4'-DDT was identified as the only risk driver for elementary school staff exposed to surface soil (0 to 2 feet bgs) in the unpaved areas outside the schoolyard fence (no risk drivers were identified for elementary school children exposed to these surface soils). Benzo(a)pyrene, dioxins, and other carcinogenic, benzo(a)pyrene-like PAHs were identified as risk drivers for elementary school children and staff exposed to surface soil (0 to 2 feet bgs) under the schoolyard pavement.

- Construction workers - Benzo(a)pyrene was identified as the only risk driver for construction workers.

- Residents and commercial/industrial workers – Under Method 1, benzo(a)pyrene, dioxins, and other carcinogenic, benzo(a)pyrene-like PAHs were identified as the primary risk drivers for residents and commercial/industrial workers for exposure to either site-wide surface soil (0 to 2 feet bgs) or site-wide combined surface and subsurface soil (0 foot bgs to groundwater). Under Method 2, bis(2-chloroethyl)ether and naphthalene were identified as the primary risk drivers for residents and commercial/industrial workers for exposure to either site-wide surface soil (0 to 2 feet bgs) or site-wide combined surface and subsurface soil (0 foot bgs to groundwater).

As described above, the noncancer HIs for the adult and child residents and commercial/industrial workers, exposed to either site-wide surface soil (0 to 2 feet bgs) or site-wide combined surface and subsurface soil (0 foot bgs to groundwater), were greater than 1. Naphthalene was identified as the primary contributor to these HIs, and was the only COPC to contribute a chemical-specific hazard quotient (HQ) greater than 1 (via inhalation of vapors in indoor air).

Elevated concentrations of benzo(a)pyrene, dioxins, naphthalene, and the other carcinogenic, benzo(a)pyrene-like PAHs identified as risk drivers were for the most part limited to localized areas of contamination or "hot spots" (Debris Areas C and D). Furthermore, bis(2-chloroethyl)ether, identified as a significant risk driver for the resident and commercial/industrial worker under Method 2, was only detected once in 147 site-wide samples. Finally, the identification of naphthalene as the primary contributor to the noncancer HIs for the adult and child residents and commercial/industrial workers that were greater than the noncancer HI threshold of 1 was due largely to elevated concentrations at a PAH hot spot (Debris Area C).

For purposes of this risk assessment and to provide information necessary for making risk management decisions concerning the necessity for or selection of remedial alternatives for surface and subsurface soil at Site 31, the RME potential cancer risks were recalculated excluding results associated with localized contamination within Debris Areas C and D, and at individual sample locations SSYHP009 (excluded bis(2-chloroethyl)ether) and T094-001 (excluded elevated dioxin TEQ concentration). In addition, the RME noncancer HQs for inhalation of naphthalene vapors in indoor air for child residents and commercial/industrial workers were recalculated excluding results from the naphthalene hot spot (Debris Area C).The

recalculation of potential cancer risks, excluding sample results associated with the above mentioned hot spots, resulted in the following adjusted risk estimates:

| Receptor | RME Cancer Risk Estimates Adjusted to Exclude Hot Spots | |
|---|---|---|
| | Method 1 | Method 2 |
| Elementary School Child – Exposure to Soil (0-2 feet bgs, Inside Schoolyard Fence Line)[1,2] | 6E-07 (down from 1E-05) | 1E-06 (down from 2E-05) |
| Elementary School Staff – Exposure to Soil (0-2 feet bgs, Inside Schoolyard Fence Line[1,2] | 1E-06 (down from 2E-05) | 3E-06 (down from 4E-05) |
| Construction Worker – Exposure to Soil (0 foot bgs – groundwater, Site-wide)[3], Groundwater, and Vapors in Trench Air[4] | 3E-07 (down from 3E-06) | 7E-07 (down from 5E-06) |
| Resident – Exposure to Soil (0-2 feet bgs, Site-wide)[3] and Vapors in Indoor Air[5] | 1E-05 (down from 7E-05) | 8E-05 (down from 3E-03) |
| Resident – Exposure to Soil (0 foot bgs - groundwater, Site-wide)[3] and Vapors in Indoor Air[5] | 1E-05 (down from 6E-05) | 8E-05 (down from 3E-03) |
| Commercial/Industrial Worker – Exposure to Soil (0-2 feet bgs, Site-wide)[3] and Vapors in Indoor Air[5] | 3E-06 (down from 3E-05) | 1E-05 (down from 4E-04) |
| Commercial/Industrial Worker – Exposure to Soil (0-2 feet bgs, Site-wide)[3] and Vapors in Indoor Air[5] | 3E-06 (down from 2E-05) | 1E-05 (down from 4E-04) |

Notes:

1 Exposure to soil via incidental ingestion, dermal contact, and inhalation pathways presented in Section I.8.2 of Appendix I.
2 Soil assumed to be unpaved for this assessment.
3 Exposure to soil via incidental ingestion, dermal contact, and inhalation of particulates or vapors in outdoor air.
4 In-trench concentrations modeled from groundwater.
5 Indoor air concentrations modeled from groundwater and site-wide combined surface and subsurface soil (0 foot bgs to groundwater).
bgs Below ground surface
RME Reasonable maximum exposure

To complete the hot spot evaluations, RME potential cancer risks were estimated for hypothetical exposure to the PAH and dioxin hot spots themselves. RME potential cancer risks from exposure to identified PAH hot spots ranged from $3 \times 10^{-7}$ (construction worker exposed to the Debris Area D hot spot under Method 1) to $1 \times 10^{-3}$ (resident exposed to the Debris Area C hot spot under Method 2). RME potential cancer risks from exposure to identified dioxin hot spots ranged from $4 \times 10^{-7}$ (construction worker exposed to the hot spot at location T094-001 in Debris Area E) to $1 \times 10^{-5}$ (resident exposed to the Debris Area C hot spot, the Debris Area D hot spot, or the hot spot at location T094-001 in Debris Area E). To account for utility worker exposure to combined surface and subsurface soil beneath 11th Street, RME cancer risks were estimated using construction worker exposure parameters and EPCs calculated for COPC concentration data for soil samples collected from Debris Area E. The Method 1 and Method 2 RME cancer risk estimates for this hot spot evaluation were $4 \times 10^{-7}$ and $5 \times 10^{-7}$, respectively.

The recalculation of the RME noncancer HQs for inhalation of naphthalene vapors in indoor air for child residents and commercial/industrial workers excluding results from the naphthalene hot spot (Debris Area C) resulted in an HQ of 2 for child residents and an HQ of 0.2 for commercial/industrial workers. The resulting HQ for child residents remained above the benchmark of 1 as concentrations of naphthalene in Debris Area D (0.29 mg/kg at location S031-43 at 1.3 feet bgs) and Debris Area E (0.68 mg/kg at location T094-3-1 at 1.5-2.0 feet bgs and 0.4 mg/kg at the same location at 3.5 feet bgs) contribute largely to the adjusted EPC used as the source term for vapor intrusion modeling (Figure 4-3). Using construction worker exposure parameters, HIs estimated for utility worker exposure to noncarcinogenic COPCs detected in combined surface and subsurface soil beneath 11$^{th}$ Street were below 1.

The potential for human health effects caused by lead is typically estimated based on blood-lead concentrations. LeadSpread modeling (DTSC 1999) was performed to evaluate blood-lead levels in an elementary school child and adult and child residents. For modeled EPCs, blood-lead modeling resulted in 99th percentile concentrations below 10 micrograms per deciliter (µg/dL) for the elementary school child and adult residents, below 10 µg/dL for child residents exposed to lead in site-wide surface soil, and above 10 µg/dL for child residents exposed to lead in site-wide combined surface and subsurface soil. To evaluate potential deleterious effects from exposure to lead in soil for elementary school staff, construction workers or commercial/industrial workers, EPCs were compared to the EPA Region IX PRG for industrial soil, 800 mg/kg (EPA 2004c). The lead EPCs in the three surface soil data sets, ranging from 149 mg/kg to 346 mg/kg, were well below this benchmark for potential industrial sites, but the lead EPC in site-wide combined surface and subsurface soil, 858 mg/kg, exceeded this criterion.

Similar to the cancer risk drivers, elevated concentrations of lead were primarily limited to localized areas. The 99th percentile blood-lead concentrations were recalculated using EPCs excluding samples from potential hot spots (Debris Areas A through E). Blood-lead modeling using the adjusted EPCs resulted in 99th percentile concentrations below 10 µg/dL for all receptors. Predicted 99th percentile blood-lead concentrations for exposure to the identified lead hot spots exceeded 10 µg/dL for elementary school children and child residents, with all lead hot spot EPCs exceeding 400 mg/kg. Lead hot spot EPCs estimated for Debris Area E for potential construction/utility worker exposure exceeded the PRG for industrial soil, 800 mg/kg (EPA 2004c).

Using a Tier 1 risk assessment approach (Navy 2001) to evaluate potential recreational exposures in the southeast quadrant, cancer risks of $1 \times 10^{-5}$ and $4 \times 10^{-5}$ were estimated for exposure to site-related chemicals in surface soil (0 to 2 feet bgs) and exposure to site-related chemicals in combined surface and subsurface soil (0 foot bgs to groundwater), respectively. For both exposure scenarios, benzo(a)pyrene and dioxins were identified as risk drivers, and arsenic was identified as an additional risk driver for the combined surface and subsurface soil exposure scenario. Cancer risks for benzo(a)pyrene and dioxins exceeded $1 \times 10^{-6}$ because a small sample size required the maximum detected concentrations of these compounds as the exposure point concentration (EPC). Noncancer adverse health hazards estimated for exposure to site-related chemicals in surface soil (0 to 2 feet bgs) and combined surface and subsurface soil (0 foot bgs to groundwater) were both equal to the HI benchmark of 1. None of the target organ HIs exceeded the HI benchmark of 1. To be protective of potential recreational exposure to lead in soil in the

southeast quadrant, LeadSpread modeling (DTSC 1999) was performed using default exposure parameter values for residents. For modeled EPCs, blood-lead modeling resulted in 99th percentile concentrations below 10 micrograms per deciliter (μg/dL) for adult and child residents (protective of adult and child recreational visitors, respectively) exposed to lead in surface soil (0 to 2 feet bgs), below 10 μg/dL for adult residents exposed to lead in combined surface and subsurface soil (0 to 10 feet bgs), and above 10 μg/dL (11.4 μg/dL) for child residents exposed to lead in combined surface and subsurface soil.

### ECOLOGICAL RISK ASSESSMENT

The terrestrial habitat of NAVSTA TI is of poor quality for wildlife species because the island is predominantly covered with urbanized areas. Site 31 does not contain significant habitat and was not considered for a detailed ERA for terrestrial receptors. Instead, the ERA focused on detected chemicals in groundwater at Site 31 and the potential risk to aquatic receptors associated with chemical groundwater migration to the offshore surface waters of the Bay.

A step-wise approach for evaluating chemicals in groundwater was used to identify chemicals of potential ecological concern (COPEC) for the ecological point of exposure which is defined to be groundwater located at the inland margin of the tidal mixing zone at NAVSTA TI. If a chemical detected in groundwater at Site 31 exceeded the groundwater screening criterion for NAVSTA TI, then the chemical was deemed a COPEC. No organic chemicals were reported at concentrations exceeding the NAVSTA TI ecological screening criterion.

NAVSTA TI ambient concentrations of metals in groundwater were used as a secondary groundwater comparison (Tetra Tech 2001a). This comparison was incorporated to address metals that naturally occur in groundwater at NAVSTA TI or are the result of other anthropogenic sources unrelated to site-specific activities. Other than the essential nutrients discussed previously, no chemicals exceeded both NAVSTA TI ecological screening criteria and ambient levels in monitoring well samples.

Based on this initial screening, no COPECs were identified for Site 31. As a result, a complete screening level ecological risk assessment was not warranted for Site 31. Site 31 does not pose a risk to the environment.

## APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Applicable or relevant and appropriate requirements (ARAR) are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address the situation at a CERCLA site. The requirement is applicable if the jurisdictional prerequisites of the standard show a direct correspondence when objectively compared to the conditions at the site. An applicable federal requirement is an ARAR. An applicable state requirement is an ARAR only if it is more stringent than federal ARARs. A review of ARARs specific to Site 31will be identified during the Feasibility Study (FS).

## CONCLUSIONS AND RECOMMENDATIONS

The nature and extent of contaminants at the site and the site geologic and hydrogeologic conditions have been adequately characterized. On the basis of the chemical characterization of current site conditions, the findings of the fate and transport evaluation, and the results of the HHRA for the site, existing site conditions are considered protective of human health and the environment under current land use at the site as an elementary schoolyard.

Although the future residential or commercial/industrial reuse of Site 31 is not planned, nor is the elementary schoolyard anticipated to be redeveloped as an unpaved play yard, consideration of further evaluation of benzo(a)pyrene, dioxin, lead, and naphthalene at currently paved locations in Debris Areas A, B, and C (under the schoolyard), Debris Area D (in the southeast quadrant), and Debris Area E (under 11th Street and 11th Street sidewalks) may be warranted prior to any such future reuse. A FS should be conducted to evaluate remedial alternatives that would ensure protection of human health to these compounds in the event that the school is reopened in the future with the schoolyard pavement removed, or the area is developed for residential or commercial/industrial use.