Comprehensive Long-Term Environmental Action Navy (CLEAN II)

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Basewide Radiological Removal Action Action Memorandum

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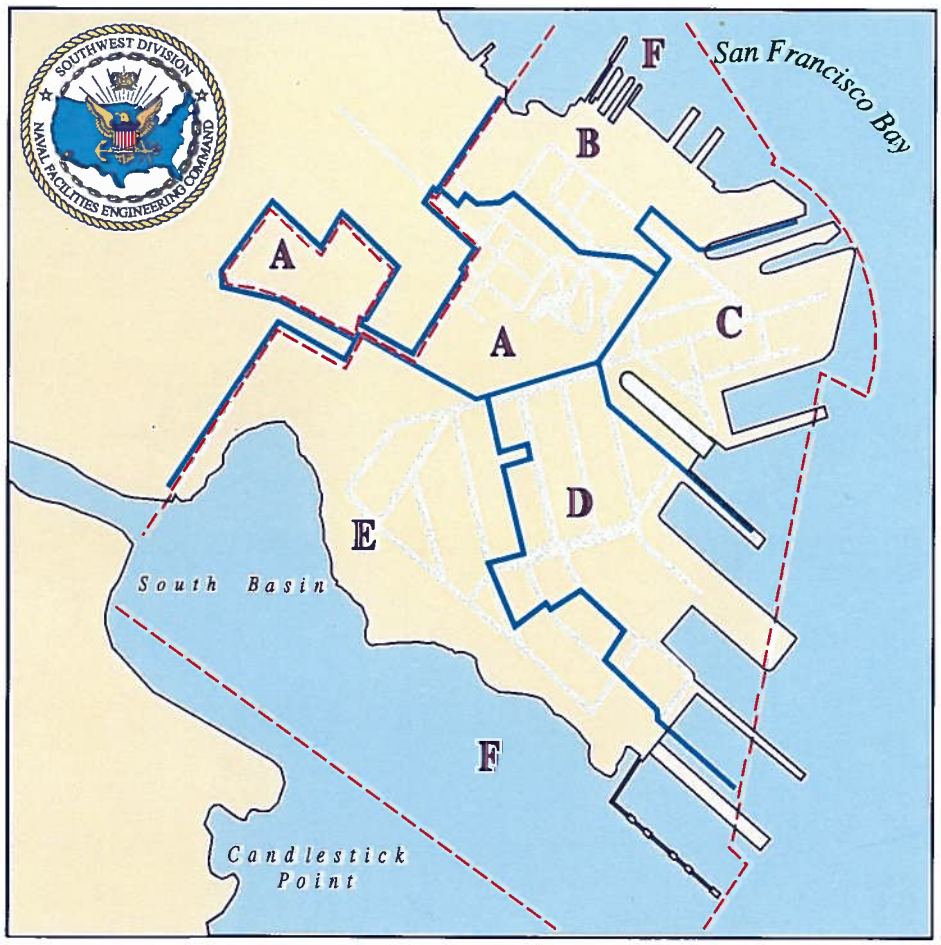
San Francisco, California



FINAL

November 19, 2001

Department of the Navy • Southwest Division

FINAL
BASEWIDE RADIOLOGICAL REMOVAL ACTION
ACTION MEMORANDUM
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

November 19, 2001

DEPARTMENT OF THE NAVY
Southwest Division
Naval Facilities Engineering Command
San Diego, California

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ACRONYMS AND ABBREVIATIONS

§	Section
AM	Action memorandum
ARAR	Applicable or relevant and appropriate requirement
BRAC	Base Realignment and Closure
Ca-HSC	California Health and Safety Code
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
DHS	California Department of Health Services
DTSC	California Environmental Protection Agency Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
HPS	Hunters Point Shipyard
HRA	Historical radiological assessment
IR	Installation Restoration
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
Navy	U.S. Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NRC	U.S. Nuclear Regulatory Commission
NRDL	Naval Radiological Defense Laboratory
O&M	Operation and maintenance
PRC	PRC Environmental Management, Inc.
PRG	Preliminary remediation goal
PRP	Potentially responsible party
RI/FS	Remedial investigation and feasibility study
RWQCB	California Regional Water Quality Control Board, San Francisco Bay Region
SARA	Superfund Amendments and Reauthorization Act of 1986
TCRA	Time-critical removal action
TtEMI	Tetra Tech EM Inc.
USC	*United States Code*

ACTION MEMORANDUM

Hunters Point Shipyard
San Francisco, California, 94124

November 19, 2001

Subject: **Action Memorandum for Time-Critical Removal Action of Radiological Materials in Soils, Debris/Slag, or Structures at Hunters Point Shipyard, San Francisco, California**

Site Status: **National Priorities List: listed in November 1989; Parcel A was de-listed in February 1999**

Removal Category: **Time-Critical Removal Action**
CERCLIS ID: **CA1170090087**
Site ID: **0902722**

I. PURPOSE

The purpose of this action memorandum (AM) is to document for the administrative record the U.S. Department of Navy's (Navy) decision to undertake time-critical removal actions (TCRA) at areas throughout the base that may contain localized radiological contamination in soils, debris/slag, and buildings at Hunters Point Shipyard (HPS). The Department of Defense has the authority to undertake Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response actions, including removal actions, under Title 42 of the *United States* Code (USC) Section (§) 2705 and the federal Executive Order 12580. Further, this removal action is consistent, to the maximum extent possible, with Chapter 6.8 of California Health and Safety Code (Ca-HSC).

The proposed removal actions described in this AM will substantially eliminate identified pathways of exposure to hazardous substances for surrounding populations and nearby ecosystems, such as nearby wetlands and the San Francisco Bay. Removal actions performed per this AM are anticipated to be complete cleanups to, or below, the cleanup goals specified in this document.

Removal actions performed per this AM are deemed consistent with (1) the factors set forth within the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Title 40 of the *Code of Federal Regulations* (CFR) Part 300, and (2) Chapter 6.8, Ca-HSC, based on the findings below.

Threats to public health or welfare:

- Nearby human populations may be affected by exposure to low-level radioactive materials

- Low-level radioactive materials may migrate or be released because of their presence near the surface
- Low-level radioactive materials may migrate or be released because of weather conditions

Threats to the environment:

- Nearby animals, and food chains may be affected by exposure to low-level radioactive materials
- Radioactive materials can have very long half-lives. Their release into the environment could be detrimental

No nationally significant or precedent setting issues exist for this site.

II. SITE CONDITIONS AND BACKGROUND

This section describes the site history and background of HPS, summarizes each action conducted to date, and presents the findings of previous characterizations of radioactivity at HPS.

A. SITE DESCRIPTION

The following sections summarize characteristics of the site, any releases or threatened releases of contaminants, and the status of the site on the National Priorities List (NPL).

1. Removal Site Evaluation

To date, several radiological site investigations have been conducted at HPS to assess the presence of radiological materials remaining from past operations associated with the Navy Radiological Defense Laboratory (NRDL) and ship decontamination and maintenance procedures. Those investigations delineated certain areas at which low-level radiological contaminants were found, and some of those areas have been addressed under a previous radiological removal action.

As investigations continue, additional areas throughout HPS are being considered for their potential to contain low-level radiological contamination. This AM addresses those potential areas through removal and off-site disposal actions.

Three general types of media exist in which radiological contamination may be found:

1. Soils
2. Debris/slag
3. Buildings: walls, foundations, slabs, and so on

Examples of previously identified low-level radiological contamination include anomalies found in soils near buildings; debris/slag containing embedded radium dials; and surface contamination on concrete slabs, walls, and piping associated with buildings.

2. Physical Location

HPS is located in the City and County of San Francisco, California, and is shown on Figure 1. HPS is situated on a long promontory in southeast San Francisco, extending eastward into San Francisco Bay. The primary mission of HPS was naval shipyard activities. HPS consists of 947 acres, 494 of which are on land, and is divided into six parcels (A through F) to facilitate environmental investigation and cleanup activities.

The climate is characterized as temperate, or Mediterranean, which typically has moist mild winters and dry summers. The average annual precipitation in the area is 21.79 inches. The precipitation occurs mostly during the months of December, January, and February. There are public residencies within a mile radius of HPS and the nearest major thoroughfare is I-280, located roughly five miles west of the site.

3. Site Characteristics

HPS is a federally owned facility, which began using radioactive materials in the 1940s with the formation of the NRDL. In 1969, radiological studies at HPS ended, and NRDL buildings were decontaminated and cleared for unrestricted reuse. The Navy also conducted ship decontamination, repair, and dismantling activities, which generated radium dial and sandblast grit waste streams. During NRDL operations, the Navy utilized a radiological waste-handling program, which included removal of high-level radioactive materials from HPS and transport of the materials to an off-site disposal area.

As a result of past operations, some NRDL-associated buildings have been found to contain low-level radiological contaminants and radium dials have been found embedded in both debris and slag, or buried in disposal areas. Hazardous materials have also been found at HPS. The site was placed on the NPL in 1989, pursuant to CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986.

In 1991, HPS was slated for closure pursuant to the terms of the Defense Base Closure and Realignment Act of 1990 (Public Law 101-510). Closure of HPS includes conducting environmental remediation activities and transfer of the property to the City of San Francisco for future nondefense reuse.

4. Release or Threatened Release into the Environment of a Hazardous Substance or Pollutant or Contaminant

The radioisotopes encountered to date, and likely to be encountered during future investigations, include americium-241, cobalt-60, strontium-90, cesium-137 (and daughter products), europium-152 and europium-154, radium-226, thorium-228, thorium-232, and uranium-235 (and daughter products), and are hazardous substances, as defined by §101(14) of CERCLA, and pollutants or contaminants, as defined by §101(33) of CERCLA.

Because of the presence of low-level radiological waste in areas exposed to erosion and weathering, a threat of migration and release to surrounding populations and the environment exists.

To date almost all radiological materials encountered at HPS have been isolated from human contact and located in restricted-access areas. However, the threat of release does exist because of the persistence of radiological materials, their presence in areas designated for future unrestricted use, and their presence in areas that may be affected by weather and erosion.

Removal actions conducted in accordance with this AM are therefore designed to (1) substantially reduce ionizing radiation to cleanup goals and (2) eliminate identified pathways of exposure to ionizing radiation.

5. National Priorities List Status

HPS was placed on the NPL on November 21, 1989, with a Hazard Ranking Score of 48.77. Parcel A was delisted in February 1999. Each parcel has undergone, or is undergoing, a CERCLA remedial investigation and feasibility study (RI/FS); RI/FSs have been completed for Parcels A and B, and are being conducted for Parcels C, D, and E.

6. Maps, Pictures, and Other Geographical Representations

Figure 1 shows the location of HPS, and Figure 2 presents all currently known radiological-related areas at HPS. Many radiological areas have already been addressed by previous investigations and by a previous radiological removal action.

B. OTHER ACTIONS TO DATE

Several radiological investigations and a radiological removal action have been conducted at HPS. The following sections summarize those actions.

1. Previous Actions

Four phases of radiological investigations were performed at HPS, beginning in 1991. Phases I and II delineated the surface and subsurface distribution of radium-containing devices. Phases III and IV recommended the removal of anomalies near Buildings 364, 509, 529, and 707 in Parcels D and E. Each investigation is summarized below.

1.1 Phase I

The phase I radiological investigation was conducted in 1991 to evaluate the extent of radium-containing devices identified in a surface radiation survey conducted by Harding Lawson Associates (1990) in 1988. The phase I investigation included Installation Restoration (IR) sites 01/21, 02, 03, and portions of IR site 11/14/15.

Over 300 radium-containing point sources were detected in a centralized area in IR-02 Northwest during the phase I investigation, and additional anomalies were observed in IR-01/21 and IR-02 Southeast. A dial with anomalously high gamma activity was also found on the door of a combination safe in IR-11/14/15.

Thirteen soil samples collected from the disposal area in IR-02 Northwest contained radium-226 at concentrations exceeding background levels. One soil sample collected from IR-01/21 and two soil samples collected from IR-02 Southeast contained radium-226 at concentrations exceeding background levels (PRC Environmental Management, Inc. [PRC] 1992).

The phase I investigation concluded that elevated gamma activity was a result of the presence of radium-containing devices in surface soil at scattered locations at IR-01/21 and on the surface and in the subsurface of the centralized disposal area in IR-02 Northwest, which extends into IR-02 Central.

The phase I radiation investigation recommended an investigation of the subsurface distribution of radium-containing devices in soil in IR-02 Northwest, removal of the combination safe from IR-11/14/15, and further speciation of radiological analytes in groundwater. The first and second recommendations have been performed, and the third is ongoing.

1.2 Phase II

The phase II radiological investigation was conducted in 1993 to delineate the subsurface distribution of radium-containing devices in the IR-01/21 landfill and in the disposal areas in IR-02 Northwest and IR-02 Central. Field activities included excavation of trenches and test pits, collection of soil samples, and collection of air samples (PRC 1996).

Excavation activities at the disposal area in IR-02 Northwest and in IR-02 Central revealed 111 discrete subsurface gamma-emitting point sources, all located within a well-defined disposal area. A large amount of industrial and construction debris was also found mixed with soils in the disposal area. Radium-containing devices and industrial debris were detected at the surface in IR-01/21, but not in the subsurface of IR-01/21 or at the beach and intertidal areas of IR-02 Northwest (PRC 1996).

The phase II radiological investigation concluded that the disposal area in IR-02 Northwest and IR-02 Central was the primary disposal area for all radium-containing devices generated at HPS as a result of ship repair and maintenance activities, and that radium-containing devices were only present on the surface of the landfill in IR-01/21.

1.3 Phase III

The phase III radiological investigation was conducted in 1997 to address concerns about the use, storage, and disposal of radioactive materials during past NRDL operations at HPS. The goal of the phase III investigation was the eventual release for unrestricted use, all remaining buildings and sites not previously released, including three formerly used defense sites. Radiological surveys were conducted within and around Buildings 506, 509, 517, and 529.

The Phase III radiological investigation recommended the following actions (Tetra Tech EM Inc. [TtEMI] 1997):

- Excavation of a potential buried point source behind Building 529
- Excavation of an area with an anomalous count rate of 9,374 counts per minute near Building 509
- Further study of Buildings 364 and 707 (TtEMI 1997)

All phase III recommendations were implemented in the phase IV investigation, or in the removal action.

1.4 Phase IV

The phase IV radiological investigation was conducted in 1999 to quantify ambient concentrations of specific radionuclides and to further characterize two radiological sites located near Buildings 364 and 707. The goal of the phase IV investigation was free release for industrial use of the areas located near Buildings 364 and 707.

The phase IV investigation recommended the following actions:

- Removal of a cesium-137 spill site near Building 364
- Removal of anomalies near the former locations of Buildings 509, 529, and 707

Both of the phase IV recommendations were implemented in the removal action, which began in February 2001.

2. Current Actions

Current radiological actions at HPS include a removal action that was initiated in February 2001 and a Historical Radiological Assessment (HRA). These actions are described below.

2.1 Current Removal Action

Based on the results of the phase IV investigation, a removal action was begun in early 2001 and is nearing completion. The removal action was designed to focus on Buildings 364, 509, 529, and 707, as identified in the final AM dated August 2000 (TtEMI 2000a).

The initial goals of the removal action were to remove (1) radioactive anomalies found in the upper soil layer at levels exceeding U.S. Environmental Protection Agency (EPA) decay-corrected preliminary remediation goals (PRG) and (2) a subterranean concrete sump near Building 364. The sump was previously used to store liquids with radiological contamination. Those goals were met, and the scope of the removal action was expanded to address additional contamination found in concrete materials near Building 364 and to conduct a shoreline radiological survey focusing on characterization of intertidal debris.

All radiological materials removed as part of the current removal action are being properly stored, transported, and disposed at an approved off-site facility. Postexcavation confirmation samples are being collected from soil excavation sites to ensure complete removal and achievement of the cleanup goals. All successfully excavated areas are being backfilled with clean materials.

2.2 Historical Radiological Assessment

The HRA is being conducted to evaluate all previous uses of radiological materials at HPS and to assess their potential to impact the site. A draft version of the HRA is expected in December 2001.

C. STATE AND LOCAL AUTHORITIES ROLE

The California Department of Health Services (DHS) and EPA have actively participated in the radiological investigations and the radiological removal action at HPS. In the past, EPA has provided site-specific input for the establishment of removal action cleanup goals and investigative strategies.

The California Environmental Protection Agency Department of Toxic Substances Control (DTSC) and California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) are also regulatory agency stakeholders.

1. State and Local Actions to Date

As previously discussed, federal Executive Order 12580 delegates to the Department of Defense the President's authority to undertake CERCLA response actions. Congress further outlined this authority in its Defense Environmental Restoration Program Amendments, which can be found at 10 USC §2701-2705. Both CERCLA §120(f) and 10 USC §2705 require Navy facilities to ensure that state and local officials be given timely opportunity to review and comment on Navy response actions. CERCLA §120 further requires the Navy to apply state removal and remedial action law requirements at its facilities.

Accordingly, DHS, DTSC, and RWQCB have provided technical advice and oversight during phases of the RI/FS process, during previous radiological investigations, and during the radiological removal action begun in February 2001.

2. Potential for Continued State or Local Response

DHS, RWQCB, and DTSC deferred to EPA for development of cleanup goals for the previous radiological removal action. Those cleanup goals were also chosen for this removal action. DHS, RWQCB, and DTSC will continue to provide input through review of radiological documents and participation in the Base Realignment and Closure (BRAC) Cleanup Team.

It is expected that the Navy's BRAC account funds will continue to be the exclusive source of funding for this program.

III. THREATS TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT AND STATUTORY AND REGULATORY AUTHORITIES

In accordance with the NCP, the following threats must be considered in determining the appropriateness of a removal action (40 CFR §300.415[b][2]):

- Actual or potential exposure to hazardous substances, pollutants, or contaminants of nearby populations, animals, and food chains
- Actual or potential contamination of drinking water supplies and sensitive ecosystems
- Hazardous substances, pollutants, or contaminants in drums, barrels, tanks, and other bulk storage containers that may pose a threat of release
- High levels of hazardous substances or pollutants or contaminants in soils largely at, or near, the surface that may migrate
- Weather conditions that may cause hazardous substances, pollutants, or contaminants to migrate or to be released
- Threat of fire or explosion
- Other situations or factors that may pose threats to human health or the environment

A. THREATS TO PUBLIC HEALTH OR WELFARE

Three potential threats to public health or welfare exist:

- Nearby human populations may be affected by exposure to low-level radioactive materials
- Low-level radioactive materials may migrate or be released because of their presence near the surface
- Low-level radioactive materials may migrate or be released because of weather conditions

Because of the possible adverse health effects from ionizing radiation (EPA 1998) and the long decay periods (half-lives) for many radionuclides, removal and off-site disposal is considered the most effective option for most of the radiological contaminants found at HPS. Physical removal of radiological materials will ensure that the potential for diffuse radioactivity is reduced to levels that meet or are below cleanup goals.

B. THREATS TO THE ENVIRONMENT

Two potential threats to the environment exist:

- Nearby animals and food chains may be affected by exposure to low-level radioactive materials
- Radioactive materials can have very long half-lives; therefore, their release into the environment could be detrimental

Physical removal of radiological materials from HPS also provides the most effective option for mitigation of threats to the environment from ionizing radiation.

IV. DETERMINATION OF ENDANGERMENT

Results of radiological investigations conducted to date (TtEMI 1997, 2000b) demonstrate that current conditions at HPS may present immediate and severe threats to the aquatic ecosystem, public health, welfare, or the environment.

Actual or threatened releases of radiological materials from HPS, if not addressed by implementing the response action selected in this AM, may present an imminent and substantial endangerment to public health, welfare, or the environment. The primary endangerment mechanism is through migration: if radiological contaminants migrate, they have the potential to contaminate water and soils. Water and soil contamination could be long lasting, since some radionuclides have half-lives in the tens of thousands of years.

The HRA currently being conducted will provide a comprehensive review and assessment of the affect of past radiological operations at HPS.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

The following sections summarize the actions proposed for any TCRA performed per this AM.

A. PROPOSED ACTION

The proposed action for localized radiological contamination present at HPS is to physically remove it and dispose of the contamination at an off-site disposal facility. For purposes of this AM, localized is defined as any area less than approximately 3 acres in which radiological contamination is the primary risk driver. The definition for "localized" is based on the results of past radiological investigations, the size of the radium dial disposal area in IR-02 Northwest and IR-02 Central, and the size of the intertidal debris area; these areas are assumed to be the largest probable areas this AM would address.

Estimates on the quantity of radiological materials that will be removed per this AM remain pending, until additional sites are identified for removal actions and more accurate information is gathered. Removal actions performed per this AM will comply with the off-site policy by using a fully permitted off-site disposal facility.

Removal actions performed per this AM are subject to the cleanup goals listed in Tables 1 and 2, for soils/debris and surfaces, respectively. Before initiating a removal action per this AM, the area being considered will be delineated using real-time radiation detection devices or soil sampling and analyses.

The cleanup goals for radionuclides in soils were used during the previous radiological removal action, and Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance is being used to apply the cleanup goals. If radionuclides that are not listed in Tables 1 and 2 are encountered during removal actions, cleanup goals will be derived using EPA PRGs (EPA 1991) and MARSSIM guidance (EPA and others 2001) for soils and debris, and 63 Federal Register 64132 for surfaces.

Areas where radiological contamination may be too pervasive to conduct a localized removal action, where radiological contamination is not the primary risk driver, or where excavation activities pose a high risk to workers, will be addressed as part of the ongoing CERCLA process. The IR-01/21 landfill is one example of an area that has multiple risk drivers, has a large affected area, and would pose excessive hazards to workers performing excavation activities.

1. Proposed Action Description

Physical removal and off-site disposal of radiological materials will follow the general steps listed below for three types of environmental media in which radiological contamination is likely to be encountered at HPS. Removal actions will be preceded by preparation of site-specific work plans. To the extent practicable, radioactive materials will be segregated from other materials (such as construction debris or nonaffected soils) to minimize radiological waste stream generation.

- **Soils**
  - Delineation of radiological contamination using real-time radiation detection instruments or soil sampling and analyses
  - Excavation of radiological materials and proper off-site disposal
  - Soil confirmation sampling and analyses; comparison of results against cleanup goals listed in Table 1 using MARSSIM methodology
  - Site backfilling and restoration
- **Debris/Slag**

- Delineation of contamination, or general area of suspected contamination, using real-time radiation detection instruments or sampling and analyses
- Collection and segregation of radioactive materials
- Proper off-site disposal of materials
- Comparison of remediated area against cleanup goals listed in Tables 1 or 2, depending on the surrounding environmental media (soils or surfaces) using MARSSIM methodology
- Site backfilling or restoration

- **Concrete Surfaces (walls, slabs, and foundations)**
  - Delineation of radiological contamination using real-time radiation detection instruments or wipe samples and analyses
  - Decontamination of surfaces by acid or solvent washing or mechanical removal such as scabbling (scabbling will be preferred in order to reduce waste stream generation)
  - Proper off-site disposal
  - Comparison of residual radioactivity to the cleanup goals listed in Table 2, using MARSSIM methodology

  Note: if surface decontamination is not technically feasible, the entire structure may be removed and disposed of appropriately.

If radiological areas are found in or near wetlands or intertidal areas, removal actions will be modified to minimize the affect to those areas.

The following laboratory analyses are associated with characterization of the radiological materials that may be addressed by this AM:

- Isotopic Americium and Uranium (234, 235, 238) analyses in soil by American Society for Testing and Materials method D3972-90M
- Gamma spectroscopy analyses in soil by EPA method 901.1

Institutional controls will not be required for removal actions performed under this AM. Radiological areas that cannot be addressed by this AM (for example, areas with large quantities of low-level radiological waste or areas where radiation is not considered the primary risk driver) will continue to be evaluated by the ongoing CERCLA process. Radiological sites not addressed under this AM will continue to have restricted access, until a final remedy is selected.

Postremoval site controls will not be required following removal actions performed per this AM, since the intent of each removal action is to reduce radioactive contaminants to or below the cleanup goals.

2. Contribution to Remedial Performance

Removal of radiological contamination per this AM will allow for the ongoing CERCLA process to address any remaining contamination and will avoid future "mixed waste" (waste with both chemical and radiological contamination). Each removal action taken per this AM will be performed to achieve specified cleanup goals, and will be intended as the final radiological remedy at each site. Removal actions taken per this AM will also take into account the City of San Francisco's reuse plan for the site.

3. Description of Removal Alternative

Several removal action alternatives were considered for use in this AM; however, physical removal and proper off-site disposal was the only viable alternative retained for evaluation.

Other actions such as in-place stabilization, and removal and consolidation in the closed HPS industrial landfill, were considered; however, those alternatives would not physically remove the contamination (requiring long operation and maintenance [O&M] periods), would involve large costs, or would require restricted reuse of certain areas of HPS for long periods of time.

The steps required to remove and properly dispose of low-level radioactive materials at an approved off-site facility were detailed in Section V.A.1.

Removal and proper disposal of radioactive materials will provide a timely response and the best option for protection of human health and the environment. Previous radiological soil removals have been completed within several months, and achievement of cleanup goals ensures that human health risks related to radiological materials are eliminated from the site in question.

The Sections 3.1 and 3.2 summarize the criteria used to evaluate the proposed alternative and results of the evaluation.

3.1 Evaluation Criteria

Three criteria were used to evaluate the removal and disposal alternative proposed in this AM: effectiveness, implementability, and cost.

Effectiveness

Three general factors were considered in evaluating effectiveness: (1) overall protection of human health and the environment, (2) short-term effectiveness, and (3) long-term effectiveness and permanence.

Implementability

This criterion addresses the technical and administrative feasibility of implementing the removal action. Items evaluated include (1) the availability of services and materials required during implementation of the action, (2) the institutional or social concerns that could preclude the action, and (3) state and community concerns that could affect implementation. The following factors were considered:

- Technical feasibility: the ease or difficulty of implementing the alternative and the reliability of the technology
- Administrative feasibility: activities, such as obtaining waivers or permits, requiring coordination with other offices and agencies

Cost

This criterion is concerned with the estimated costs of the alternatives, and is based on previous radiological removal actions for soils and building surfaces. O&M costs were not considered in the cost evaluation since removal actions will be performed in less than a year, and no follow-on costs are associated once this removal action has been completed.

3.2 Evaluation of Proposed Removal and Off-site Disposal Action

The removal and off-site disposal alternative provides the highest degree of effectiveness, is feasible to implement, and is also economically feasible.

Effectiveness

Removal and off-site disposal provides the highest degree of protection for human health and the environment by physically removing the materials from HPS. Removal and off-site disposal will also comply with chemical-, action-, and location-specific ARARs.

Implementability

This alternative does not have administrative constraints and has few technical constraints. Most of the radioactive contamination identified at HPS to date has been in localized areas. Surface scans performed in the past have found point-source anomalies and specific disposal areas containing radioactive contamination. Subsurface investigations have found concentrated areas where disposal of dials or other radioactive materials occurred. Physical removal is very feasible for these types of situations. If large quantities of radioactive materials are found, physical removal and off-site disposal may have significant technical constraints. Any areas found to contain large quantities of low-level radioactive waste will not be addressed by this AM, but will be evaluated further in the ongoing CERCLA process.

Cost

Unit costs for labor, mobilization, and site remediation are comparable with a standard soil removal and disposal project involving chemical contamination. The unit cost for disposal of radioactive materials is on average greater than the unit cost of chemical contamination in soils; however, the cost does not become prohibitive unless very large volumes of radioactive materials are removed and disposed. Further details regarding the unit costs for this alternative are provided in Section V.B.

4. Engineering Evaluation and Cost Analysis

Since this is a time-critical removal action, an engineering evaluation and cost analysis is not applicable.

5. Applicable or Relevant and Appropriate Requirements

Section 300.415(j) of the NCP provides that removal actions must attain ARARs to the extent practicable, considering the exigencies of the situation.

Section 300.5 of the NCP defines applicable requirements as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a CERCLA site.

Section 300.5 of the NCP defines relevant and appropriate requirements as cleanup standards, standards of control and other substantive requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site and are well-suited to the particular site.

Because CERCLA on-site response actions do not require permitting, only substantive requirements are considered as possible ARARs. Administrative requirements such as approval of, or consultation with administrative bodies, issuance of permits, documentation, reporting, record keeping, and enforcement are not ARARs for CERCLA actions confined to the site.

Only those state standards that are identified by a state in a timely manner and are more stringent than federal requirements may be applicable or relevant and appropriate.

There are three types of ARARs: contaminant-specific, location-specific, and action-specific. The first type includes contaminant specific requirements. These ARARs set limits on concentrations of specific hazardous substances, contaminants, and pollutants in the environment. Examples of this type of ARAR are ambient water quality criteria and drinking water standards. The second type of ARAR includes location-specific requirements that set restrictions on certain types of activities based on site characteristics. These include restrictions on activities in wetlands, floodplains, and historic sites. The third type of ARAR includes action-specific requirements. These are technology-based restrictions which are triggered by the type of action under consideration. Examples of action-specific ARARs are Resource Conservation and Recovery Act regulations for waste treatment, storage, and disposal.

ARARs must be identified on a site-specific basis from information about specific chemicals at the site, specific features of the site location, and actions that are being considered as removal actions.

The ARARs used to prepare this AM are presented in Attachment A.

The cleanup goals presented in this AM were derived by considering the following:

- Soil cleanup goals: EPA decay-corrected PRGs (EPA 1991)
- Radium-226 contamination in soils: the first ARAR listed in Attachment A (40 CFR 192.12[a])
- Radioactive contamination on surfaces: U.S. Nuclear Regulatory Commission (NRC), "Use of Screening Values to Demonstrate Compliance with the Final Rule on Radiological Criteria for License Termination." (NRC 2000)
- Application of soils, debris, and surface cleanup goals to sites: MARSSIM guidance (EPA and others 2001)

The cleanup goals derived for the project are considered to be the most conservative available. For example, use of EPA decay-corrected PRGs for soil removal actions is more conservative than use of other federal ARARs listed in Attachment A.

6. Project Schedule

Individual removal action project schedules will be generated as each site is identified for removal of radiological materials. Based on previous removal actions for radiological materials, field events are expected to last from 1 to 4 months. Prior to commencing field work, detailed work plans and health and safety plans will be generated. Following field events, analytical reports, data validation reports, or summary reports will also be generated to summarize actions taken.

B. ESTIMATED COSTS

The Navy has made a present worth estimate of the removal action costs. The estimated costs include the direct and indirect capital costs. The items listed below are considered capital costs. They are based on a previous removal action, which removed and disposed of 17 cubic yards of contaminated soils. Costs for removal actions involving debris or surfaces will be comparable, if the quantity of radioactive materials disposed of is similar.

Estimated Costs – Typical 17-Cubic-Yard Soil Removal Action

Direct Capital Costs	
Construction/Equipment/Materials:	$17,000
Soil excavation ($75.00/cubic yard):	$1,275
Transport and disposal:	$21,250
Analytical (12 confirmation samples)	$5,400
Indirect Capital Costs	
Work plans, engineering, etc.	$2,000
Soils Removal Action Total:	$46,925

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If action should be delayed or not taken, exposure of human populations to low-level radiological materials may occur. Contamination may spread from HPS to nearby areas from wind erosion, surface water runoff, or other erosion mechanisms. Migration of radiological contamination could result in an increased health risk to local populations because of prolonged exposure to low-level radioactive materials.

Since the half-lives of radiological contaminants can range up to tens of thousands of years, the associated risk could be very long term, and migration over this time period may result in a greater volume of material to be remediated. This would also result in an increase in treatment or disposal costs.

VII. PUBLIC INVOLVEMENT

This document will be added to the administrative record (Attachment B) and will be made available for public review at the following locations:

San Francisco Public Library
Government Documents
100 Larkin Street
San Francisco, California 94102

Anna E. Waden Library
5075 Third Street
San Francisco, California 94124

VIII. OUTSTANDING POLICY ISSUES

No outstanding policy issues exist for this removal action.

IX. RECOMMENDATION

To date, the Navy has not acquired evidence identifying other potentially responsible parties (PRP) at this site. However, information acquired in the future, including but not limited to, information acquired during the implementation of this removal action or future response actions at the site, could result in the identification of other PRPs.

This AM was prepared in accordance with current EPA and Navy guidance documents for TCRAs under CERCLA. The purpose of this AM is to identify and analyze removal actions to address localized radiological contamination in soils, debris/slag and buildings basewide.

Based on the analysis of the removal action alternatives completed in Section V.A.3, the recommended removal action is removal of radiological contamination from localized areas in soils, debris/slag, and buildings, followed by appropriate off-site disposal at a fully permitted disposal facility. This alternative will apply to localized areas throughout HPS, provide a high degree of protection for human health and the environment, does not have significant administrative or technical constraints, and is not cost prohibitive.

This decision document represents the selected removal action for HPS located in San Francisco, California, developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based on the administrative record for the site (included in Attachment B).

15 Nov 01

Richard G. Mach Jr., P.E.
BRAC Environmental Coordinator
Hunters Point Shipyard

Date

REFERENCES

Title 40 *Code of Federal Regulations* 300.415, Removal Action, National Oil and Hazardous Substances Pollution Contingency Plan under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

Harding Lawson and Associates. 1990. "Reconnaissance Activities Report, Remedial Investigation/ Feasibility Study, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California" August 9.

PRC Environmental Management, Inc. (PRC). 1992. "Surface Confirmation Radiation Survey, Hunters Point Shipyard [HPS], San Francisco, California." November 3.

PRC. 1996. "Results of Subsurface Radiation Investigation in Parcels B and E, HPS, San Francisco, California." May 8.

Tetra Tech EM Inc. (TtEMI). 1997. "Draft Final Parcel E Remedial Investigation Report, HPS, San Francisco, California." October 27.

TtEMI. 2000a. "Radiological Removal Action, Action Memorandum, HPS, San Francisco, California." August 17.

TtEMI. 2000b. "Draft Phase IV Radiation Investigation Report, HPS, San Francisco, California." May 15.

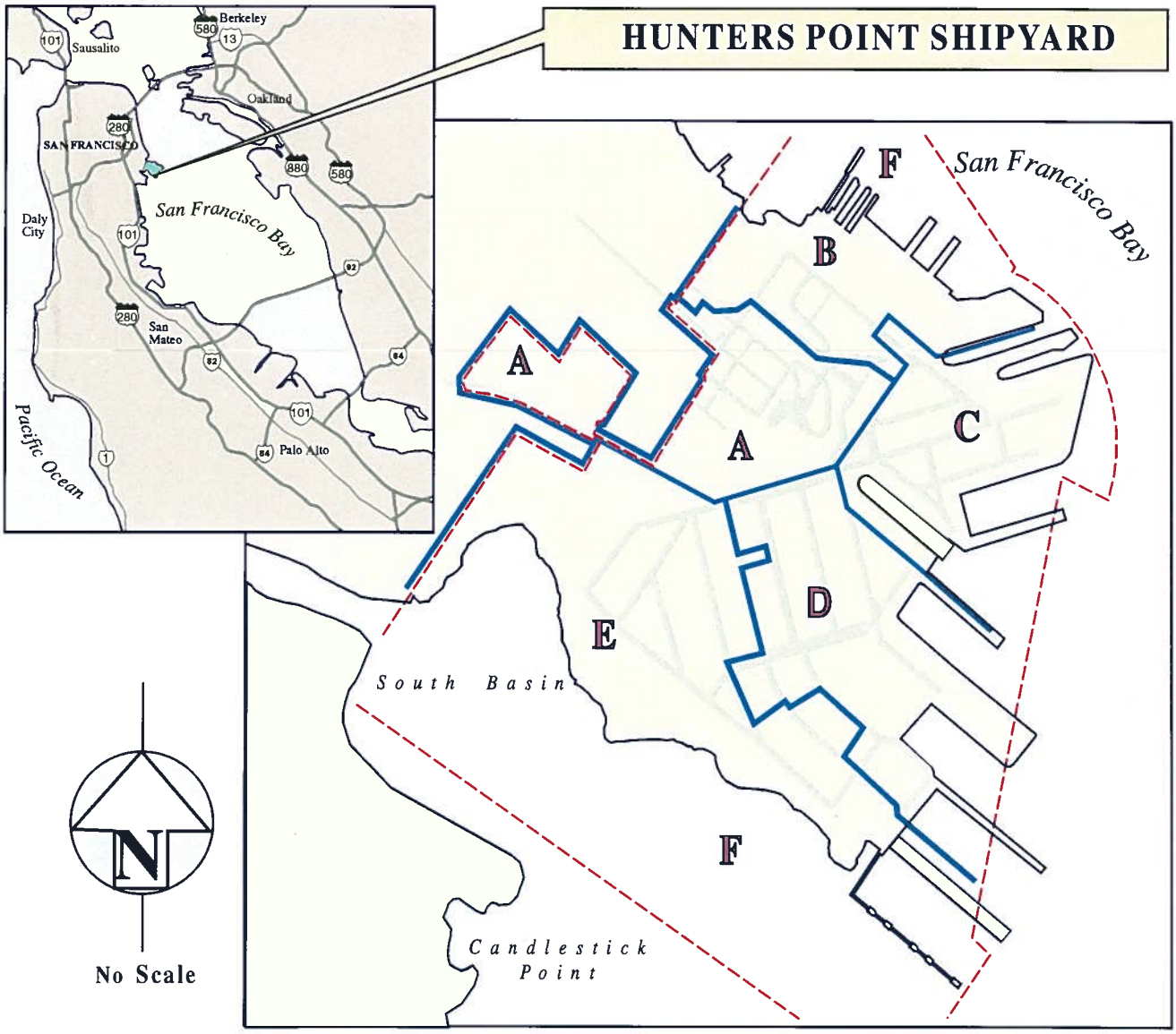
U.S. Environmental Protection Agency (EPA). 1991. "Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals), Interim." EPA/540/R-92/003.

EPA. 1998. "A Fact Sheet on the Health Effects from Ionizing Radiation." EPA 402-F-98-010. May.

EPA, U.S. Department of Energy, U.S. Department of Defense, and U.S. Nuclear Regulatory Commission. 2001. "Multi-Agency Radiation Survey and Site Investigation Manual." Revision 1. 65 Federal Register 62531. June 1.

U.S. Nuclear Regulatory Commission. 2000. "65 Federal Register 37186 - Use of Screening Values to Demonstrate Compliance with the Final Rule on Radiological Criteria for License Termination." June 13.

FIGURES



HUNTERS POINT SHIPYARD

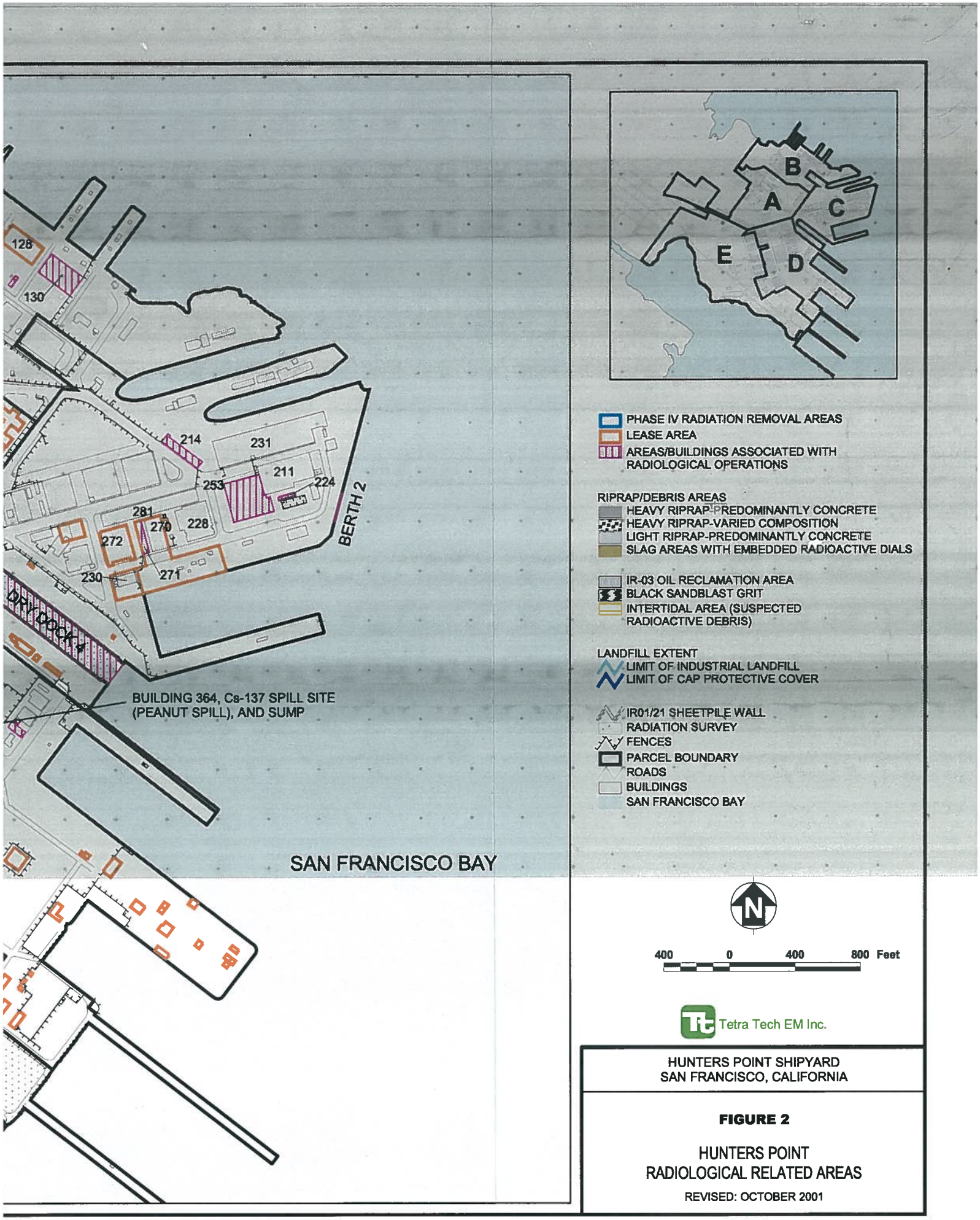
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

SOUTHWEST DIVISION

SAN DIEGO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 1
FACILITY LOCATION MAP

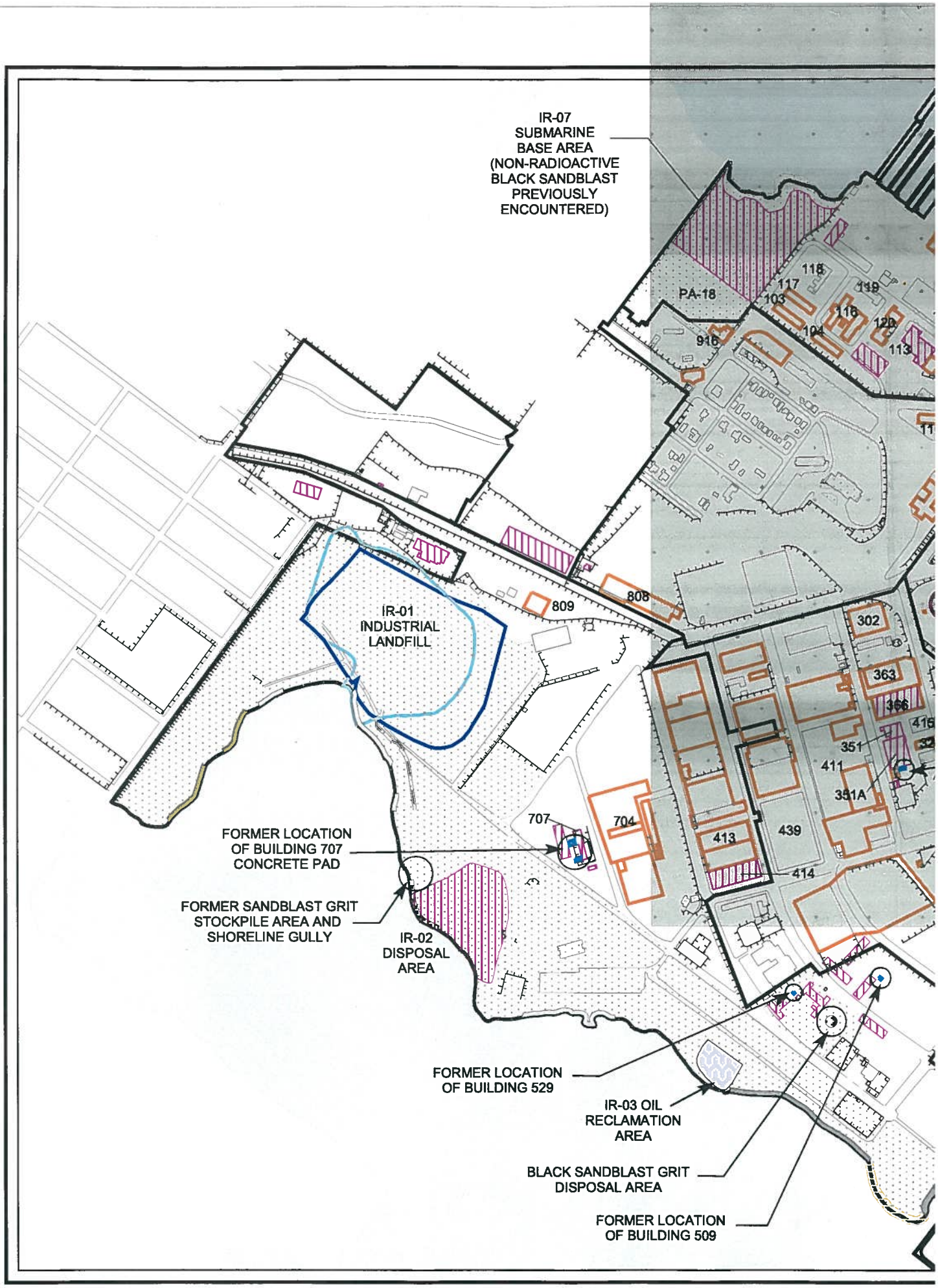


HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

FIGURE 2

HUNTERS POINT
RADIOLOGICAL RELATED AREAS

REVISED: OCTOBER 2001



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TABLES

TABLE 1

RADIOLOGICAL REMOVAL ACTION CLEANUP GOALS – SOILS AND DEBRIS/SLAG

Radionuclide of Interest[a]	Cleanup Goal (Commercial Reuse)	Cleanup Goal Source	ARAR[b]
Radiological Contamination in Soils			
Americium-241	7.8 pCi/g[c]	EPA decay-corrected PRG	40 CFR 192.12(a), 10 CFR 20.1301, 10 CFR 20.1402
Cobalt-60	0.42 pCi/g[c]	EPA decay-corrected PRG	40 CFR 192.12(a), 10 CFR 20.1301, 10 CFR 20.1402
Cesium-137	0.13 pCi/g[c]	EPA decay-corrected PRG	40 CFR 192.12(a), 10 CFR 20.1301, 10 CFR 20.1402
Europium-152	0.13 pCi/g[c]	EPA decay-corrected PRG	40 CFR 192.12(a), 10 CFR 20.1301, 10 CFR 20.1402
Europium-154	0.23 pCi/g[c]	EPA decay-corrected PRG	40 CFR 192.12(a), 10 CFR 20.1301, 10 CFR 20.1402
Uranium-235 (and daughter products)	0.57 pCi/g[c]	EPA decay-corrected PRG	40 CFR 192.12(a), 10 CFR 20.1301, 10 CFR 20.1402
Uranium-233	68 pCi/g[c]	EPA decay-corrected PRG	40 CFR 192.12(a), 10 CFR 20.1301, 10 CFR 20.1402
Radium-226	Less than 5 pCi/g above background, averaged over 100 square meters, for the top 15 centimeters	40 CFR 192.12(a)	40 CFR 192.12(a)
Debris/Slag with Radiological Contamination or Intact Radium Dials			
Intact radium dials (or other devices)	Remove the intact device, along with 1 foot of surrounding materials[d]	Not applicable	10 CFR 20.1301

Notes:

a	Based on previous and ongoing investigations at HPS.
b	See Attachment A for a detailed listing of ARARs.
c	Based on EPA decay-corrected PRGs for commercial reuse and a previous action memorandum (TtEMI 2000a).
d	Based on previous investigations it was determined that radium dial contamination was usually confined to within inches of the radium-containing device.
ARAR	Applicable or relevant and appropriate requirements
EPA	U.S. Environmental Protection Agency
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
pCi/g	PicoCurie per gram
PRG	Preliminary remediation goal
TtEMI	Tetra Tech EM Inc.

Sources:

TtEMI. 2000a. "Radiological Removal Action, Action Memorandum, HPS, San Francisco, California." August 17.

U.S. Environmental Protection Agency (EPA). 1991. "Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals), Interim." EPA/540/R-92/003.

EPA, U.S. Department of Energy, U.S. Department of Defense, and U.S. Nuclear Regulatory Commission. 2001. "Multi-Agency Radiation Survey and Site Investigation Manual." Revision 1. 65 Federal Register 62531. June 1.

TABLE 2

RADIOLOGICAL REMOVAL ACTION CLEANUP GOALS – SURFACES

Radionuclides[a]	Acceptable Screening Levels[b] for Unrestricted Release (dpm/100 cm^2)[c]
Hydrogen-3 (Tritium)	1.2E+08
Carbon-14	3.7E+06
Sodium-22	9.5E+03
Sulfur-35	1.3E+07
Chlorine-36	5.0E+05
Manganese-54	3.2E+04
Iron-55	4.5E+06
Cobalt-60	7.1E+03
Nickel-63	1.8E+06
Strontium-90	8.7E+03
Technetium-90	1.3E+06
Iodine-129	3.5E+04
Cesium-137	2.8E+04
Iridium-192	7.4E+04

Notes:

a Screening levels for radionuclides not listed in the table above shall be derived following the procedures detailed in 63 Federal Register 64132, November 18, 1998.

b Screening levels are based on the assumption that the fraction of removable surface contamination is equal to 0.1. For cases when the fraction of removable contamination is undetermined or higher than 0.1, users may assume for screening purposes that 100 percent of surface contamination is removable; therefore, screening levels should be decreased by a factor of 10. Alternatively, users with site-specific data on the fraction of removable contamination (such as within the 10 to 100 percent range) may calculate site-specific screening levels using the latest version of the Decontamination and Decommissioning code.

c One dpm is equivalent to 0.0167 becquerel. The screening values represent surface concentrations of individual radionuclides that would be deemed in compliance with the 0.25 mSievert per year (25 millirems per year) unrestricted release dose limit in Title 10 of the CFR 20.1402. For radionuclides in a mixture, the "sum of fractions" rule applies; see 10 CFR Part 20, Appendix B, Note 4. Refer to U.S. Nuclear Regulatory Commission Draft Guidance DG-4006 for further information on the application of values in this table.

CFR *Code of Federal Regulations*

dpm/100 cm^2 Disintegrations per minute per 100 square centimeter

Sources:

63 Federal Register 64132, November 18, 1998

U.S. Nuclear Regulatory Commission. 2000. "65 Federal Register 37186 - Use of Screening Values to Demonstrate Compliance with the Final Rule on Radiological Criteria for License Termination." June 13.

ATTACHMENT A

POTENTIAL FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR POTENTIALLY CONTAMINATED SITES AT HUNTERS POINT SHIPYARD

(Two Pages)

POTENTIAL FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR POTENTIALLY CONTAMINATED SITES AT HUNTERS POINT SHIPYARD

Regulation	Citation	Synopsis	Applicable or Relevant and Appropriate?	Comment
Chemical-Specific ARAR				
Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings	40 CFR 192.12(a)	This regulation establishes cleanup criteria for radium-226 averaged over 100 square meters, not to exceed the background level by more than 5 pCi/g averaged over the first 15 centimeters.	Applicable	This requirement is applicable for selecting the health-based standard of 5 pCi/g for radium-226 in soils.
Dose Limits for Individual Members of the Public	10 CFR 20.1301	This regulation establishes a TEDE for individual members of the public of 100 mrem/yr over background, exclusive of medical sources, from NRC-licensed operations.	Relevant and Appropriate	This requirement is a health-based standard that is relevant and appropriate for exposure to members of the public during the removal action.
Radiological Criteria for Unrestricted Use at Closing USNRC Licensed Facilities	10 CFR 20.1402	This regulation sets a standard TEDE of 25 mrem/yr above background for average members of a critical group where residual radioactivity has been reduced to levels that are ALARA.	Relevant and Appropriate	The Navy would apply this requirement, with the exception that 15 mrem/yr TEDE is substituted for 25 mrem, as ALARA.
Identification and Listing of Hazardous Waste	22 CCR, Division 4.5, Chapter 11, Article 2	This regulation identifies and lists hazardous wastes. Article 2 includes criteria not found in 40 CFR.	Applicable	This requirement is applicable for determining whether waste that is generated during the removal action is hazardous.
Standards Applicable to Generators of Hazardous Waste, Applicability	22 CCR, Division 4.5, Chapter 12, Article 1	This regulation requires a generator to determine whether waste is hazardous and to obtain an identification number.	Applicable	This requirement is applicable for waste generated during implementation of the removal action. If the waste is determined to be hazardous, it will be managed accordingly.
Standards Applicable to Generators of Hazardous Waste, Pretransport Requirements	22 CCR, Division 4.5, Chapter 12, Article 3	This article identifies generator requirements, including pretransport labeling, working, and limits on accumulation times.	Applicable	This requirement is applicable for waste that is determined to be hazardous and is transported off site for treatment or disposal.
National Emission Standards for Radionuclide Emissions from Federal Facilities Other Than NRC Licenses and Not Covered by 40 CFR Part 61, Subpart H.	40 CFR Part 61, Subpart I	Ensures that radionuclides are not released to the atmosphere at levels that may harm the general public during the removal action.	Applicable	Would apply in situations such as fires involving radioactive materials or other situations that may release radioactive contaminants into the atmosphere.

POTENTIAL FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR POTENTIALLY CONTAMINATED SITES AT HUNTERS POINT SHIPYARD (Continued)

Regulation	Citation	Synopsis	Applicable or Relevant and Appropriate?	Comment
Chemical-Specific ARAR (Continued)				
NRC Dose Limits for Individual Members of the Public.	10 CFR Part 20, Appendix B, Table 2.	Establishes a concentration value of 60 pCi/L for radium-226 in effluent releases from licensed facilities to unrestricted areas.	Applicable	Would be applicable during removal actions near San Francisco Bay or where groundwater intrudes into soil excavation; would restrict release of radiological contamination to the Bay or local groundwater.
Location-Specific ARAR				
Federal Coastal Zone Management Act	16 USC 1456(c)(1)(A)	This act specifies that federal actions that affect the coastal zone must be consistent with the policies of the San Francisco Bay Conservation and Development Commission's federally approved coastal management program.	Applicable	This requirement is applicable to all removal actions performed in close proximity to San Francisco Bay.
Action-Specific ARAR				
Storage and Control of Licensed Material	10 CFR Part 20 Subpart I 20.1801	This regulation establishes security for stored material and control of material not in storage.	Relevant and Appropriate	This requirement is relevant and appropriate when waste material is awaiting off-site disposal.

Notes:

ALARA	As low as reasonably achievable
ARAR	Applicable or relevant and appropriate requirements
CCR	*California Code of Regulations*
CFR	*Code of Federal Regulations*
mrem	Millirem
mrem/yr	Millirem per year
pCi/g	PicoCurie per gram
TEDE	Total effective dose equivalent
USC	*United States Code*
USNRC	U.S. Nuclear Regulatory Commission

ATTACHMENT B

ADMINISTRATIVE RECORD INDEX

(One Page)

LIST OF DOCUMENTS IN ADMINISTRATIVE RECORD

Document Date	Document Type	Classification	Author Affiliation	Title or Subject
11/03/92	Report	AR	PRC	Surface Confirmation Radiation Survey (Phase I Investigation)
05/08/96	Report	AR	PRC	Results of Subsurface Radiation Investigation in Parcels B and E, HPS, San Francisco, California (Phase II Investigation)
10/27/97	Report	AR	TtEMI	Draft Final Parcel E RI Report, HPS, San Francisco, California (Phase I – III Investigation summary)
05/15/00	Report	AR	TtEMI	Draft Phase IV Radiation Investigation Report, HPS, San Francisco, California
08/17/00	Report	AR	TtEMI	Radiological Removal Action, Action Memorandum, HPS, San Francisco, California

Notes:

AR	Administrative record
HPS	Hunters Point Shipyard
PRC	PRC Environmental Management, Inc.
RI	Remedial investigation
TtEMI	Tetra Tech EM Inc.

Prepared for

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Southwest Division
Naval Facilities Engineering Command
San Diego, California
Lead Remedial Project Manager: David DeMars

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