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Historical Radiological Assessment – Supplemental Technical Memorandum

**Naval Station Treasure Island
San Francisco, California**

August 6, 2012

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**Base Realignment and Closure
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Prepared by:

**TriEco-Tt, a Joint Venture of TriEco LLC and
Tetra Tech EM Inc.
1230 Columbia Street, Suite 1000
San Diego, California 92101**

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PREPARED FOR:

DEPARTMENT OF THE NAVY

REVIEW AND APPROVAL

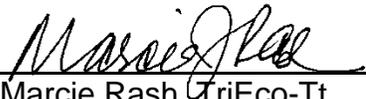
Project Manager:  Date: August 6, 2012
Marcie Rash, TriEco-Tt

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ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
AOI	Area of Interest
Bay Bridge	San Francisco-Oakland Bay Bridge
BCT	Base Realignment and Closure Cleanup Team
Br	Bromine
BRAC	Base Realignment and Closure
Cal/EPA	California Environmental Protection Agency
CCSF	City and County of San Francisco
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cpm	Counts per minute
CSM	Conceptual Site Model
CSO	Caretaker Site Office
DRMO	Defense Reutilization and Marketing Office
DTSC	Department of Toxic Substances Control
FOSL	Finding of suitability to lease
FOST	Finding of suitability to transfer
FS	Feasibility study
FSS	Final status survey
GGIE	Golden Gate International Exposition
HRA	Historical radiological assessment
HRASTM	Historical radiological assessment supplemental technical memorandum
IR	Installation Restoration
IRP	Installation Restoration Program
K	Potassium
LCS	Landing Craft Ship
Na	Sodium
NAVSTA TI	Naval Station Treasure Island
Navy	Department of the Navy
NTCRA	Non-time-critical removal action
PCB	Polychlorinated biphenyl
pCi/g	Picocurie per gram
Ra	Radium

ACRONYMS AND ABBREVIATIONS (CONTINUED)

RADIAC	Radiation Detection, Indication, and Computation
RASO	Radiological Affairs Support Office
RCA	Radiologically Controlled Area
RHB	Radiological Health Branch
RI	Remedial investigation
SARA	Superfund Amendments and Reauthorization Act of 1986
SFUSD	San Francisco Unified School District
Shaw	Shaw Environmental, Inc.
State	State of California
SWDA	Solid waste disposal area
Tetra Tech	Tetra Tech EM Inc.
Th	Thorium
TI	Treasure Island
TIDA	Treasure Island Development Authority
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
USC	<i>United States Code</i>
WWII	World War II
YBI	Yerba Buena Island

EXECUTIVE SUMMARY

This technical memorandum supplements the findings of the “Final Treasure Island Naval Station Historical Radiological Assessment (HRA), Former Naval Station Treasure Island (NAVSTA TI), San Francisco, California,” (Weston 2006). The intent of the HRA was to provide a comprehensive history of radiological operations by the Department of the Navy (Navy) and their contractors at NAVSTA TI at the time of its publication in February of 2006. This HRA Supplemental Technical Memorandum (HRASTM) documents the findings of additional investigation relative to radiological operations and disposal at the Treasure Island (TI) portion of former NAVSTA TI since the original HRA was completed. This additional investigation included additional research of historical records and review of reports documenting intrusive investigations after the publication of the HRA. Yerba Buena Island, part of NAVSTA TI, is not included in the scope of this technical memorandum.

As a result of additional intrusive investigation following the development of the HRA it was confirmed that some areas, including a disposal area and location of former incineration activities, contained radiologically contaminated material. Therefore, additional research was warranted to further understand the sources and disposal process for the radiological material, and the Conceptual Site Models (CSMs) presented in the original HRA had to be updated and refined to address the finding of radiological material. The updated CSMs, historical research, and a review of activities that occurred at TI since the original HRA was published are presented in this HRASTM. Research for this HRASTM included review of all past TI projects having a radiological component, aerial photographs, geological reports, field activity logs, base-wide soil sample and scanning locations for radiological materials, and various efforts supporting establishment of TI-specific background values for radium-226.

To do a complete review of radiological activities at TI, naval operational history was also reviewed. TI was divided into eight Areas of Interest (AOI) to facilitate review of areas of TI with aerial photos from different years in detail and side-by-side. Changes in land use were assessed to determine the potential for activities that may have resulted in radioactive contamination and migration pathways. This review was done in coordination with the Navy’s Radiological Affairs Support Office (RASO) and included a review of documents at the Navy’s RASO office in Yorktown, Virginia; files consisting of building plans and other drawings and documents in the Caretaker Site Office (CSO) at Building 1; and documents from the former TI Museum related to the Golden Gate International Exposition (GGIE), currently in Building 449 on TI.

As a result of the research done and discussed elsewhere in this HRASTM, these new radiologically impacted areas were identified:

- Building 3 was identified as impacted based on ship repair activities and the presence of a former optical shop in the building during World War II (WWII). Building 3 was previously identified in the HRA as non-impacted.

- Site 6, Building 570, and a surrounding laydown area were identified as impacted based on remedial activities done in association with the Site 12 Solid Waste Disposal Areas (SWDA). This area was not addressed in the HRA.
- A probable WWII era salvage yard was identified as impacted based on the potential for scrap metal recycling activities adjacent to former Building 327 during WWII.
- Both former sites of the training ship mock-up, known as the *USS Pandemonium*, were identified as impacted based on a reevaluation of existing data after the HRA.
- A salvage yard known as Lot 69 was identified as impacted based on the handling of salvage materials in that area.
- A former storage area that includes Sites 30 and 31 was identified as impacted based on investigatory results obtained after the HRA.
- Building 342 was identified as impacted based on investigatory results obtained after the HRA.

1.0 INTRODUCTION

This Historical Radiological Assessment Supplemental Technical Memorandum (HRASTM) documents the findings of additional investigation relative to radiological operations and disposal at the Treasure Island (TI) portion of former Naval Station Treasure Island (NAVSTA TI). Yerba Buena Island (YBI), part of former NAVSTA TI, is not included in the scope of this HRASTM. This HRASTM supplements the findings of the "Final Treasure Island Naval Station Historical Radiological Assessment (HRA), NAVSTA TI, San Francisco, California" (Weston 2006). The intent of the HRA was to provide a comprehensive history of radiological operations by the Department of the Navy (Navy) and their contractors at NAVSTA TI at the time of its publication in February of 2006. Additional details of the original HRA are discussed in Section 2.3. The purpose, methodologies employed and organization of this HRASTM are further discussed below.

1.1 PURPOSE

This HRASTM was prepared pursuant to the Navy's Installation Restoration (IR) Program that encompasses the Navy's Base Realignment and Closure (BRAC) Program, and in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). The format and content are designed to augment the original HRA with new information obtained through additional research and the review and consideration of new data that became available through site investigations since the HRA was finalized. The new information was used to update conceptual site models (CSMs) for radiologically impacted areas and to update the list of areas designated as impacted. Areas designated as radiologically impacted are based on the potential or known impacts of past radiological operations and an assessment of the likelihood of potential contamination and potential contamination migration pathways.

1.2 TECHNICAL MEMORANDUM PREPARATION METHODOLOGIES

This HRASTM was prepared based on a thorough research effort and visual inspections of the facilities on NAVSTA TI. Research included all past projects under the NAVSTA TI Installation Restoration Program (IRP); review of records in archives including files from the former TI Museum in Building 449; NAVSTA TI and 12th Naval District Files at The National Archives at San Francisco, in San Bruno, California; internal files at the Radiological Affairs Support Office (RASO) in Yorktown, Virginia; and internal files in the CSO at Building 1 on NAVSTA TI.

The following historical radiological operations were reviewed during the HRA and reexamined for this HRASTM:

- Operational training of personnel on the calibration, maintenance, and operation of radiation monitoring instruments.
- Training personnel on radiological monitoring and decontamination of ships and airplanes.
- Berthing of OPERATION CROSSROADS ships before those ships were given final radiological clearance.

Additional naval operations and other previously unreviewed records were examined. Reviews were done for all projects having a radiological component in the NAVSTA TI IRP. This included work at Sites 6, 12, 31, 32, and 33, and other efforts supporting the development of background values for radium (Ra)-226. The types of files reviewed to support this HRASTM included:

- The 2006 Final HRA and all associated references
- NAVSTA TI plan maps and files
- Archived photographs
- Aerial photographs
- Newspaper articles and guidebooks from the 1939-1940 Golden Gate International Exposition (GGIE)
- Real property records and correspondence
- Historical base maps
- Copies of the NAVSTA TI base newsletter, the *Masthead*
- Geological reports for TI
- IRP documents
- Field activity logs associated with intrusive environmental remediation work.

The research identified new information that differs from the conclusions of the HRA in these areas:

- New findings demonstrate that significant ship repair activities occurred at NAVSTA TI during World War II (WWII); though the HRA concluded that "...NAVSTA TI's mission was training and not the maintenance and repair of ships..." While it is unclear precisely when these ship repair activities ceased, they were significantly reduced immediately following the war. Repair activities were primarily done alongside Piers 11 through 16. Inside shop work was done in Building 3 ([Navy 1946a](#)).
- Potential areas have been identified where scrap metal from ship repair activities during WWII was processed or stored; these areas were designated as impacted. The ship repair activities generated significant scrap materials that were recycled. The probable locations for these recycling activities during WWII have been designated as impacted because, on other bases, these types of areas have historically been found to have radium contamination incidental to their operations.

- An area referred to as Lot 69 was identified as having been a Supply Department Salvage Yard. Salvage yards have often been linked with the potential for disposal of unregulated radiological commodities and have historically been found to have radium contamination incidental to their operations.
- Research identified the presence of an optical shop in Building 3. The presence of such a shop is notable, as these shops have historically been found to have radium and thorium contamination associated with their operations on other bases. Radium and thorium were used for their radioluminescent properties in optical sighting devices and rangefinders during the WWII period.
- Remedial activities at Site 12 after publication of the 2006 HRA resulted in the creation of additional radiologically impacted sites—Site 6, Building 570 and its surrounding area.
- Research identified a radiological counting room in Building 342. The presence of a counting room suggests that samples may have been handled without encapsulation and warrants designating the building as radiologically impacted.

A more conservative interpretation of existing data in the HRA resulted in designating both sites where a training ship mock-up, known as the USS *Pandemonium*, was located as impacted.

1.3 TECHNICAL MEMORANDUM ORGANIZATION

A detailed review of the facility background was done using the information acquired through the file research and is in [Section 2.0](#). For this HRASTM, TI was divided into eight Areas of Interest (AOI) to allow the side-by-side comparison of aerial photographs from different times and to facilitate the discussion that focuses on the changes in land use as it relates to the likelihood of potential contamination and migration pathways. [Section 2.0](#) presents conclusions regarding the designation of specific areas as impacted or non-impacted by radiological constituents. [Sections 3.0](#) and [4.0](#) discuss the previous radiological operations and IRP activities on TI, and [Section 5.0](#) discusses the CSMs developed as part of this HRASTM to evaluate the potential releases of contamination in impacted areas. [Section 6.0](#) has the findings and recommendations and [Section 7.0](#) cites the references used in this report.

Figures are at the end of the report. [Appendix A](#) has the references used in the HRASTM. [Appendix A](#) is provided on CD only.

2.0 FACILITY BACKGROUND

This section describes the NAVSTA TI facility, summarizes its history, and discusses the previous HRA.

2.1 FACILITY DESCRIPTION

NAVSTA TI is in the San Francisco Bay (Figure 1), at mid-span of the San Francisco-Oakland Bay Bridge (Bay Bridge). NAVSTA TI consists of two islands: YBI, a naturally occurring island, and TI, a manmade island built on submerged land (Figure 1). This HRASTM addresses the manmade portion of NAVSTA TI referred to as TI. TI was divided into eight AOIs due to the nature of available photographic coverage, and to facilitate refining the analysis and discussion in this HRASTM (Figure 2). YBI is not included in the scope of this HRASTM.

2.2 FACILITY HISTORY

Military activities at NAVSTA TI date back to 1866, before the construction of TI, when the U.S. government took possession of YBI for defensive fortifications. YBI was occupied by the U.S. Department of the Army until 1896, when the Navy assumed operations. The Navy operated the first West Coast naval training station on YBI until 1923, when these activities were transferred to an alternate location in San Diego, California. The portion of NAVSTA TI that is the subject of this HRASTM was built on submerged lands in San Francisco Bay.

When California came into the Union on September 9, 1850, it acquired title to the submerged land and tideland in San Francisco Bay. The land on which NAVSTA TI was constructed is in the City and County of San Francisco (CCSF) and north of YBI. In 1933, the State of California (State) granted the CCSF the parcel of land currently containing the NAVSTA TI for construction of a public airport, wharf and dock facilities, and for use as an airfield (Cal Stats of 1933 Chapter 912, August 21, 1933). At that time, seaplanes and land-based airplanes were regularly used in air transportation. The parcel of land (to be filled by dredge material) was a 4,500- by 8,000-foot rectangle. The CCSF was authorized to reclaim, fill, and raise the submerged land. The CCSF received the right to construct a bridge or causeway between the lands to be filled and YBI.

In 1935, the State granted the CCSF the right to use TI for expositions and fairs. From February 1936 through August 1937, the U.S. Army Corps of Engineers (USACE) conducted construction activities on the 403-acre, man-made TI on behalf of the CCSF in preparation for the GGIE. The Yerba Buena Shoals, a 735-acre reef extending north from YBI, was used as the foundation for this work. To build the island, the USACE constructed a perimeter of rock and filled it with millions of tons of silt dredged from the Bay and Delta (Lee 1969). The GGIE opened in early 1939 and ended in late 1940.

In response to a request by the Navy, the CCSF leased NAVSTA TI to the Navy in 1941 for the duration of WWII. On February 7, 1942, under the authority of this lease, TI became a major naval station, processing approximately 12,000 military personnel per day for service overseas and upon their return to the U.S. In parallel with operations under the lease, Congress passed the Naval Appropriations Act, Public Law 441, 77th Congress. This act appropriated funds for the acquisition of TI. Congress also passed the Second War Powers Act of 1942, Public Law 507, 77th Congress, March 27, 1942. This act further broadened the Government's right to condemn land. The Government filed a complaint in condemnation and a Declaration of taking on April 17, 1942 in the U.S. District Court in San Francisco, captioned "United States of America v 380

acres of tideland and submerged lands” Civil No. 22164G. The State and the CCSF were named as defendants. Both the State and CCSF contested the condemnation that was ultimately settled and the Final Judgment in the case was filed April 3, 1944, granting the government the lands described in the condemnation action in fee simple absolute.

During WWII, NAVSTA TI was used primarily for training, administration, housing, and other support services to the U.S. Pacific Fleet. After the war ended in 1945, the CCSF agreed to trade the deed for TI to the Navy in exchange for government-owned land south of San Francisco, where the San Francisco International Airport was eventually built. Major naval organizations at TI included the U.S. Naval Station itself, which provided varied support for elements of the U.S. Pacific Fleet and administers to the island's many tenant commands and units; Headquarters offices of the Commandant Twelfth Naval District and the Commander; Western Sea Frontier; the Navy Regional Naval Schools Command; the Navy Regional Finance Center; and the Naval Training Center.

In 1993, the Defense BRAC Commission recommended closure of NAVSTA TI pursuant to the Defense Base Closure and Realignment Act of 1990 (Pub. L. 101-510, Title XXIX, Title 10 USC § 2687 note). NAVSTA TI was closed on September 30, 1997. CCSF is the target recipient of remaining untransferred NAVSTA TI property. In general, many changes to NAVSTA TI have occurred from the start of construction in 1936 to the present. The original exposition center and barracks no longer exist. The exposition center was replaced by numerous other buildings, and the barracks were replaced by parking areas and open space. Family housing replaced the ammunition storage area. Numerous piers were demolished, especially along the eastern side of NAVSTA TI. Only one major pier, constructed in the late 1980s in the southeast corner of TI, remains.

At the start of WWII, NAVSTA TI was designated a “Section Base” with limited repair capability. The designation and the repair capability was upgraded later in the war to a “Frontier Base” and TI became one of the largest Frontier Bases by supplementing similar repair facilities around the Bay area that were overloaded. The Frontier Base took on the important job of completely servicing inshore and offshore operations and voyage and transient repairs for all crafts up to and including 2,200 ton destroyers ([Navy 1946a](#)). Further evidence of the magnitude of repair work is provided by *Masthead* articles that refer to the amount of scrap metal from repair activities at 200,000 pounds per month ([Navy 1945a](#)) and the complete replacement of an engine room on LCS 119 (Landing Craft Ship) that was struck by a Japanese Kamikaze ([Navy 1945b](#)). Wartime recycling activities, particularly related to ship repair activities, have historically yielded radioactive impacts to the locations, thus the evaluation of them in this HRASTM. In addition to ship repair work, evidence was found regarding an optical shop in association with the “Section/Frontier Base” ([Navy 1944](#), [Navy 1945c](#), [Navy 1951](#) and [Navy Undated](#)). Former Navy optical shops at other bases have been found to contain residual radium and thorium contamination. The optical shop on NAVSTA TI was located on Building 3.

This HRASTM primarily differs from the conclusions of the HRA as it finds that significant ship repair activities occurred at NAVSTA TI during WWII. After Victory Over Japan Day, August 15, 1945, the designation of Frontier Base was disestablished and NAVSTA TI was redesignated as a U.S. Navy Small Craft Facility whose previous functions continued on a reduced scale.

2.2.1 AOI 1: Seaplane Lagoon Area

AOI 1 consists of half of the causeway between TI and YBI and the land from California Avenue (formerly named 2nd Street) south toward the Seaplane Lagoon (Figure 3). The infrastructure improvements on the uplands in this parcel have not changed substantively since construction for the GGIE in 1939-1940, except Building 180 and piers that were built appurtenant to the uplands. Land between buildings in this parcel has remained developed with landscaping or paved surfaces throughout the Navy's ownership. One site in AOI 1 (Building 3) was identified in the HRA as a non-impacted site because, despite the historical storage of instrument check sources in the building, there were no reports the check sources had leaked in the building. This HRASTM concludes that unrelated to those historical check sources, Building 3 is appropriately designated as radiologically impacted due to the magnitude of ship repair activities historically associated with this building during WWII and the presence of an optical repair shop on the roof of Building 3. Further discussion regarding Building 3 is provided below.

The primary structures in AOI 1 consist of Buildings 1, 2, 3, and 180. Building 1 was an administration building during the GGIE and still is.

The Yerba Buena Club and "Treasure Garden" were built for the GGIE. The Yerba Buena Club was demolished and replaced with a parking lot soon after the end of the GGIE. The Treasure Garden was demolished and Building 180 was constructed in its place beginning in 1942 (see 4 June 1942 aerial photograph on Figure 3). Building 180 was initially used as a hanger and later for transportation shops. Building 2 was the "Hall of Air Transportation" during the GGIE and appears to have continued as a "hanger" through WWII (the building is labeled "Hanger" on a 1946 map (Navy 1976) and Pan American World Airways operated "clippers" from TI throughout the war). Photos 1 and 2 depict the interior of Hanger 2 following the war and show that it remained as relatively open space (a radar facility was built in the building in 1953, and the building was used as a Naval Reserve facility in 1963).

Hanger 3 was the Palace of Fine and Decorative Arts during the GGIE. It is evident from the records reviews and Photo 3 that Building 3 was configured to conduct significant inside shop work associated with the repair activities associated with the "Section/Frontier Base" operations. Building 3 has been designated as radiologically impacted in this HRASTM because of the potential for those historical ship repair activities to have involved radioactive deck markers and gauges. Evidence was found regarding the potential for an optical shop associated with the "Section/Frontier Base" on NAVSTA TI (Navy Undated). Former Navy optical shops at other bases have been found to contain residual radium contamination. The optical shop was on the roof of Building 3 as shown on Photo 4. The plan elevation and details show the presence of sinks and drains in the optical shop and these drains are considered impacted from the point of origin in the shop to the pump station on Photo 5. It is apparent that the 6-inch sanitary sewer line shown on Photo 5 was added sometime after 1943 as it is not shown in earlier drawings and, therefore it was likely added in association with the construction of the optical shop (Navy 1944). As noted in the handwritten note on the plan elevation and details, the optic shop was demolished in 1969. Part of the drain line serving the shop was removed along with the shop, but the majority of the line leading to the pump station remains. There were a number of ship repair piers and two floating dry-docks by the war's end that were dedicated to this activity (see Figure 3, 20 February 1945 aerial photograph). Ship repair activities appear to have ceased sometime in the 1950s; however, it is not clear exactly when these activities ceased.



Photo 1: Interior of Hanger 2, 1953, showing radar building



Photo 2: Interior of Hanger 2, 1963, label on photo states "Naval Reserve"



Photo 3: Interior of Hanger 3 during WWII repair shop for Frontier Base

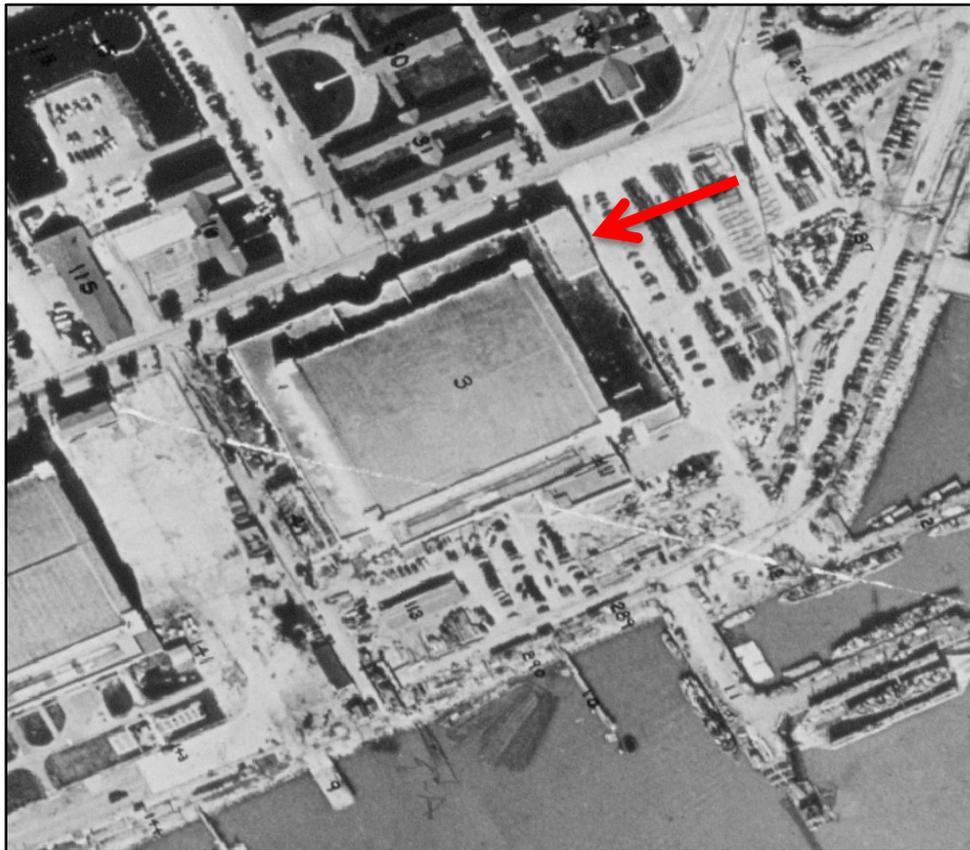


Photo 4: 1945 photo showing the presence of the optical shop on the north corner of the Building 3 roof

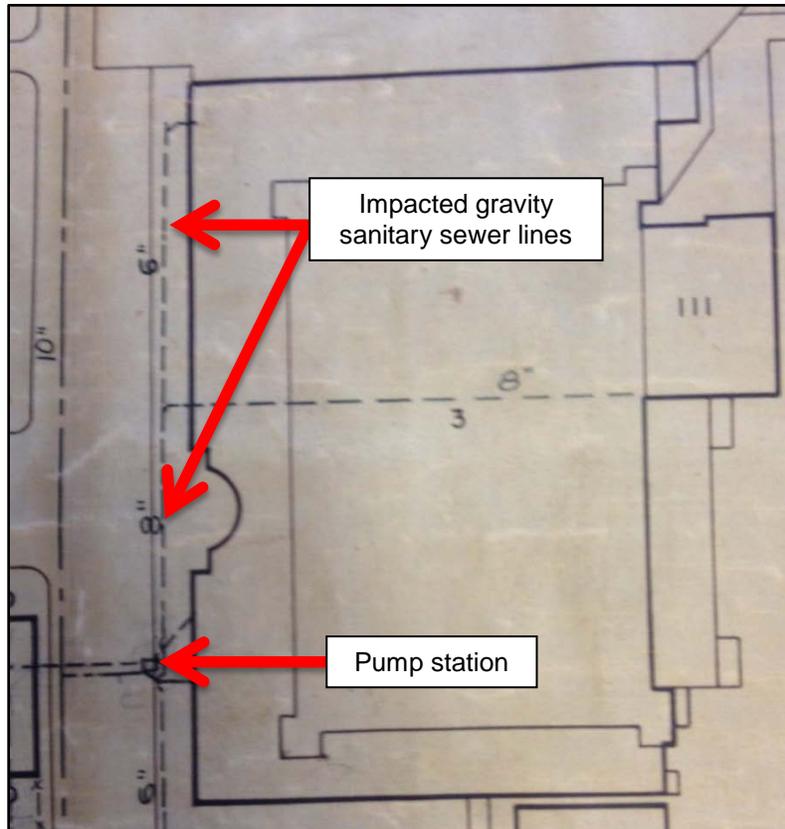


Photo 5: Showing sanitary sewer line in 1946 drawing

2.2.2 AOI 2: Former Hospital Area

AOI 2 consists of the former hospital area and is bounded on the south by California Avenue (formerly 2nd Street), by San Francisco Bay to the east, the Hospital Barracks and 5th Street to the north, and by H Avenue to the west. Only one site in AOI 2 (Building 233) was identified in the HRA as a radiologically impacted site. The findings of this HRASTM for AOI 2 are consistent with those of the HRA.

AOI 2 is shown in [Figure 4](#) and is composed of three general areas; the hospital area, an open area associated with piers 15 and 16; and the waterfront (Federal Building area). Except for the Federal Building, the GGIE structures in this area ([Photo 6](#)) were demolished prior to 1942. By early 1942, the Lake of the Nations had been filled in and construction of the hospital buildings was nearing completion (see [Photo 7](#) and [Figure 4](#)). Because the Lake of the Nations was filled in before Navy operations began; and, because the footprint of the entire area was developed early in the war and before other Navy operations were expanded on the island, there is little likelihood that any debris associated with Navy operations would have been disposed of in this area or that any debris would have contained radioactive items associated with those later Navy operations. The Waterline Replacement Area, Site 33, ([Figure 4](#)) is currently undergoing additional investigation, including radiological surveys, and the work to-date has not identified the presence of radioactive materials above established background levels for TI. All data associated with the work will be published in a Remedial Action Completion Report after the work is done.

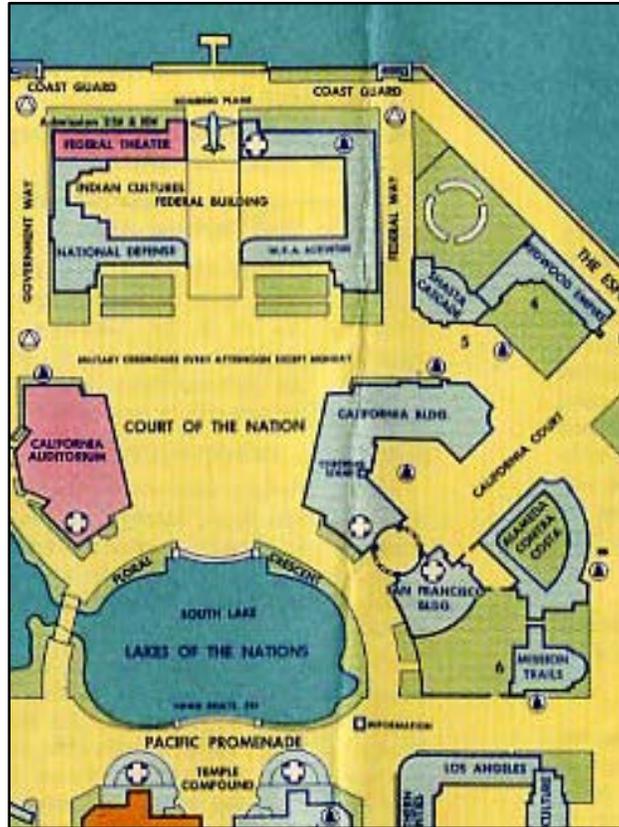


Photo 6: 1939 Map of GGIE showing the vicinity of the future hospital area



Photo 7: Early 1942 oblique aerial photo of AOI 2

Building 233 was constructed in 1944 adjacent to the Federal Building (Building 7) and was used beginning in 1947 for the Radiation Safety School. Building 233 was the site of a radium sulfate spill in 1950, documented in the HRA, and was designated as impacted in the HRA. Building 233, the soil around the building and a sanitary sewer line associated with the building are currently being remediated and a report will be issued documenting a Final Status Survey (FSS) for the site. AOI 2 was built out by the end of WWII and because it was already developed by that time, there is little likelihood for debris to be disposed of in the AOI during that period. After the end of WWII through the end of the 1950s, there was little change in this area, but, beginning in the 1960s and thereafter, structures were periodically demolished and replaced with open grassy areas, or in one case, a ball field. There is no evidence of any debris disposal in AOI 2 during this period or additional radiological activities other than those already documented in the HRA.

2.2.3 AOI 3: Island Core Area

AOI 3 consists of the Island Core area and is bounded on the south by California Avenue, by San Francisco Bay to the west, by 9th Street to the north, and by H Avenue to the east. The HRA concluded that there were no radiologically impacted sites in AOI 3. The findings of this HRASTM for AOI 3 are consistent with those of the HRA.

During Navy operations, AOI 3 ([Figure 5](#)) was historically composed of barracks and administrative areas (Buildings 117, 118, 137, 139, 147, 148, 149, 150, 151, 152, 170, 171, 172, 173, 174, 175, 177, 178, and 179). The area was dominated by four large L-shaped halls during the GGIE ([Photo 8](#)). These halls were used as barracks, Buildings 452 and 453, during WWII, and additional barracks and other classroom room and administrative facilities were built around them during the war (see [Photo 9](#) and 1942 and 1947 aerial photographs on [Figure 5](#)). Following the war, the halls were demolished and the land was unused until the star barracks were built in the late 1960s. Available aerial photographs do not show the former footprint of the GGIE halls being used for laydown areas or debris disposal areas during the period from hall demolition until construction of the star barracks. This is to be expected as these open areas were surrounded by barracks and administrative areas during this period, making it unlikely that such debris disposal would occur in an active area of the base.

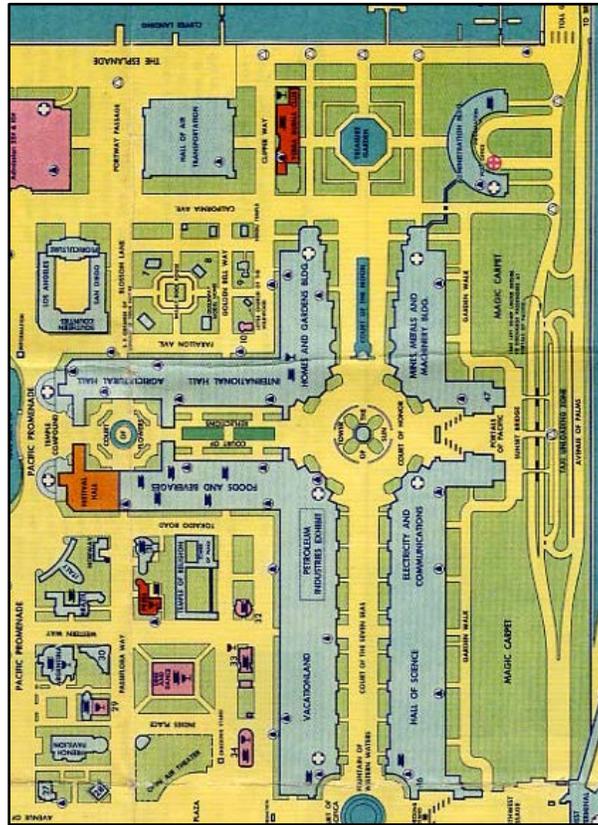


Photo 8: Map showing halls of GGIE



Photo 9: 1943 photo of AOI 3

2.2.4 AOI 4: Southwestern Community Area

AOI 4 consists of an area generally associated with community functions during former Navy operations. This area is bounded on the south by 5th Street, by H Avenue on the west, by 9th Street on the north, and by San Francisco Bay on the east. The HRA concluded that in AOI 4, there were two radiologically impacted sites, Buildings 343 and 344. This HRASTM finds that Building 342 in AOI 4 should also be considered radiologically impacted.

AOI 4 is shown on [Figure 6](#). Immediately following the GGIE, the Lake of the Nations and all GGIE structures in this AOI were demolished, except the former Hall of Western States and U.S. Army Encampment facilities ([Photos 10](#) and [11](#)). During Navy operations, the area was historically composed of community related functions such as barracks, classrooms, athletic fields, tennis courts, a Navy Exchange, gymnasium, theatre, library, laundry, Enlisted Men’s club, Chief Petty Officer club and a heating plant. A large supply warehouse, Building 260, dominated the site ([Figure 6](#)).

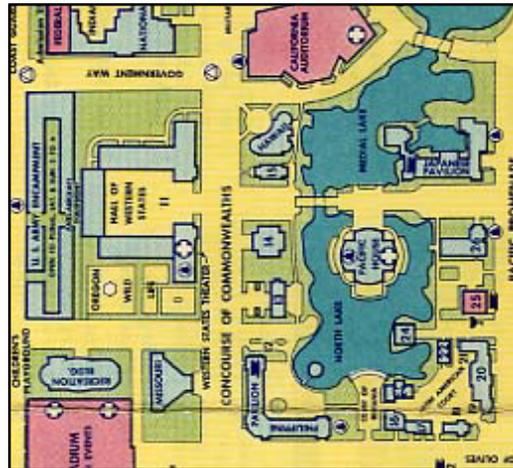


Photo 10: Vicinity of AOI 4 during the GGIE



Photo 11: 1942 photograph of AOI 4

Following WWII in 1948 and 1949, the former GGIE Hall of Western States and Army encampment were demolished and a picnic area and tennis courts were constructed in the footprint ([Figure 6](#)). Based on reviewed base maps, sometime between 1962 and 1968, a Supply Department salvage yard was established to the east of the tennis courts (see [Photo 12](#) and [Figure 6](#)). By 1996, this salvage yard area was referred to as Lot 69 and was listed as a Hazardous Waste Accumulation Area in the Spill Prevention, Control, and Countermeasures plan. The northern, larger part of Lot 69 was the non-hazardous storage or staging area for furniture and non-hazardous tools waiting to be disposed of by the Defense Reutilization and Marketing Office (DRMO). South of the lot there is a transfer station for solid waste. A general inventory of waste stored in the hazardous waste accumulation area consisted of waste oils, flammables, corrosives, and other regulated materials like rags, latex paints, empty paint and flammables containers.

Because this area was used as a salvage yard and due to the lack of any other radiological information associated with this site, this HRASTM identifies this salvage yard (Lot 69) as impacted based on the fact that salvage yards are often linked with the potential for disposal of unregulated radiological commodities.

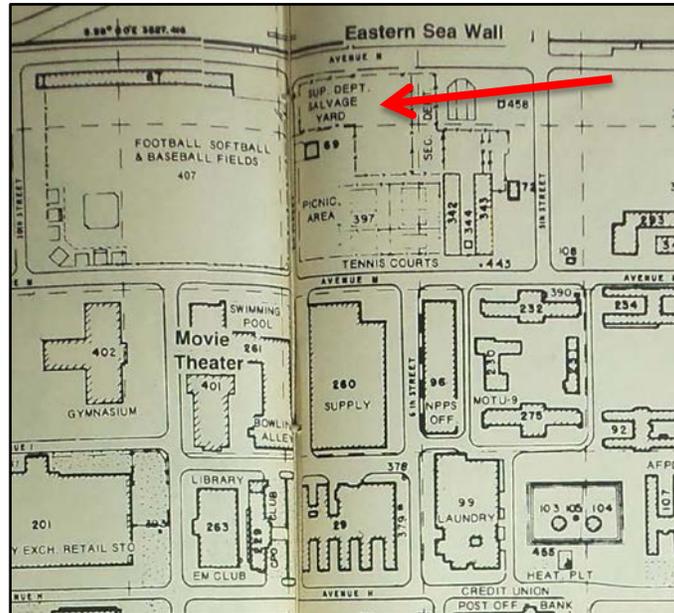


Photo 12: 1969 base map showing the Supply Department Salvage Yard

Building 342 was identified as non-impacted in the HRA because, although sealed sources were used in the building, there were no records identifying that the sources had leaked. This HRASTM identifies the building as impacted based on a more conservative position that because sources were handled in the building it is appropriate to consider it radiologically impacted. Buildings 343 and 344 were identified as impacted in the HRA. An FSS was recommended for the storeroom in Building 343 and for Building 344. These FSS reports were done in 2008 (Tetra Tech EC Inc. 2008a, 2008b). The California Environmental Protection Agency’s Department of Toxic Substances Control (DTSC) concurred with the unrestricted release of Buildings 343 and 344 on January 16, 2009 (DTSC 2009). Based on the completion of the FSS reports for Buildings 343 and 344, and DTSC acceptance of unrestricted release of these buildings, no further action is required for these buildings at the time of this HRASTM.

2.2.5 AOI 5: Northeastern Community Area

AOI 5 consists of the area referred to as the “Northeastern Community Area” during Navy operations. This AOI is bounded by 9th Street on the south, about a block west of H Avenue on the west, by 13th Street on the north, and by San Francisco Bay on the east (Figure 7). The HRA concluded that there were no impacted sites in AOI 5, and the findings of this HRASTM for AOI 5 are consistent with those of the HRA, except Building 570 and an associated outdoor storage area outside the building.

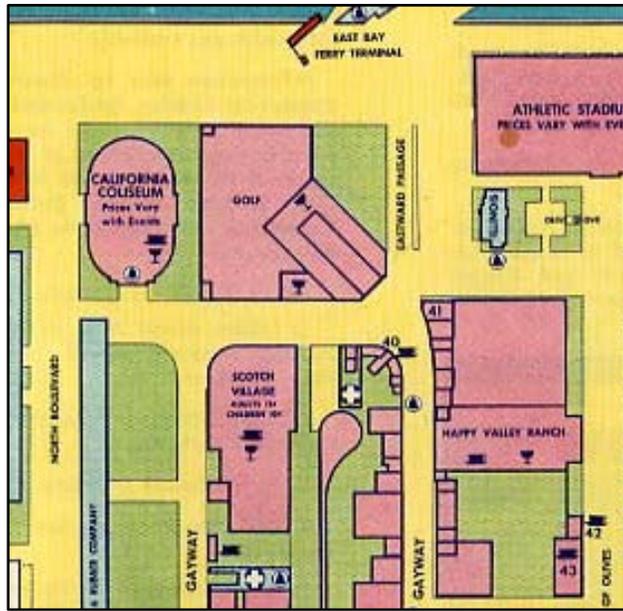


Photo 13: Map of AOI 5 area during the GGIE

Following the GGIE, all the facilities shown in [Photo 13](#) were demolished and two parallel runways were constructed (see 1942 aerial photograph on [Figure 7](#)). Improvements consisting of a ball field, and related structures were completed so the entire site was developed with facilities by the end of the war (see 1947 aerial photograph on [Figure 7](#)). Based on a review of aerial photographs and the 1969 base map, the majority of the wartime structures remained in place in this AOI until the early 1970s when the old barracks began to be dismantled. A firefighting training school was constructed in the southeastern quadrant of this AOI in the late 1980s. File and aerial photograph reviews have not revealed the likelihood of any operations that would have resulted in the area being designated as impacted, except the Building 570 area discussed below.



Photo 14: Portable gamma spectrometers in Building 570

Building 570 and the surrounding fenced yard was designated as impacted in this HRASTM as result of the handling and storage of radiologically contaminated items and soil samples (collected from other impacted TI sites) in the building and fenced yard area. The radiological subcontractor, New World Technology of Livermore, California, mobilized two gamma spectrometers to Building 570 in 2007 (Photo 14 above). These spectrometers were used for quick turnaround laboratory analysis of soil samples and radioactive commodities found in the Site 12 solid waste disposal areas (SWDA). The radioactive commodities and soil samples are stored in a conex box (storage or shipping container) in the fenced compound surrounding Building 570. The use of this area for the storage of radiological materials continues in association with the non-time-critical removal action (NTCRA) in the Site 12 SWDAs.

2.2.6 AOI 6: Sewage Treatment Area

AOI 6 consists of the area referred to as the “Sewage Treatment Area.” This area is bounded by 13th Street on the south, Avenue I (inclusive of Building 292) to the west, and by San Francisco Bay to the north and east (Figure 8). The HRA concluded that there were no impacted sites in AOI 6. The findings of this HRASTM differ from the HRA for AOI 6 by identifying three separate and contiguous areas as radiologically impacted. These three areas include the former USS *Pandemonium* Site II, a potential salvage yard where metal recycling was done during WWII, and an area referred to as the Site 6 radiologically controlled area (RCA) where radioactive materials associated with radiological remedial activities at Site 12 were handled and stored. The three sites are further discussed below.

AOI 6 is shown on Figure 8 and Photo 15. The GGIE structures shown on Photo 15 were demolished immediately following the GGIE except for the warehouse (Building 62) shown in the upper right side of Photo 15, which is still there. As discussed in the HRA, the USS *Pandemonium* Site II (NE) was in AOI 6 after the USS *Pandemonium* was moved there in 1969 from the west side of the island (USS *Pandemonium* Site I, AOI 8). The HRA concluded that Site II (NE) was not impacted because:

“Sealed Cs-137 (cesium-137) sources were used for fallout simulation. Leak test of the Cs-137 sources confirmed there was no leakage. The short-lived liquid isotopes decayed away within three months of last use (1969). There were no reports of instrument check source leakage.”

Although no new information regarding this USS *Pandemonium* Site II (NE) location was found, the HRASTM more conservatively identifies this location to be impacted because of the potential for contamination to have been spread there or in the surrounding area from the known use of instrument check sources consisting of bagged radium gauges. The use of these gauges was documented in the HRA (HRA reference TI-HRA-57). After the HRA, and unrelated to the USS *Pandemonium* Site II, a removal action was completed in 2009 at Site 32 that included the footprint of the USS *Pandemonium* Site II. This removal was done to address contaminants of concern that included polychlorinated biphenyls (PCB), dioxins, pesticides, total petroleum hydrocarbons and metals. Much of the soil surrounding the USS *Pandemonium* Site II (NE) was removed during the removal action, including the foundation for the ship, to depths ranging from 2 to 12 feet below ground surface (Shaw 2011a). The HRASTM identifies the area generally bounded by Site 32 to be considered impacted, including the holding tanks that remain on-site and were associated with the USS *Pandemonium* Site II (NE) operations, and a former office/training building (Building 462).



Photo 15: Vicinity of AOI 6 during the GGIE

As noted in [Section 2.2](#), significant ship repair activities were ongoing throughout WWII. Those activities generated significant amounts of scrap metal as evidenced by a *Masthead* article that referred to the amount of scrap metal from repair activities as 200,000 pounds per month ([Navy 1945a](#)). This same article contained a photograph ([Photo 16](#)) showing in progress salvage operations for scrap metal. Salvage yards are typically a concern at ship repair facilities as there is a potential for impacted sites from the processing of waste containing unregulated radioisotopes such as Ra-226. While it is not clear exactly where the salvage area was, it is likely that the area would have been in the open area just to the south of Building 327 that was identified as a "Salvage Building" in the HRA. [Photo 17](#) is a 1945 aerial photograph of this area and suggests that the area south of Building 327 is likely the pictured salvage yard based on the presence of the buildings in the background of [Photo 16](#). Therefore, this area has been designated as impacted in this HRASTM. As shown on [Figure 8](#), Building 327 was demolished in the 1960s and the impacted salvage yard area is now in the footprint of the sewage treatment plant that was constructed in 1984.



Photo 16: *Masthead* photo showing welders cutting up scrap metal for salvage

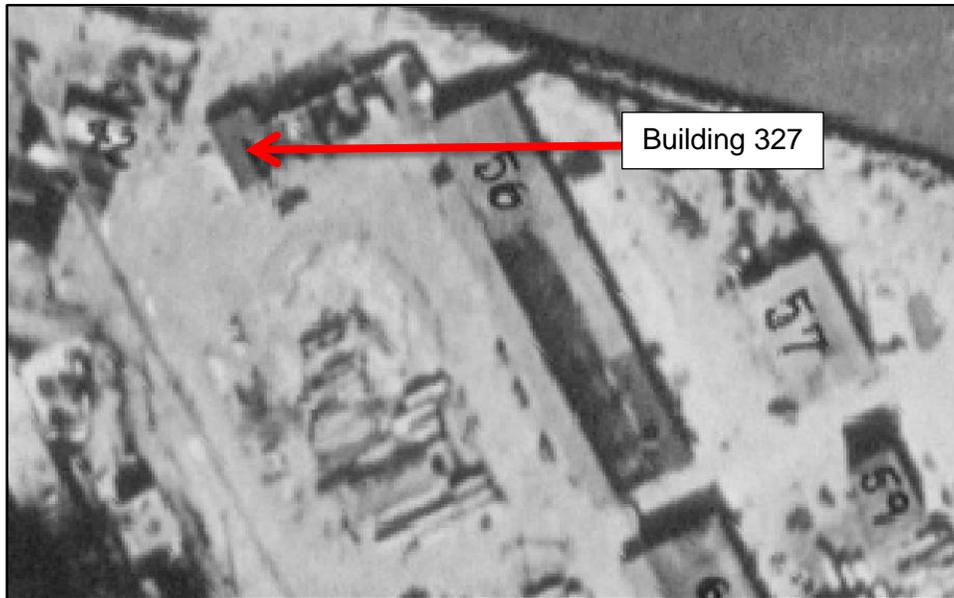


Photo 17: Building 327 and probable salvage yard directly to the south

The third area in AOI 6 to be designated as impacted in this HRASTM is an area used for stockpiling, truck loading, and truck decontamination operations in association with previous trenching and removal actions in Site 12 (Figure 8). Based on a review of the work plans for the exploratory trenching and removal actions at Site 12, records indicate that the use of this impacted area for processing soil from SWDAs began in 2007, after the HRA was finalized in 2006 (Shaw 2012b). Based on the work plans, the removed soil and investigation derived waste from prior trenching actions and removal actions in Site 12 was transported to Site 6 (IT Corporation 2001). During these operations some potentially radiologically contaminated soil was reportedly transported from SWDA A&B in Site 12 to the Site 6 area in an end loader bucket and in a manner that was not in conformance with procedure. In response to this incident, the transportation routes were subjected to gamma walkover surveys (CDPH 2011). Further investigation is necessary for the elevated gross gamma measurements found on the streets in Site 12 and the diffused elevated areas of gross gamma measurements detected around the perimeter of the SWDA A&B. All roadways in Site 12 and open areas not previously included in a surface scan will be subject to an additional gamma walkover survey in fiscal year 2013. Site 6 will be subjected to an FSS following its use as a low-level radiological waste storage area.

2.2.7 AOI 7: Northern Housing Area of Interest

AOI 7 consists of an area referred to as the “Northern Housing Area of Interest.” This area is bounded by 13th Street and a former runway on the south, by San Francisco Bay to the west and north, and by Avenue I to the east (Figure 9) and the area is wholly contained in Site 12.

During the GGIE in 1939 and 1940, the area that now encompasses AOI 7 was unpaved and used for vehicle parking (Photo 18). The Navy constructed ammunition bunkers along the northern portion of AOI 7 after the Navy took over the lease of NAVSTA TI, as seen on the aerial photographs shown on Figure 9. The bunker complex was expanded further throughout

the war, and in late 1944 a magazine was established on TI for servicing destroyers and smaller craft. This magazine continued to function until June 1946 when the function was turned over to facilities at Mare Island Naval Shipyard and Port Chicago, Concord Naval Weapons Station (Navy 1946b). It is unclear if the ammunition bunkers were used for ammunition storage after June 1, 1946, but presumably at least some bunkers continued to be used to store blank rounds and other ordnance required for NAVSTA TI operations after WWII.

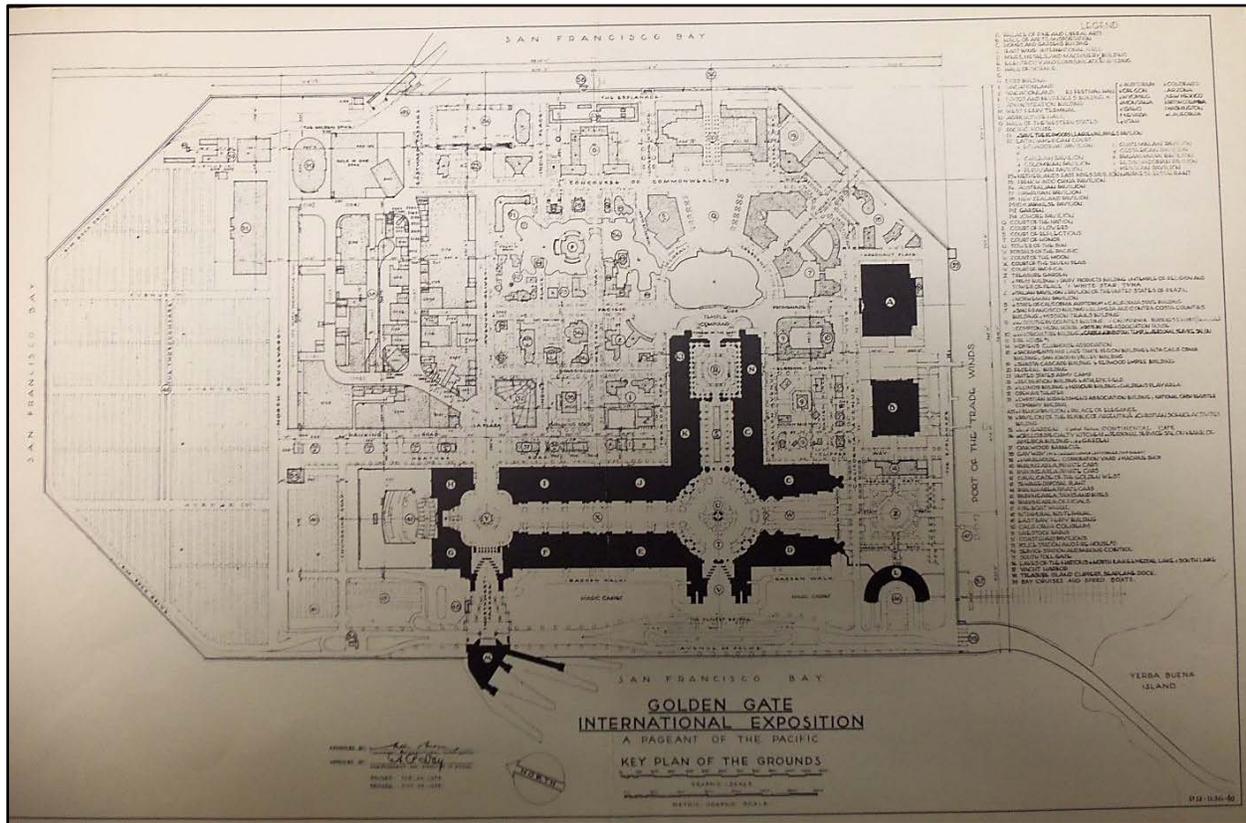


Photo 18: Map of the GGIE showing the parking areas on the north end of TI

In addition to the ammunition bunkers, the other important features in this area of IR Site 12 include an incinerator (Photo 19), burn pits, and SWDAs that were discussed in the HRA. Playing fields and a storage/salvage yard were in AOI 7. The playing fields were in the southeastern corner and remained in use until housing was constructed in 1969 (see 1947 and 1968 aerial photographs on Figure 9) making it unlikely that any disposal activity would have taken place on the playing fields. In 2009, the Navy conducted a gamma walkover survey of the common area in the North Point Drive housing loop (Navy 2009). All gamma readings during the survey were within background levels, except at one location between Buildings 1244 and 1246. A metallic object about 4 inches round and 1.5 inches deep was thought to be a radioactive gauge and was discovered between the housing units, in the footprint of the former ball field. The discovery of this gauge is likely from an anomalous transport of the item from a SWDA during construction activities associated with the housing area.

The storage/salvage yard was in the southwestern corner of AOI 7 and remained in use until housing was constructed in 1966 (see 1947 aerial photograph on [Figure 9](#)). The 1947 aerial photo shows this storage/salvage yard being used for storage; a 1962 base map, clearly labels it as a “Supply Salvage Yard” ([Photo 20](#)). As discussed in a *Masthead* news article the salvage yard would “receive large, prefabricated sections of steel decking, gun platforms, etc., from the repair and overhaul work at the Industrial Shops.” in addition to other scrap steel ([Navy 1945a](#)). Salvage yards are typically a concern at ship repair facilities as there is potential for impacted sites from the processing of waste containing unregulated radioisotopes such as Ra-226. No records could be found to suggest this area served as a salvage yard during the period when ship repair activities were ongoing (i.e., WWII). This is evidenced by the fact that the salvage yard pictured during the WWII period had a structure in the immediate background ([Photo 16](#)), and there were no such structures in the area of this storage/salvage yard during the WWII period ([Figure 9](#), 1947 photo inset).

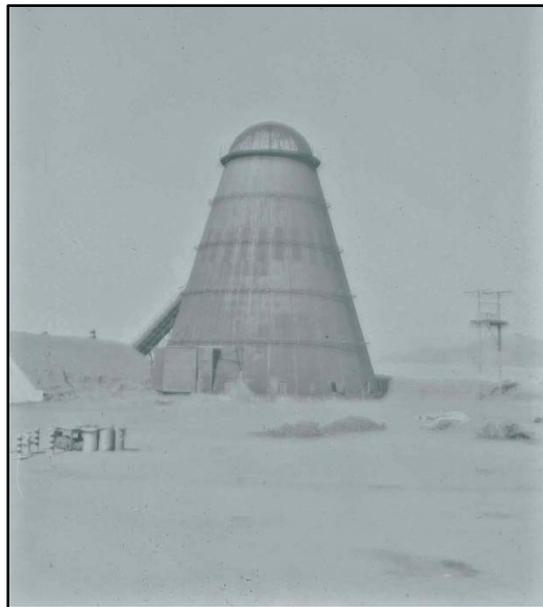


Photo 19: Photograph of incinerator

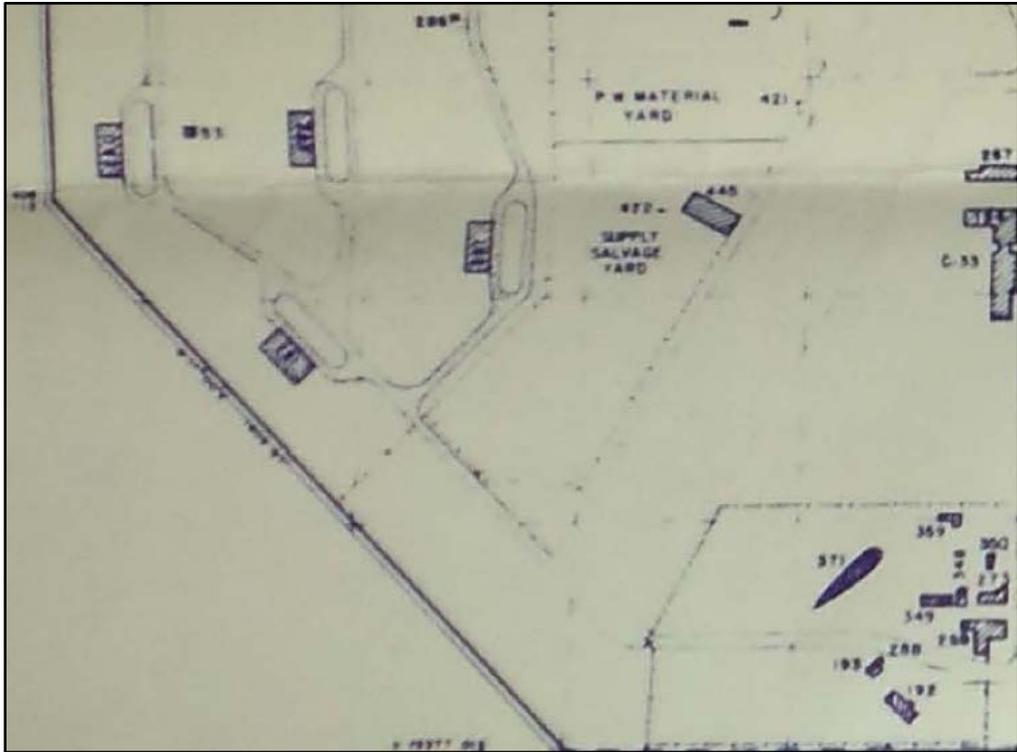


Photo 20: Supply Salvage Yard shown in 1962 base map

Site 12, named the Old Bunker Area and often referred to as the TI housing area, currently contains two-story residential buildings (about 900 housing units) that are constructed with slab-on-grade foundations, with backyards and four to eight residential units per building (Figure 9). Site 12 is flat, consisting of open grassy areas between buildings, paved roads, and parking areas. In 2002, the site boundary was expanded to include all existing residential areas that are encompassed by AOI 7 and AOI 8. Although further investigation will be performed, the potential for the presence of radioactive materials in AOI 7 outside of the SWDAs is minimized because:

- The footprint of the former playing fields was developed early in the Navy's occupancy and remained in use until housing was constructed in the 1960s. The continuity and type of use limits the possibility of debris disposal.
- In 2009, the Navy conducted gamma walkover surveys of the North Point and Bayside areas outside of the areas of the SWDAs of Site 12 (Photo 21). One point source anomaly was discovered during these surveys between housing units 1244 and 1246 that are outside the SWDAs. A gauge was removed from within one foot of the ground surface and was properly disposed of. No other anomalies were discovered outside the existing SWDAs during those surveys, suggesting significant subsurface contamination is confined to the SWDAs (Navy 2009).
- There is no evidence that the footprint of the former storage/salvage yard in Site 12 was a salvage yard during the WWII period when ship repair was done at NAVSTA TI.

- Site 12 was subjected to extensive trenching operations that included radiological screening in 2003 (Shaw 2004). The screening consisted of monitoring the removed soils with a gamma scintillation detector. Once soils were excavated, all four sidewalls of the trench were also monitored and gamma readings were recorded on the trench log forms (Shaw 2003). No data points related to excavated material have indicated the presence of radioactive contamination that would be considered above ambient or would warrant further characterization or concern for worker protection based on the monitoring and action levels prescribed in project procedures. The corresponding gamma spectroscopy data from analyses of gravel samples from soils at or near the three trenches exhibiting the highest gamma counts indicates no elevated concentrations for the isotopes included in the analytical suite (Shaw 2005). These gamma readings were intended to monitor the immediate health and safety of Shaw's workers in the field and were essentially qualitative in nature. The scope of the Site 12 investigation did not include radiological concerns with respect to site remediation (which would have required the collection of much higher-quality data and be based on more rigorous assessments of risk) (Shaw 2005).
- Based on a 1945 aerial photograph, Site 12 also contains an approximately 175,000-square-foot former storage yard overlapping Halyburton Court and Bigelow Court (TriEco-Tt 2012). The identity of specific materials stored at the former storage yard prior to the construction of housing is not known. Bigelow Court is a SWDA planned for a remedial action in 2012. The former storage yard differs from the SWDAs because waste was not intentionally disposed of in this area. Results from sampling in 2000 indicated soils in the former storage yard area contained PCBs and polycyclic aromatic hydrocarbons (PAHs) at concentrations in excess of the action levels protective of human health. Based on these results, the Navy performed a removal action in the former storage yard area. Excavations were from 2.5 to 4 feet deep in the footprint shown in Photo 22. While no screening for radiological material was done, the excavated soil was replaced with clean soil from an off-base source. There will be additional excavation in the Bigelow Court area, as shown in Photo 23, because in previous investigations between 1995 and 2003, concentrations of dioxins, lead, and PAHs exceeded their respective action levels and these chemicals of concern may pose a threat to current and future residents and utility workers. There will be screening for radiological materials.

Because Buildings 156, 224, and 225 were used as gun sheds and a garage, it is presumed that the open areas in the southwest quadrant of AOI 8 would have been used for laydown or parking areas related to these functions during WWII, except the open area around Buildings 269 and 273 that was used for chemical warfare training. The area north of this quadrant and south of the runway appears to have been used for parking. None of these functions or areas were found to have supported activities that would cause them to be designated as radiologically impacted. One open area in the general location of Sites 30 and 31 can be seen on [Figure 10](#) in use as an outdoor storage or laydown area in the 1947 aerial photograph. By 1963, the USS *Pandemonium* Site I (NW) is visible in the aerial photograph and a number of buildings have been demolished. The 1975 and 2000 aerial photographs show the progression of housing construction on the site. By 2000, all GGIE structures in AOI 8 were demolished and only two WWII era structures remain, Buildings 225 and 257.

This HRASTM includes the former USS *Pandemonium* Site I (NW) as a radiologically impacted area based on a more conservative interpretation of existing information in the HRA. This HRASTM includes a former storage area around Sites 30 and 31 as radiologically impacted areas based the detection of Ra-226 in the sidewall of a removal action at Site 31.

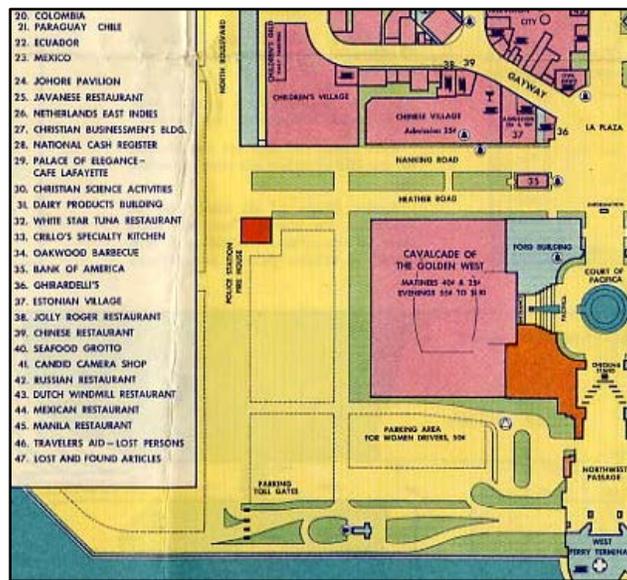


Photo 24: AOI 8 during the GGIE

As discussed in the HRA, the USS *Pandemonium* Site I (NW) was originally in AOI 8 as shown in the 1963 aerial photograph on [Figure 10](#). The training ship mock-up was first put into service in 1957 and remained in service at this location until July 1969. The gravel-surfaced fenced-off training area was approximately 400 by 600 feet. The area was ultimately regraded and housing was constructed following the relocation of the USS *Pandemonium* Site I (NW) in 1969. According to the geotechnical report associated with the housing, it was speculated that the holding tanks used to store contaminated water from training activities were likely "...broken down below grade. While the tank walls have been broken down below grade, it is possible that the base slabs and lower wall portions were left in place and backfilled." ([Lowry & Associates 1971](#)).

The radioactive water containing short-lived isotopes was initially allowed to soak into the soil. Later, radioactive water from the decontamination training was collected in the two sub-grade concrete tanks and stored until the short-lived isotopes had decayed. When the radioactivity was within allowable limits, the water was discharged to the San Francisco Bay through a 6-inch pipe. Decontamination training initially used only sealed sources of Cs-137 to simulate radioactive fallout. In 1963, a radioactive material license was granted by the Atomic Energy Commission (AEC) to also use short-lived liquid radioisotopes (bromine [Br]-82, Br-80, sodium [Na]-24, and potassium [K]-42) to more realistically simulate radioactive fallout. Survey instruments containing radioactive check sources were used during the training exercises. The Cs-137 sealed sources were leak tested and were demonstrated to be intact. Due to the short life of the Br-82, Br-80, Na-24, and K-42 isotopes, and because there were periodic leak checks of the Cs-137 sealed sources, this site was designated as non-impacted in the HRA. This HRASTM designates the USS *Pandemonium* Site I (NW) area as a radiologically impacted area based on a more conservative interpretation of existing information in the HRA. Previous Navy RASO technical assistance visits noted the practice of using non-regulated radium devices as check sources (HRA reference TI-HRA-57), so this HRASTM assumes that such a practice was likely the case at both USS *Pandemonium* Site I (NW) and Site II (NE) locations and may have resulted in a release of radioactive contamination.

At the time of the HRA, no radioactive material had been found in the SWDAs, and the HRA recommended "...radiation monitoring during soil excavation of the known solid waste disposal areas." After the HRA, radiological commodities were found in each of the SWDAs and as a result, radiological screening was expanded to include intrusive work in Site 31. In June 2010, radiological screening was done on a sidewall of an open excavation at Site 31. Elevated count rates were detected (11,000 counts per minute [cpm]) with a contact static reading of 20,000 cpm. The laboratory background count rate for the detector (Ludlum 44-10) used in the scan survey was 4,517 cpm. Following the static reading, approximately 3 inches of soil were removed from the excavation sidewall. A second contact static reading yielded 40,000 cpm. On April 26, 2011, three soil samples were collected near the radiological anomaly at Site 31. Analytical results indicated Ra-226 was present at concentrations exceeding the cleanup goal of background + 1 picocurie per gram (pCi/g) above the mean background concentration in the reference background area; the highest of the three samples collected was 10.8 pCi/g of Ra-226. Based on the elevated readings, Site 31 was designated as radiologically impacted, adjacent Site 30, and historic storage yards north and south of Sites 30 and 31 are designated by this HRASTM as radiologically impacted pending the outcome of the Site 31 investigation ([Shaw 2012a](#)).

2.3 HISTORICAL RADIOLOGICAL ASSESSMENT (HRA)

The Final HRA for NAVSTA TI was published in February 2006 ([Weston 2006](#)). The HRA provided a comprehensive history of radiological operations by the Navy and their contractors at NAVSTA TI. The HRA was prepared pursuant to the Navy's IRP that encompasses the Navy's BRAC Program, and in accordance with CERCLA and SARA. The format and content of the HRA followed the guidelines for an HRA established in the Multi-Agency Radiation Survey and Site Investigation Manual (TI-HRA-3).

The primary purpose of the original HRA was to designate sites as radiologically impacted or non-impacted. A radiologically impacted site is one that has, or at one time had, the potential for radioactive contamination, based on historical information, in excess of natural background or fallout levels. In many instances, designation as radiologically impacted does not confirm that radioactive contamination is present; only that the possibility exists and must be investigated.

A non-impacted site is one, based on historical documentation or results of previous radiological survey information, where there is no reasonable possibility for residual radioactive contamination. If new historical information becomes available or contamination is found at a non-impacted site, the site would be re-designated as radiologically impacted.

To designate sites as radiologically impacted or non-impacted, the HRA defined the extent of past radiological operations, assessed the likelihood of potential contamination and potential contamination migration pathways, and recommended future actions. Historical radiological operations examined at NAVSTA TI included:

- Training personnel on the calibration, maintenance, and operation of radiation monitoring instruments.
- Training personnel on radiological monitoring, and decontamination of ships and airplanes
- Berthing of OPERATION CROSSROADS ships prior to those ships being given final radiological clearance.

Overall, the HRA's review of previous radiological activities, cleanup actions, and release surveys did not identify any imminent threat or substantial risk to human health or the environment of NAVSTA TI or the local community.

3.0 PREVIOUS RADIOLOGICAL OPERATIONS

This section describes the previous use and disposal of materials during radiological operations at NAVSTA TI.

3.1 USE OF RADIOACTIVE MATERIALS

To investigate the possibility that debris containing radiological materials (radioluminescent devices) was inadvertently or intentionally disposed of on the upland portion of the TI property, the island was divided into logical AOIs as shown on [Figure 2](#). Each of these AOIs was reviewed chronologically by reviewing aerial photographs to determine if there was an opportunity during that time, for any debris disposal that could contain radioactive materials. [Figures 3](#) through [10](#) were developed to show each AOI at different times with respect to development of the area. The results of that aerial photograph review are discussed in [Section 2.0](#).

New information was discovered, during research for this HRASTM, that significant ship repair activities took place at NAVSTA TI during the WWII period. In association with those ship repair activities, an optical shop was operated in Building 3. It is likely that unregulated radioactive materials including Ra-226 and thorium (Th)-232 were handled in association with those repair activities. Radiologically contaminated soil and commodities were discovered to have been disposed of in the SWDAs in Site 12 based on intrusive investigations conducted after the final HRA.

3.2 DISPOSAL PRACTICES FOR RADIOACTIVE MATERIALS

As documented in the HRA, licensed radioactive materials were properly disposed of at a site off of NAVSTA TI. Based on new information obtained since the final HRA, it is clear that unregulated radioactive material or debris containing unregulated radioactive material was buried in the locations designated as radiologically impacted SWDAs in the HRA. This new information is based on the results of radiological surveys and removal actions in the SWDAs as well as the recommendation in the HRA. Based on elevated gamma scan readings in an excavation at Site 31, the potential exists that unregulated radioactive material or debris containing unregulated radioactive material was disposed of at Site 31, which raises the possibility that additional disposal sites may exist.

4.0 RECENT REMEDIATION ACTIVITIES/PRACTICES

This section addresses work that was done at newly designated radiologically impacted sites and non-impacted sites since the final HRA. Newly identified radiologically impacted sites are discussed in [Section 4.1](#). Sites designated as non-impacted in the HRA are in [Section 4.2](#) and if appropriate, an updated status is provided. Radiological work done outside the identified radiologically impacted and non-impacted sites is discussed in [Section 4.3](#).

4.1 RADIOLOGICALLY IMPACTED SITES

This section addresses work done at sites not designated as radiologically impacted at the time of the HRA, but have been designated as radiologically impacted in this HRASTM. These sites include Building 3, Building 570, former USS *Pandemonium* Sites I and II, a probable former salvage yard site, a waste and clean soil stockpile/loading and decontamination site, and a former storage area (Sites 30 and 31).

4.1.1 Building 3

Building 3 was designated as non-impacted in the HRA. No radiological-related work has been done at Building 3 since the time of the HRA. In association with other IRP work, a treatability study was done to evaluate cleanup alternatives for contaminated groundwater at Site 21 and operated between August 2005 and August 2010 ([Shaw 2011b](#)). Site 21 was originally a 400 by 75-foot-wide area along the shoreline. Because a dip tank to clean aircraft parts was reportedly at the southeastern corner of Building 3, the site boundary was expanded to include portions of Building 3 and the open area between the building and the shoreline. The treatability study

report was completed in March 2011. Groundwater monitoring is currently in progress. The Site 21 work is not expected to have affected the radiological status of this building. Building 3 has now been designated as radiologically impacted due to the extensive repair activities that occurred in the building during WWII and the presence of the optical shop on the northeastern corner of the roof.

4.1.2 Building 570

Building 570 was not identified in the HRA as a radiologically impacted or non-impacted site. Building 570 has been used as an office trailer and laydown area by a Navy contractor (Shaw Environmental Inc.) in association with remedial activities on NAVSTA TI, including those at Site 12. Building 570 and the surrounding storage yard is now designated as radiologically impacted as discussed in [Sections 2.2.5](#) and [5.2.3](#), because removal in the Site 12 SWDAs that occurred after the HRA involved radiological commodities and radiologically contaminated soil. Soil samples were stored and counted in the Building 570 area and radiological commodities were stored in conex boxes in the smaller fenced yard of Building 570 ([Photo 25](#)).



Photo 25: Conex boxes used for storage of radiological commodities in the Building 570 compound

4.1.3 USS *Pandemonium* Site II (NE)

The USS *Pandemonium* Site II (NE) was designated as a non-impacted site in the HRA. No radiological related work has been conducted at the site of the USS *Pandemonium* Site II (NE) ([Figure 8](#)) since the HRA. The former training and storage area includes Buildings 462 and 463 (see [Figure 8](#), AOI 6) and is in Site 32. The area has been used as a parking area for vehicles and forklifts, a storage area for hazardous materials and hazardous wastes, a tear gas training area, and as storage for former training facilities. A concrete pad, north of Building 463, formerly held an electrical transformer. The USS *Pandemonium* Site II (NE) is now considered radiologically impacted due to a more conservative estimate of the potential for contamination to

have resulted from unlicensed instrument check sources or failure to comply with procedures. The site was also used for radiological decontamination training. The Damage Control School that included a previous site for the USS *Pandemonium* was relocated from the northwestern area (See [Section 4.1.6](#)) to the northeastern area of the base in March 1970. The USS *Pandemonium* Site II (NE) was removed from the training site and sold for scrap metal prior to the HRA.

After the HRA, a remedial investigation (RI) report for Site 32 recommended a feasibility study (FS). A PCB remediation under the Toxic Substances Control Act (TSCA), an interim removal action that also addressed arsenic, was done at Site 32 in March 2010. During this removal, the bulk of the remaining USS *Pandemonium* (NE) infrastructure was removed and significant portions of the site were excavated between 2 and 12 feet deep ([Photo 26](#)). Radioactive isotopes were not chemicals of concern; however, during the course of excavation work and as a health and safety procedure at that time, the contractor did periodic radiological scans on the hands and feet of personnel, and on rubber tires of heavy equipment demobilizing from the site. All scans were done with a Ludlum Model 3 survey meter with a Ludlum 449 or Eberline HP-260 probe. No elevated radiation was detected ([Shaw 2011a](#)).

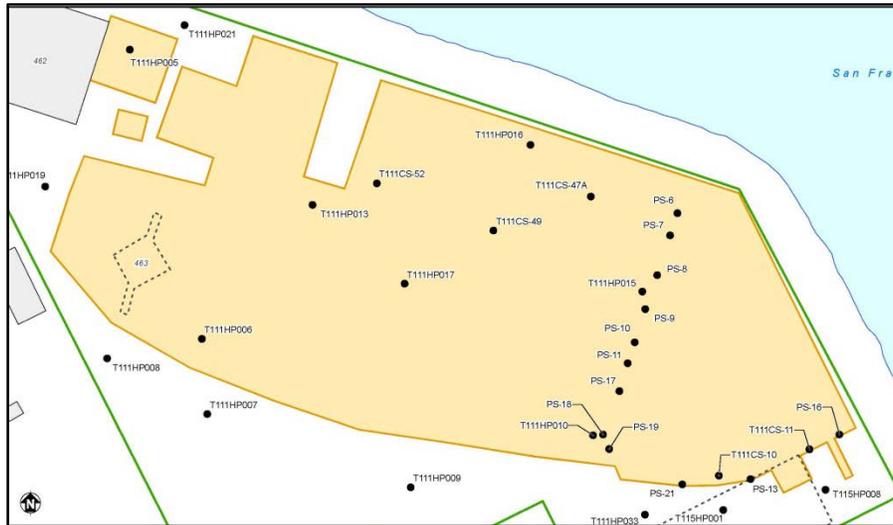


Photo 26: Site 32 excavation footprint

A year of post removal action groundwater monitoring was completed in February 2012, and a groundwater monitoring summary report is currently being prepared. The former USS *Pandemonium* (NE) holding tanks and discharge piping are all that remains of the former ship mock-up and associated infrastructure ([Photo 27](#)).

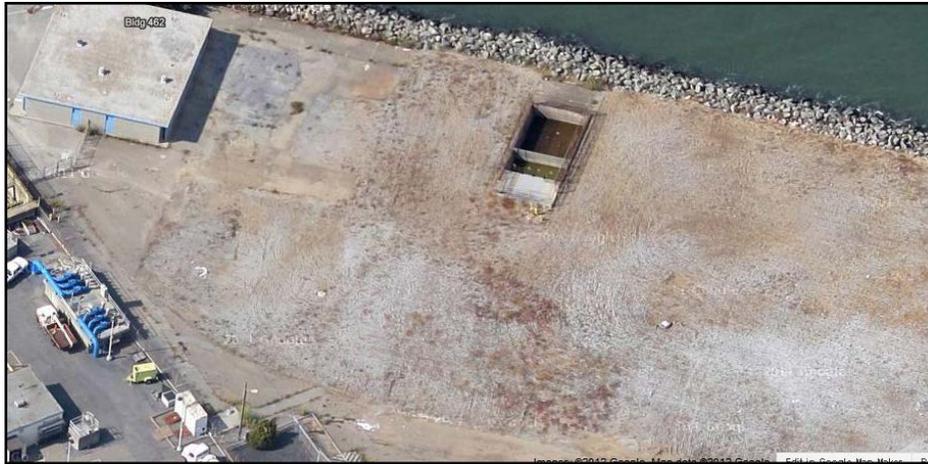


Photo 27: USS *Pandemonium* Site II holding tanks after interim removal action in 2011

4.1.4 Former Salvage Yard Site

The Former Salvage Yard was not identified in the HRA as a radiologically impacted or non-impacted site. No radiological related or other IRP work has been conducted at the Former Salvage Yard site (Figure 8) since the HRA. The site is considered radiologically impacted due to the historic propensity for former salvage yards that handled industrial debris to be radiologically contaminated. The former WWII era salvage yard is in the footprint of the current waste water treatment plan as shown in Photo 28.



Photo 28: Current photo of TI waste water treatment plant

4.1.5 Waste and Clean Soil Stockpile/Loading and Decontamination Site

The Waste and Clean Soil Stockpile/Loading and Decontamination Site was not identified in the HRA as a radiologically impacted or non-impacted site. The Waste and Clean Soil Stockpile/Loading and Decontamination Site was used as a laydown area by a Navy contractor (Shaw) in association with remedial activities on NAVSTA TI including those at Site 12. This area is also known as the Site 6 RCA. As discussed in [Sections 2.2.6](#) and [5.2.3](#), after the HRA, removals in the Site 12 SWDAs involved the removal of radiological commodities and radiologically contaminated soil. Both contaminated and clean soil associated with the Site 12 removals were transported to the Waste and Clean Soil Stockpile/Loading and Decontamination Site temporary storage and, in the case of contaminated soil, repacked for shipment. No other intrusive activities associated with the IRP at NAVSTA TI have occurred in this area.

4.1.6 USS *Pandemonium* Site I (NW)

The USS *Pandemonium* Site I (NW) was designated as non-impacted in the HRA. Since the time of the HRA, radiological intrusive work has been done in the portion of SWDA A and B that overlie the USS *Pandemonium* Site I (NW) ([Figure 10](#)). The entire USS *Pandemonium* Site I (NW) is now considered radiologically impacted due to a more conservative estimate of the potential for contamination to have resulted from unlicensed instrument check sources or failure to comply with procedures.

4.1.7 Former Storage Areas and Sites 30 and 31

The Former Storage Areas and Sites 30 and 31 were not identified in the HRA as radiologically impacted or non-impacted sites. The Former Storage Area consists of the combined footprints of Sites 30 and 31 ([Figure 10](#)) and areas north and south of the IR sites. No radiological or other IRP related work has been done at Site 30 or the areas north and south of the IR sites, since the HRA.

For Site 31, the FS report was finalized in March 2007. The proposed plan/draft remedial action plan was finalized on September 18, 2008, and the public meeting was held on October 7, 2008. The record of decision/remedial action plan was finalized on August 5, 2009. A final soil remediation work plan was submitted January 28, 2010. The soil remediation field work (referred to as Phase I) began in February 2010 and continued through July 2010. This work involved removing soil in the footprints shown in [Photo 29](#). The site is considered radiologically impacted due to the historic propensity for former salvage yards that handled industrial debris to be radiologically contaminated. Elevated radioactivity above background was discovered in the remedial excavation. Laboratory testing confirmed the presence of non-naturally occurring Ra-226, possibly from a deteriorated metal gauge. The Navy is currently doing the Phase II soil remediation for Site 31 that includes further radiological characterization of in situ soil as well as existing soil stockpiles.

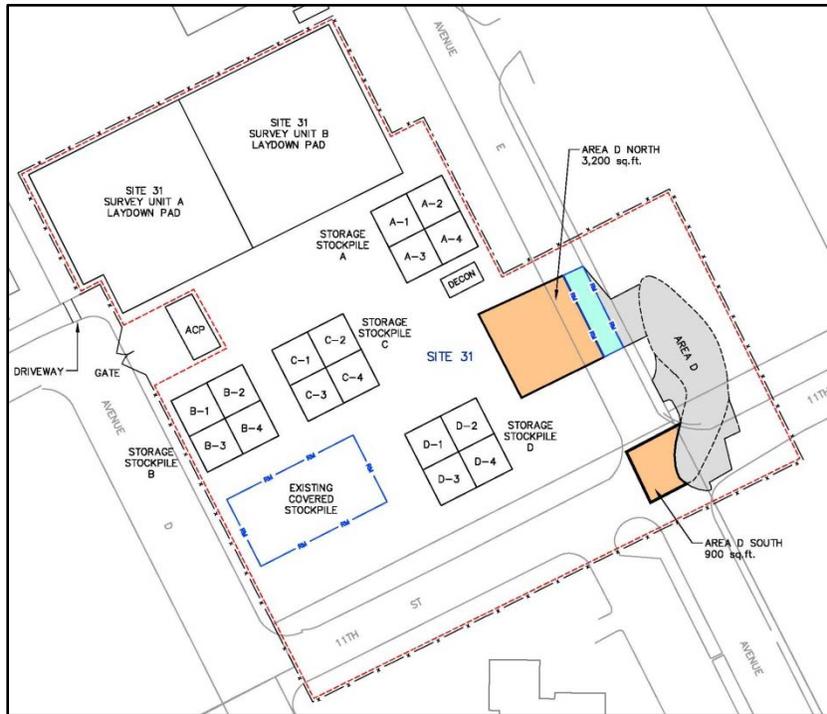


Photo 29: Site 31 excavation areas (colored portions)

4.1.8 Building 342

Building 342 was identified in the HRA as a non-impacted site. It is a metal one-story building built on a concrete foundation, completed in 1951. As originally configured, this building of approximately 8,000 square feet contained three laboratories of equal size. The building was used for instrument calibration and instruction. Laboratories were used to conduct training exercises and instrument calibrations with sources in fixed locations. The radiation beams from the sealed sources were controlled in specific directions. As stated in the HRA, periodic leak tests of all sealed sources were required by operational procedures. The use of the building was gradually reduced, and the last use of radioactive sources was in 1972. No reports of leakage were made; however, this HRASTM recommends the building be considered impacted due to the possibility that prior use may have resulted in contamination. No intrusive work has been done at the site of Building 342 since the HRA.

4.2 RADIOLOGICALLY NON-IMPACTED SITES

This section addresses work completed since the final HRA at sites designated as radiologically non-impacted in the HRA. Sites that were designated non-impacted in the HRA and that are designated as radiologically impacted in this HRASTM are discussed in [Section 4.1](#).

4.2.1 Former Pier 13

Pier 13 was demolished well before the time of the HRA, so no additional work has been done there since the HRA.

4.2.2 Former Building 7 West Wing

Building 7, including the west wing, was demolished, and no additional work has been done there since the final HRA.

4.2.3 Former Pier 21

Pier 21 was demolished well before the time of the HRA, so no additional work has been done there since the HRA.

4.2.4 Former Buildings 226 and 228

Building 226 and 228 were two identical Bachelor Officer's Quarters. They were multi-story, "E" shaped structures constructed about 1944. Building 226 was demolished by 1966 and Building 228 was demolished by 1968 (Weston 2006). No IRP intrusive work has been done at the locations of the former Buildings 226 and 228 since the HRA.

4.2.5 Former Building 273

Building 273 was a small, single-story building (Quonset hut type) on a concrete foundation with a concrete and wood superstructure and a corrugated iron roof. It was built in 1944 and was identified on maps and Public Works data as the Chemical Warfare School Decontamination Building. The building was demolished in 1977 and the site was redeveloped with multi-family housing. No intrusive IRP work has been done at the former location of Building 273 since the final HRA.

4.2.6 Building 461

Building 461 was constructed in 1970 and was part of the new Damage Control School complex that included Buildings 462 and 463 and the training ship mock-up, USS *Pandemonium* Site II, after it was moved from the northwest corner of NAVSTA TI. No intrusive IRP work has been done at the site of Building 461 since the HRA.

4.2.7 Building 462

Building 462 was constructed in 1970 and was part of the new Damage Control School complex that included Buildings 461 and 463 and the training ship mock-up, USS *Pandemonium* Site II, after it was moved from the northwest corner of NAVSTA TI. No intrusive IRP work has been done at the site of Building 462 since the HRA.

4.3 OTHER SIGNIFICANT RADIOLOGICALLY-RELATED WORK

This section presents other significant radiological work done after the final HRA.

4.3.1 Site 12 Trenching

The Navy did trenching and sampling throughout Site 12. These trenching investigations occurred before the HRA, and are briefly summarized here because of their significance with respect to the radiological status of Site 12. The Navy excavated 581 exploration trenches, 7 step-out trenches, and 7 step-out hand auger locations, to evaluate potential risks to human health and to make decisions about further remediation at Site 12 (Shaw 2004). The trenching investigation specifically excluded areas previously remediated or that were scheduled for future remediation (i.e., the SWDAs), and streets, sidewalks, and parking areas. During the investigation, the trenches and excavated soil were surveyed in the field for gamma radiation, for health and safety. As each trench was excavated, a Shaw technician used a Ludlum Model 44-10 2- by 2-inch sodium iodide scintillation counter to take field readings of the trench sidewalls and the excavated soil. The low levels of radioactivity found in these surveys were determined to be caused by natural soil materials (Shaw 2005).

4.3.2 Site 12 Recreational Area

In July 2011, the CDPH RHB did surveys of the 9th Street recreational area on NAVSTA TI (Figure 10). Based on the elevated readings noted during the survey, CDPH RHB recommended that the recreational area be designated as radiologically impacted. On March 22, 2012, CDPH modified their recommendations for this area to include characterization to identify the isotopes present and additional actions if found necessary. CDPH recommended that the recreational area not be used as a basis for site wide background radiation levels due to elevated radiation readings (CDPH 2012). Subsequent investigation by the Navy determined that the isotopes responsible for the elevated readings in the recreational area are naturally occurring Th-232 and Ra-226 and a formal report is being developed to document these findings. No additional action relative to the elevated readings noted by CDPH in this area is planned, other than the gamma walk over surveys planned for Site 12 (Section 2.2.7), and to exclude the area from use as a reference area for site-wide background levels. The Navy will summarize the characterization of the site in a response to the 2012 CDPH correspondence.

4.3.3 CDPH Scans Outside of the Site 12 SWDAs

The CDPH RHB did scans in areas of the SWDAs, however, they noted the scans were cursory and were not intended to draw conclusions. The survey consisted of a towed array survey that used 2- by 2-foot sodium-iodide detectors with global positioning system capabilities. The survey was done to assess the radiation exposure along publicly accessible roads in Site 12 and to ensure there are no health and safety risks. The CDPH RHB also did gamma walkover surveys in intervals around the fence line of the RCA at Site 12 (CDPH 2011). During the gamma walkover survey, CDPH RHB identified five locations with elevated counts—four of which were outside the fence and one was under the fence that constituted the RCA for SWDA A&B. The Navy expanded the fence line to encompass these four areas in the expanded boundaries of the RCA. Eighty-four out of thousands of locations had been identified above the background level on the roadways, and the elevated locations were considered by CDPH to be representative of naturally occurring isotopes found in asphalt. The Navy intends to do gamma walkover surveys of Site 12 roads and areas not previously subject to surface scans to further characterize the site (Navy 2011).

4.3.4 Building 233

Building 233 is the former location of the Radiation Detection, Indication, and Computation (RADIAC) Instrument Calibration School. In 1950, a spill of radium sulfate was reported in one of the laboratories in Building 233. Students unknowingly tracked the radiological material throughout the building before the spill was discovered. The U.S. Naval Radiological Defense Laboratory decontaminated and cleaned up the building. Although the floor was decontaminated at the time, the Navy is currently doing remedial activities and surveys to ensure the 1950 cleanup meets current standards. A radiological assessment of Building 233 was done and a survey report was issued in January 2007. The scoping survey indicated that at least some of the building piping is radiologically impacted. It was recommended that the piping be removed and fully surveyed for release during building demolition ([Tetra Tech EC Inc. 2008c](#)).

The demolition of the building was completed in January 2011 and at the time of this HRASTM, the Navy is currently completing the characterization, remediation, and FSS for the building footprint, the sanitary sewer system associated with the building and the surrounding area in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (Revision 1 August 2000).

4.3.5 Buildings 343 and 344

Building 343 is one of the three buildings that comprised the RADIAC school from the 1950s to the 1970s. The closeout survey done by the Navy in a storeroom of Building 343 detected two alpha wipe survey points that were above release limits. Although these survey points were decontaminated, the HRA found that they were not adequately investigated and recommended an FSS for the building. Building 344 was the location of a 1988 investigation of contamination in a waste container. The radioactive contamination was cleaned up and disposed of at a location off of NAVSTA TI. Surveys demonstrated that the areas were decontaminated to meet the Navy standards at the time. The HRA recommended an FSS for Building 344.

Radiological surveys for Buildings 343 and 344 were done in September 2007. In 2008, FSS reports were prepared for Buildings 343 and 344 ([Tetra Tech EC Inc. 2008a, 2008b](#)). The survey reports for Buildings 343 and 344 indicated that the survey results for both buildings met the release criteria and the buildings can be released for unrestricted use. DTSC and CDPH concurred that unrestricted release for Buildings 343 and 344 was appropriate ([DTSC 2009](#)).

4.3.6 SWDA 1231/1233

A non-time-critical removal action (NTCRA) began in May 2007 at three SWDAs along the shoreline: A&B, 1207/1209, and 1231/1233 ([Shaw 2007b](#)). The Navy is currently excavating and screening soils for chemical and radiological contaminants. During the NTCRA, radiological items that have been identified containing Ra-226 were found in all of the SWDAs, and in some cases have been found outside of but near the boundary of the SWDAs identified in the HRA. All radiological items in the SWDAs have been removed and disposed of properly. Confirmation samples will be collected in the SWDA areas once excavations are completed. At the time of this HRASTM, it is estimated that the NTCRA field activities will be completed by December 2014.

4.3.7 SWDA 1207/1209

See [Section 4.3.6](#).

4.3.8 SWDA A&B

See [Section 4.3.6](#).

5.0 CONCEPTUAL SITE MODEL

The purpose of this section is to discuss the CSM for radiologically impacted sites. A CSM is an effective tool for defining site dynamics, streamlining any future risk evaluations, and developing any further actions at a site. The purpose of the CSM is to aid in understanding and describing potential exposure pathways that may be at a site. A CSM typically includes:

- Suspected sources and types of contaminants
- Contaminant release and transport mechanisms
- Affected media
- Rate of contaminant release and transport (if possible)
- Known and possible routes of migration
- Known and potential exposure pathways
- Known and potential human and ecological receptors

While the HRA did not specifically identify CSMs in association with the radiologically impacted sites, the elements of a CSM were discussed in Section 7.3 of the HRA.

5.1 EXISTING CONCEPTUAL SITE MODEL

The HRA discussed impacted sites in Section 8.3.1 of the HRA, either under specific subheadings in the text or in the section narrative.

5.2 UPDATE TO CONCEPTUAL SITE MODEL

This HRASTM developed CSMs in the form of flowcharts and figures to better communicate the postulated mechanism by which radioactive materials or contamination may have been disposed of or distributed on the site. The radiologically impacted sites identified in the HRA were based on the potential for contamination or commodities to be present because of former spills (such as Building 233 and associated sewer drain), former storage of radioactive material (such as at Buildings 342, 343, and 344), and the potential on-site disposal and dispersion of unregulated radioactive materials in Site 12.

The research done for this HRASTM identified that, contrary to the findings of the HRA, significant ship repair activities occurred at NAVSTA TI during the WWII period and, in association with those repair activities, the potential for radiologically impacted areas exists at NAVSTA TI. This HRASTM provides a CSM for Repair/Solid Waste Disposal Operations/activities associated with the former optical repair shop to address the potential for these activities to have impacted the site. CSMs are provided: (1) to account for spills such as the one that occurred at Building 233, or that may have occurred at either of the USS *Pandemonium* locations; and (2) to account for the potential for spills to have occurred in association with remedial activities in the Site 12 SWDAs where radioactive waste and contaminated soils have been disposed of. Each of these CSMs is discussed further in the subsections below.

5.2.1 CSM for Repair/Solid Waste Disposal Operations

A CSM has been developed to account for radioactive waste that may have resulted from Repair/Solid Waste Disposal/optical shop operations. This CSM is shown in [Figure 11](#) in the form of a flowchart and pictorially in [Figure 12](#). The CSM addresses the potential for radioactive contamination at Building 3 in AOI 1 ([Figure 3](#)), the potential for radioactive contamination at a potential former salvage yard in AOI 6 ([Figure 8](#)), and both the radioactive commodities and contamination found in the SWDAs in AOIs 7 and 8 ([Figures 9 and 10](#)).

5.2.1.1 Suspected Sources and Types of Contaminants

The potential radionuclides of concern at Building 3 in AOI 1 ([Figure 3](#)) include both Ra-226 and Th-232. Ra-226 may have been present in Building 3 in the form of gauges or deck markers found on hull plating or for components such as gauges associated with ship repair activities. Ra-226 and Th-232 have been commonly found in optical repair shops in conjunction with radioluminescent painted pointers in rangefinders, thorium oxide in optical lenses, or thorium fluoride used in treating the surfaces of optical lenses.

Significant waste would have been generated during repair activities in addition to the potential handling of radioactive commodities from repair activities in Building 3 (see [Section 2.2.6](#)). This waste may have included radioactive commodities such as deck markers or gauges that could have been disposed of on site. Radioactive waste-contaminated soil and commodities have been identified during previous investigations and the greatest concentrations are localized in the four SWDAs ([Figures 9 and 10](#)). Because of the grading and site preparation for construction of the housing units, including mixing and spreading of the solid waste material with fill and surface soil in and outside the known SWDAs, radioactive commodities have been found in areas adjacent to these SWDAs. Ra-226 is the radionuclide of concern and the items found in these areas were radioactive foils, buttons, deck markers, and gauges. The deck markers and gauges are likely related to waste from ship repair activities during WWII. Based on the research conducted to-date, the source of the radioactive foils and buttons is unclear; the source of the deck markers found in the SWDAs was likely related to ship repair activities. Scrap metal salvage yards represent other areas potentially impacted by radioactive commodities associated with ship repair activities ([Figure 6](#)).

5.2.1.2 *Affected Media*

Media affected by the suspected sources and types of contaminants from the Repair/Solid Waste Disposal/optical shop operations CSM include structures, surface soil, sanitary sewers, subsurface soil, and groundwater.

5.2.1.3 *Contaminant Release, Transport Mechanisms, and Known Migration Routes*

The potential contaminant release and transport mechanisms from the CSM for Repair/Solid Waste Disposal Operations (Figure 11) are spilling and dumping, dispersion during waste processing activities, leaching from disposal areas, and contaminant infiltration and migration through the soil. The areas that are now referred to as SWDAs were created as a result of debris dispersion during earthwork operations prior to construction of the housing at Site 12 (Figures 9 and 10). This re-grading spread the localized contaminant-containing soil over the ground surface and potentially in areas away from the original sources. Consequently, soil contamination was observed in Site 12 during previous investigations.

5.2.1.4 *Human Receptors and Exposure Pathways*

Potential human receptors that may be present at the radiologically impacted sites were identified as follows, in conjunction with the CSM for Repair/Solid Waste Disposal Operations (Figure 11) and the 2011 TI/YBI Redevelopment Land Use Plan prepared for TIDA:

- Building 3 (Figure 3): commercial/industrial workers and construction workers.
- Potential Former Salvage Yard (Figure 8): commercial/industrial workers and construction workers
- SWDAs (Figure 9 and 10): residents, commercial/industrial workers (in the event an alternative commercial/industrial land use is implemented), recreational users, and construction workers.
- Former Storage Yard (Sites 30 and 31) (Figure 10): residents, commercial/industrial workers (in the event an alternative commercial/industrial land use is implemented), recreational users, and construction workers.

5.2.1.5 *Ecological Receptors and Exposure Pathways*

NAVSTA TI has poor quality terrestrial wildlife habitat because the island is predominantly covered with urbanized areas. The areas identified as radiologically impacted do not contain significant habitat, so no significant impacts to ecological receptors was identified.

5.2.2 CSM for Incidental Release in Association with Training Operations

A CSM was developed to account for radioactive contamination that may have resulted from potential incidental releases in association with training/operations. This CSM is shown on [Figure 13](#) in the form of a flowchart and pictorially for three specific sites (Building 233 and USS *Pandemonium* sites) on [Figures 14 and 15](#). The CSM addresses the potential for radioactive contamination in AOI 2 (Building 233, [Figure 3](#)), the potential for radioactive contamination in AOI 4 (Buildings 342, 343 and 344, [Figure 5](#)), AOI 6 (former USS *Pandemonium* Site II, [Figure 8](#)), and AOI 8 (former USS *Pandemonium* Site I, [Figure 10](#)).

Building 233 was identified as radiologically impacted in the HRA and a pictorial CSM is provided as [Figure 14](#). The building has since been demolished and characterization and scoping surveys are ongoing. Similarly, Buildings 343 and 344 were identified as radiologically impacted in the HRA and were subsequently surveyed and released for unrestricted use. Buildings 343 and 344 are not discussed further in this HRASTM. The locations of former USS *Pandemonium* Sites I and II are discussed below.

5.2.2.1 Suspected Sources and Types of Contaminants

The potential radionuclides of concern for USS *Pandemonium* Sites I and II (AOIs 6 and 8 on [Figures 8 and 10](#)), is Ra-226 associated with radioluminescent gauges used as check sources. Both of the former USS *Pandemonium* locations were identified as non-impacted in the HRA; however, as discussed in [Sections 2.2.6 and 2.2.8](#), this HRASTM has designated them as radiologically impacted based on a re-evaluation of existing information.

5.2.2.2 Affected Media

Media affected by the suspected sources and types of contaminants from the CSM for Incidental Releases from training operations include structures and buildings, surface soil, subsurface soil, discharge piping and groundwater.

5.2.2.3 Contaminant Release, Transport Mechanisms, and Known Migration Routes

The CSM for potential contaminant release and transport mechanisms from the potential incidental releases in association with training/operations are the dispersion of loose surface contamination from handling of the gauges that are documented for use as check sources at the USS *Pandemonium* Site II (NE) in AOI 6 (it is presumed that similar check sources were used at the USS *Pandemonium* Site I [NW] in AOI 8; however, no records to that effect have been located).

5.2.2.4 Human Receptors and Exposure Pathways

Potential human receptors that may be present at the radiologically impacted sites were identified as follows, in conjunction with the CSM for Incidental Releases from Training/Operations and based on the 2011 TI/YBI Redevelopment Land Use Plan prepared for TIDA:

- USS *Pandemonium* Site I (NW) ([Figure 10](#)): residents, commercial/industrial workers (in the event an alternative commercial/industrial land use is implemented), recreational users, and construction workers.
- USS *Pandemonium* Site II (NE) ([Figure 8](#)): commercial/industrial workers and construction workers.

5.2.2.5 Ecological Receptors and Exposure Pathways

The receptors and exposure pathways are the same as those for the CSM described in [Section 5.2.1.5](#).

5.2.3 CSM for Spills/Contamination Resulting from Handling of Contaminated Soils from Site 12 SWDAs

A CSM has been developed for to account for radioactive contamination that may have resulted from spills/contamination from handling of contaminated soils from Site 12 SWDAs. This CSM is shown on [Figure 16](#) in the form of a flowchart. The CSM addresses the potential for radioactive contamination originating at the SWDAs having been spread during transport through Site 12, or in handling at the Building 570 area in AOI 5 ([Figure 7](#)), and the potential for radioactive contamination at the Waste and Clean Soil Stockpile/Loading and Decontamination Site in AOI 6 ([Figure 8](#)).

5.2.3.1 Suspected Sources and Types of Contaminants

The potential radionuclides of concern for the Building 570 area and the Waste and Clean Soil Stockpile/Loading and Decontamination Site is Ra-226 based on the radioisotopes found in soil and commodities previously removed from the SWDAs in Site 12. These areas are newly identified as radiologically impacted based on the known handling of radioactive materials originating in the Site 12 SWDAs. The discovery of radioactive items in the SWDAs occurred after the publication of the HRA.

5.2.3.2 Affected Media

Media affected by the suspected sources and types of contaminants from the CSM for Spills/Contamination Resulting from Handling of Contaminated Soils from Site 12 include roadways and surrounding surface soil.

5.2.3.3 Contaminant Release, Transport Mechanisms, and Known Migration Routes

The potential contaminant release and transport mechanisms from the CSM for spills/contamination from handling of contaminated soils from Site 12 are from dispersion of loose surface contamination from handling, hauling, and storage of contaminated soil and radioactive commodities originating in the Site 12 SWDAs.

5.2.3.4 Human Receptors and Exposure Pathways

Potential human receptors that may be present at the radiologically impacted sites were identified as follows, in conjunction with the CSM for spills/contamination from handling of contaminated soils from Site 12 and based on the 2011 TI/YBI Redevelopment Land Use Plan prepared for the TIDA:

- Building 570 area (Figure 7): recreational users and construction workers.
- Waste and Clean Soil Stockpile/Loading and Decontamination Site (Figure 8): commercial/industrial workers and construction workers.

5.2.3.5 Ecological Receptors and Exposure Pathways

The receptors and exposure pathways are the same as those for the CSM described in Section 5.2.1.5.

6.0 FINDINGS AND RECOMMENDATIONS

This section provides findings and recommendations for sites designated as radiologically impacted in the HRA or in this HRASTM. Additional data requirements are presented and property suitable for transfer is identified

6.1 RADIOLOGICALLY IMPACTED SITES

This section provides findings and recommendations for sites designated as radiologically impacted in the HRA or in this HRASTM.

6.1.1 Radiologically Impacted Sites Identified in the HRA

This section provides findings and recommendations for sites designated as radiologically impacted in the HRA. Changes, if any, in the following categories are noted: Site Description, Former Uses, Current Uses, Radionuclides of Concern, Previous Radiological Investigations, Contamination Potential, Potential Migration Pathways, and Recommend Actions. Where information is unchanged from the HRA, it is not repeated.

6.1.1.1 Building 233

Building 233 is the former location of the RADIAC Instrument Calibration School. In the HRA, Building 233 and the Building 233 drain lines were separately presented as radiologically impacted. The HRA recommended a characterization survey of both floors of the building and the crawl space beneath it. Scoping surveys of the sanitary drains were recommended to include the first sanitary sewer manhole downstream from Building 233.

A final scoping survey report was issued for the building and the associated drain lines in January 2007. The scoping survey for the drain lines indicated that at least some of the building piping is radiologically impacted. It was recommended that the piping be removed and fully surveyed for release during building demolition. The demolition of the building was completed in January 2011 and at the time of this HRASTM the Navy is completing characterization, remediation, and an FSS for the building footprint, the sanitary sewer system associated with the building, and the surrounding area. This HRASTM did not identify any changes from the previous findings of the HRA for this building and sanitary sewer system other than the plan to conduct an FSS for the building footprint, the sanitary sewer system associated with the building, and the surrounding area.

6.1.1.2 Buildings 343 and 344

Building 343 and 344 are buildings that comprised the two of the three buildings of the RADIAC school from the 1950s through the 1970s. The HRA recommended that buildings 343 and 344 undergo an FSS. Radiological surveys for Buildings 343 and 344 were done in September 2007 and the FSS reports were issued in 2008. The Buildings 343 and 344 survey reports identified that Buildings 343 and 344 survey results met the release criteria and the buildings could be released to unrestricted use. DTSC and CDPH concurred that unrestricted release for Buildings 343 and 344 was appropriate, so no further action is required for these buildings.

6.1.1.3 Site 12

The HRA identified the contamination potential from solid waste disposal/incineration and recommended radiation monitoring during excavation of identified solid waste disposal areas. Following results from an ongoing, non-time-critical removal action and other investigations, based on the results from the NTCRA at Site 12, the SWDAs were found to be contaminated with radiological items or contamination containing Ra-226. As a result of the information obtained from the field work completed to-date, the following changes have been made to the subcategories of information for Site 12 that were in Section 8.3.1.4 of the HRA:

Site Description – Revise to add italicized sentence at the end. “What is now known as Installation Restoration 12 on the northern end of NAVSTA TI was once a disposal area for trash and debris. Four discrete solid waste disposal areas have been identified. Parts of Site 12 were used for storage of ammunition in bunkers and also for the disposal and incineration of refuse. Later, portions of the site were used for material storage. Beginning in the 1960s, the area was developed for military housing. It is believed that over the course of development of the northern portion of the island for residential use, some of the debris and ash has been incorporated into fill material or otherwise scattered as a result of site grading operations (**TI-HRA-91**). General waste disposal took place around and in-between bunkers. Waste disposal operations continued until approximately 1963. *Intrusive investigation has identified the presence of radiological commodities and contamination containing Ra-226 (**TI-HRASTM-1**).*”

Contamination Potential – Change “Unlikely” to “Likely”

Contaminated Media

Surface Soil – Change “None” to “Medium”

Subsurface Soil – Change “None” to “High”

Groundwater – Change “None” to “Low”

Potential Migration Pathways

Groundwater – Change “None” to “Low”

Recommended Actions – Change “Perform radiation monitoring during soil excavation of the known solid waste disposal areas.” to “Complete a characterization survey and remediate known areas of radiological contamination. Complete an FSS after remediation is complete. Complete a gamma walkover scoping survey for areas outside of radiologically impacted SWDA boundaries in Site 12.”

6.1.2 Radiologically Impacted Sites Identified in this HRASTM

This section provides findings and recommendations at sites that were not designated as radiologically impacted at the time of the HRA, but were designated as radiologically impacted in this HRASTM. These sites include Building 3 (Photos 30 and 31), Building 570 area (Photo 32), former USS *Pandemonium* Sites I (NW) (Photos 37 and 38) and II (NE) (Photos 33 and 34), three former salvage yard sites (Photos 20, 35, and 42), a waste and clean soil stockpile/loading and decontamination site (Photo 36), a former storage area that includes Sites 30 and 31 (Photos 39 and 40), and Building 342 (Photo 41).

6.1.2.1 Building 3



Photo 30: Northeast side of Building 3

Site Description – Building 3 is one of the original buildings constructed on TI for the 1939 GGIE. It is a large general warehouse building with both arched and flat roofs. The building covers approximately 145,000 square feet. This building was designated as non-impacted in the HRA. An optical repair shop was located on the roof of the northern corner of the building.

Former Uses – Palace of Fine and Liberal Arts, port control office, ships repair shops, optical repair shop, training school, and equipment repair. The Damage Control HT “A” school administration and offices maintained radiation survey instruments with check sources. There were no reports of leaking check sources.

Current Uses – Occasional commercial film studio

Potential Radionuclides of Concern – Ra-226 from ship repair activities, and Ra-226 and Th-232 from the former optical repair shop

Previous Radiological Investigations – None

Contamination Potential – Likely the drains leading from the former optical repair shop; unlikely for the remainder of the building.

Contaminated Media

- Surface Soil – None
- Subsurface Soil – None
- Sediment – None
- Surface Water – None
- Groundwater – None
- Air – None
- Structures – Low
- Drainage Systems – High

Potential Migration Pathways

- Surface Soil – None
- Subsurface Soil – None
- Sediment – None
- Surface Water – None
- Groundwater –None
- Air – None
- Structures – None
- Drainage Systems – High

Recommended Actions – Scoping survey of floor spaces and sanitary sewer drains associated with former optical repair shop out to the first pump station.

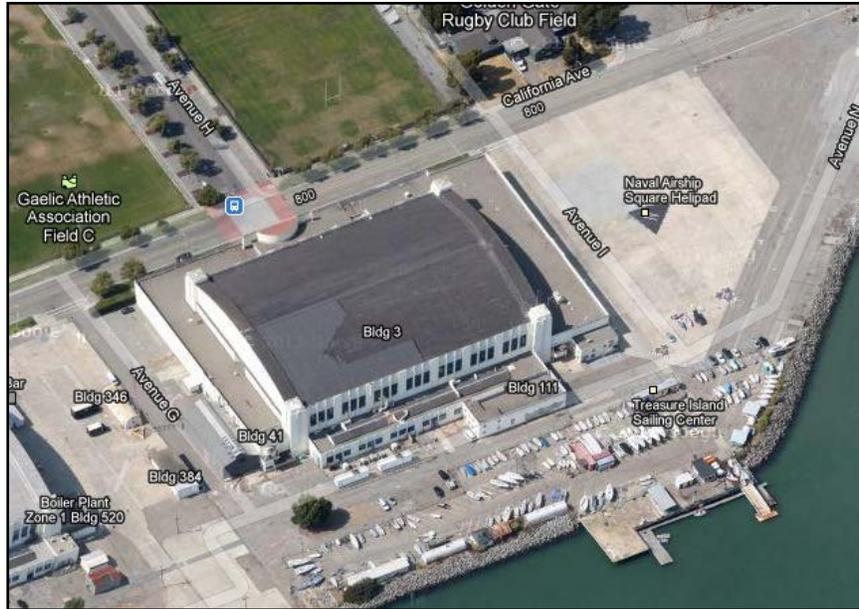


Photo 31: Location of Building 3

6.1.2.2 Building 570



Photo 32: Building 570 area and location

Site Description – Building 570 was constructed in 1988. It is a single story slab-on-grade metal building. The building covers approximately 3,000 square feet. This area was not identified as radiologically impacted in the HRA.

Former Uses – Operation training facility

Current Uses – The Building 570 area has been used as an office trailer and laydown area by the Navy in association with remedial activities on NAVSTA TI including those at Site 12. As discussed in [Sections 2.2.5](#) and [5.2.3](#), removals in the Site 12 SWDAs after the HRA involved the removal of radiological commodities and soil contaminated with radiological constituents. Soil samples were stored and analyzed for radioisotopes in the Building 570 area. Radiological commodities were stored in conex boxes in a smaller fenced yard in the Building 570 area.

Potential Radionuclides of Concern – Ra-226

Previous Radiological Investigations – None

Contamination Potential – Unlikely

Contaminated Media

- Surface Soil – Low
- Subsurface Soil – None
- Sediment – None
- Surface Water – None
- Groundwater – None
- Air – None
- Structures – Low
- Drainage Systems – Low

Potential Migration Pathways

- Surface Soil – Low
- Subsurface Soil – None
- Sediment – None
- Surface Water – None
- Groundwater –None
- Air – None
- Structures – None
- Drainage Systems – Low

Recommended Actions – Conduct an FSS of structures and yard.

6.1.2.3 USS Pandemonium Site II (NE)



Photo 33: USS Pandemonium Site II (NE)

Site Description – The USS *Pandemonium* training ship was moved to the northeast corner of NAVSTA TI in 1969 where it remained until it was demolished in 1996. The training ship was part of the new Damage Control School complex that included Buildings 461, 462, and 463. Access to the area was by the tear-gas decontamination building (462). An 8-foot high fence separated the training area from the rest of the island. Use of the mock-up ship ended in 1992 though the mock-up remained until 1996. While in use, the training ship was used to simulate radioactive fallout using short-lived isotopes (a short-lived isotope is one with such a short half-life that it decays to a negligible quantity in a matter of hours or perhaps days) as discussed in [Section 2.2.6](#), and Cs-137 sources for fixed locations. Two below-grade concrete holding tanks collected the washdown water when decontamination of short-lived isotopes was done in the USS *Pandemonium*. The washdown water was released to the bay through a 6-inch pipe after sufficient time transpired for the isotopes to have decayed away. Ra-226-containing gauges were used as check sources during training, as discussed in [Section 2.2.6](#). The USS *Pandemonium* Site II (NE) was designated as non-impacted in the HRA.

Former Uses – Damage Control School decontamination training area (after July 1969). Although the mock-up ship remained until 1996, the use of the mock-up ended in 1992. No radiological-related work has been conducted at the site of the former USS *Pandemonium* Site II (NE) ([Figure 8](#)) since the time of the HRA. Decontamination training used sealed sources of Cs-137 to simulate radioactive fallout and also used short-lived liquid radioisotopes (Br-82, Br-80, Na-24, and K-42) to more realistically simulate radioactive fallout. Survey instruments containing radioactive check sources were used during the training exercises. The Cs-137 sealed sources were leak tested and demonstrated to be intact. The licensed check sources were also required to be leak tested on a periodic basis; however, unlicensed check sources would not have required leak testing. No reports of leakage were found during the course of the HRA and this HRASTM. The short-lived isotopes were last used at this location in 1972 and have decayed away and are no longer present.

Current Uses – None

Potential Radionuclides of Concern – Ra-226, Cs-137

Previous Radiological Investigations – None

Contamination Potential – Unlikely

Contaminated Media

- Surface Soil – Low
- Subsurface Soil – None
- Sediment – None
- Surface Water – None
- Groundwater – None
- Air – None
- Structures – Low
- Drainage Systems – Low

Potential Migration Pathways

- Surface Soil – Low
- Subsurface Soil – None
- Sediment – None
- Surface Water – None
- Groundwater – None
- Air – None
- Structures – None
- Drainage Systems – Low

Recommended Actions – Complete a scoping survey of the concrete holding tanks, structures, and ground surface in the former training area.



Photo 34: Location of former USS *Pandemonium* Site II (NE)

6.1.2.4 Former Salvage Yard



Photo 35: Location of Former Salvage Yard

Site Description – As noted in [Section 2.2](#), significant ship repair activities were ongoing throughout WWII. Those activities generated significant amounts of scrap metal, which was potentially processed in the open area and south of Building 327 that was identified as a Salvage Building in the HRA. Building 327 was demolished in the 1960s and the radiologically impacted area is now beneath the footprint of the sewage treatment plant that was constructed in 1984. This area was not identified as radiologically impacted in the HRA.

Former Uses – Salvage

Current Uses – The area is now the site of the NAVSTA TI sewage treatment facility.

Potential Radionuclides of Concern – Ra-226

Previous Radiological Investigations – None

Contamination Potential – Unlikely

Contaminated Media

- Surface Soil – Low
- Subsurface Soil – Low
- Sediment – None
- Surface Water – None
- Groundwater – None
- Air – None
- Structures – Low
- Drainage Systems – Low

Potential Migration Pathways

Surface Soil – Low
Subsurface Soil – Low
Sediment – None
Surface Water – None
Groundwater – None
Air – None
Structures – None
Drainage Systems – Low

Recommended Actions – Complete a scoping survey of the ground surface in the sewage plant area.

6.1.2.5 Waste and Clean Soil Stockpile/Loading and Decontamination Site



Photo 36: Waste and Clean Soil Stockpile/Loading and Decontamination Site

Site Description – The Waste and Clean Soil Stockpile/Loading and Decontamination Site is an open area in AOI 6 (Figure 8) and shown in Photo 36 above. This area was not identified as radiologically impacted in the HRA.

Former Uses – A number of WWII era training and administrative buildings were located in this area. All buildings were demolished.

Current Uses – The Waste and Clean Soil Stockpile/Loading and Decontamination Site is currently used by a Navy contractor in association with remedial activities at Site 12 on NAVSTA TI. Contaminated and other soil removed from the SWDAs has been repackaged and stored in the area for off-site disposal.

Potential Radionuclides of Concern – Ra-226

Previous Radiological Investigations – None

Contamination Potential – Unlikely

Contaminated Media

- Surface Soil – Low
- Subsurface Soil – low
- Sediment – None
- Surface Water – None
- Groundwater – None
- Air – None
- Structures – None
- Drainage Systems – Low

Potential Migration Pathways

- Surface Soil – Low
- Subsurface Soil – None
- Sediment – None
- Surface Water – None
- Groundwater – None
- Air – None
- Structures – None
- Drainage Systems – None

Recommended Actions – Complete an FSS of the ground surface in the Waste and Clean Soil Stockpile/Loading and Decontamination Site.

6.1.2.6 USS Pandemonium Site I (NW)



Photo 37: USS Pandemonium Site I (NW)

Site Description – The USS *Pandemonium* training ship was constructed in 1956. The training ship was commissioned for use in February 1957 and remained in service in the northwest corner until July 1969. The fenced-off, gravel-surfaced training area was approximately 400 by 600 feet. The area enclosed eight buildings, two old aircraft, the USS *Pandemonium* mock-up ship, and a paved road. During testing of the radioactive spreader device for short-lived isotopes, the radioactive water was allowed to soak into the soil. Later, radioactive water from the decontamination training was collected in two below-grade concrete tanks and stored until the short-lived isotopes had decayed. When the radioactivity was within allowable limits, the water was discharged to the bay through a 6-inch pipe. The USS *Pandemonium* Site I (NW) was moved from this area in 1969 to the northeast corner of NAVSTA TI. The location of the former USS *Pandemonium* Site II (NE) has since been converted into multiple family military housing units. As discussed in [Section 2.2.8](#), the former holding tanks have likely been partially demolished, leaving the floor of the tank. The USS *Pandemonium* Site II (NE) was designated as non-impacted in the HRA.

Former Uses – Nuclear, Biological, and Chemical Warfare School. Decontamination training area. Decontamination training initially used only sealed sources of Cs-137 to simulate radioactive fallout. In 1963, a radioactive material license was granted by the AEC to use short-lived liquid radioisotopes (Br-82, Br-80, Na-24, and K-42) to more realistically simulate radioactive fallout. Survey instruments containing radioactive check sources were used during the exercises. The Cs-137 sealed sources were leak tested and demonstrated to be intact. The licensed check sources were required to be leak tested on a periodic basis; however, unlicensed check sources would not have required leak testing. No reports of leakage were during the course of the HRA and this HRASTM. The short-lived isotopes were last used at this location in 1969, have decayed away and are no longer present. It is likely that check sources such as the gauges containing Ra-226 may have been used during training.

Current Uses – Multi-family housing

Potential Radionuclides of Concern – Ra-226, Cs-137

Previous Radiological Investigations – None

Contamination Potential – Unlikely

Contaminated Media

- Surface Soil – Low
- Subsurface Soil – Low
- Sediment – None
- Surface Water – None
- Groundwater – None
- Air – None
- Structures – None
- Drainage Systems – Low

Potential Migration Pathways

Surface Soil – None
Subsurface Soil – Low
Sediment – None
Surface Water – None
Groundwater – None
Air – None
Structures – None
Drainage Systems – None

Recommended Actions – Complete a scoping survey of the former holding tanks, structures, and ground surface in the USS *Pandemonium* Site I (NW) area and a gamma walkover survey of the roadways and areas not previously subject to gamma walkover surveys.



Photo 38: Location of former USS *Pandemonium* Site I (NW)

6.1.2.7 Former Storage Area and Sites 30 and 31



Photo 39: Storage yard area circa 1945

Site Description – The Former Storage Area that includes sites 30 and 31 is a former open area in AOI 10 (Figure 10) and shown in Photo 39. The area is composed of two former storage areas north and south of IRP Sites 30 and 31 and the IRP sites that are discussed further below. This area was not identified as radiologically impacted in the HRA.

Storage Area North of Site 31. This area was bordered by a runway to the north, avenues D and E to the west and east and IR Site 31 to the south. The site, appearing as bare soil in a 1942 aerial photo, can be seen being used as a laydown area adjacent to the runway (Figure 10 June 1942 photo). It currently has elementary school buildings and paved surfaces

Site 30. Currently referred to as the Daycare Center it is south of the TI Elementary School, at the corner of Avenue D and 11th Street. As part of the environmental baseline survey prepared to support the leasing of the daycare center, the Navy reviewed a 1989 as-built drawing of the water lines in the area. The drawing noted the comment “buried trash” along 11th Street. In 2002, a series of investigations identified various types of wastes (including buried burned debris associated with historical practices) that contained lead at concentrations exceeding the site soil screening level. Based on these findings, the Navy completed a time-critical removal action in July 2002. Additional burned debris was found, and analytical results for soil samples showed the presence of dioxins, lead, arsenic, and vanadium. The Navy continued to investigate the area to delineate the extent of the burned debris and dioxin contamination. Some of the soil containing burned

debris was not accessible and could not be removed. In January 2003, the Navy installed a 6-inch concrete pad adjacent to the daycare center to cover the 1,400-square-foot area around and between the locations that contain elevated concentrations of dioxin in the subsurface soil. The concrete pad is a protective barrier to prevent contact with the soil.

Site 31. The asphalt-covered playground south of the TI Elementary School is referred to as the former South Storage Yard and is at the corner of Avenue E and 13th Street. In 2002, the Navy investigated the area because of its former use as a storage yard and because of the reference to an “old trash dump” noted on a 1989 as-built drawing for the 11th Street water line replacement project. An initial investigation found construction and burned debris. The initial investigation of the soil found lead, PCBs, and dichlorodiphenyltrichloroethane with concentrations above the site soil screening levels. These chemicals may have been associated with fuel leaks or other releases from items that were stored in the former storage yard area. The site was designated as a CERCLA site in September 2003. The RI report was finalized in July 2006. The FS report was finalized in March 2007. The proposed plan was finalized on September 18, 2008, and the public meeting was held on October 7, 2008. The record of decision was finalized on August 5, 2009. A final soil remediation work plan was submitted on January 28, 2010, and the soil remediation field work (referred to as Phase I) began in February 2010 and continued through July 2010. The Navy prepared another work plan for Phase II soil remediation work in January 2012 and, at the time of this HRASTM, is conducting additional soil remediation at this site.

Storage Area South of IR Site 30. This area was bordered by IR Site 30 to the north, avenues D and E to the west and east and 9th street to the south. The site, appearing as bare soil in a 1942 aerial photo, can be seen being used as a laydown area (Figure 10, March 1947 photo). It currently contains a number of bungalows and paved surfaces.

Former Uses – Site 30 was undeveloped until the Navy’s former daycare center was built in 1985. After NAVSTA TI closed, the TI Daycare Center was leased to the City and County of San Francisco under a finding of suitability to lease (FOSL) on July 29, 1997. The daycare center opened on March 17, 2003. Site 31 was used during the 1970s as a storage yard; however, the nature of, and operations at the storage yard are unknown. In the late 1970s, the area was paved over and developed as a playground for the elementary school. Based on the FOSL and the restrictions identified in it, the Navy entered into a lease agreement with the San Francisco Unified School District (SFUSD) on May 13, 1996 for the elementary school and associated playground. The school had originally been constructed by SFUSD in approximately 1968 when the military housing was built, and was operated under a previous agreement with the Navy until the 1996 lease agreement.

Current Uses – The northern portion of the storage area is currently occupied by the elementary school. Site 30 remains in use as a day care center. Site 31 is currently fenced, is undergoing remediation, and being used as a laydown area associated with the remediation. The southern portion of the former storage area is a parking lot and contains several bungalows and a large paved parking lot.

Potential Radionuclides of Concern – Ra-226

Previous Radiological Investigations – The northern and southern portion of the storage area – None; Site 30 – None; Site 31 – During the Phase I removal action, elevated radioactivity above background was discovered in the sidewall of the excavation. Laboratory testing confirmed the presence of non-naturally occurring Ra-226, possibly from a deteriorated metal gauge. The Navy is currently doing the Phase II soil remediation for Site 31, including further radiological characterization.

Contamination Potential – Likely

Contaminated Media

Surface Soil – Low
Subsurface Soil – Low
Sediment – None
Surface Water – None
Groundwater – None
Air – None
Structures – None
Drainage Systems – None

Potential Migration Pathways

Surface Soil – Low
Subsurface Soil – Low
Sediment – None
Surface Water – None
Groundwater – None
Air – None
Structures – None
Drainage Systems – None

Recommended Actions – Complete a characterization survey and remediate known areas of contamination. Complete an FSS after remediation is completed.

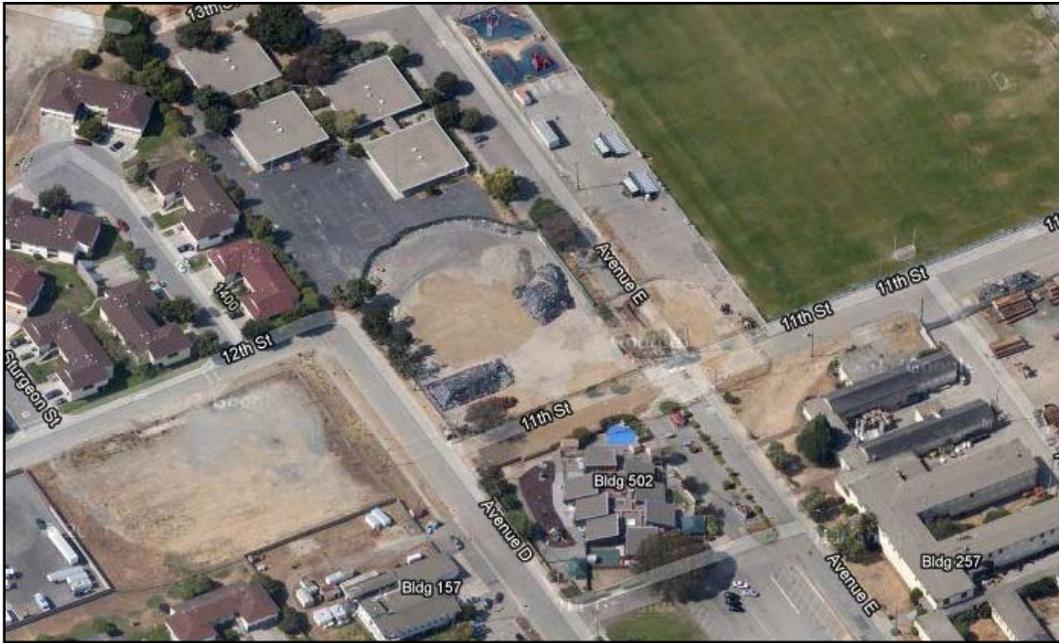


Photo 40: Former storage yard location (including Sites 30 and 31)

6.1.2.8 Building 342



Photo 41: Building 342 area

Site Description – Building 342 was constructed in 1951. It is a single story slab-on-grade approximately 8,000-square-foot metal building. This area was not identified as radiologically impacted in the HRA. The 1972 license description states that “Building 342 houses two labs belonging to RADIAC Maintenance School and one lab that belongs to Underway Replenishment School. Lab #1 is not in use. Lab #2 contains RADIAC storage spaces, a workshop and a counting lab. Lab #3 contains equipment

for demonstrating underway replenishment [sic] techniques.” The HRA designated 342 as non-impacted because, as stated in the HRA, nothing but sealed sources were used in the building, but the fact that the license says there was a counting room warrants classifying the site as radiologically impacted (Navy 1972).

Former Uses – RADIAC instruction, counting and RADIAC calibration.

Current Uses – None, unoccupied

Potential Radionuclides of Concern – Ra-226, Cs-137

Previous Radiological Investigations – None

Contamination Potential – Low

Contaminated Media

- Surface Soil – Low
- Subsurface Soil – None
- Sediment – None
- Surface Water – None
- Groundwater – None
- Air – None
- Structures – Low
- Drainage Systems – Low

Potential Migration Pathways

- Surface Soil – Low
- Subsurface Soil – None
- Sediment – None
- Surface Water – None
- Groundwater –None
- Air – None
- Structures – None
- Drainage Systems – Low

Recommended Actions – Do a scoping and an FSS of the structure, and a scoping survey of the sanitary sewer line that services the building out to the nearest sump.

6.1.2.9 Former Salvage Yard (Lot 69)



Photo 42: Location of Former Salvage Yard (Lot 69)

Site Description – As noted in [Section 2.2](#), sometime between 1962 and 1968, a Supply Department Salvage Yard was established east of the tennis courts (see above [Photo 42](#) and [Figure 6](#)). By 1996, this salvage yard area was referred to as Lot 69 and was listed as a Hazardous Waste Accumulation Area in the Spill Prevention, Control, and Countermeasures plan. The northern, larger part of Lot 69 was the non-hazardous storage or staging area for furniture and non-hazardous tools waiting to be disposed of by the DRMO. South of the lot there is a transfer station for solid waste. A general inventory of waste stored in the hazardous waste accumulation area consisted of waste oils, flammables, corrosives, and other regulated materials like rags, latex paints, empty paint and flammable containers. Because this area was used as a salvage yard and due to the lack of any other radiological information associated with this site, this HRASTM identifies this salvage yard (Lot 69) as impacted based on the fact that salvage yards are often linked with the potential for disposal of unregulated radiological commodities.

This area was not identified as radiologically impacted in the HRA.

Former Uses – Salvage

Current Uses – The area is now used as a storage area.

Potential Radionuclides of Concern – Ra-226

Previous Radiological Investigations – None

Contamination Potential – Unlikely

Contaminated Media

Surface Soil – Low
Subsurface Soil – Low
Sediment – None
Surface Water – None
Groundwater – None
Air – None
Structures – None
Drainage Systems – Low

Potential Migration Pathways

Surface Soil – Low
Subsurface Soil – Low
Sediment – None
Surface Water – None
Groundwater – None
Air – None
Structures – None
Drainage Systems – Low

Recommended Actions – Perform a scoping survey of the ground surface in the salvage yard area.

6.2 FINDING OF SUITABILITY TO TRANSFER (FOST) AREAS

All areas of NAVSTA TI subject to the prior HRA and this HRASTM are suitable for transfer with respect to potential impacts on human health and the environment from exposure to radiological contamination, provided they have not been designated as radiologically impacted in either of these documents. Only Buildings 343 and 344 have reached regulatory closure as they have been released for unrestricted use; therefore, these “radiologically impacted” buildings are an exception and are suitable for transfer.

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FIGURES



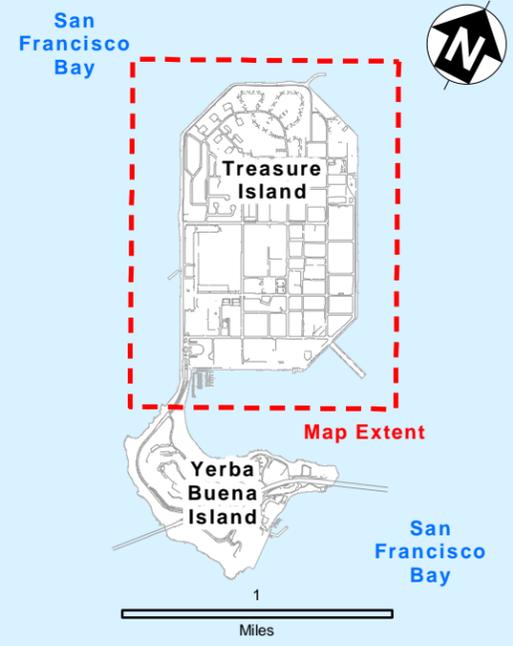
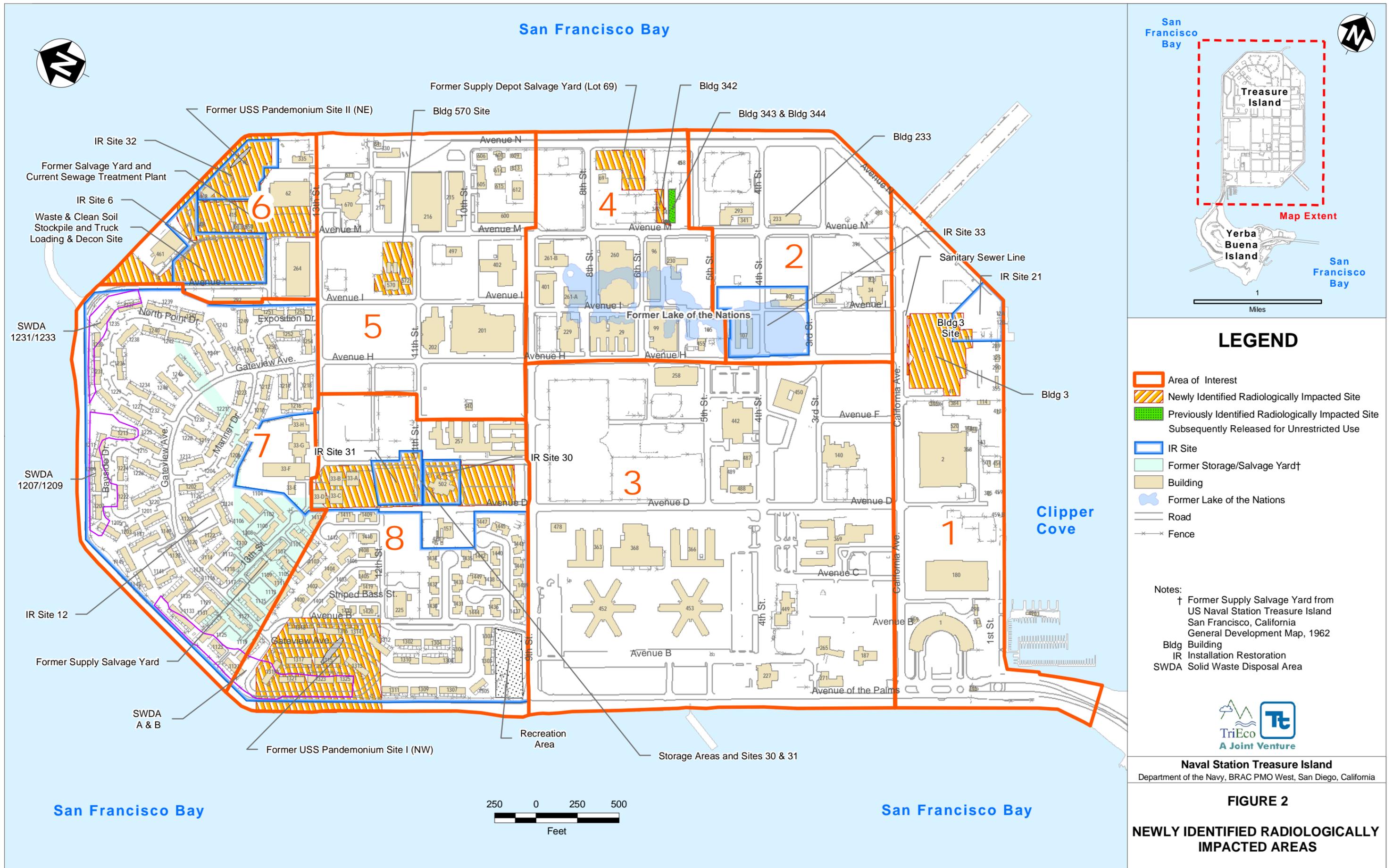
LEGEND

- ▬▬▬ Freeway
- ▬▬▬ Highway
- ▬▬▬ Major Road
- + + + + Railroads
- ▬▬▬ Rivers



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FIGURE 1
LOCATION MAP
TREASURE ISLAND
AND THE
SAN FRANCISCO BAY AREA



LEGEND

- Area of Interest
- Newly Identified Radiologically Impacted Site
- Previously Identified Radiologically Impacted Site Subsequently Released for Unrestricted Use
- IR Site
- Former Storage/Salvage Yard†
- Building
- Former Lake of the Nations
- Road
- Fence

Notes:
 † Former Supply Salvage Yard from US Naval Station Treasure Island San Francisco, California General Development Map, 1962
 Bldg Building
 IR Installation Restoration
 SWDA Solid Waste Disposal Area



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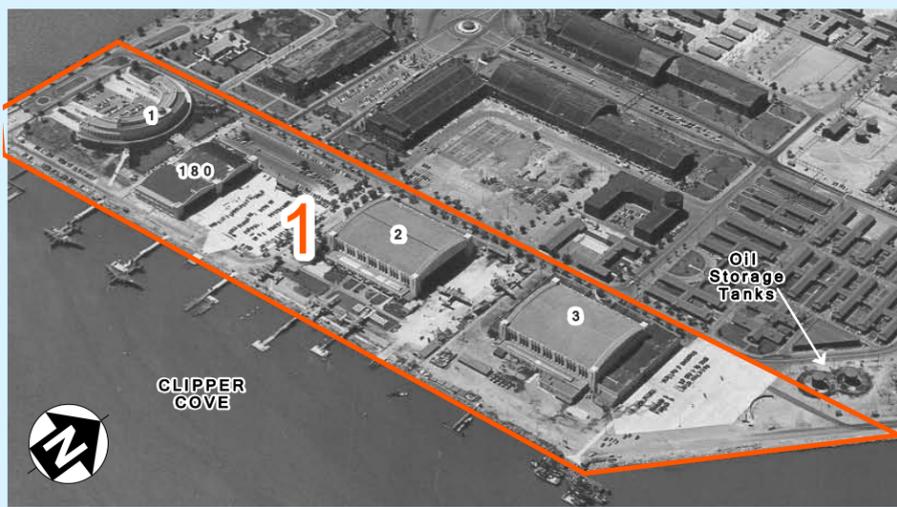
FIGURE 2
NEWLY IDENTIFIED RADIOLOGICALLY IMPACTED AREAS



Seaplane Lagoon Area of Interest
15 August 2000 (not to scale)

NOTES:

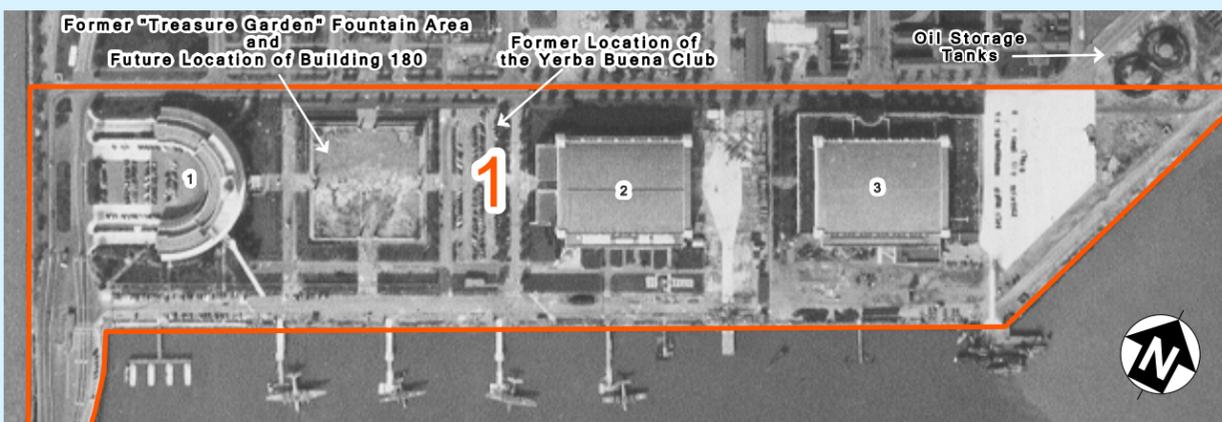
- Treasure Island was leased by Navy on 31 February 1941. The Navy took title to Treasure Island on 17 April 1942.
- Infrastructure was essentially built out and predominately paved since beginning of operations when licensed or unlicensed radioactive materials would have been handled.
- No significant construction occurred during the war period with the exception of piers. Building 180 represents the only significant infrastructure change within this footprint subsequent to the World's Fair. During the World's Fair, the footprint of Building 180 was referred to as the "Treasure Garden" and contained a fountain. In the 4 June 1942 photo (bottom left) the fountain has been demolished and site preparations for Building 180 are underway.
- Building 3 is considered impacted due to the level of repair operations that were conducted during WWII which may have involved the handling of radium containing devices.
- In addition, an optical shop which likely handled radioactive materials was located on the roof of Building 3.
- Oil storage tanks on southeast corner of Treasure Island were removed shortly after the end of the WWII.



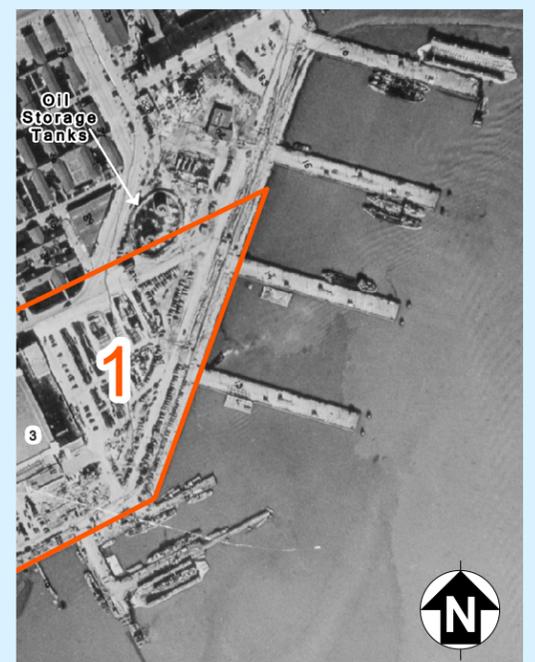
Seaplane Lagoon Area of Interest
ca. 1943 (not to scale)



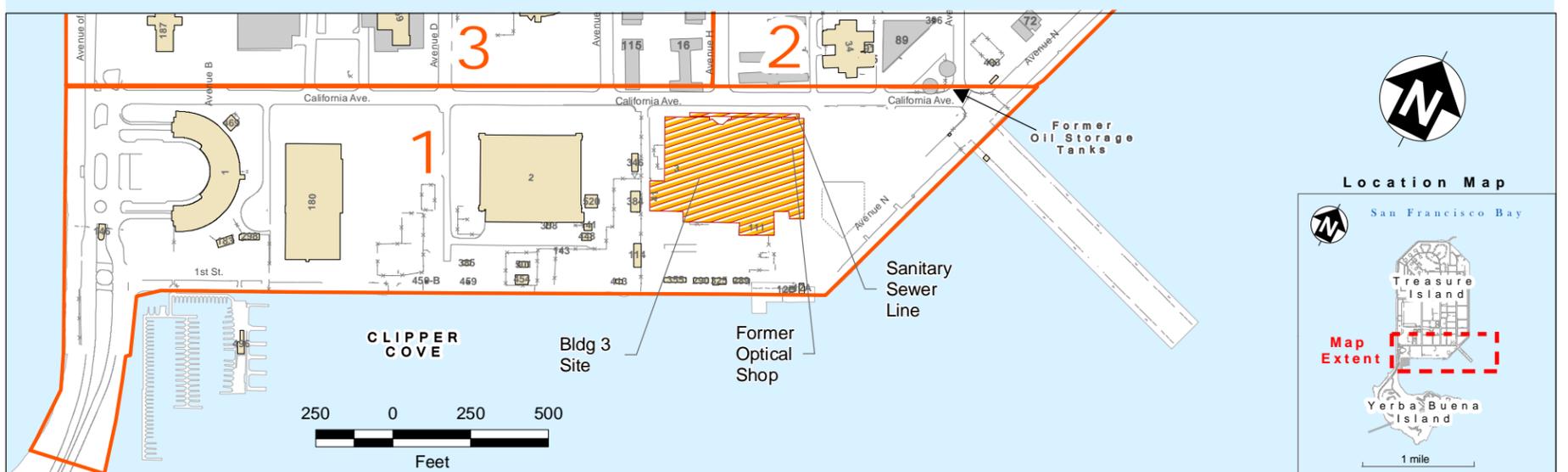
Seaplane Lagoon Area of Interest
24 March 1947 (not to scale)



Seaplane Lagoon Area of Interest
04 June 1942 (not to scale)



Seaplane Lagoon Area of Interest
20 February 1945
(not to scale)



LEGEND

- | | |
|---|---------------------|
| Area of Interest | Demolished Building |
| Newly Identified Radiologically Impacted Area | Road |
| Existing Building (as of 19 June 2011) | Fence |



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FIGURE 3
SEAPLANE LAGOON
AREA OF INTEREST 1



Island Core Area of Interest
15 August 2000 (not to scale)

NOTES:
Area of Interest 3 has no radiologically impacted areas:
1) No evidence of radiological work has been found in this area;
2) Buildings in the area primarily served as barracks and support facilities and there is no evidence of industrial activities in this area;
3) There is no evidence of industrial lay down areas having been present in this area from review of available documents.



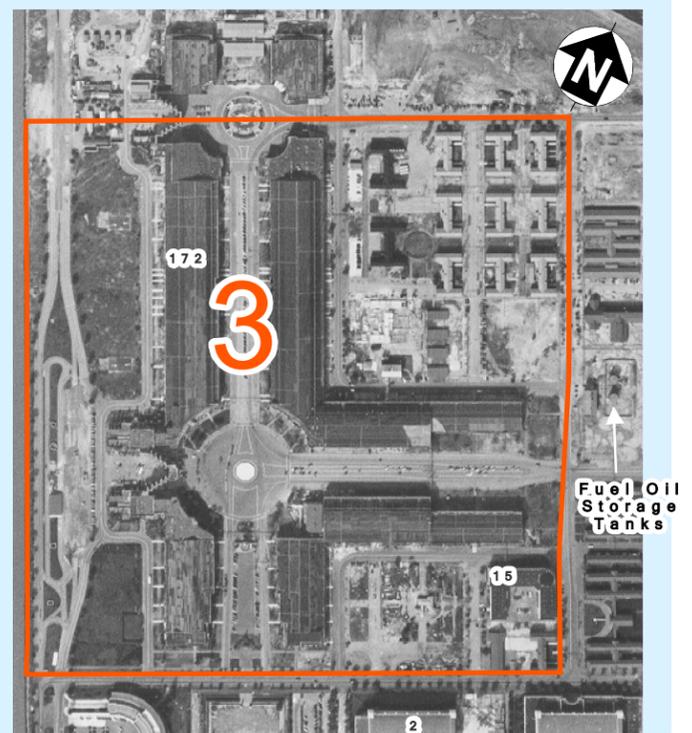
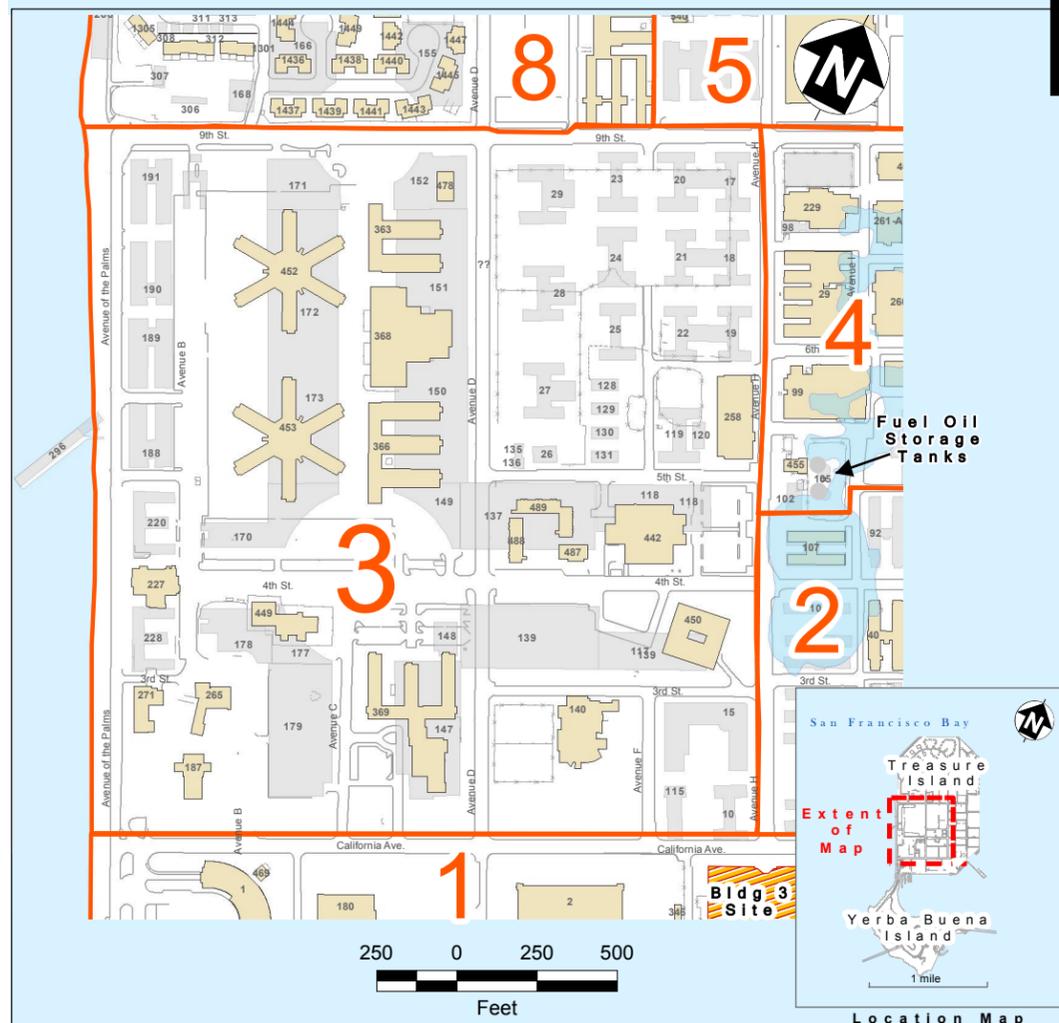
Island Core Area of Interest
19 May 1969 (not to scale)



Island Core Area of Interest
18 April 1968 (not to scale)



Island Core Area of Interest
24 March 1947 (not to scale)



Island Core Area of Interest
ca. 1942 (not to scale)

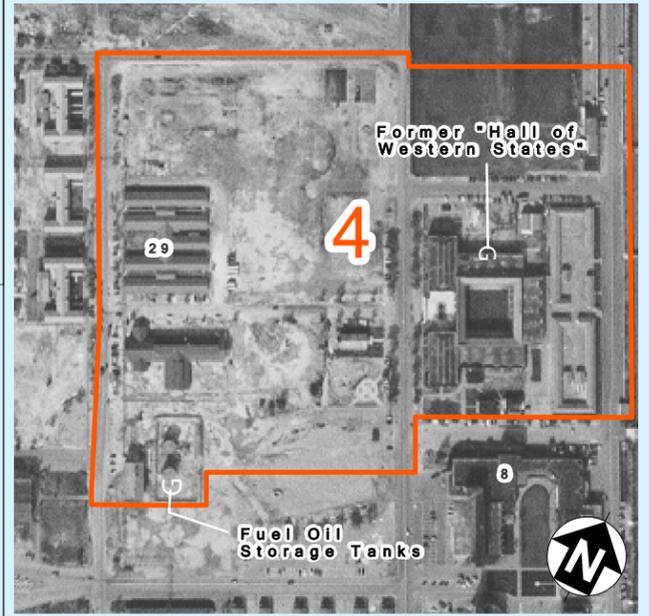
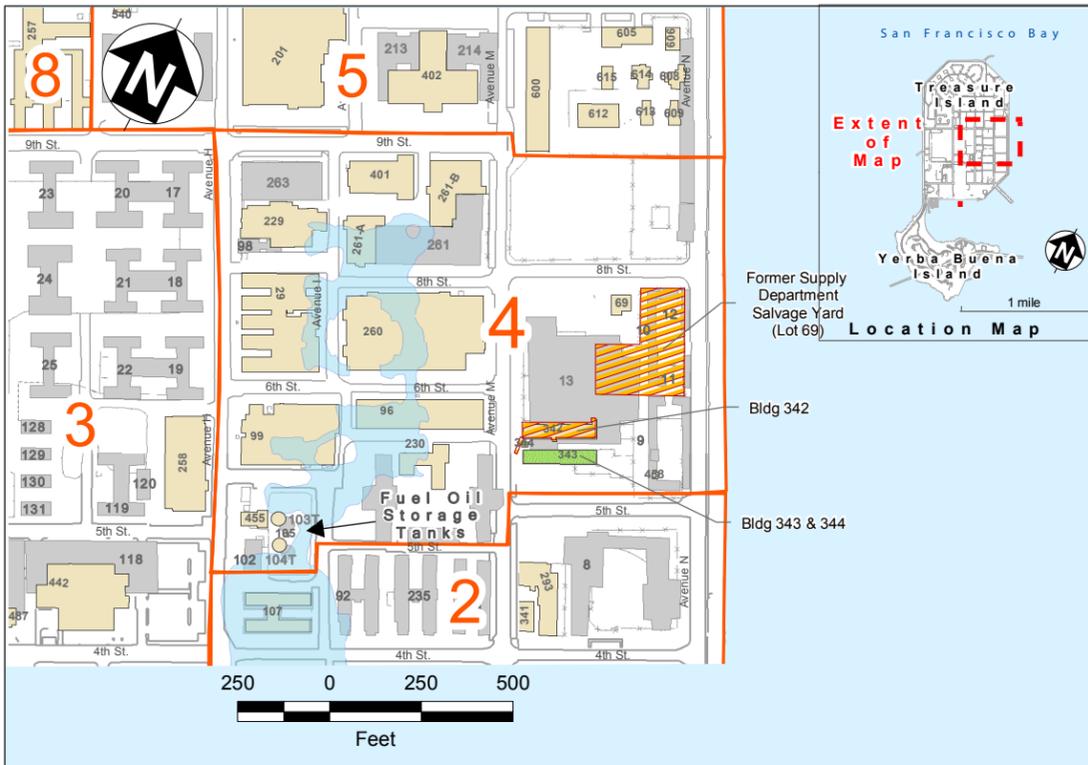
LEGEND

- Area of Interest
- Newly Identified Radiologically Impacted Area
- Existing Building (as of 19 June 2011)
- Demolished Building
- Road
- Fence
- Former Lake of the Nations



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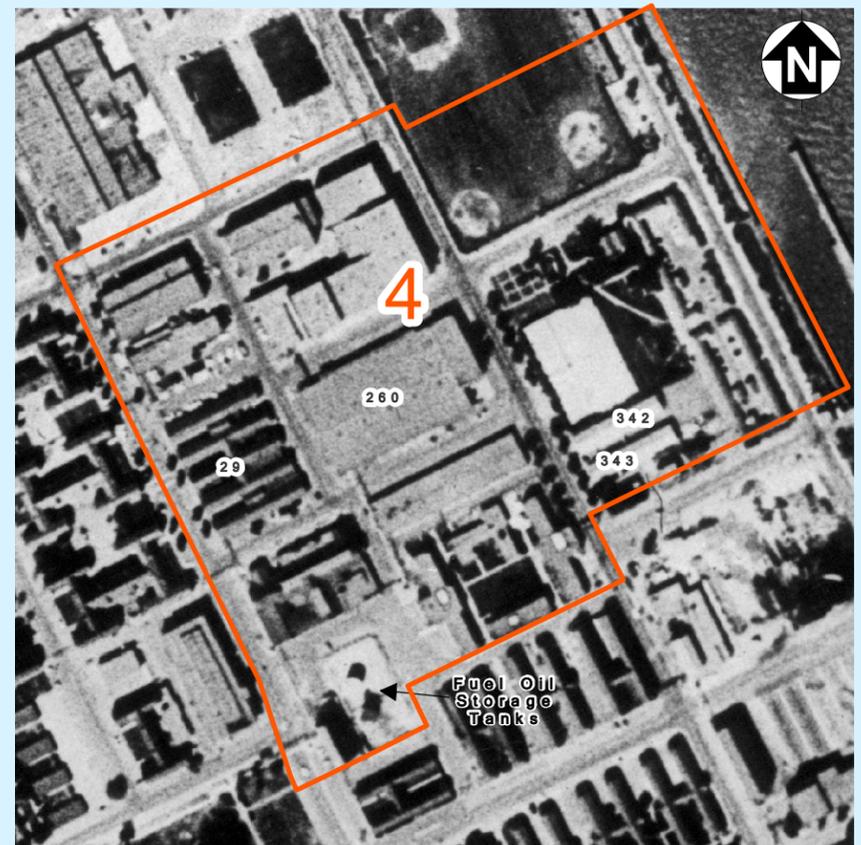
FIGURE 5
ISLAND CORE
AREA OF INTEREST 3



Southwestern Community Area of Interest
04 June 1942 (not to scale)



Southwestern Community Area of Interest
24 March 1947 (not to scale)



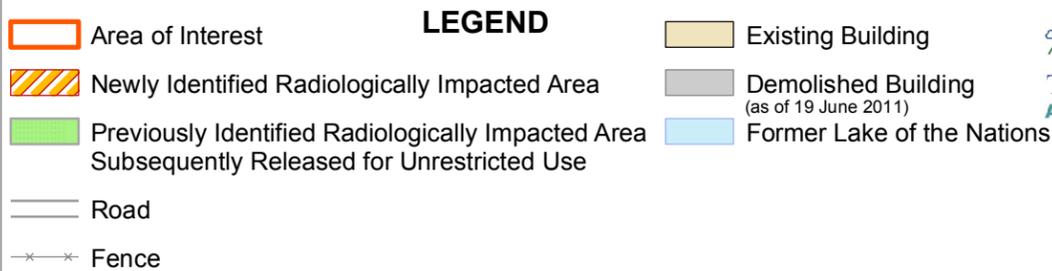
Southwestern Community Area of Interest
1 March 1958 (not to scale)



Southwestern Community Area of Interest
15 August 2000 (not to scale)

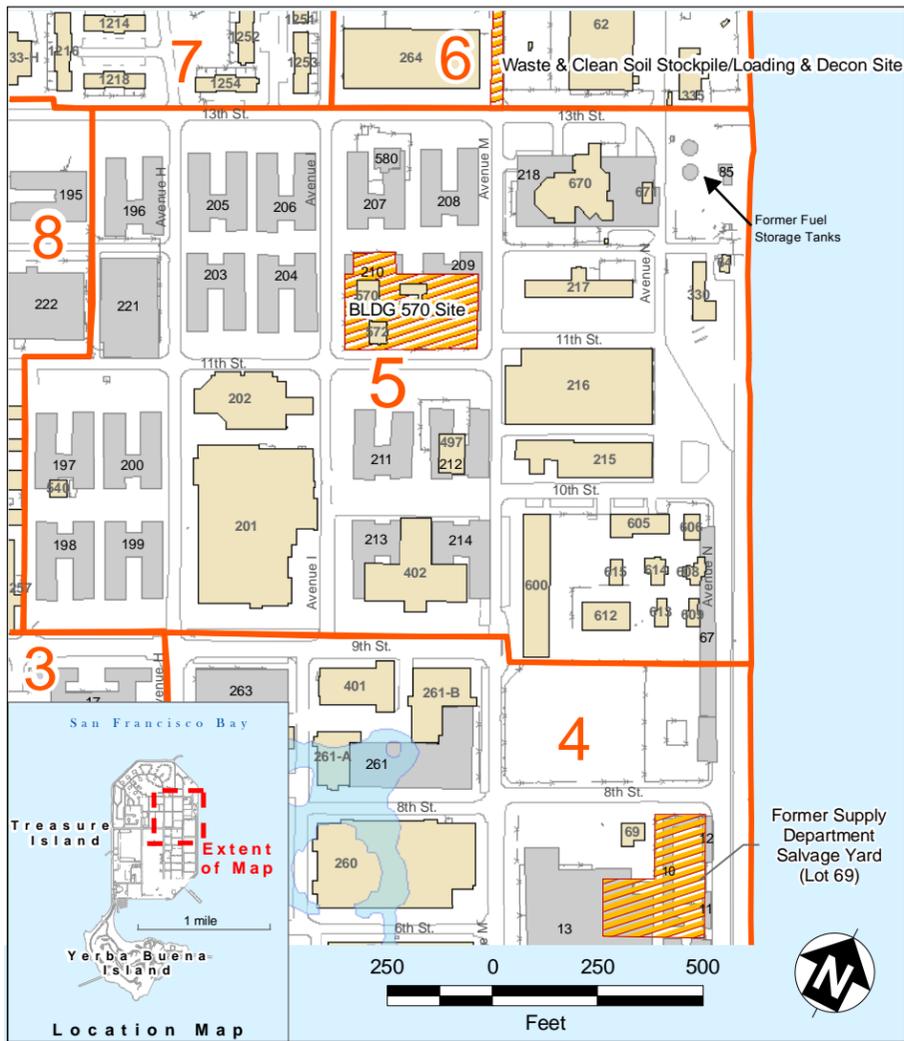


Southwestern Community Area of Interest
09 April 1975 (not to scale)

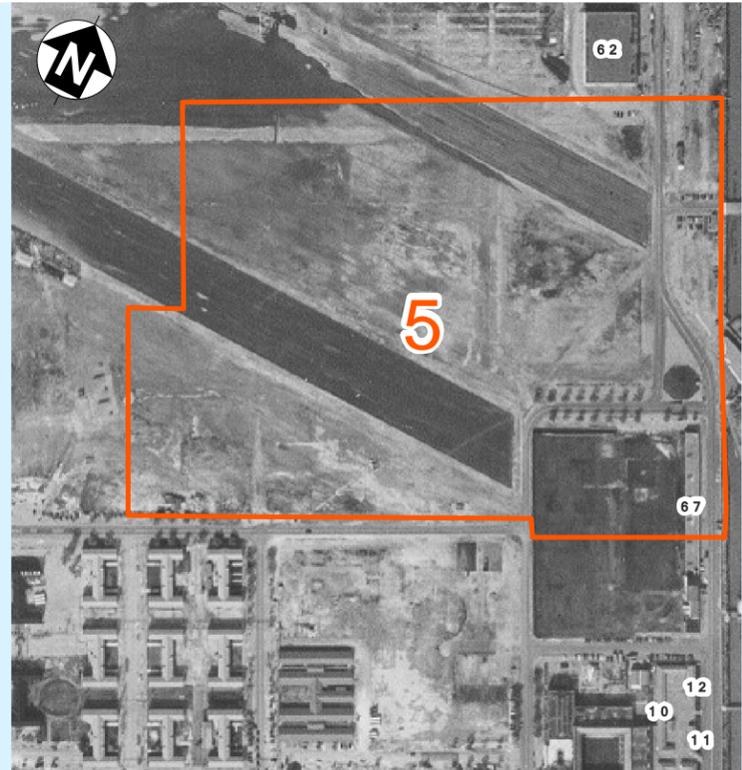


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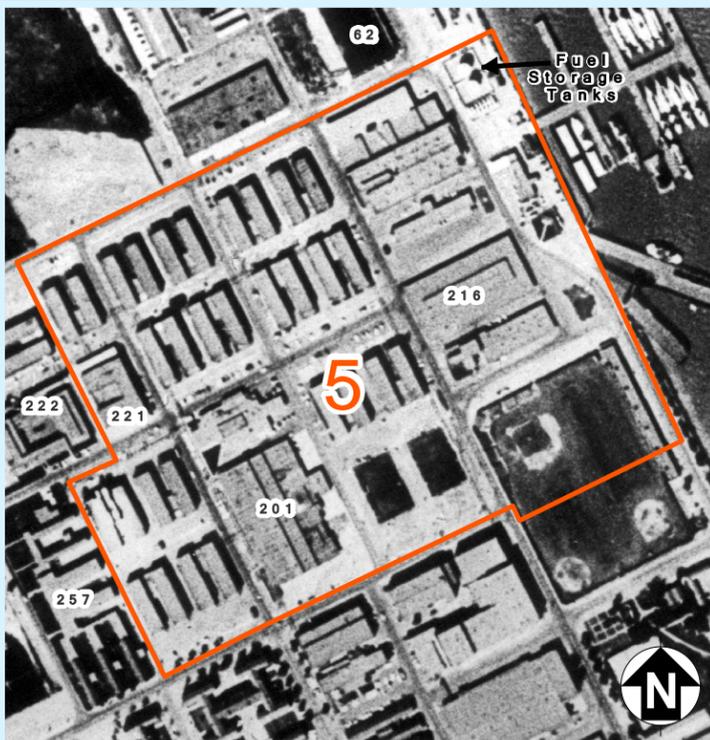
FIGURE 6
SOUTHWESTERN COMMUNITY
AREA OF INTEREST 4



NOTES:
 -Area of Interest largely undeveloped prior to commencement of significant naval operations with the exception of runway construction (later abandoned) and the piers.
 -The parcel was entirely built out during war period leaving little likelihood or opportunity for disposal operations to occur.



Northeastern Community Area of Interest
 04 June 1942 (not to scale)



Northeastern Community Area of Interest
 01 March 1958 (not to scale)



Northeastern Community Area of Interest
 24 March 1947 (not to scale)



Northeastern Community Area of Interest
 15 August 2000 (not to scale)



Northeastern Community Area of Interest
 04 Sept. 1975 (not to scale)

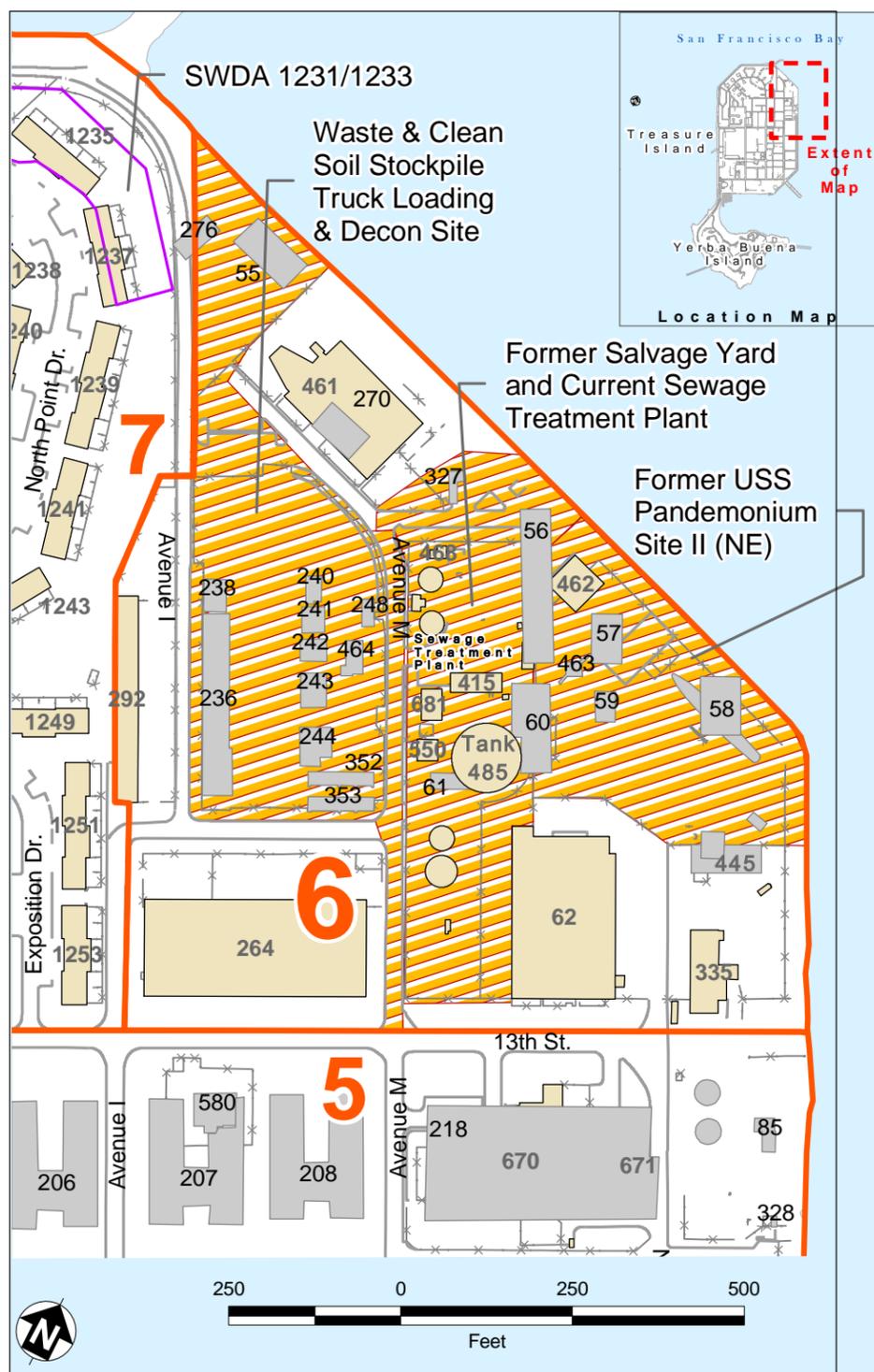
LEGEND

- Area of Interest
- Newly Identified Radiologically Impacted Area
- Former Lake of the Nations
- Road
- Fence
- Existing Building (as of 19 June 2011)
- Demolished Building



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FIGURE 7
NORTHEASTERN COMMUNITY
AREA OF INTEREST 5



Sewage Treatment Area of Interest
04 June 1942 (not to scale)



Sewage Treatment Area of Interest
24 March 1947 (not to scale)



Sewage Treatment Area of Interest
15 August 2000 (not to scale)



Sewage Treatment Area of Interest
30 December 1969 (not to scale)

NOTES:

-There is evidence of lay down areas being used during the war in the area that is now the sewage treatment plant, suggesting this activity was associated with the Supply Department or a salvage yard. The waste treatment facility was constructed in the early 1960s.

-In 1970, the Navy's damage control school, which included radioactive decontamination training, was relocated to the northern portion of the site. Facilities included Buildings 461 and 462 and the USS Pandemonium Site II, a full scale mock-up training ship. The relocation was completed in September 1970. The use of these facilities ended by 20 February 1994.

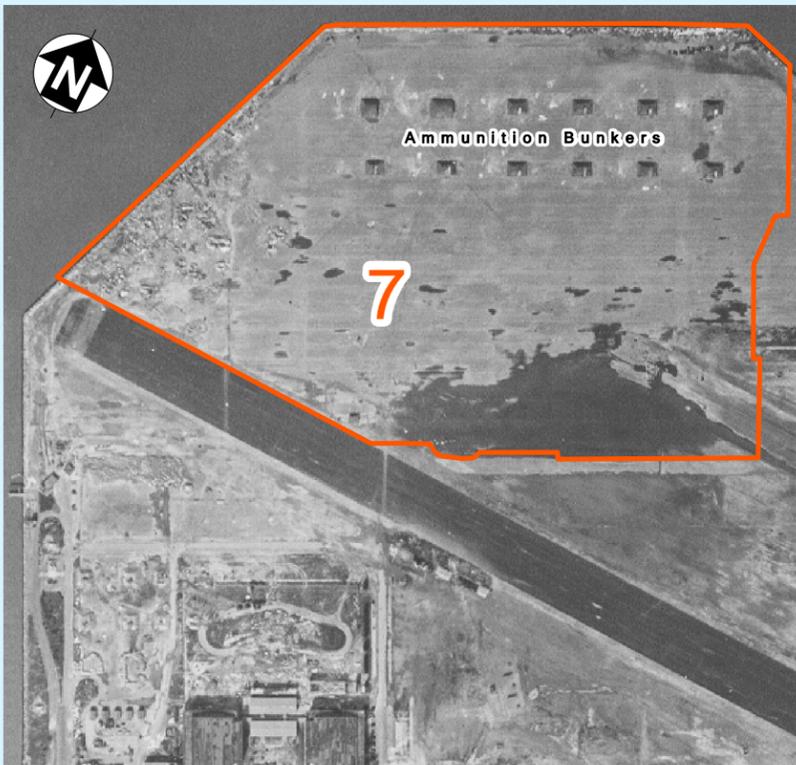
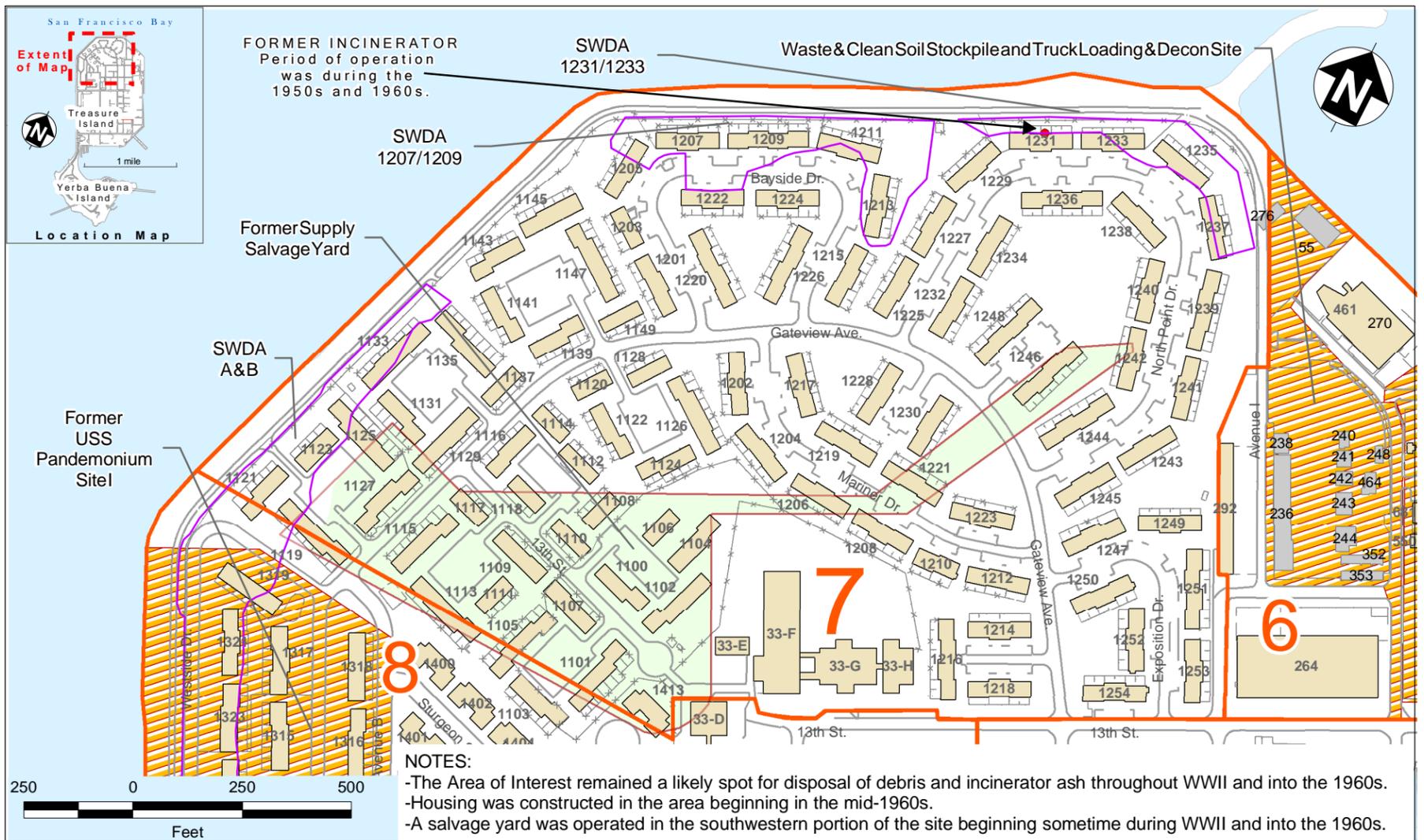
LEGEND

- Area of Interest
- Newly Identified Radiologically Impacted Area
- Existing Building (as of 19 June 2011)
- Demolished Building
- Road
- Fence



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FIGURE 8
SEWAGE TREATMENT
AREA OF INTEREST 6



Northern Housing Area of Interest
04 June 1942 (not to scale)



Northern Housing Area of Interest
24 March 1947 (not to scale)



Northern Housing Area of Interest
30 December 1969 (not to scale)



Northern Housing Area of Interest
10 April 1968 (not to scale)

LEGEND

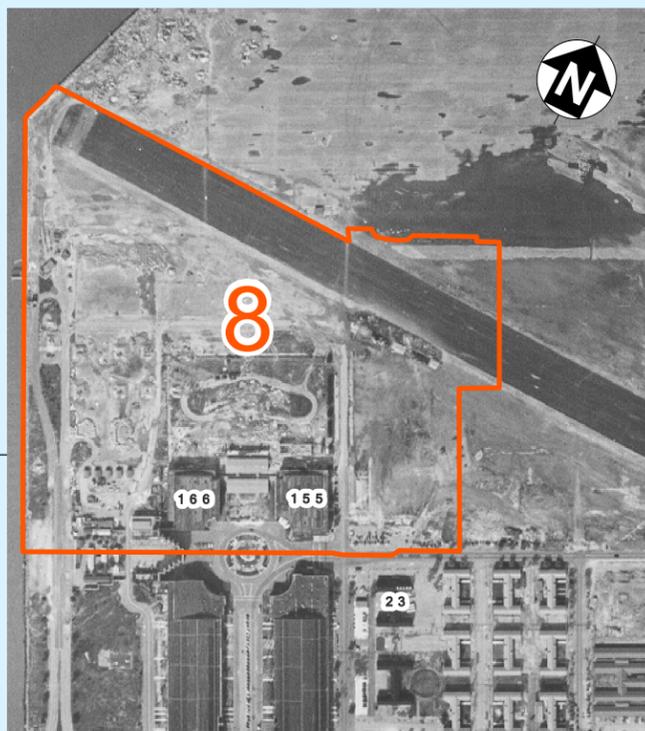
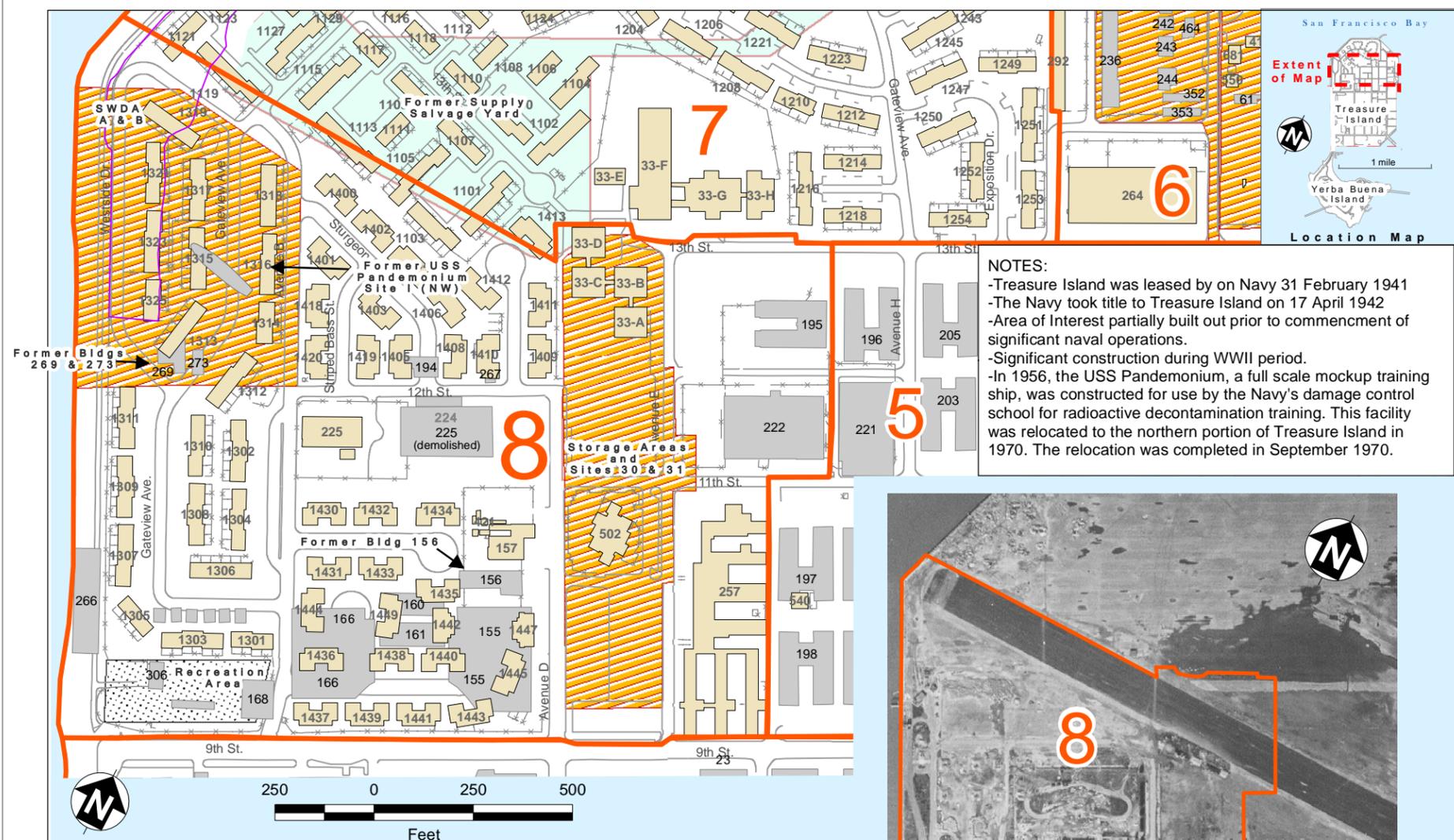
- Area of Interest
- Newly Identified Radiologically Impacted Area
- Former Storage/Salvage Yard†
- Existing Building (as of 19 June 2011)
- Road
- Fence
- Demolished Building



Notes:
† Former Supply Salvage Yard from US Naval Station Treasure Island San Francisco, California General Development Map, 1962

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**FIGURE 9
NORTHERN HOUSING
AREA OF INTEREST 7**



Southern Housing Area of Interest
04 June 1942 (not to scale)



Southern Housing Area of Interest
9 July 1963 (not to scale)



Southern Housing Area of Interest
4 September 1975 (not to scale)



Southern Housing Area of Interest
24 March 1947 (not to scale)



Southern Housing Area of Interest
5 August 2000 (not to scale)

LEGEND

- Area of Interest
- Newly Identified Radiologically Impacted Area
- Former Storage/Salvage Yard†
- Recreation Area
- Road
- Fence
- Existing Building (as of 19 June 2011)
- Demolished Building



Notes:
† Former Supply Salvage Yard from US Naval Station Treasure Island San Francisco, California General Development Map, 1962

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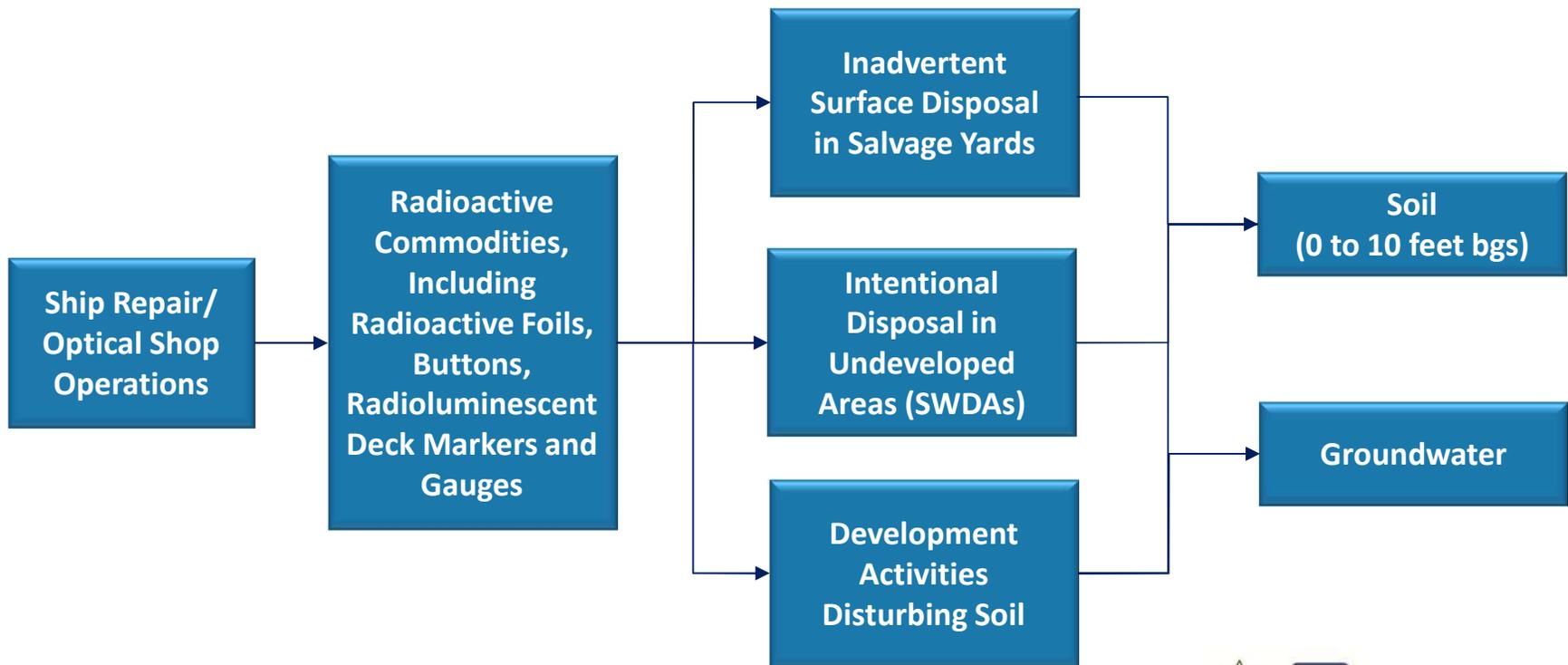
FIGURE 10
SOUTHERN HOUSING
AREA OF INTEREST 8

Historic Source

Primary Contamination

Transport Pathways

Contaminated Media



Notes:

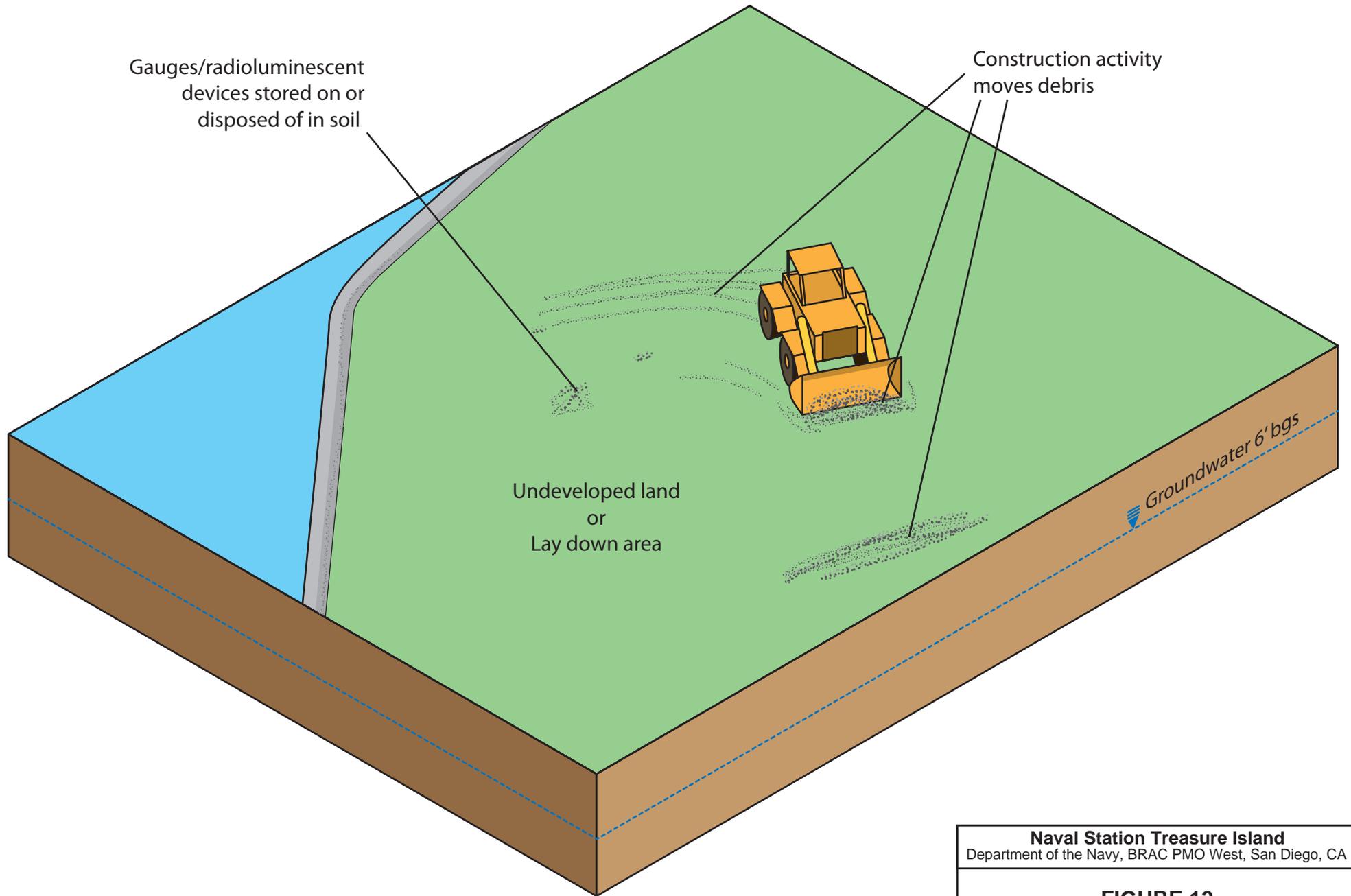
- bgs Below ground surface
- SWDA Solid waste disposal area

Key Assumptions:

1. Ship repair activities were limited to WWII (the Frontier Base) and for a short period afterward (the "Small Craft Facility").
2. Disposal/burial areas would not be found within active or developed areas of the base.

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FIGURE 11
REPAIR/SOLID WASTE DISPOSAL
OPERATIONS –
CONCEPTUAL SITE MODEL



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FIGURE 12
REPAIR/SOLID WASTE DISPOSAL
OPERATIONS -
CONCEPTUAL SITE MODEL

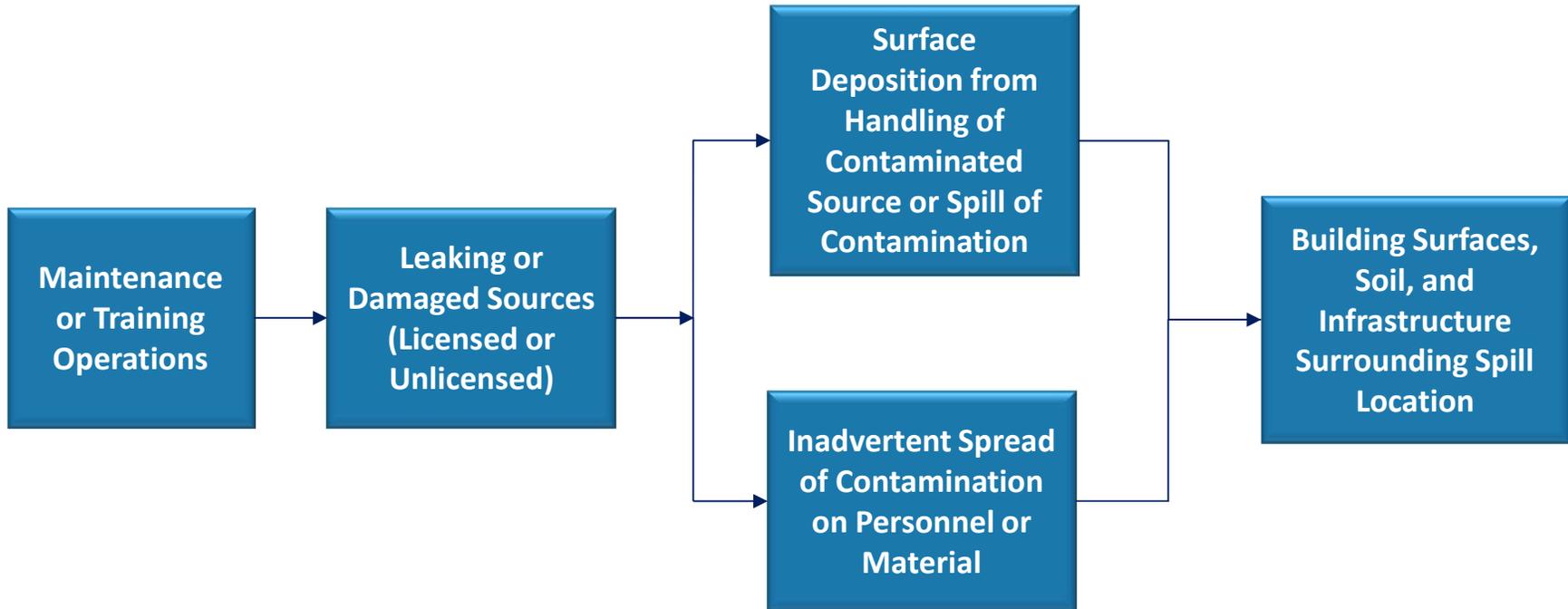
Note:
 bgs Below ground surface

Historic Source

Primary Contamination

Transport Pathways

Contaminated Media

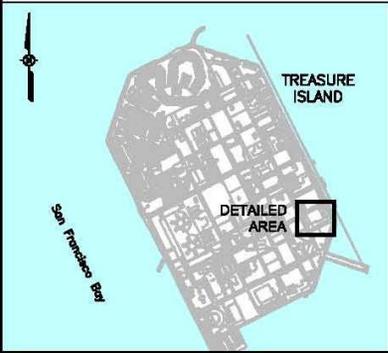
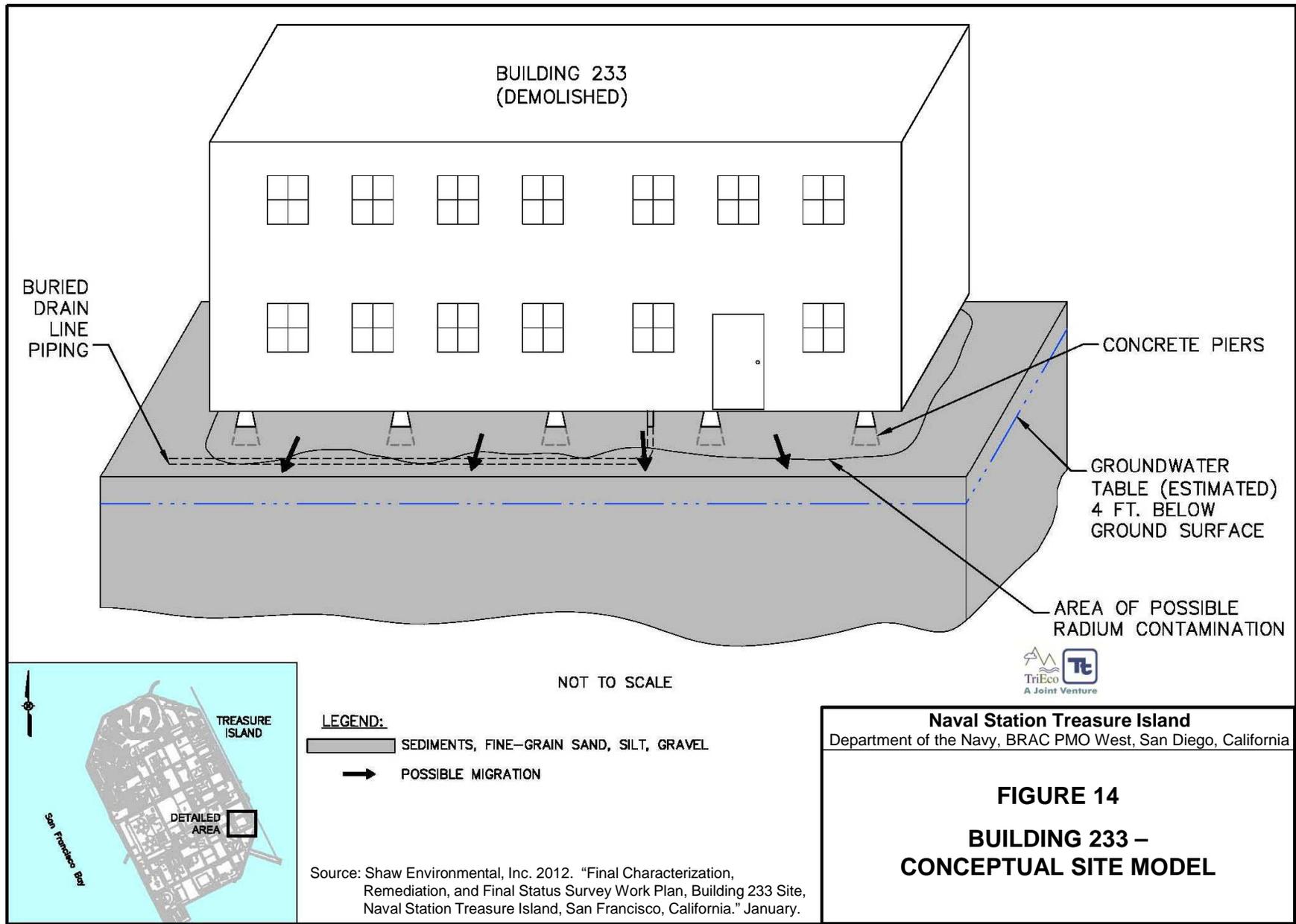


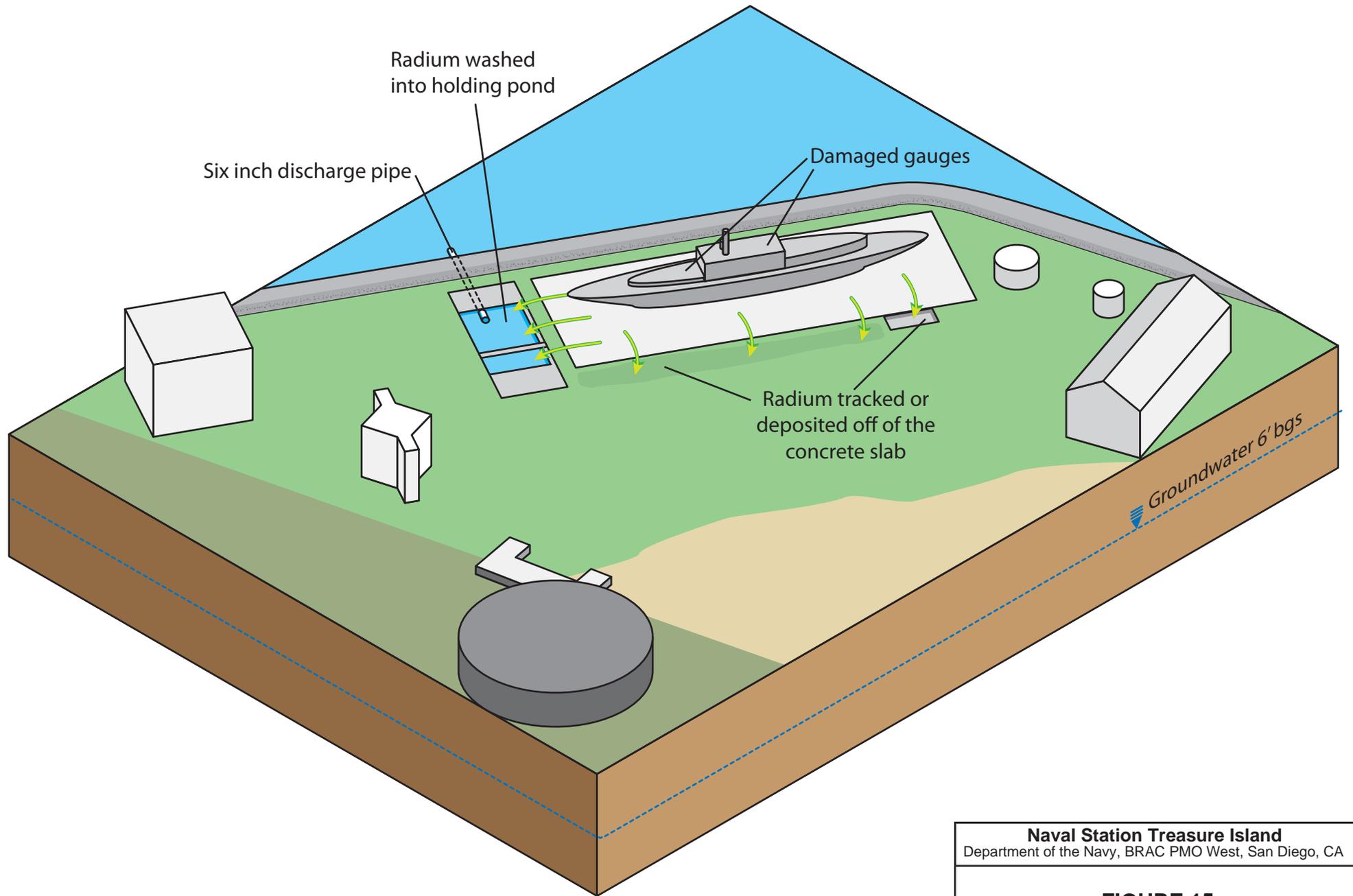
Key Assumption:

1. Known actual or potential spills are confined to Building 233 and former USS *Pandemonium* locations.

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FIGURE 13
INCIDENTAL RELEASES FROM TRAINING OPERATIONS – CONCEPTUAL SITE MODEL





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FIGURE 15
USS PANDEMONIUM SITE II -
CONCEPTUAL SITE MODEL

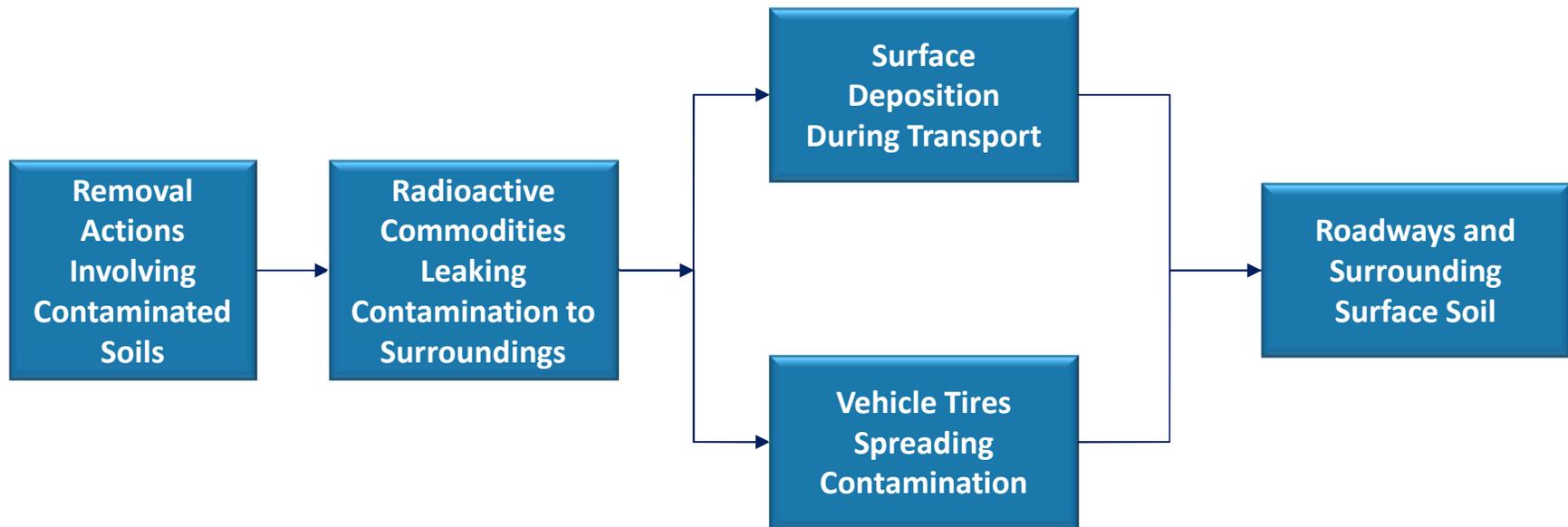
Note:
 bgs Below ground surface

Historic Source

Primary Contamination

Transport Pathways

Contaminated Media



Note:

SWDA Soild waste disposal area

Key Assumptions:

1. Controls on transport of contaminated soil from Site 6, Site 12 SWDAs, and Site 32 were not adequate to contain contamination.
2. Impacted areas would be confined to primary truck routes.

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FIGURE 16
SPILLS/CONTAMINATION RESULTING FROM HANDLING OF CONTAMINATED SOILS FROM SITE 12 SWDAs – CONCEPTUAL SITE MODEL

**APPENDIX A
HISTORICAL RADIOLOGICAL ASSESSMENT SUPPLEMENTAL TECHNICAL
MEMORANDUM REFERENCES**

(Provided on CD only)