

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

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APPROVAL FORM

FINAL RADIOLOGICAL REMOVAL ACTION ACTION MEMORANDUM HUNTERS POINT SHIPYARD

Conditions at four radiation sites at Hunters Point Shipyard meet the National Oil and Hazardous Substances Pollution Contingency Plan criteria under Title 40 of the Code of Federal Regulations, Section 300.415(b)(2), for conducting a removal action. The Navy approves the recommended removal action of excavation and off-site soil disposal described in this action memorandum.

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Date

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ACRONYMS AND ABBREVIATIONS

A/C	Asphaltic-concrete
AM	Action Memorandum
Am-241	Americium 241
AR	Administrative Record
ARARs	Applicable or relevant and appropriate requirements
BCT	BRAC Cleanup Team
bgs	Below ground surface
BRAC	Base Realignment and Closure
CaHSC	California Health and Safety Code
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	<i>Code of Federal Regulations</i>
Co-60	Cobalt 60
cpm	Counts per minute
Cs-137	Cesium 137
DCGL	Derived concentration guideline level
DERP	Defense Environmental Restoration Program
DHS	California Department of Health Services
DoD	U.S. Department of Defense
DTSC	California Department of Toxic Substances Control
EO	Executive Order
EPA	U.S. Environmental Protection Agency
Eu-152	Europium 152
Eu-154	Europium 154
FUDS	Formerly Used Defense Sites
H-3	Tritium 3
HPS	Hunters Point Shipyard
IR	Installation Restoration
K-40	Potassium 40
mrem/yr	millirem per year
NaI	Sodium iodide
Navy	U.S. Department of Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NRDL	Naval Radiological Defense Laboratory
O&M	Operations and Maintenance

ACRONYMS AND ABBREVIATIONS (Continued)

pCi/g	picoCuries per gram
PRC	PRC Environmental Management, Inc.
PRG	Preliminary remediation goal
Ra-226	Radium 226
RESRAD	Residual Radiation
RWQCB	Regional Water Quality Control Board – San Francisco Bay Region
SARA	Superfund Amendments and Reauthorization Act of 1986
Sr-90	Strontium 90
SWDIV	Southwest Division, Naval Facilities Engineering Command
TBC	To be considered
Th-228	Thorium 228
Th-232	Thorium 232
TMV	Toxicity, mobility, or volume
TSDF	Treatment, storage, and disposal facility
TtEMI	Tetra Tech EM Inc.
U-235	Uranium 235
U-238	Uranium 238
USC	<i>United States Code</i>

EXECUTIVE SUMMARY

The U.S. Department of Defense (DoD) has the authority to undertake Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) response actions, including removal actions, under Title 42 of the *United States Code* (USC), Section 9604; Title 10 of the USC, Section 2705; and Federal Executive Order (EO) 12580. The time-critical removal action proposed in this action memorandum (AM) will be undertaken pursuant to CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This AM complies with the requirements of CERCLA; the Superfund Amendments and Reauthorization Act; the Defense Environmental Restoration Program (Title 10 USC, Sections 2701 *et seq.*); Title 40 of the Code of Federal Regulations (CFR), Part 300.415; and EO 12580.

SITE CONDITIONS AND BACKGROUND

Hunters Point Shipyard (HPS) is in the City and County of San Francisco, California. The main portion of HPS is situated on a long promontory located in the southeastern part of San Francisco extending eastward into San Francisco Bay ([see Figure 1](#)). The on-base property at HPS consists of 936.37 acres, 493.47 of which are on land and 442.90 of which are below bay waters. In 1991, HPS was slated for closure pursuant to the terms of the Defense Base Closure and Realignment Act of 1990 (Public Law 101-510).

The following radiation sites are the subjects of this time-critical removal action: (1) the Building 364 Cesium 137 (Cs-137) spill site at Installation Restoration (IR) Site 34 (IR-34) in Parcel D, (2) the Building 707 concrete drum storage pad at IR-39 in Parcel E, (3) the potential buried point source behind Building 529 at IR-11/14/15 in Parcel E, and (4) the radiation anomaly outside Building 509 at IR-11/14/15 in Parcel E ([see Figure 1](#)).

Use of radiological materials at HPS began in the 1940s, when a group of Navy personnel, later known as the Naval Radiological Defense Laboratory (NRDL), became involved in radioactivity studies and research. In 1969, all radioactivity studies ceased at HPS. The NRDL was disestablished and NRDL buildings were decontaminated and returned for shipyard use at HPS.

IR-34 (Building 364), IR-39 (Building 707), and IR-11/14/15 (Buildings 529 and 509) are within the facility's industrial complex. The structures and topographies are typical of an industrial area. Paved roads and other buildings surround Buildings 364, 707, 529, and 509.

Building 364, formerly known as the “hot cell,” was used as a chemistry laboratory under the NRDL program. The concrete pad at Building 707 was used as a storage area for drums containing radioactive waste. Building 529 stored radioisotopes, and Building 509 was a former animal irradiation site.

CONTAMINANTS OF CONCERN AND AFFECTED MEDIA

Cs-137 was detected in asphaltic/concrete (A/C) and soil at a spill site adjacent to Building 364 at levels that were distinguishable from background concentrations. At the U.S. Environmental Protection Agency’s (EPA) request, the Navy compared the Building 364 Cs-137 A/C and soil data to decay-corrected preliminary remediation goals (PRG). Average Cs-137 concentrations at the Building 364 site did not exceed the EPA decay-corrected PRG, although results for three individual samples exceeded the decay-corrected PRG. At the Building 707 concrete drum storage pad, average Cs-137 concentrations exceeded the EPA decay-corrected PRG. Maximum concentrations of americium 241 (Am-241), europium 152 (Eu-152), europium 154 (Eu-154), and uranium 235 (U-235) exceeded the decay-corrected PRGs; however, the average concentrations of these radionuclides did not exceed the decay-corrected PRGs. In addition, Buildings 529 and 509 each contained one area of elevated gamma activity that demonstrated anomalous gamma count rate measurements.

The Navy will perform a CERCLA time-critical removal action at all four sites to reduce radiological contamination to levels not greater than the decay-corrected PRGs to be conservatively protective of human health and the environment and to help expedite the transfer of Parcels D and E to the City of San Francisco.

Preliminary information indicates that conditions at the sites have not endangered occupants or visitors and do not represent a clear threat to human populations. The proposed removal action is designed to (1) reduce ionizing radiation to EPA decay-corrected PRG levels that allow the release of the Building 364, 707, 529, and 509 sites for unrestricted use and (2) substantially reduce and, in most cases, eliminate the identified pathways of exposure to ionizing radiation.

PROPOSED ALTERNATIVE

CERCLA encourages treatment as a principal means of addressing threats from site-related contamination; however, because the contamination in this case is radioactive, treatment was not considered a practicable option. Treatment technologies were not evaluated because they were inconsistent with future land use and were not cost effective. Consequently, one practicable removal alternative and the no action alternative were evaluated. Based on the comparative analysis of

alternatives evaluated, the following actions represent the best method for addressing the sources of ionizing radiation at the Building 364, 707, 529, and 509 sites:

- Remove and dispose of radiation sources at the Building 364, 707, 529, and 509 sites that exceed the EPA decay-corrected PRGs
- Backfill excavations to match the existing grade and resurface backfilled excavations to match pre-excavation conditions

The no action alternative was rejected based on the effectiveness criterion. The no action alternative is the basis of comparison for all other alternatives and assumes that no action would be taken.

PUBLIC PARTICIPATION

The public is encouraged to review and comment on the proposed activities described in this AM. The administrative record contains documents used in the decision-making process for the proposed removal action. [Appendix A](#) lists documents included in the administrative record for the proposed removal action, and [Section 1.3](#) of this AM, Public Comment Period, discusses public participation for this removal action.

1.0 INTRODUCTION

This action memorandum (AM) identifies and evaluates removal alternatives for radioactive materials at sites adjacent to Buildings 364, 707, 529, and 509 at Hunters Point Shipyard (HPS) in San Francisco, California. The objectives of this AM are as follows:

- To evaluate the implementability, effectiveness, and cost of alternatives to address radioactive materials at the Building 364, 707, 529, and 509 sites
- To recommend one of the alternatives considered
- To examine potentially applicable regulatory requirements
- To document, for the Administrative Record (AR), the U.S. Department of Navy's (Navy) decision to undertake a removal action at the subject sites

The removal action is designed to reduce ionizing radiation to acceptable release limits at sites adjacent to Buildings 364, 707, 529, and 509. The proposed time-critical removal action will consist of removing identified radioactive sources and will substantially reduce the quantity of radioactive contaminants remaining on site and reduce potential pathways of exposure to ionizing radiation.

This AM consists of nine sections including this introduction. The introduction describes the statutory framework for this removal action; the roles of the Navy and Federal, state, and local authorities; and the public comment period. [Section 2.0](#) describes site conditions and provides background information. [Section 3.0](#) discusses potential threats to human health and the environment from the sites. [Section 4.0](#) outlines removal action objectives and goals. [Section 5.0](#) evaluates and compares removal action alternatives. [Section 6.0](#) presents the proposed removal action and associated estimated cost. [Section 7.0](#) discusses outstanding policy issues. [Section 8.0](#) discusses the recommended removal action. [Section 9.0](#) lists references cited in this AM. [Figures, tables,](#) and [appendices](#) follow the references.

1.1 STATUTORY FRAMEWORK

The U.S. Department of Defense (DoD) has the authority to undertake Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response actions, including removal actions, under Title 42 of the *United States Code* (USC), Section 9604 Title 10 of the USC, Section 2705; and Federal Executive Order (EO) 12580. The proposed removal action will be taken pursuant to CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) under the authority delegated by the Office of the President of the United States by EO 12580. This order provides the Navy with the authorization to finance and conduct removal actions.

This AM has been prepared to satisfy the requirements of CERCLA; the Superfund Amendments and Reauthorization Act of 1986 (SARA); the Defense Environmental Restoration Program (DERP) in 10 USC, Sections 2701 *et seq.*; Title 40 of the *Code of Federal Regulations* (CFR), Part 300.415; and EO 12580.

1.2 ROLES OF NAVY AND FEDERAL, STATE, AND LOCAL AUTHORITIES

This section describes current and future environmental management roles for the sites adjacent to Buildings 364, 707, 529, and 509.

1.2.1 Navy Role

EO 12580 delegates to the DoD the President's authority to undertake CERCLA response actions. Congress further outlines this authority in its DERP Amendments (10 USC, Sections 2701 through 2705). Both 42 USC, Section 9620(f), and 10 USC, Section 2705, require Naval facilities to ensure that state and local officials are given timely opportunity to review and comment on Navy response actions. In addition, 42 USC, Section 9620(a)(4), requires the Navy to comply with state removal action requirements at its facilities, which is consistent with CERCLA and NCP requirements.

The Navy, with Federal and state regulatory support, is the lead agency for the removal action. The Navy has approval authority over the recommended alternative and all public participation activities.

Southwest Division, Naval Facilities Engineering Command (SWDIV), is the regional manager for Navy's CERCLA program. SWDIV is providing technical expertise specific to the preparation of this AM and the execution of the recommended alternative.

1.2.2 Federal, State, and Local Authority Role

The U.S. Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board – San Francisco Bay Region (RWQCB) will provide oversight during all phases of the execution of the recommended alternative.

DTSC, RWQCB, EPA, and Navy representatives make up the Base Realignment and Closure (BRAC) Cleanup Team (BCT). The BCT and the California Department of Health Services (DHS) will provide technical advice, oversight, and assistance during this removal action and will continue to do so throughout the Installation Restoration (IR) Program.

1.3

PUBLIC COMMENT PERIOD

The Navy will publish a notice of availability of the AR file in the *New Bayview* and *The Independent* on August 23, 2000, to encourage the public to review and comment on the proposed removal activities described in this AM. To provide a more thorough understanding of activities associated with this removal action and to facilitate public comment, a final draft of this AM and the AR for the removal action will be made available at the following locations:

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

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

The Navy will circulate the AM for 30 days to provide the public with the opportunity to contribute to discussions concerning the removal action. Records of the public's questions and comments and the Navy's responses will be provided and placed in the AR. [Appendix A](#) of this AM provides a list of documents to be included in the AR for the removal action.

2.0 SITE CONDITIONS AND BACKGROUND INFORMATION

This section describes each site, actions conducted to date, and radiological characterization findings.

2.1

SITE DESCRIPTIONS

The site descriptions include discussions of site locations, history and operations, structures and topography, surrounding land use, and sensitive ecosystems.

2.1.1

Site Location

HPS is located in the City and County of San Francisco, California ([see Figure 1](#)). HPS is situated on a long promontory located in the southeastern part of San Francisco extending eastward into San Francisco Bay. HPS consists of 936.37 acres, 493.47 of which are on land. The Building 364, 707, 529, and 509 sites are located within the HPS facility, as shown on [Figure 1](#).

2.1.2 History and Operations

The use of radioactive materials at HPS began in the 1940s, when a group of Navy personnel, later known as the Naval Radiological Defense Laboratory (NRDL), became involved in nuclear weapons projects. In 1969, radioactivity studies at HPS ended and NRDL buildings were decontaminated.

Because of the presence of hazardous materials from past shipyard operations at HPS and the shipyard's proximity to a nearly upgradient water supply source, the property was placed on the National Priorities List in 1989 as a Superfund site pursuant to CERCLA as amended by SARA. In 1991, HPS was slated for closure pursuant to the terms of the Defense Base Closure and Realignment Act of 1990 (Public Law 101-510). Closure of HPS included conducting environmental remediation activities and making the property available for nondefense use. HPS is undergoing redevelopment, and access to HPS is no longer restricted solely to military personnel.

Buildings 364, 707, 529, and 509 were former NRDL sites. Building 364 was a chemistry laboratory containing a former storage tank, which has been removed, and an associated sump for secondary containment. The concrete pad at Building 707 was used as a storage area for drums of radioactive waste. Building 529 was the former site of the NRDL Radioisotope Storage, and the building was later demolished. Building 509 was an animal irradiation laboratory and was also demolished.

2.1.3 Structures and Topography

The structures and topographies of the Building 364, 707, 529, and 509 sites are typical of an industrial area. Paved roads and other buildings surround the sites ([see Figure 1](#)).

2.1.4 Surrounding Land Use

HPS is bounded by the City of San Francisco to the west and San Francisco Bay to the north, east, and south. The bay is used for commerce and recreation. Land use to the west is predominantly light industrial and residential.

2.1.5 Sensitive Ecosystems

There are no sensitive ecosystems located at the Building 364, 707, 529, and 509 sites.

2.2 ACTIONS CONDUCTED TO DATE

Four phases of HPS radiological characterization were performed, beginning with Phase I in 1991. Phases I and II delineated the surface and subsurface distribution of radium-containing devices. Phases III and IV recommended the removal of the Building 364, 707, 529, and 509 sites. Descriptions and findings of these phases of radiological characterization are presented in [Section 2.3](#).

2.3 RADIOLOGICAL CHARACTERIZATION FINDINGS

Four phases of HPS radiological characterization have been completed under the Comprehensive Long-Term Environmental Action Navy program at HPS. Each phase is discussed below.

2.3.1 Phase I

A Phase I radiation investigation was initiated in 1991 to determine the nature and areal extent of radium-containing devices in the disposal dump area at IR-02 Northwest. Anomalously high gamma readings were detected at IR-02 Northwest during a 1988 surface radiation survey conducted by HLA. Although the anomalies were detected at IR-02 Northwest only, IR-01/21, IR-02 Central, IR-02 Southeast, IR-03, and portions of IR-11/14/15 were also surveyed during the Phase I investigation because of these sites' proximity to the disposal dump area at IR-02 Northwest.

A local grid coordinate system was developed to map and relocate radioactive material detected during the Phase I surface walkover survey. Soil samples were collected to establish whether radioisotopes from radium-containing devices had migrated to soil. To detect gamma-emitting radioactive material within the landfill area, health physics technicians performed a surface gamma walkover survey using 2-inch by 2-inch sodium iodide (NaI) detectors coupled to ratemeters (PRC Environmental Management, Inc. [\[PRC\] 1992](#)). High-volume air and groundwater sampling for gross alpha and gross beta radioactivity was also performed.

During the surface walkover survey, over 300 radium-containing point sources were detected in a centralized area at IR-02 Northwest that corresponds to the location of the disposal dump area used by the Navy to dispose of radium-containing devices. Additional anomalies were observed in IR-01/21 and IR-02 Southeast. A dial on the door of a combination safe found at IR-11/14/15 had anomalously high gamma activity. Thirteen soil samples collected from the disposal dump area at IR-02 Northwest contained Radium 226 (Ra-226) at concentrations exceeding background levels. One soil sample from IR-01/21 and two soil samples from IR-02 Southeast contained Ra-226 at concentrations exceeding background levels ([PRC 1992](#)).

The Phase I radiation investigation concluded that the cause of elevated gamma activity at HPS was the presence of radium-containing devices in (1) surface soil at scattered locations at IR-01/21 and (2) in a centralized disposal dump area at IR-02 Northwest extending into IR-02 Central. In addition, the investigation concluded that radium-containing devices may be present in the subsurface of these landfill areas.

The Phase I radiation investigation recommended the following actions:

- Investigation of the subsurface distribution of radium-containing devices in soil within the disposal dump area at IR-02 Northwest
- Removal of the combination safe from IR-11/14/15 (completed in 1996) and evaluation of alternate methods of analysis for gross alpha and gross beta radioactivity in groundwater samples

2.3.2 Phase II

The purpose of the Phase II radiation investigation conducted in 1996 was to delineate the subsurface distribution of radium-containing devices at the IR-01/21, IR-02 Northwest, and IR-02 Central landfill areas. Field activities were conducted from January 21 through July 25, 1993, and included the excavation of trenches and test pits, the collection of soil samples, and the collection of air samples ([PRC 1996](#)).

To delineate the subsurface distribution of radioactive point sources at IR-02 Northwest, IR-02 Central, and IR-01/21, 40 15-foot-deep test pits and three 100-foot-long trenches were excavated at locations associated with radiation anomalies. NaI detectors were used to scan the walls of each excavation for gamma-emitting radioactive material below the surface. Radioactive point source anomaly locations were further investigated by excavation; if radium-containing devices were found, soil samples were collected to identify present radioisotopes. Air sampling was performed during excavation activities, but neither gross alpha nor gross beta radioactivity were detected above background levels. Subsurface soil samples were collected for radiochemical analysis where radium-containing devices were found ([PRC 1996](#)).

Excavation activities at the disposal dump area at IR-02 Northwest and IR-02 Central revealed approximately 111 discrete subsurface gamma-emitting point sources. A large amount of industrial and construction debris was mixed with the soil at the disposal dump area. Radium-containing devices and industrial debris were detected at the surface but not in the subsurface at the beach and intertidal areas of IR-02 Northwest or at IR-01/21 ([PRC 1996](#)).

The Phase II radiation investigation report conclusions are presented below:

- The disposal dump area at IR-02 Northwest and IR-02 Central was the primary disposal area for all radium-containing devices generated at HPS as a result of ship repair and maintenance activities.
- Radium-containing devices at surface locations at IR-01/21 and the beach and intertidal areas at IR-02 Northwest were not present in the subsurface.

2.3.3 Phase III

The purpose of the Phase III radiation investigation conducted in 1997 was to address concerns regarding the use, storage, and disposal of radioactive materials during past NRDL operations at HPS. The goal of the Phase III investigation was the eventual release of all remaining buildings and sites for unrestricted use, including the three Formerly Used Defense Sites (FUDS).

The following buildings and FUDS were proposed for radiological surveys during Phase III: Buildings 351A, 364, 506, 507, 508, 509, 510, 510A, 517, 529, and 707. Radionuclides of concern included cesium 137 (Cs-137), cobalt 60 (Co-60), potassium 40 (K-40), Ra-226, strontium 90 (Sr-90), thorium 228 (Th-228), thorium 232 (Th-232), tritium 3 (H-3), uranium 235 (U-235), and uranium 238 (U-238). Gas proportional detectors, alpha scintillation detectors, and NaI gamma scintillation detectors were used (Tetra Tech EM Inc. [TtEMI] 1997). Phase III investigation analytical results are presented in [Appendix B](#).

The Phase III work supported the release of Buildings 351A, 507, 508, and 510, and 510A for unrestricted use, but results suggested that further evaluation be conducted for Buildings 506, 529, 509, 517, 364, and 707.

As a result, a radiological survey of surface soil was conducted within and around Buildings 506 and 529, which are adjacent to each other. [Figures 2 and 3](#) show Building 529 survey grid and sampling locations and a gamma count and contour map, respectively. One radiation anomaly was detected between Buildings 529 and 520 in an area that was probably formerly paved asphalt ([see Figure 3](#)). The gamma count reading was 11,205 counts per minute (cpm) at the surface; 13,130 cpm at 4 inches below ground surface (bgs); 18,394 cpm at 8 inches bgs; and 20,000 cpm at 12 inches bgs. Investigators concluded that a potential buried point source may be present behind Building 529, although the elevated gamma count reading might also be associated with a nearby Cs-137 soil concentration of 0.15 picoCuries per gram (pCi/g) ([TtEMI 1997](#)).

A radiological survey within and surrounding Buildings 509 and 517 was conducted to identify areas exhibiting elevated gamma count rates. For the purposes of this AM, the areas surrounding Buildings 509 and 517 and the associated anomaly will hereafter be referred to as the Building 509 site. One count of 9,374 cpm was measured near Building 517. [Figures 4 and 5](#) show Building 509 survey grid and sampling locations and a gamma count and contour map, respectively. All radiological isotopes detected in soil samples at Buildings 509 and 517 were at background activity concentrations ([TtEMI 1997](#)). Count rate and analytical results for the Building 529 and 509 sites are presented in [Tables 1 through 4](#).

The Phase III radiation investigation recommended the excavation of (1) the potential buried point source behind Building 529 and (2) the area around the anomalous count rate measurement of 9,374 cpm near Building 509. Further study was recommended for Buildings 364 and 707 ([TtEMI 1997](#)).

2.3.4 Phase IV

The purpose of the Phase IV radiation investigation conducted in 1999 was to quantify ambient concentrations of specific radionuclides and further characterize two radiation sites outside Buildings 364 and 707. The goal of Phase IV was to determine whether specific areas adjacent to Buildings 364 and 707 were available for radiological free release and industrial reuse.

Soil and asphaltic-concrete (A/C) samples were collected using a stainless steel trowel or soil auger and a single-person power concrete cutter. The primary radioactive contaminant of concern at the Building 364 site during the Phase IV sampling event was Cs-137. In addition, at the Building 707 concrete pad site, americium 241 (Am-241), Co-60, europium 152 (Eu-152), europium 154 (Eu-154), and U-235 were present at concentrations that were considered distinguishable from background levels ([TtEMI 1997, 2000](#)).

Thirty-two samples, 16 A/C and 16 soil samples were collected at the Building 364 Cs-137 spill site ([TtEMI 2000](#)). Of the 32 samples, 16 were background samples. During the Phase III radiation investigation, four distinct anomalies were located at the Building 707 concrete pad site, two on the pad and two off the pad on A/C. The two anomalies on the pad were close together and treated as one for the Phase IV radiation investigation. At Building 707, 76 samples, 38 A/C and 38 soil samples, were collected. Of the 76 samples, 20 were background samples. [Appendix C](#) contains photographs taken during the Phase IV sampling events at the Building 364 and 707 sites.

Cs-137 concentrations outside Building 364 and Am-241, Co-60, Cs-137, Eu-152, Eu-154, and U-235 concentrations at the Building 707 concrete pad were distinguishable from background levels. The Navy used the Residual Radiation (RESRAD) model and DTSC's basic radiation dose of 25 millirems per year (mrem/yr) to calculate site-specific, derived concentration guideline levels (DCGL) for each of the contaminants of concern. No samples collected at the Building 364 site contained Cs-137 at a concentration exceeding the DCGL calculated for Cs-137. The human health risk, calculated using the RESRAD model, was within the acceptable risk range for the Building 364 site. EPA requested that the Phase IV data also be compared to decay-corrected preliminary remediation goals (PRG). The average A/C and soil concentrations for Cs-137 at the Building 364 site did not exceed the EPA decay-corrected PRG, although three samples did contain Cs-137 at concentrations exceeding the decay-corrected PRG ([TtEMI 2000](#)).

At the Building 707 concrete pad site, Cs-137 was the only radionuclide for which sample concentrations exceeded the DCGL calculated for the site. The human health risk at the Building 707 site ranged from 9.1×10^{-6} to 1.2×10^{-5} excess cancer lifetime risk, which is within the EPA's acceptable risk range. Average A/C and soil concentrations of Cs-137 exceeded the EPA decay-corrected PRG. Maximum concentrations of Am-241, Eu-152, Eu-154, and U-235 exceeded the decay-corrected PRGs, but the average concentrations of these radionuclides did not exceed the decay-corrected PRGs ([TtEMI 2000](#)). Analytical results for samples collected from the Building 364 and 707 sites are presented in [Tables 5 and 6](#) and [Appendix D](#).

The Phase IV radiation investigation recommended the removal of the Building 364 Cs-137 spill site and the Building 707 concrete pad to reduce the radiological contamination at these sites to levels consistent with the decay-corrected PRGs.

3.0 THREATS TO HUMAN HEALTH AND THE ENVIRONMENT

This section discusses potential threats to human health and the environment from the Building 364, 707, 529, and 509 sites. An endangerment determination is also included in this section. Radioactive contamination at Buildings 364, 707, 529, and 509 has resulted in surface radioactivity at levels above background activity levels in some areas of the sites ([TtEMI 1997, 2000](#)). Potential exposure pathways; potentially exposed populations; and potential current, future, and environmental risks are discussed in [Section 3.1](#).

3.1

EVALUATION OF THREATS

In accordance with the NCP (40 CFR, Section 300.415[b][2]), the Navy evaluated the potential for the following threats to determine the appropriateness of a removal action:

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

Of these threats, only (i), actual or potential exposure to hazardous substances, pollutants, or contaminants of nearby populations, animals, and food chains applies to the Building 364, 707, 529, and 509 sites.

The Navy is taking action to reduce potential risk to human health for full-time building occupants, maintenance or demolition workers, and future area residents. The diffuse radioactivity identified at the surface at the Building 364, 707, 529, and 509 sites will be reduced to levels or concentrations that meet or exceed (when practicable) the protectiveness criteria established by EPA.

3.2

ENDANGERMENT DETERMINATION

Data from the Phase III and IV radiation investigation reports ([TtEMI 1997, 2000](#)) indicate that the Building 364, 707, 529, and 509 sites have been contaminated by radioactive sources. A detailed health risk analysis of these sites has not been completed. However, preliminary information indicates that conditions at these sites have not endangered occupants or visitors and do not represent a threat to human populations. The actions recommended in this AM are proactive steps designed to reduce present and future potential radiation exposure to levels substantially below levels that would pose any threat to human health in the long term and to levels that meet the EPA and state protectiveness criteria for radioactive materials.

Action at the Building 364, 707, 529, and 509 sites would reduce the potential threat of contaminant migration and eliminate the potential of exposure of construction workers and building occupants. Other potential nonradioactive contamination will be addressed as part of the final remedial action at the Building 364, 707, 529, and 509 sites. Action at the Building 364, 707, 529, and 509 sites would also eliminate the potential exposure of future building occupants, maintenance workers, and construction workers to radioactive contamination.

4.0 REMOVAL ACTION OBJECTIVES AND GOALS

This section discusses the laws and regulations that affect the removal action. The development of removal action goals is also discussed.

4.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(d) of CERCLA, as amended by SARA, states that remedial actions selected under Section 104 of CERCLA shall require a level or standard of control of hazardous substances which at least attains legally applicable or relevant and appropriate requirements (ARAR) under federal or state environmental or facility citing laws. ARARs may include standards, criteria, limitations, or other requirements promulgated under federal or state laws. ARARs are typically used to determine the appropriate cleanup level of a given site, develop site-specific remedial or removal action goals, and to direct site cleanup. However, the EPA decay-corrected PRGs that serve as the numerical basis of this AM are more stringent than the ARARs. Upon the request of the EPA, the Navy is using decay-corrected PRGs to develop cleanup goals for this removal action.

The following sections provide an overview of the ARARs process and a summary of ARARs that relate to the development of removal action goals.

4.1.1 ARARs Overview

Identification of ARARs is a site-specific determination and involves a two-part analysis: (1) a determination if a given requirement is applicable and (2) if not applicable, a determination if it is relevant and appropriate. A requirement is deemed applicable if the specific terms of the law or regulation directly address the chemical of concern, response action, or placement involved at the site. If the jurisdictional prerequisites of the law or regulation are not met, a legal requirement may nonetheless be relevant and appropriate if the site's circumstances are sufficiently similar to circumstances in which the law otherwise applies and is well suited to the conditions at the site.

Determining whether a requirement is relevant and appropriate is made in accordance with the factors listed in Section 300.400(g)(2) of the NCP. The determination is based on best professional judgment of the lead agency (EPA 1988, 1989). Additionally, only laws and regulations that contain environmental or citing requirements can be ARARs, and only the substantive provisions of those environmental or citing requirements are considered ARARs. Thus, for example, provisions of environmental or citing laws that are procedural or administrative are not ARARs. Recordkeeping, permitting, and reporting requirements are not ARARs.

4.1.2 Identification of Potential ARARs

In addition to ARARs, the NCP provides that the lead agency may identify reliable information, such as advisories, criteria, or guidance developed by federal agencies and the states, termed “TBCs” (for “to be considered”), that may be useful in developing CERCLA remedies (40 CFR, Section 300.400 [g][3]).

Requirements of ARARs and TBCs are generally divided into three categories: chemical-specific, location-specific, and action-specific. For example, chemical-specific ARARs are health- or risk-based numerical values or methodologies that, when applied to site-specific conditions result in the establishment of removal action goals. These goals will establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. Only when health-based ARARs are not available, or in unusual circumstances where ARARs are not sufficiently protective of human health and the environment, will removal action goals be established through a site-specific risk assessment to ensure that exposure levels are within acceptable limits for human and ecological receptors.

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of response activities due to the characteristics of the site or its immediate environment. Action-specific ARARs are requirements or limitations on specific potential response actions. The type and nature of these requirements are dependent upon the particular response action to be taken at a site, and thus different actions or technologies are often subject to different action-specific ARARs.

DoD, and by delegation the Navy, has been delegated authority under CERCLA and SARA to act as the lead agency under the NCP for conducting response actions at Naval installations. As lead agency, the Navy is responsible for identifying potential federal and state ARARs. Upon the request of the EPA, the Navy is using the decay-corrected PRGs to develop cleanup goals for this AM instead of the ARARs. Federal and state ARARs that would have been used to develop removal action objectives and numerical goals are listed in [Appendix E](#).

4.2 REMOVAL ACTION OBJECTIVES AND GOALS

This section discusses the objectives and numerical goals of the removal action.

4.2.1 Objectives

Based on CERCLA, the NCP, and the potential risks, the removal action objective is as follows:

- Reduce ionizing radiation to EPA decay-corrected PRG levels that allow the release of the Building 364, 707, 529, and 509 sites for unrestricted use

4.2.2 Numerical Goals

The numerical goals to be achieved by this removal action are the EPA's decay-corrected PRGs (see [Table 7](#)). It is expected that implementation of the removal action will allow the Navy to obtain concurrence from EPA and DHS in their determination of no further action at these areas at Buildings 364, 707, 529, and 509 sites, thereby enabling the sites to be transferred to the City of San Francisco in the future.

Under the California Health and Safety Code (CaHSC), DHS has statutory authority to regulate users of any quantity of radioactive material. Therefore, DHS claims that these facilities must meet DHS criteria at the time of lease or transfer from federal jurisdiction. The EPA decay-corrected PRGs are more stringent than those of the DHS Radiologic Health Branch.

The EPA decay-corrected PRGs will also be used to (1) design the final sampling program, (2) develop data quality objectives for the sampling program, and (3) provide specifications to the design engineer and remediation contractor for the removal action. The removal action will be followed by confirmation soil sampling to demonstrate that the Building 364, 707, 529, and 509 sites meet the decay-corrected PRGs.

5.0 EVALUATION OF REMOVAL ACTION ALTERNATIVES

This section discusses removal action alternatives, evaluation criteria, evaluation of the alternative, and a comparative analysis of the alternatives.

5.1 REMOVAL ACTION ALTERNATIVES

Two removal action alternatives were developed for the Building 364, 707, 529, and 509 sites:

- Alternative 1 – No Action
- Alternative 2 – Removal and Off-Site Disposal

Each alternative is described below.

5.1.1 Alternative 1 – No Action

Alternative 1 is the no action alternative. This alternative is the basis of comparison for all other alternatives. The no action alternative assumes no removal or other action would be conducted.

5.1.2 Alternative 2 – Removal and Off-Site Disposal

Alternative 2 consists of the following actions for the Building 364, 707, 529, and 509 sites:

- Removal of radioactive sources that exceed the EPA decay-corrected PRGs from the upper soil layer. [Figures 3, 5, 6, and 7](#) show the areas planned for removal at the Building 529, 509, 364, and 707 sites, respectively. The proposed removal sites will be excavated to a depth of 2 feet.
- Disposal of removed sources
- Collection of confirmation soil samples. If confirmation samples exceed the EPA's decay-corrected PRGs, additional material will be excavated from the proposed removal sites until the cleanup objectives are met.
- Restoration of excavated areas with clean fill

5.2 EVALUATION CRITERIA

Each alternative is required to undergo a detailed evaluation against NCP screening criteria. This evaluation forms the basis for a comparative analysis of the ability of each alternative to meet the evaluation criteria and the removal action goals. The three evaluation criteria are effectiveness, implementability, and cost. Each criterion is discussed below.

5.2.1 Effectiveness

The following factors were considered to evaluate the effectiveness of each alternative:

- Overall protection of human health and the environment
- Compliance with the EPA decay-corrected PRGs
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume (TMV) of contaminants through treatment
- Short-term effectiveness

5.2.2 Implementability

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

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

5.2.3 Cost

This criterion is concerned with the estimated costs of the alternatives. The estimated costs in this document are order-of-magnitude estimates developed for comparative purposes only. The removal action recommended for HPS is intended to be a final action with respect to radioactive contamination. Each alternative can be completed within 1 month. Therefore, a performance period of 1 month has been assumed for the comparative analysis.

5.3 EVALUATION OF ALTERNATIVES

This section evaluates each alternative based on the effectiveness, implementability, and cost criteria.

5.3.1 Alternative 1 – No Action

Effectiveness

The overall human health and environmental risks would remain unchanged under this alternative because no removal action would be implemented. The no action alternative does not comply with cleanup levels associated with the EPA decay-corrected PRGs.

Implementability

There are no constraints to implementability because no action would be implemented under this alternative.

Cost

No capital costs are associated with the no-action alternative. Costs associated with site maintenance would be similar to those for the other alternatives and therefore are not used for comparative purposes.

5.3.2 Alternative 2 – Removal and Off-Site Disposal

Effectiveness

Alternative 2 would provide protection of human health and the environment from sources of ionizing radiation by removing them from the sites. Alternative 2 would also comply with chemical-, action-, and location-specific ARARs.

Excavating the sources and removing contaminated soil at the Building 364, 707, 529, and 509 sites would eliminate the radiation sources. Residual concentrations of radioactive contaminants would be below the EPA decay-corrected PRGs. [Table 7](#) lists the EPA decay-corrected PRGs for radioisotopes that were present at levels above background, as determined during the Phase III and IV investigations.

Excavated materials would be analyzed for contaminants other than Cs-137, Am-241, Co-60, Eu-152, Eu-154, and U-235 for disposal purposes. Wastes would be evaluated for mixed waste content at the time of excavation and would be disposed of accordingly at a licensed TSDF (treatment, storage, and disposal facility).

Workers might be exposed to ionizing radiation during source removal and containerization. Exposure will be minimized through the proper use of personal protective equipment.

Removal action goals would be achieved as soon as the sources were removed.

Implementability

This alternative does not have any technical or administrative constraints.

Cost

Alternative 2 has an estimated total cost of \$263,250; further details are included in [Section 6.2](#).

5.4 COMPARATIVE ANALYSIS

The removal action alternatives were evaluated against one another in terms of effectiveness, implementability, and cost ([see Table 8](#)). Treatment technologies were not practicable for this case because they are inconsistent with future land use scenarios.

5.4.1 Effectiveness

Alternative 2 would provide the greatest protection to human health and the environment through the removal of near-surface radiation sources. The decay-corrected PRGs are considerably lower than the DCGLs approved by the state. If implemented, Alternative 2 would comply with EPA's decay-corrected PRGs and state requirements. Alternative 1 would not comply with the EPA decay-corrected PRGs or state requirements.

5.4.2 Implementability

Alternative 2 has no technical, administrative, or other constraints that would preclude implementation. Removal of the radioactive sources and replacement of the excavations with clean fill could be completed in approximately 3 weeks. This criterion does not apply to Alternative 1 because no action would be implemented.

5.4.3 Cost

Maintenance costs for the sites under both alternatives would essentially be the same and are therefore not considered. The cost of Alternative 1 is assumed to be zero. The cost of Alternative 2 is approximately \$263,250.

6.0 PROPOSED REMOVAL ACTION AND ESTIMATED COST

This section describes the proposed removal action, estimated cost, and expected change if the removal action is delayed or not taken.

6.1 PROPOSED REMOVAL ACTION

CERCLA encourages treatment as a principal means of addressing threats from contamination at a site. However, because the contamination is radioactive, treatment was not considered a practicable option. Consequently, the Alternative 2 removal action was evaluated. A description of the proposed action, its contribution to remedial action, and project implementation documents are discussed below.

6.1.1 Proposed Action Description

Based on the comparative analysis in [Section 5.4](#), Alternative 2 represents the best method for addressing sources of ionizing radiation at the Building 364, 707, 529, and 509 sites. Alternative 1 was rejected based on effectiveness.

The removal action will consist of the following:

Building 364 Cs-137 Spill Site and Building 707 Concrete Pad Site:

- Radioactively Contaminated A/C and Soil Removal: remove of radioactively contaminated A/C and soil that exceeds the EPA decay-corrected PRGs

Building 509 and Building 529 Radiation Anomalies:

- Anomaly Removal: remove and dispose of radiation sources adjacent to Buildings 509 and 529 that exceed the EPA decay-corrected PRGs

Building 364, 707, 509, and 529 Sites:

- Site Restoration: backfill excavations to match the existing grade, and resurface backfilled excavations to match pre-excavation conditions
- Collect and dispose of contaminated water: collect water from decontamination and dewatering activities
- Collect and dispose of excavated A/C and soil: collect excavated A/C and soil and dispose of at a licensed TSDF

6.1.2 Contribution to Remedial Performance

When the removal action is complete, all identified near-surface radioactive contamination that exceeds removal action goals will have been excavated, removed, and disposed of. The Navy will remove the radioactive contamination at the proposed sites to meet EPA's decay-corrected PRG levels, which are considerably lower than the state-approved DCGLs. No further remedial action for the radiologically contaminated portions of these sites is anticipated.

6.1.3 Project Implementation Documents

After public notice of this proposed action, the Navy will prepare a work plan for the implementation of the alternative that will include preparation of specific design drawings and performance specifications for the removal action. A sampling and analysis plan and a health and safety plan will also be prepared that will specify sampling protocols and protective measures for workers.

This is intended to be a final action with respect to radioactive contamination at the Building 364, 707, 529, and 509 sites.

6.2 ESTIMATED COST

The estimated cost of Alternative 2 is as follows:

Mobilization/Demobilization:	\$8,000
Excavation (\$75/cubic. yard):	\$17,250
Off-Site Disposal and Transportation:	\$165,000
Confirmatory Sampling:	\$12,000
Oversight and Field Support:	\$36,000
Documentation:	\$25,000
Total Cost:	\$263,250

Operation and maintenance (O&M) costs are associated with implementation of the removal action (that is, removing radiation sources) and do not represent post-removal action maintenance costs. Because the removal action can be accomplished in less than 1 month, the O&M cost was assumed to be zero for this evaluation.

6.3

EXPECTED CHANGE IF ACTION DELAYED OR NOT TAKEN

Navy policy is to remove radioactive material, where practicable, when human contact is possible. If action is delayed or not taken at the Building 364, 707, 509, and 529 sites, the Navy could delay the transfer of Parcels D and E to the City of San Francisco because potential exposure to the radionuclides could cause public concern. It is not anticipated that contamination could spread significantly, threaten transient maintenance workers, or pose a significant risk to human health through the food chain. It is possible that on further analysis, the sites could meet the protectiveness criteria established by EPA without any additional action.

The Navy has proposed removal action goals that meet the protectiveness criteria for radioactive materials established by EPA. EPA's decay-corrected PRG levels are considerably lower than the state-approved DCGL values. Attainment of the proposed removal action goals should allow the Building 364, 707, 529, and 509 sites to be used without property, access, or deed restrictions exclusively with regard to residual radioactive materials.

7.0 OUTSTANDING POLICY ISSUES

No outstanding policy issues exist for this removal action.

8.0 RECOMMENDATION

This AM presents the selected removal action for the Building 364, 707, 529, and 509 sites at HPS, San Francisco, California. This action was developed in accordance with CERCLA, as amended by SARA, and is consistent with the NCP. Conditions at the site indicate that removal is appropriate in accordance with 40 CFR, Section 300.425(b)(2), Criteria for Removal. The removal action is based on the AR for the sites. An index to the AR for this action is included in [Appendix A](#).

The purpose of this AM is to identify and evaluate removal actions to address ionizing radiation at the Building 364, 707, 529, and 509 sites. Two removal action alternatives were identified and evaluated:

- Alternative 1 – No Action
- Alternative 2 – Removal and Off-Site Disposal

Based on the comparative analysis of the removal action alternatives documented in [Section 5.0](#), the recommended action is Alternative 2 – Removal and Off-Site Disposal. Alternative 2 would provide a higher degree of human health and environmental protection compared to Alternative 1. Alternative 1 was rejected based on effectiveness.

9.0 REFERENCES

- PRC Environmental Management, Inc. (PRC). 1992. "Surface Confirmation Radiation Survey, Hunters Point Shipyard (HPS), San Francisco, California." November 3.
- PRC. 1996. "Results of Subsurface Radiation Investigation in Parcels B and E, HPS, San Francisco, California." May 8.
- Tetra Tech EM Inc. (TtEMI). 1997. "Draft Final Parcel E Remedial Investigation Report, HPS, San Francisco, California." October 27.
- TtEMI. 2000. "Draft Phase IV Radiation Investigation Report, HPS, San Francisco, California." May 15.
- U.S. Environmental Protection Agency (EPA). 1988. "Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Compliance with Other Laws Manual, Interim, Final." Office of Emergency and Remedial Response. Guidance No. EPA/G-89/006. August.
- EPA. 1989. "CERCLA Compliance with Other Laws Manual: Part II. Clean Air Act and Other Environmental Statutes and State Requirements." Office of Solid Waste and Emergency Response No. 9234 1-02." August.

FIGURES



LEGEND

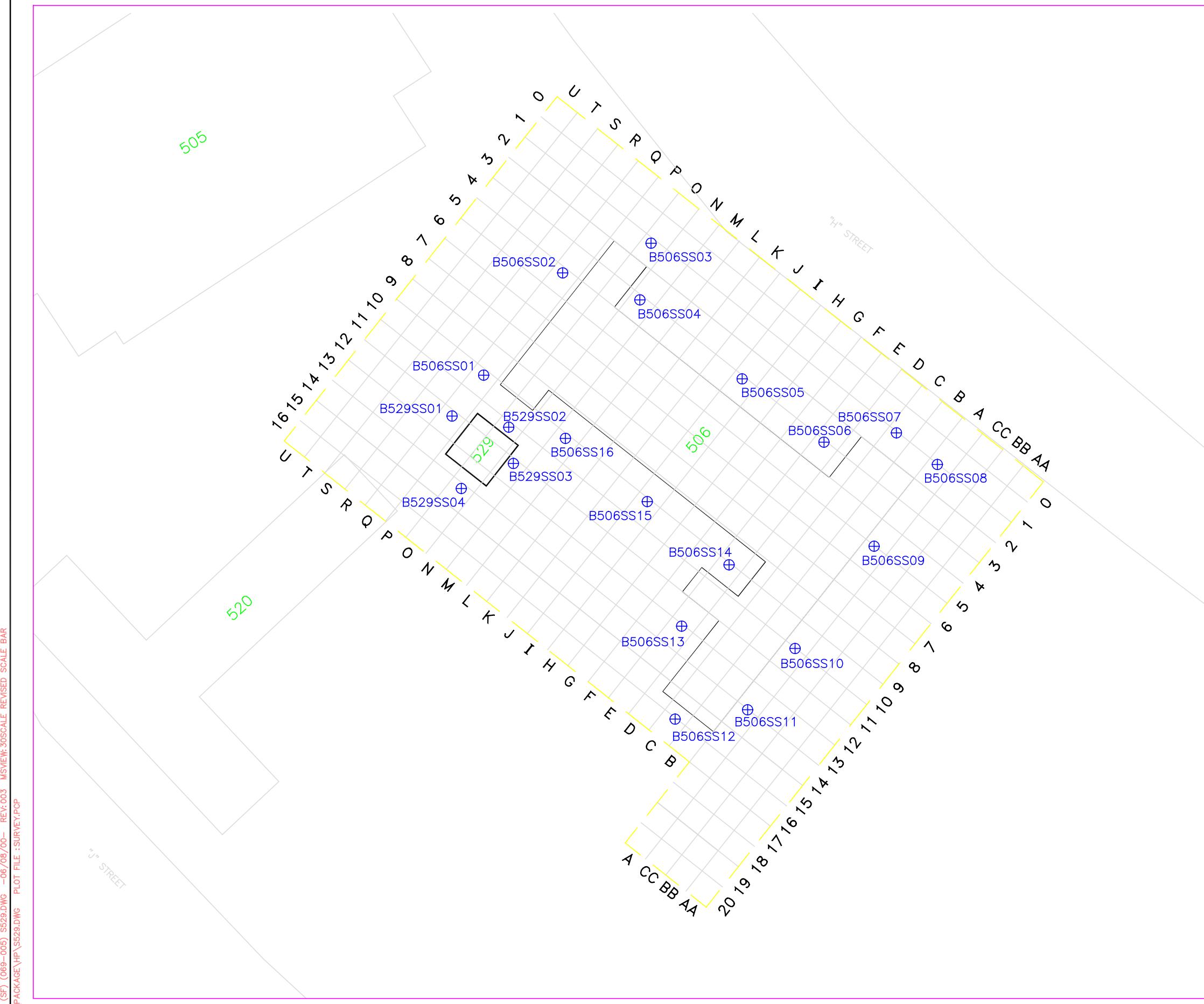
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- - - PARCEL BOUNDARY
- INVESTIGATION AREA

500 0 500 1000
SCALE IN FEET

FILE NAME: O:\HUNTER\005-RWP\MAP1.DWG GOOGS-005B101
DATE: 5/13/99 VEC DN

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
SOUTHWEST DIVISION
HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

Figure 1
HPS INSTALLATION LAYOUT AND
PHASE IV RADIATION SITES
PHASE IV RADIATION INVESTIGATION

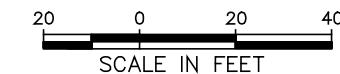


LEGEND

- APPROXIMATE LIMIT OF SURVEY
- ⊕ SURFACE SOIL SAMPLING LOCATION

NOTE:

GRIDS ARE APPROXIMATELY
10 FEET BY 10 FEET SQUARE



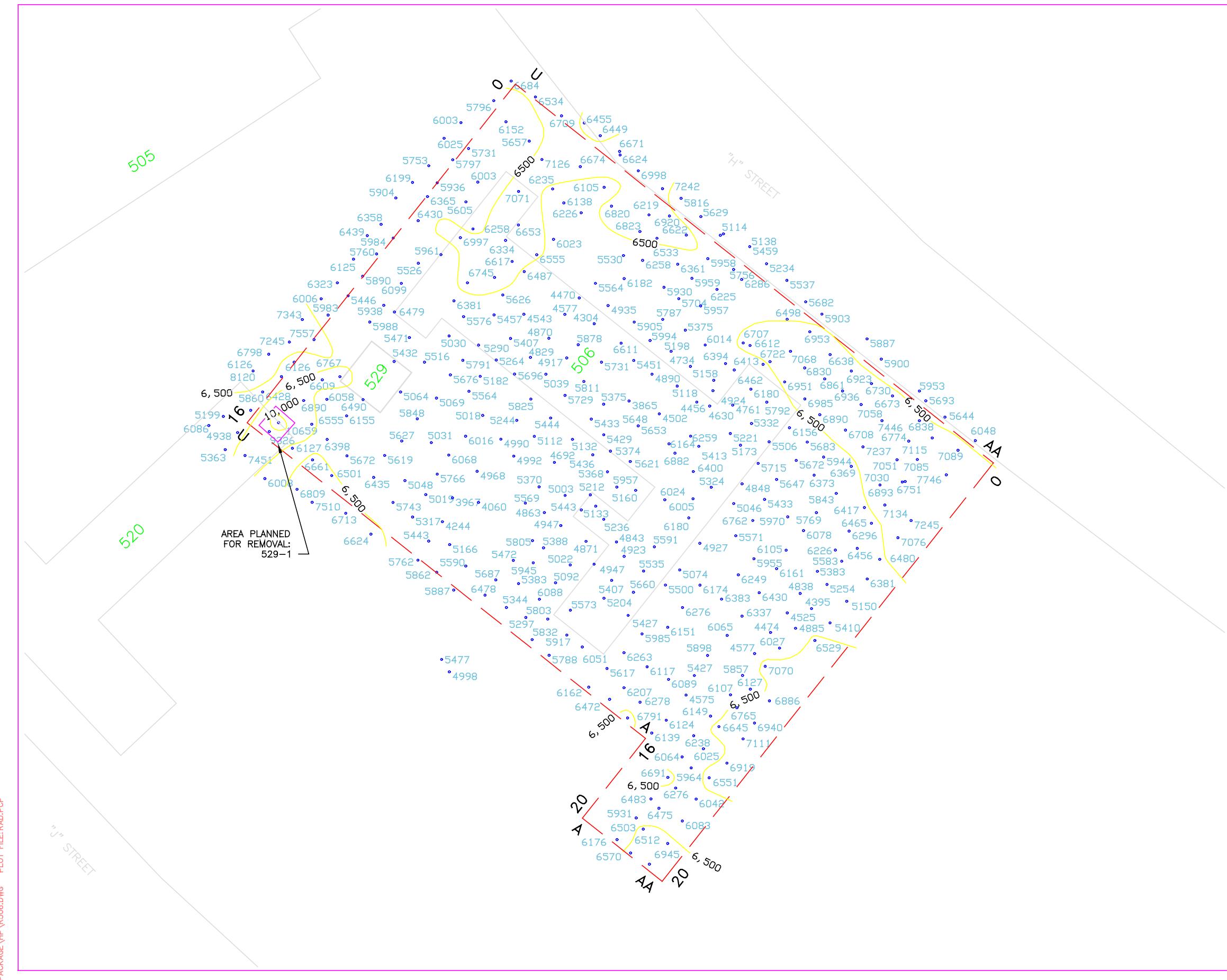
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

SOUTHWEST DIVISION

HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

Figure 2
BUILDING 529
SURVEY GRID AND
SAMPLING LOCATIONS



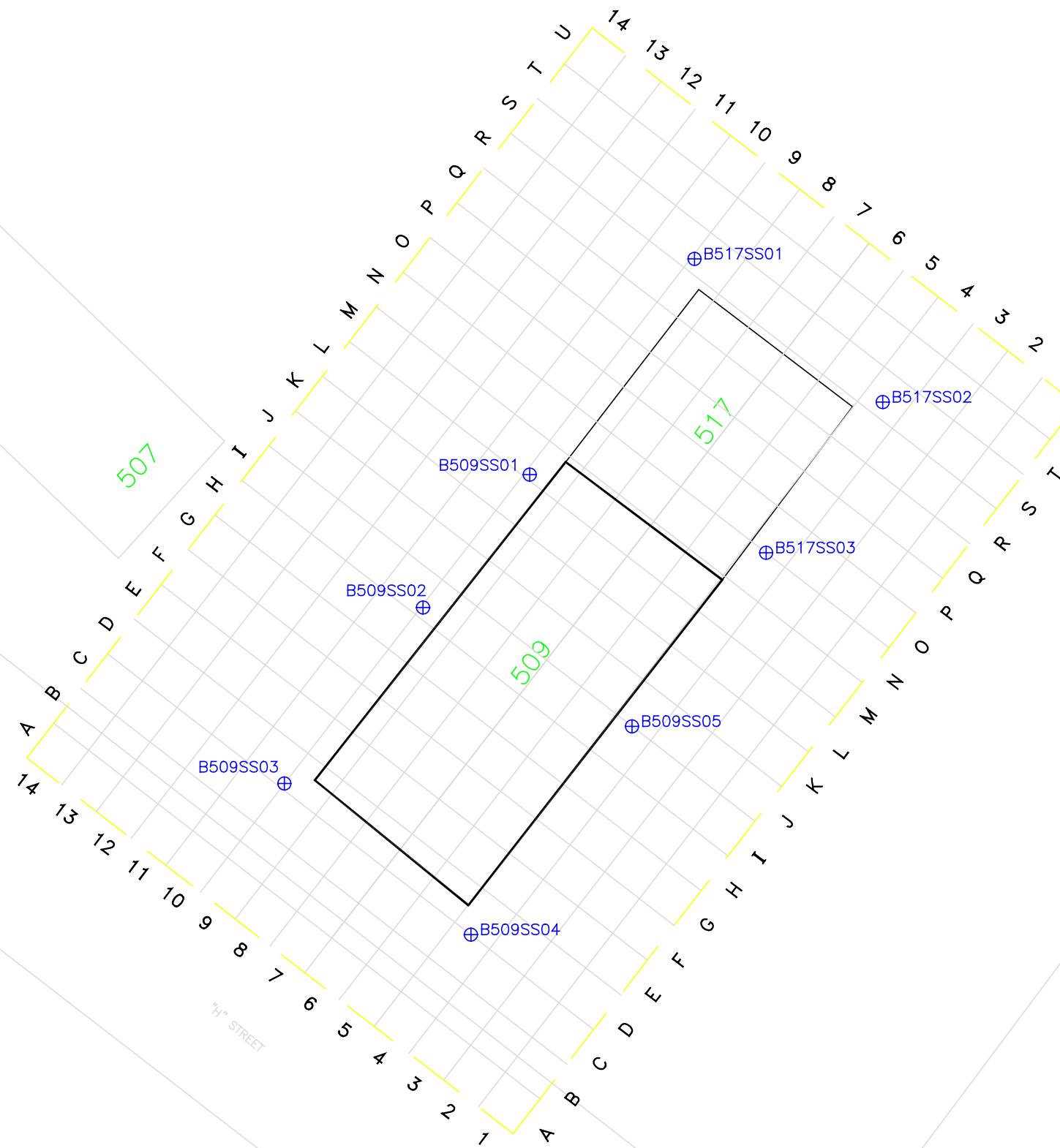


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SOUTHWEST DIVISION
HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

Figure 3

BUILDING 529 GAMMA COUNT AND CONTOUR MAP

20 0 20 40
SCALE IN FEET



LEGEND

— APPROXIMATE LIMIT OF SURVEY

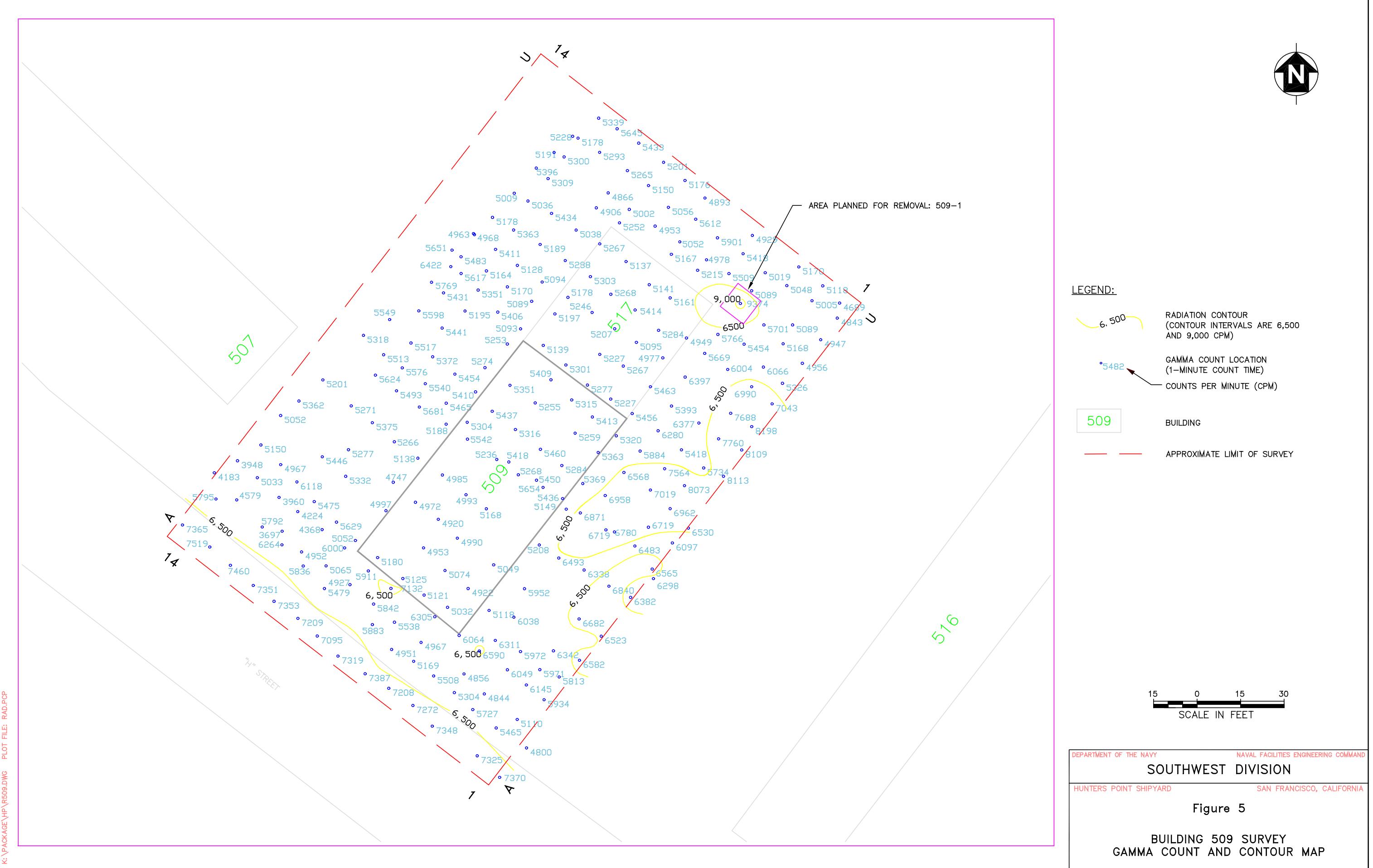
⊕ SURFACE SOIL SAMPLING LOCATION

NOTE:

GRIDS ARE APPROXIMATELY 10 FEET BY 10 FEET SQUARE

15 0 15 30
SCALE IN FEET

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
SOUTHWEST DIVISION
HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA
Figure 4
BUILDING 509
SURVEY GRID AND
SAMPLING LOCATIONS



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Figure 5
BUILDING 509 SURVEY
GAMMA COUNT AND CONTOUR MAP



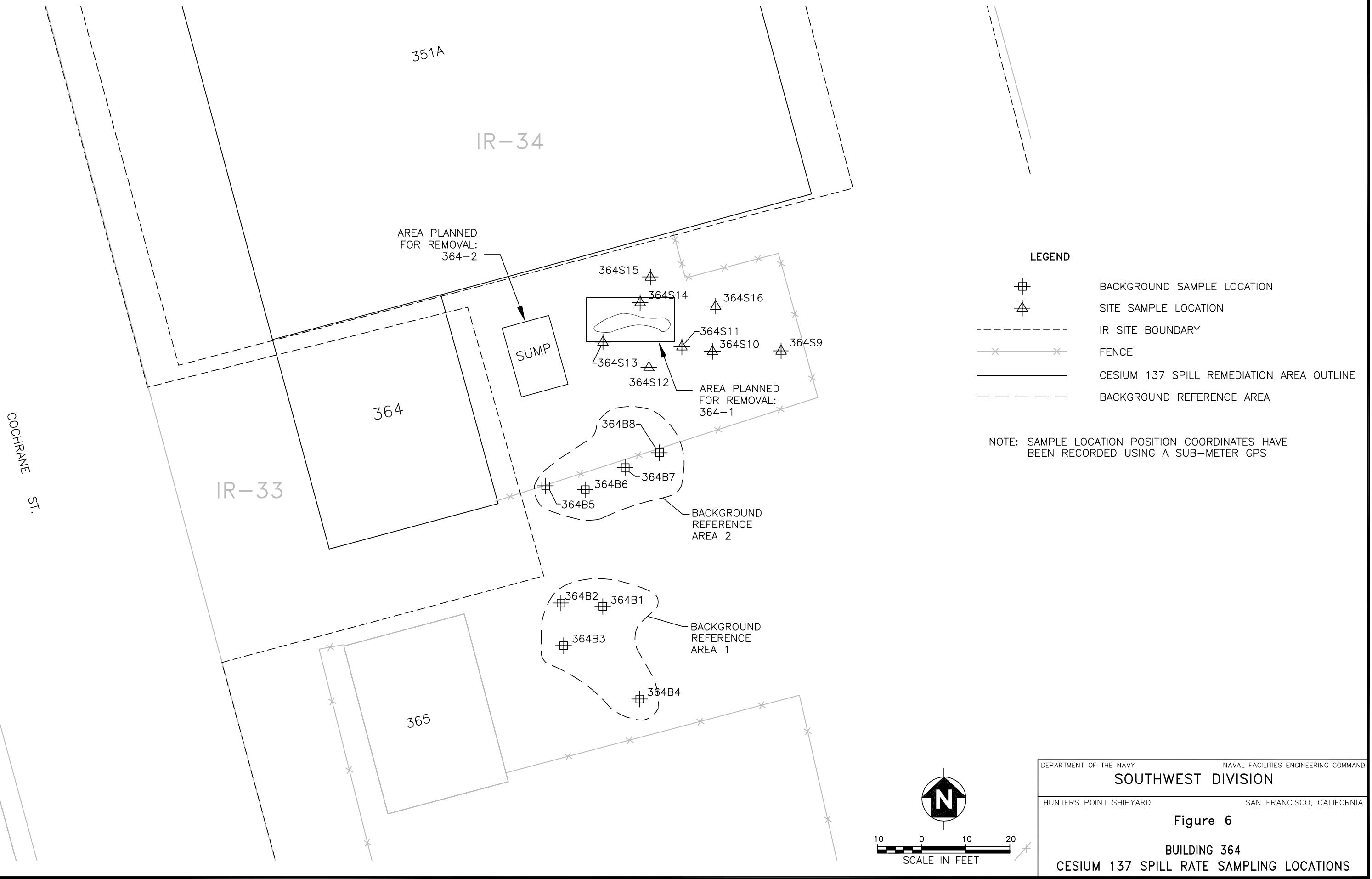
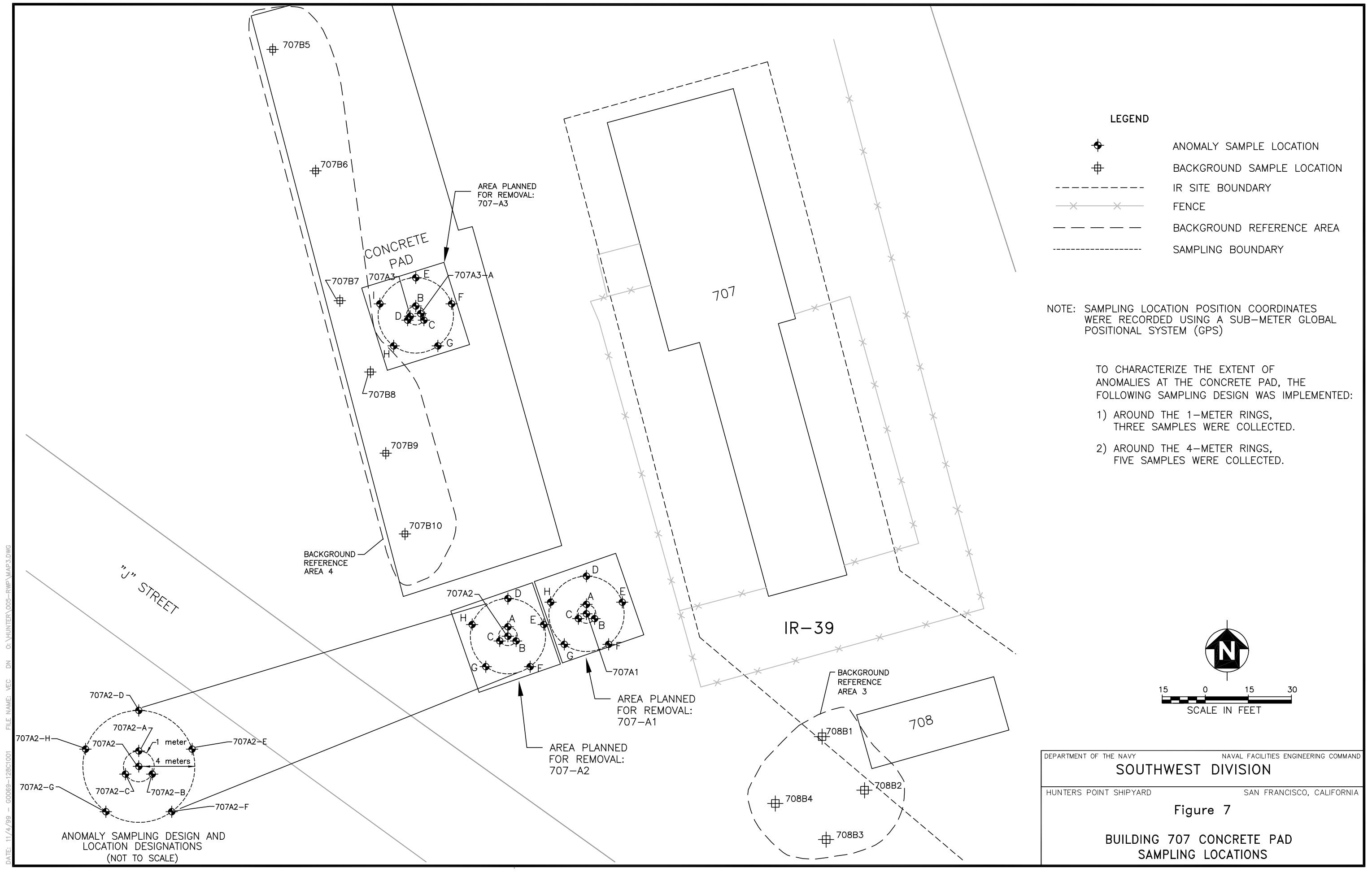


Figure 6

BUILDING 364
CESIUM 137 SPILL RATE SAMPLING LOCATIONS



TABLES

TABLE 1
BUILDING 529 COUNT RATES AND SURFACE COVERINGS
(Page 1 of 4)

Building No.	Grid ID No.	Count Rate (cpm)^a	Surface Cover
506/529	A0	6,586	Asphalt
506/529	A01	7,446	Asphalt
506/529	A02	7,237	Asphalt
506/529	AA0	7,089	Grass
506/529	AA2	7,746	Asphalt
506/529	AA2	7,552	Asphalt
506/529	AA3	7,245	Asphalt
506/529	AA4	7,076	Asphalt
506/529	AA9	6,529	Asphalt - mound
506/529	AA10	6,673	Asphalt
506/529	AA11	8,372	Asphalt
506/529	AA12	6,886	Asphalt - mound/rubble pile
506/529	AA13	6,940	Asphalt
506/529	AA14	7,111	Asphalt
506/529	AA15	6,919	Asphalt
506/529	AA16	6,551	Asphalt
506/529	AA19	6,512	Asphalt - hollow
506/529	AA20	6,945	Asphalt
506/529	B0	6,673	Asphalt
506/529	B01	7,058	Asphalt
506/529	B02	6,708	Asphalt
506/529	B16	6,791	Asphalt
506/529	BB0	7,115	Asphalt
506/529	BB1	7,085	Asphalt
506/529	BB2	6,751	Asphalt
506/529	BB2	7,030	Asphalt
506/529	BB3	7,134	Asphalt
506/529	BB11	7,070	Asphalt
506/529	BB13	6,765	Asphalt
506/529	BB14	6,645	Asphalt
506/529	BB19	6,503	Grass
506/529	BB20	6,570	Asphalt

TABLE 1 (Continued)
BUILDING 529 COUNT RATES AND SURFACE COVERINGS
(Page 2 of 4)

Building No.	Grid ID No.	Count Rate (cpm)^a	Surface Cover
506/529	C0	6,730	Asphalt
506/529	C01	6,936	Gravel
506/529	C02	6,890	Gravel
506/529	C07	6,762	Gravel
506/529	C19	7,254	Grass
506/529	CC0	6,838	Asphalt
506/529	CC1i	7,051	Asphalt
506/529	CC3	6,893	Asphalt
506/529	CC17	6,691	Asphalt
506/529	D0	6,923	Asphalt
506/529	D01	6,861	Gravel
506/529	D02	6,985	Gravel
506/529	D12	7,557	Grass
506/529	D13	6,798	Grass
506/529	D14	8,120	Gravel
506/529	D19	7,144	Grass
506/529	D20	6,845	Grass
506/529	E0	6,638	Asphalt
506/529	E01	6,830	Gravel
506/529	E02	6,951	Gravel
506/529	E16	7,133	Grass
506/529	E19	6,603	Concrete
506/529	F0	6,953	Concrete - mound
506/529	F01	7,068	Asphalt
506/529	F02	6,722	Asphalt
506/529	F08	6,921	Grass
506/529	F20	6,666	Grass
506/529	G02	6,612	Asphalt
506/529	G07	6,882	Grass
506/529	G20	6,988	Grass
506/529	H08	7,302	Grass
506/529	H2	6,707	Grass

TABLE 1 (Continued)
BUILDING 529 COUNT RATES AND SURFACE COVERINGS
(Page 3 of 4)

Building No.	Grid ID No.	Count Rate (cpm)^a	Surface Cover
506/529	I2	6,882	Grass
506/529	II9	7,401	Grass
506/529	L0	6,622	Gravel
506/529	L5	6,611	Grass
506/529	M0	6,920	Asphalt
506/529	M1	6,533	Gravel
506/529	N00	7,242	Asphalt - mound
506/529	N1	6,823	Asphalt
506/529	O0	6,820	Grass
506/529	OO0	6,998	Asphalt
506/529	O4	6,884	Grass
506/529	O5	6,722	Grass
506/529	O16	6,624	Grass
506/529	P00	6,624	Gravel
506/529	P4	6,555	Grass
506/529	P16	6,713	Grass
506/529	Q0	6,864	Grass
506/529	Q00	6,671	Gravel
506/529	Q1A	7,835	Grass
506/529	Q4	6,617	Grass
506/529	Q5	6,745	Grass
506/529	Q12	7,666	Grass
506/529	Q15	6,501	Grass
506/529	Q16	7,510	Asphalt
506/529	R0	6,574	Grass
506/529	R0	6,674	Grass - hollow
506/529	R1	7,126	Gravel
506/529	R2	7,235	Gravel
506/529	R3	7,049	Grass
506/529	R5	7,078	Grass
506/529	R8	6,744	Asphalt
506/529	R11	6,994	Soil

TABLE 1 (Continued)
BUILDING 529 COUNT RATES AND SURFACE COVERINGS
(Page 4 of 4)

Building No.	Grid ID No.	Count Rate (cpm)^a	Surface Cover
506/529	R12	6,767	Soil
506/529	R15	6,661	Asphalt
506/529	R16	6,809	Asphalt
506/529	S00	6,709	Asphalt
506/529	S11	6,802	Grass
506/529	S12	6,609	Grass
506/529	S13	6,890	Grass
506/529	S14	10,659	Grass
506/529	S15	9,323	Grass
506/529	S16	7,451	Asphalt
506/529	T00	6,534	Asphalt
506/529	T11	7,245	Grass
506/529	U00	6,684	Asphalt – hollow

Notes:

a The critical limit (L_c) was calculated to be 7,500 cpm for asphalt cover and 6,500 cpm for all other surfaces. All activity above the L_c was considered different from the background sample population. Only count rates exceeding 6,500 cpm are presented.

cpm Counts per minute

ID Identification

TABLE 2
SUMMARY OF BUILDING 529 SOIL ANALYTICAL RESULTS

Isotope	Number of Samples	Maximum Activity Concentration (pCi/g)	Average Activity Concentration (pCi/g)	Standard Deviation of Activity Concentration (pCi/g)
Cesium 137	4	0.15 ±0.03	0.08	0.04
Potassium-40	4	13.0 ±0.74	8.88	2.52
Radium-226	4	0.42 ±0.06	0.38	0.05
Thorium-228	4	0.49 ±0.05	0.42	0.06
Thorium-232	4	0.64 ±0.16	0.49	0.1

Notes:

pCi/g picoCuries per gram

± Plus or minus

TABLE 3
BUILDING 509 COUNT RATES AND SURFACE COVERINGS
(Page 1 of 2)

Building No.	Grid ID No.	Count Rate (cpm)^a	Surface Cover
509/517	A01	7,370	Asphalt
509/517	A02	7,325	Asphalt
509/517	A03	7,348	Asphalt
509/517	A03	7,912	Asphalt
509/517	A04	7,272	Asphalt
509/517	A05	7,208	Asphalt
509/517	A06	7,387	Asphalt
509/517	A07	7,319	Asphalt
509/517	A09	7,095	Asphalt
509/517	A10	7,209	Asphalt
509/517	A11	7,353	Asphalt
509/517	A12	7,351	Asphalt
509/517	A13	7,460	Asphalt
509/517	A14	7,519	Asphalt
509/517	A15	7,365	Asphalt
509/517	D04	6,590	Grass
509/517	D07	6,632	Grass
509/517	D08	7,132	Grass
509/517	E03	6,780	Grass
509/517	F01	6,582	Grass
509/517	G01	6,523	Grass
509/517	G02	6,682	Grass
509/517	H02	6,840	Grass
509/517	I01	6,565	Grass
509/517	J02	6,745	Grass
509/517	J03	6,719	Grass
509/517	J04	6,871	Grass
509/517	K02	6,719	Grass
509/517	K04	6,958	Grass
509/517	K04	6,978	Grass
509/517	L01	6,530	Grass
509/517	L02	6,962	Grass

TABLE 3 (Continued)
BUILDING 509 COUNT RATES AND SURFACE COVERINGS
(Page 2 of 2)

Building No.	Grid ID No.	Count Rate (cpm)^a	Surface Cover
509/517	L03	7,019	Gravel
509/517	L04	6,568	Grass
509/517	M01	7,533	Grass
509/517	M02	8,073	Grass
509/517	M03	7,564	Grass
509/517	N01	8,113	Grass
509/517	O01	8,109	Grass
509/517	O02	7,760	Grass
509/517	P01	8,198	Grass
509/517	P02	7,688	Grass
509/517	Q01	7,043	Grass
509/517	Q02	6,990	Grass
509/517	S04	9,374	Grass
509/517	T03	6,912	Grass

Notes:

a The critical limit (L_c) was calculated to be 7,500 cpm for asphalt cover and 6,500 cpm for all other surfaces. All activity above the L_c was considered different from the background sample population. Only count rates exceeding 6,500 cpm are presented.

cpm Counts per minute

ID Identification

TABLE 4
SUMMARY OF BUILDING 509 SOIL ANALYTICAL RESULTS

Isotope	Number of Samples	Maximum Activity Concentration (pCi/g)	Average Activity Concentration (pCi/g)	Standard Deviation of Activity Concentration (pCi/g)
Cesium 137	5	0.1 ±0.04	0.06	0.03
Potassium-40	5	15.0 ±1.1	9.43	3.28
Radium-226	5	0.31 ±0.07	0.29	0.02
Thorium-228	5	0.49 ±0.06	0.36	0.08
Thorium-232	5	0.49 ±0.15	0.34	0.11

Notes:

pCi/g picoCuries per gram

± Plus or minus

TABLE 5
SUMMARY OF BUILDING 364 CESIUM 137 ANALYTICAL RESULTS

Radionuclide	Results (pCi/g)
Decay Corrected PRG	0.13
Average A/C Concentration	0.115
Average Soil Concentration	0.045

Source: [TtEMI 2000](#)

Notes:

A/C Asphaltic concrete
pCi/g picoCuries per gram
PRG Preliminary remediation goal

TABLE 6
SUMMARY OF BUILDING 707 CONCRETE PAD ANALYTICAL RESULTS

Radionuclide	Cs-137 (pCi/g)	Am-241 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	U-235 (pCi/g)
Decay-Corrected PRG	0.13	7.8	0.42	0.13	0.23	0.57
Anomaly 707A1						
Average A/C Concentration	2.425	2.59	0.007	0.064	0	0.091
Average Soil Concentration	18.955	0.43	0.022	0	0.05	0.238
Anomaly 707A2						
Average A/C Concentration	4.146	0	0	0	0	0.009
Average Soil Concentration	0.458	0	0	0	0	0
Anomaly 707A3						
Average A/C Concentration	6.506	0	0	0	0	0.039
Average Soil Concentration		0	0	0	0	0.177
Total						
Average A/C Concentration	4.491	0.139	0.002	0.021	0	0.047
Average Soil Concentration	10.745	0.835	0.007	0	0.016	0.139

Notes:

A/C Asphaltic concrete
 Am-241 Americium 241
 Co-60 Cobalt 60
 CS-137 Cesium 137
 Eu-152 Europium 152
 Eu-154 Europium 154
 pCi/g picoCuries per gram
 PRG Preliminary remediation goal

TABLE 7
EPA DECAY-CORRECTED PRELIMINARY REMEDIATION GOALS
ASSUMING COMMERCIAL REUSE

Radionuclide	PRG (pCi/g)
Americium 241	7.8
Cobalt 60	0.42
Cesium 137 (and daughter)	0.13
Europium 152	0.13
Europium 154	0.23
Uranium 235 (and daughters)	0.57 ^a

Notes:

a The PRG for uranium 235 is not decay-corrected.

EPA U.S. Environmental Protection Agency

pCi/g picoCuries per gram

PRG Preliminary remediation goal

TABLE 8
COMPARISON OF REMOVAL ACTION ALTERNATIVES FOR THE BUILDING 364, 707, 529, AND 509 SITES

Alternative	Effectiveness					Implementability		Acceptance		Cost
	Overall Protection	Compliance with ARARS	Long-Term	Reduction of Toxicity, Mobility, and Volume	Short-Term	Technical Feasibility	Administrative Feasibility	State	Community	
1 – No Action	No	No	No	No	No	No	No	TBD	TBD	\$0
2 – Removal and Off-Site Disposal	Yes	Yes	Yes	No	Yes	Yes	Yes	TBD	TBD	\$263,250

Notes:

ARAR Applicable or relevant and appropriate requirement

TBD To be determined during the public comment period

APPENDIX A
LIST OF DOCUMENTS IN ADMINISTRATIVE RECORD
(1 Page)

LIST OF DOCUMENTS IN ADMINISTRATIVE RECORD

Doc No.	Doc Date	Doc Type	Classification	Author Affiliation	Title or Subject
	05/15/00	Report	AR	TtEMI	Draft Phase IV Radiation Investigation Report, HPS, San Francisco, California
	10/27/97	Report	AR	TtEMI	Draft Final Parcel E RI Report, HPS, San Francisco, California
	05/08/96	Report	AR	PRC	Results of Subsurface Radiation Investigation in Parcels B and E, HPS, San Francisco, California
	11/03/92	Report	AR	PRC	Surface Confirmation Radiation Survey

Notes:

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

APPENDIX B
PHASE III RADIATION INVESTIGATION ANALYTICAL RESULTS
(15 pages)

SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION

Station Number	2857070B1		2857070B2		B506SS01		B506SS02		B506SS03		B506SS04	
Sampling Depths (feet bgs)	0.17 - 0.17		0.17 - 0.17		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50	
Sample Number	9710A001		9710A004		9704R049		9704R048		9704R062		9704R064	
Sample Matrix	ASPHALT		CONCRETE		SOIL		SOIL		SOIL		SOIL	
Sample Date	03/06/97		03/06/97		01/22/97		01/22/97		01/22/97		01/22/97	
	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137 COBALT 60 POTASSIUM 40 RADIIUM 226	6.3±4.7 Not Detected Not Detected 70.0±13.0	0.006 6.4 210 0.01	Not Detected Not Detected Not Detected 55.0±13.0	11.0 7.8 260 0.01	Not Analyzed Not Analyzed Not Analyzed Not Analyzed							
THORIUM 228 THORIUM 232	79.0±7.0 Not Detected	0.009 38.0	Not Detected Not Detected	15.0 49.0	Not Analyzed Not Analyzed							
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	Not Analyzed		Not Analyzed		0.01±0.13	0.18	0.08±0.14	0.19	0.01±0.12	0.17	0.02±0.14	0.20

**SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION**

Station Number	B506SS05		B506SS06		B506SS07		B506SS08		B506SS09			
Sampling Depths (feet bgs)	0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50			
Sample Number	9704R052		9704R051		9704R055		9704R054		9704R058			
Sample Matrix	SOIL											
Sample Date	01/22/97		01/22/97		01/22/97		01/22/97		01/22/97			
	Result	MDA										
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137 COBALT 60 POTASSIUM 40 RADIIUM 226	Not Analyzed Not Analyzed Not Analyzed Not Analyzed											
THORIUM 228 THORIUM 232	Not Analyzed Not Analyzed											
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	0.06±0.15	0.20	-0.03±0.12	0.18	-0.03±0.14	0.20	-0.04±0.13	0.24	0.007±0.13	0.18	-0.06±0.13	0.18

**SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION**

Station Number	B506SS10		B506SS10		B506SS11		B506SS11		B506SS12		B506SS13	
Sampling Depths (feet bgs)	0.00 - 0.00		0.17 - 0.67		0.00 - 0.00		0.25 - 0.75		0.00 - 0.50		0.00 - 0.50	
Sample Number	9705R084		9705R091		9705R085		9705R090		9704R063		9704R061	
Sample Matrix	ASPHALT		SOIL		ASPHALT		SOIL		SOIL		SOIL	
Sample Date	01/28/97		01/28/97		01/28/97		01/28/97		01/22/97		01/22/97	
	Result	MDA										
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137 COBALT 60 POTASSIUM 40 RADIIUM 226	Not Analyzed Not Analyzed Not Analyzed Not Analyzed											
THORIUM 228 THORIUM 232	Not Analyzed Not Analyzed											
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	-0.04±0.15	0.19	0.003±0.12	0.16	-0.03±0.14	0.19	-0.07±0.12	0.17	-0.07±0.13	0.18	-0.08±0.13	0.19

**SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION**

Station Number	B506SS14		B506SS15		B506SS16		B507SS02		B507SS03		B507SS04	
Sampling Depths (feet bgs)	0.00 - 0.50		0.00 - 0.00		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50	
Sample Number	9704R060		9705R086		9704R050		9704R016		9704R017		9704R018	
Sample Matrix	SOIL		ASPHALT		SOIL		SOIL		SOIL		SOIL	
Sample Date	01/22/97		01/28/97		01/22/97		01/20/97		01/20/97		01/20/97	
	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137 COBALT 60 POTASSIUM 40 RADIIUM 226	Not Analyzed Not Analyzed Not Analyzed Not Analyzed		Not Analyzed Not Analyzed Not Analyzed Not Analyzed		Not Analyzed Not Analyzed Not Analyzed Not Analyzed		Not Detected Not Detected 10.0 ± 0.87 0.30 ± 0.06	0.04 0.09 0.01	Not Detected Not Detected 6.0 ± 0.69 0.29 ± 0.06	0.03 0.09 0.01	Not Detected Not Detected 7.4 ± 0.76 0.35 ± 0.08	0.04 0.09 0.01
THORIUM 228 THORIUM 232	Not Analyzed Not Analyzed		Not Analyzed Not Analyzed		Not Analyzed Not Analyzed		0.28 ± 0.04 0.42 ± 0.16	0.009 0.11	0.34 ± 0.05 0.35 ± 0.15	0.009 0.11	0.34 ± 0.04 0.34 ± 0.17	0.009 0.11
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	-0.04±0.12	0.18	0.02±0.13	0.18	0.11±0.13	0.18	Not Analyzed		Not Analyzed		Not Analyzed	

SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION

Station Number	B507SS05		B507SS06		B507SS07		B508SS01		B508SS01		B508SS02	
Sampling Depths (feet bgs)	0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50	
Sample Number	9704R019		9704R020		9704R021		9704R022		9704R023		9704R028	
Sample Matrix	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
Sample Date	01/20/97		01/20/97		01/20/97		01/20/97		01/20/97		01/20/97	
	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137 COBALT 60 POTASSIUM 40 RADIAU 226	0.04±0.03 Not Detected 4.4±0.62 0.17±0.05	0.006 Not Detected 0.09 0.01	Not Detected 7.7±0.80 0.25±0.07	0.04 0.09 0.01	0.08±0.04 Not Detected 11.0±1.1 0.26±0.08	0.006 0.09 0.01	Not Detected Not Detected 6.3±0.76 0.25±0.07	0.04 0.09 0.01	Not Detected Not Detected 7.9±0.81 0.32±0.07	0.04 0.09 0.01	Not Detected Not Detected 8.0±0.83 0.32±0.08	0.04 0.09 0.01
THORIUM 228 THORIUM 232	0.22±0.05 0.25±0.15	0.009 0.11	0.46±0.07 0.40±0.15	0.009 0.11	0.40±0.07 0.31±0.15	0.009 0.11	0.42±0.06 0.28±0.13	0.009 0.11	0.33±0.04 0.27±0.16	0.009 0.11	0.34±0.04 0.35±0.19	0.009 0.11
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	Not Analyzed		Not Analyzed		Not Analyzed		Not Analyzed		Not Analyzed		Not Analyzed	

**SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION**

Station Number	B508SS04		B508SS05		B508SS06		B508SS07		B508SS08		B509SS01	
Sampling Depths (feet bgs)	0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50	
Sample Number	9704R029		9704R027		9704R026		9704R025		9704R024		9704R012	
Sample Matrix	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
Sample Date	01/20/97		01/20/97		01/20/97		01/20/97		01/20/97		01/20/97	
	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137	Not Detected	0.04	Not Detected	0.04	Not Detected	0.04	Not Detected	0.03	Not Detected	0.04	0.05±0.04	0.006
COBALT 60	Not Detected		Not Detected		Not Detected		Not Detected		Not Detected		Not Detected	
POTASSIUM 40	6.9±0.76	0.09	8.2±0.81	0.09	7.3±0.80	0.09	6.1±0.62	0.09	9.6±0.84	0.09	7.1±0.75	0.09
RADIUM 226	0.20±0.07	0.01	0.30±0.08	0.01	0.33±0.09	0.01	0.24±0.06	0.01	0.44±0.07	0.01	0.31±0.07	0.01
THORIUM 228	Not Detected		0.30±0.04	0.009	0.33±0.04	0.009	0.24±0.03	0.009	0.48±0.05	0.009	0.49±0.06	0.009
THORIUM 232	0.23±0.06	0.11	0.29±0.18	0.11	0.40±0.21	0.11	0.35±0.11	0.11	0.56±0.18	0.11	0.49±0.15	0.11
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	Not Analyzed		Not Analyzed		Not Analyzed		Not Analyzed		Not Analyzed		Not Analyzed	

**SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION**

Station Number	B509SS02		B509SS03		B509SS04		B509SS05		B510ASS01		B510ASS02	
Sampling Depths (feet bgs)	0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.00		0.00 - 0.50		0.00 - 0.50	
Sample Number	9704R011		9704R009		9704R010		9705R083		9704R001		9704R002	
Sample Matrix	SOIL		SOIL		SOIL		ASPHALT		SOIL		SOIL	
Sample Date	01/20/97		01/20/97		01/20/97		01/28/97		01/20/97		01/20/97	
	Result	MDA										
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137	Not Detected	0.03	0.08±0.03	0.006	0.10±0.04	0.006	Not Detected	0.02	Not Detected	0.04	Not Detected	0.05
COBALT 60	Not Detected											
POTASSIUM 40	7.0±0.66	0.09	15.0±1.1	0.09	8.6±0.84	0.09	3.9±0.41	0.09	5.5±0.70	0.09	11.0±0.81	0.09
RADIUM 226	0.29±0.06	0.01	0.27±0.10	0.01	0.30±0.07	0.01	0.23±0.05	0.01	0.25±0.06	0.01	0.29±0.06	0.01
THORIUM 228	0.35±0.04	0.009	0.31±0.04	0.009	0.29±0.04	0.009	0.33±0.03	0.009	0.25±0.04	0.009	0.31±0.04	0.009
THORIUM 232	0.38±0.15	0.11	0.23±0.19	0.11	0.24±0.15	0.11	0.30±0.10	0.11	0.41±0.15	0.11	0.33±0.15	0.11
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	Not Analyzed											

**SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION**

Station Number	B510SS01		B510SS02		B510SS03		B510SS04		B510SS05		B510SS06	
Sampling Depths (feet bgs)	0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50	
Sample Number	9704R003		9704R004		9704R005		9704R006		9704R007		9704R008	
Sample Matrix	SOIL											
Sample Date	01/20/97		01/20/97		01/20/97		01/20/97		01/20/97		01/20/97	
	Result	MDA										
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137	Not Detected	0.03	Not Detected	0.03	0.05±0.03	0.006	0.03±0.03	0.006	0.04±0.03	0.006	Not Detected	0.03
COBALT 60	Not Detected											
POTASSIUM 40	5.6±0.62	0.09	7.7±0.74	0.09	7.1±0.85	0.09	8.3±0.68	0.09	10.0±0.83	0.09	7.7±0.68	0.09
RADIUM 226	0.29±0.06	0.01	0.26±0.05	0.01	0.27±0.07	0.01	0.28±0.06	0.01	0.29±0.07	0.01	0.20±0.06	0.01
THORIUM 228	0.24±0.03	0.009	0.26±0.03	0.009	0.24±0.05	0.009	0.38±0.05	0.009	0.30±0.05	0.009	0.18±0.03	0.009
THORIUM 232	0.26±0.13	0.11	0.26±0.11	0.11	0.34±0.16	0.11	0.36±0.11	0.11	0.34±0.19	0.11	0.28±0.11	0.11
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	Not Analyzed											

**SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION**

Station Number	B517SS01		B517SS02		B517SS03		B529SS01		B529SS02		B529SS03	
Sampling Depths (feet bgs)	0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50	
Sample Number	9704R013		9704R014		9704R015		9704R057		9704R056		9704R065	
Sample Matrix	SOIL											
Sample Date	01/20/97		01/20/97		01/20/97		01/22/97		01/22/97		01/22/97	
	Result	MDA										
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137	Not Detected	0.04	Not Detected	0.04	Not Detected	0.04	0.15±0.03	0.006	0.05±0.02	0.006	0.05±0.02	0.006
COBALT 60	Not Detected											
POTASSIUM 40	8.4±0.86	0.09	7.0±0.73	0.09	9.1±0.79	0.09	13.0±0.74	0.09	6.5±0.73	0.09	7.2±0.47	0.09
RADIUM 226	0.20±0.07	0.01	0.60±0.07	0.01	0.41±0.08	0.01	0.42±0.06	0.01	0.30±0.07	0.01	0.38±0.05	0.01
THORIUM 228	0.33±0.04	0.009	0.81±0.05	0.009	0.43±0.04	0.009	0.45±0.04	0.009	0.33±0.04	0.009	0.40±0.03	0.009
THORIUM 232	0.34±0.13	0.11	0.96±0.18	0.11	0.53±0.16	0.11	0.49±0.11	0.11	0.40±0.16	0.11	0.41±0.11	0.11
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	Not Analyzed											

SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION

Station Number	B529SS04		B707SS01		B707SS017		B707SS018		B707SS019		B707SS02	
Sampling Depths (feet bgs)	0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50	
Sample Number	9704R066		9704R043		9704R031		9704R032		9704R033		9704R044	
Sample Matrix	SOIL											
Sample Date	01/22/97		01/22/97		01/21/97		01/21/97		01/21/97		01/22/97	
	Result	MDA										
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137	0.07±0.03	0.006	Not Detected	0.08	0.17±0.05	0.006	0.05±0.03	0.006	0.07±0.03	0.006	Not Detected	0.04
COBALT 60	Not Detected											
POTASSIUM 40	8.8±0.65	0.09	7.8±0.81	0.09	8.6±1.1	0.09	6.6±0.77	0.09	7.2±0.77	0.09	7.3±0.78	0.09
RADIUM 226	0.41±0.06	0.01	0.22±0.08	0.01	0.12±0.10	0.01	0.15±0.07	0.01	0.22±0.07	0.01	0.22±0.06	0.01
THORIUM 228	0.49±0.05	0.009	0.21±0.04	0.009	0.17±0.05	0.009	0.19±0.03	0.009	0.22±0.03	0.009	0.24±0.05	0.009
THORIUM 232	0.64±0.16	0.11	0.18±0.13	0.11	0.22±0.17	0.11	0.26±0.17	0.11	0.19±0.14	0.11	0.19±0.16	0.11
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	Not Analyzed											

SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION

Station Number	B707SS020		B707SS021		B707SS022		B707SS023		B707SS024		B707SS025	
Sampling Depths (feet bgs)	0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50	
Sample Number	9704R034		9704R035		9704R036		9704R037		9704R038		9704R039	
Sample Matrix	SOIL											
Sample Date	01/22/97		01/22/97		01/22/97		01/22/97		01/22/97		01/22/97	
	Result	MDA										
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137 COBALT 60 POTASSIUM 40 RADIIUM 226	0.06±0.03 Not Detected 9.1±0.78 0.23±0.06	0.006 0.09 0.01	0.04±0.03 Not Detected 8.1±0.75 0.29±0.07	0.006 0.09 0.01	0.10±0.03 Not Detected 7.1±0.74 0.19±0.06	0.006 0.09 0.01	0.10±0.02 Not Detected 9.3±0.40 0.26±0.03	0.006 0.09 0.01	0.10±0.02 Not Detected 8.8±0.43 0.19±0.03	0.006 0.09 0.01	0.05±0.02 Not Detected 7.7±0.79 0.21±0.06	0.006 0.09 0.01
THORIUM 228 THORIUM 232	0.32±0.05 0.22±0.13	0.009 0.11	0.25±0.04 0.22±0.10	0.009 0.11	0.22±0.05 0.42±0.15	0.009 0.11	0.27±0.02 0.34±0.07	0.009 0.11	0.23±0.02 0.26±0.08	0.009 0.11	0.20±0.03 0.24±0.14	0.009 0.11
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	Not Analyzed											

SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION

Station Number	B707SS026		B707SS027		B707SS027		B707SS03		B707SS04		B707SS04	
Sampling Depths (feet bgs)	0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.50		0.00 - 0.00		0.33 - 0.83	
Sample Number	9704R040		9704R041		9704R042		9704R045		9705R082		9705R088	
Sample Matrix	SOIL		SOIL		SOIL		SOIL		ASPHALT		SOIL	
Sample Date	01/22/97		01/22/97		01/22/97		01/22/97		01/28/97		01/28/97	
	Result	MDA	Result	MDA								
Gamma Scan for Soil and Asphalt (pCi/g)												
CESIUM 137	0.07±0.03	0.006	0.07±0.03	0.006	0.06±0.03	0.006	0.06±0.02	0.006	Not Detected	0.05	Not Detected	0.09
COBALT 60	Not Detected		Not Detected									
POTASSIUM 40	9.7±0.77	0.09	10.0±0.80	0.09	10.0±0.87	0.09	8.8±0.37	0.09	4.7±0.78	0.09	2.7±1.8	0.09
RADIUM 226	0.27±0.06	0.01	0.25±0.06	0.01	0.25±0.07	0.01	0.19±0.03	0.01	0.20±0.07	0.01	Not Detected	
THORIUM 228	0.32±0.05	0.009	0.28±0.04	0.009	0.26±0.04	0.009	0.26±0.02	0.009	0.24±0.07	0.009	Not Detected	
THORIUM 232	0.32±0.13	0.11	0.15±0.12	0.11	0.32±0.13	0.11	0.24±0.07	0.11	0.17±0.08	0.11	Not Detected	
Strontium, total in Soil and Asphalt (pCi/g)												
STRONTIUM 90	Not Analyzed		Not Analyzed									

SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION

Station Number	B707SS05		B707SS06		B707SS07		B707SS08		B707SS09		B707SS10	
Sampling Depths (feet bgs)	0.00 - 0.00		0.00 - 0.00		0.00 - 0.00		0.00 - 0.00		0.00 - 0.00		0.00 - 0.00	
Sample Number	9705R081		9705R080		9705R079		9705R078		9705R077		9705R076	
Sample Matrix	ASPHALT		ASPHALT		ASPHALT		ASPHALT		ASPHALT		ASPHALT	
Sample Date	01/28/97		01/28/97		01/28/97		01/28/97		01/28/97		01/28/97	
	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA
Gamma (pCi/g)												
CESIUM 137 COBALT 60 POTASSIUM 40 RADON 226	Not Detected Not Detected 13.0±1.2 0.51±0.10	0.06 0.09 0.01	Not Detected Not Detected 8.7±0.82 0.43±0.10	0.05 0.09 0.01	Not Detected Not Detected 9.6±1.0 0.38±0.10	0.06 0.09 0.01	0.02±0.01 Not Detected 5.0±0.43 0.19±0.04	0.006 0.09 0.01	Not Detected Not Detected 9.4±1.2 0.67±0.17	0.08 0.09 0.01	0.10±0.03 Not Detected 9.8±0.54 0.56±0.07	0.006 0.09 0.01
THORIUM 228 THORIUM 232	0.72±0.08 0.88±0.25	0.009 0.11	0.49±0.06 0.46±0.19	0.009 0.11	0.70±0.09 0.41±0.21	0.009 0.11	0.26±0.03 0.27±0.09	0.009 0.11	0.79±0.14 0.72±0.31	0.009 0.11	0.68±0.04 0.66±0.13	0.009 0.11
Strontium (pCi/g)												
STRONTIUM 90	Not Analyzed		Not Analyzed		Not Analyzed		Not Analyzed		Not Analyzed		Not Analyzed	

**SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION**

Station Number	B707SS11		B707SS12		B707SS13		B707SS14		B707SS14		B707SS15	
Sampling Depths (feet bgs)	0.00 - 0.00		0.00 - 0.29		0.00 - 0.17		0.00 - 0.25		0.25 - 0.75		0.00 - 0.21	
Sample Number	9705R075		9705R073		9705R072		9705R071		9705R089		9705R070	
Sample Matrix	ASPHALT		ASPHALT		ASPHALT		ASPHALT		SOIL		ASPHALT	
Sample Date	01/28/97		01/27/97		01/27/97		01/27/97		01/28/97		01/27/97	
	Result	MDA										
Gamma (pCi/g)												
CESIUM 137	Not Detected	0.11	0.07±0.04	0.006	Not Detected	0.09	0.15±0.04	0.006	Not Detected	0.06	1.4±0.12	0.006
COBALT 60	Not Detected											
POTASSIUM 40	7.4±0.77	0.09	5.7±0.69	0.09	9.3±1.1	0.09	3.6±0.60	0.09	16.0±1.2	0.09	8.7±1.2	0.09
RADIUM 226	0.42±0.08	0.01	0.30±0.09	0.01	0.57±0.16	0.01	0.14±0.06	0.01	0.40±0.12	0.01	0.57±0.13	0.01
THORIUM 228	0.70±	0.009	0.41±0.06	0.009	0.69±0.07	0.009	0.24±0.05	0.009	0.54±0.07	0.009	0.89±0.13	0.009
THORIUM 232	0.66±0.17	0.11	0.40±0.20	0.11	0.81±0.27	0.11	0.17±0.14	0.11	0.46±0.19	0.11	0.55±0.28	0.11
Strontium (pCi/g)												
STRONTIUM 90	Not Analyzed											

**SOIL, ASPHALT, AND CONCRETE ANALYTICAL RESULTS IN pCi/g
HUNTERS POINT SHIPYARD, PHASE III RADIATION INVESTIGATION**

Station Number	B707SS16	
Sampling Depths (feet bgs)	0.00 - 0.25	
Sample Number	9705R069	
Sample Matrix	ASPHALT	
Sample Date	01/27/97	
	Result	MDA
Gamma (pCi/g)		
CESIUM 137	0.86±0.08	0.006
COBALT 60	Not Detected	
POTASSIUM 40	7.2±0.80	0.09
RADIUM 226	0.42±0.10	0.01
THORIUM 228	0.48±0.06	0.009
THORIUM 232	0.41±0.19	0.11
Strontium (pCi/g)		
STRONTIUM 90	Not Analyzed	

Notes:

MDA Minimum Detectable Activity
 pCi/cm² PicoCuries per centimeters square
 NA Not available

APPENDIX C

**PHOTOGRAPHIC LOG OF SAMPLING LOCATIONS FOR
PHASE IV RADIATION INVESTIGATION**

(2 Pages)



Date: July 13, 1999

Description: Building 364 Cesium 137 Spill Site

Photograph: 1



Date: July 13, 1999

Subject: Building 364 Cesium 137 Spill Site, Background Sample

Photograph: 2



Date: July 14, 1999
Subject: Building 707 Concrete Pad Site

Photograph: 3



Date: July 14, 1999
Subject: Building 707 Concrete Pad Site Soil Sampling

Photograph: 4

APPENDIX D
PHASE IV RADIATION INVESTIGATION ANALYTICAL RESULTS
(38 Pages)

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364B1	Am-241	0	0	U	0.09	0	Asphalt
		0	0	U	0.108	0	SA
	Co-60	0	0	U	0.025	0.015	Asphalt
		0	0	U	0.032	0.015	SA
	Cs-137	0	0	U	0.025	0.01	Asphalt
		0	0	U	0.028	0.01	SA
	Eu-152	0	0	U	0.06	0.03	Asphalt
		0	0	U	0.071	0.03	SA
	Eu-154	0	0	U	0.09	0	Asphalt
		0	0	U	0.105	0	SA
	Eu-155	0	0	U	0.06	0	Asphalt
		0	0	U	0.078	0	SA
	K-40	14.4	3.1		0.279	0	Asphalt
		20.3	4.3		0.333	0	SA
	Ra-226	0.416	0.1		0.044	0.1	Asphalt
		0.558	0.13		0.057	0.1	SA
	Th-228	0.45	0.099		0.029	0.1	Asphalt
		0.604	0.13		0.033	0.1	SA
	Th-232	0.576	0.16		0.11	0.1	Asphalt
		0.659	0.19		0.13	0.1	SA
	U-235	0	0	U	0.087	0	Asphalt
		0	0	U	0.105	0	SA
	U-238	0	0	U	3.24	0	Asphalt
		0	0	U	3.83	0	SA
	Zn-65	0	0	U	0.069	0	Asphalt
		0	0	U	0.082	0	SA
364B2	Am-241	0	0	U	0.044	0	Asphalt
		0	0	U	0.05	0	SA
	Co-60	0	0	U	0.015	0.015	Asphalt
		0	0	U	0.018	0.015	SA
	Cs-137	0	0	U	0.013	0.01	Asphalt
		0	0	U	0.015	0.01	SA
	Eu-152	0	0	U	0.033	0.03	Asphalt
		0	0	U	0.039	0.03	SA
	Eu-154	0	0	U	0.055	0	Asphalt
		0	0	U	0.058	0	SA
	Eu-155	0	0	U	0.034	0	Asphalt
		0	0	U	0.04	0	SA

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364B2	K-40	16.9	3.6		0.161	0	Asphalt
		19.2	4.1		0.177	0	SA
	Ra-226	0.399	0.089		0.025	0.1	Asphalt
	Ra-226	0.487	0.11		0.033	0.1	SA
	Th-228	0.449	0.097		0.017	0.1	Asphalt
		0.569	0.12		0.02	0.1	SA
	Th-232	0.443	0.12		0.067	0.1	Asphalt
		0.567	0.15		0.08	0.1	SA
	U-235	0	0	U	0.055	0	Asphalt
		0	0	U	0.065	0	SA
	U-238	0	0	U	1.82	0	Asphalt
		0	0	U	2.21	0	SA
	Zn-65	0	0	U	0.043	0	Asphalt
		0	0	U	0.048	0	SA
364B3	Am-241	0	0	U	0.03	0	Asphalt
		0	0	U	0.049	0	SA
	Co-60	0	0	U	0.03	0.015	Asphalt
		0	0	U	0.017	0.015	SA
	Cs-137	0	0	U	0.024	0.01	Asphalt
		0	0	U	0.015	0.01	SA
	Eu-152	0	0	U	0.056	0.03	Asphalt
		0	0	U	0.037	0.03	SA
	Eu-154	0	0	U	0.099	0	Asphalt
		0	0	U	0.056	0	SA
	Eu-155	0	0	U	0.077	0	Asphalt
		0	0	U	0.038	0	SA
	K-40	16.2	3.5		0.257	0	Asphalt
		21	4.5		0.155	0	SA
	Ra-226	0.446	0.11		0.049	0.1	Asphalt
		0.56	0.12		0.029	0.1	SA
	Th-228	0.466	0.1		0.027	0.1	Asphalt
		0.604	0.13		0.019	0.1	SA
	Th-232	0.628	0.19		0.128	0.1	Asphalt
		0.672	0.16		0.072	0.1	SA
	U-235	0	0	U	0.08	0	Asphalt
		0	0	U	0.122	0	SA
	U-238	0	0	U	3.66	0	Asphalt
		0	0	U	2.1	0	SA

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364B3	Zn-65	0	0	U	0.088	0	Asphalt
		0	0	U	0.048	0	SA
364B4	Am-241	0	0	U	0.49	0	Asphalt
		0	0	U	0.109	0	SA
	Co-60	0	0	U	0.023	0.015	Asphalt
		0	0	U	0.028	0.015	SA
	Cs-137	0	0	U	0.02	0.01	Asphalt
	Cs-137	0	0	U	0.023	0.01	SA
	Eu-152	0	0	U	0.047	0.03	Asphalt
		0	0	U	0.055	0.03	SA
	Eu-154	0	0	U	0.077	0	Asphalt
		0	0	U	0.094	0	SA
	Eu-155	0	0	U	0.059	0	Asphalt
		0	0	U	0.1	0	SA
	K-40	15.4	3.3		0.226	0	Asphalt
		20.7	4.5		0.227	0	SA
	Ra-226	0.431	0.103		0.040	0.1	Asphalt
		0.547	0.125		0.045	0.1	SA
	Th-228	0.515	0.11		0.023	0.1	Asphalt
		0.614	0.135		0.030	0.1	SA
	Th-232	0.539	0.15		0.094	0.1	Asphalt
		0.734	0.195		0.115	0.1	SA
	U-235	0	0	U	0.068	0	Asphalt
		0	0	U	0.094	0	SA
	U-238	0	0	U	2.81	0	Asphalt
		0	0	U	3.28	0	SA
	Zn-65	0	0	U	0.065	0	Asphalt
		0	0	U	0.077	0	SA
364B5	Am-241	0	0	U	0.03	0	Asphalt
		0	0	U	0.07	0	SA
	Co-60	0	0	U	0.012	0.015	Asphalt
		0	0	U	0.02	0.015	SA
	Cs-137	0.018	0.01		0.012	0.01	Asphalt
		0	0	U	0.019	0.01	SA
	Eu-152	0	0	U	0.026	0.03	Asphalt
		0	0	U	0.048	0.03	SA
	Eu-154	0	0	U	0.044	0	Asphalt
		0	0	U	0.074	0	SA

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364B5	Eu-155	0	0	U	0.028	0	Asphalt
		0	0	U	0.053	0	SA
	K-40	16	3.4		0.112	0	Asphalt
		9.38	2.1		0.215	0	SA
	Ra-226	0.41	0.09		0.022	0.1	Asphalt
		0.364	0.087		0.04	0.1	SA
	Th-228	0.444	0.095		0.014	0.1	Asphalt
		0.314	0.07		0.022	0.1	SA
	Th-232	0.479	0.12		0.055	0.1	Asphalt
		0.354	0.12		0.096	0.1	SA
	U-235	0	0	U	0.04	0	Asphalt
	U-235	0	0	U	0.07	0	SA
	U-238	0	0	U	1.45	0	Asphalt
		0	0	U	2.39	0	SA
	Zn-65	0	0	U	0.035	0	Asphalt
		0	0	U	0.051	0	SA
364B6	Am-241	0	0	U	0.03	0	Asphalt
		0	0	U	0.048	0	SA
	Co-60	0	0	U	0.026	0.015	Asphalt
		0	0	U	0.016	0.015	SA
	Cs-137	0	0	U	0.022	0.01	Asphalt
		0	0	U	0.014	0.01	SA
	Eu-152	0	0	U	0.051	0.03	Asphalt
		0	0	U	0.036	0.03	SA
	Eu-154	0	0	U	0.086	0	Asphalt
		0	0	U	0.053	0	SA
	Eu-155	0	0	U	0.046	0	Asphalt
		0	0	U	0.038	0	SA
	K-40	12.3	2.6		0.26	0	Asphalt
		20.9	4.5		0.159	0	SA
	Ra-226	0.465	0.11		0.042	0.1	Asphalt
		0.538	0.12		0.03	0.1	SA
	Th-228	0.613	0.13		0.027	0.1	Asphalt
		0.641	0.14		0.018	0.1	SA
	Th-232	0.723	0.19		0.112	0.1	Asphalt
		0.692	0.16		0.064	0.1	SA
	U-235	0.065	0.06	U	0.08	0	Asphalt
		0	0	U	0.06	0	SA

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364B6	U-238	0	0	U	3.15	0	Asphalt
		0	0	U	2.06	0	SA
	Zn-65	0	0	U	0.079	0	Asphalt
		0	0	U	0.046	0	SA
364B7	Am-241	0	0	U	0.087	0	Asphalt
		0	0	U	0.078	0	SA
	Co-60	0	0	U	0.027	0.015	Asphalt
		0	0	U	0.022	0.015	SA
	Cs-137	0	0	U	0.025	0.01	Asphalt
		0	0	U	0.021	0.01	SA
	Eu-152	0	0	U	0.058	0.03	Asphalt
		0	0	U	0.05	0.03	SA
	Eu-154	0	0	U	0.088	0	Asphalt
		0	0	U	0.075	0	SA
	Eu-155	0	0	U	0.059	0	Asphalt
	Eu-155	0	0	U	0.058	0	SA
	K-40	16.6	3.6		0.27	0	Asphalt
		19.9	4.2		0.226	0	SA
	Ra-226	0.424	0.1		0.04	0.1	Asphalt
		0.523	0.12		0.038	0.1	SA
	Th-228	0.456	0.1		0.027	0.1	Asphalt
		0.588	0.13		0.024	0.1	SA
	Th-232	0.465	0.13		0.104	0.1	Asphalt
		0.654	0.16		0.096	0.1	SA
	U-235	0	0	U	0.086	0	Asphalt
		0	0	U	0.078	0	SA
	U-238	0	0	U	3.13	0	Asphalt
		0	0	U	2.67	0	SA
	Zn-65	0	0	U	0.072	0	Asphalt
		0	0	U	0.06	0	SA
364B8	Am-241	0	0	U	0.038	0	Asphalt
		0	0	U	0.041	0	SA
	Co-60	0	0	U	0.015	0.015	Asphalt
		0	0	U	0.014	0.015	SA
	Cs-137	0.015	0.013		0.015	0.01	Asphalt
		0	0	U	0.012	0.01	SA
	Eu-152	0	0	U	0.033	0.03	Asphalt
		0	0	U	0.031	0.03	SA

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364B8	Eu-154	0	0	U	0.053	0	Asphalt
		0	0	U	0.047	0	SA
	Eu-155	0	0	U	0.039	0	Asphalt
		0	0	U	0.054	0	SA
	K-40	16.2	3.5		0.13	0	Asphalt
		17.9	3.8		0.137	0	SA
	Ra-226	0.409	0.091		0.026	0.1	Asphalt
		0.47	0.1		0.027	0.1	SA
	Th-228	0.481	0.1		0.017	0.1	Asphalt
		0.521	0.11		0.016	0.1	SA
	Th-232	0.504	0.12		0.06	0.1	Asphalt
		0.51	0.12		0.061	0.1	SA
	U-235	0	0	U	0.051	0	Asphalt
		0	0	U	0.066	0	SA
	U-238	0	0	U	1.85	0	Asphalt
		0	0	U	1.67	0	SA
	Zn-65	0	0	U	0.041	0	Asphalt
		0	0	U	0.038	0	SA
364S9	Am-241	0	0	U	0.021	0	Asphalt
		0	0	U	0.026	0	SA
	Co-60	0	0	U	0.019	0.015	Asphalt
		0	0	U	0.021	0.015	SA
	Cs-137	0.019	0.018	U	0.021	0.01	Asphalt
		0	0	U	0.018	0.01	SA
	Eu-152	0	0	U	0.037	0.03	Asphalt
		0	0	U	0.041	0.03	SA
	Eu-154	0	0	U	0.073	0	Asphalt
		0	0	U	0.075	0	SA
	Eu-155	0	0	U	0.032	0	Asphalt
		0	0	U	0.036	0	SA
	K-40	14.1	3.1		0.181	0	Asphalt
		5.23	1.2		0.152	0	SA
	Ra-226	0.384	0.088		0.034	0.1	Asphalt
		0.279	0.071		0.034	0.1	SA
	Th-228	0.416	0.091		0.019	0.1	Asphalt
		0.198	0.047		0.021	0.1	SA
	Th-232	0.464	0.13		0.084	0.1	Asphalt
		0.19	0.093		0.085	0.1	SA

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364S9	U-235	0	0	U	0.053	0	Asphalt
		0	0	U	0.06	0	SA
	U-238	0	0	U	2.49	0	Asphalt
		0	0	U	2.38	0	SA
	Zn-65	0	0	U	0.061	0	Asphalt
		0	0	U	0.058	0	SA
364S10	Am-241	0	0	U	0.062	0	Asphalt
		0	0	U	0.058	0	SA
	Co-60	0	0	U	0.019	0.015	Asphalt
		0	0	U	0.014	0.015	SA
	Cs-137	0.011	0.01	U	0.015	0.01	Asphalt
		0	0	U	0.014	0.01	SA
	Eu-152	0	0	U	0.04	0.03	Asphalt
		0	0	U	0.037	0.03	SA
	Eu-154	0	0	U	0.061	0	Asphalt
		0	0	U	0.046	0	SA
	Eu-155	0	0	U	0.046	0	Asphalt
		0	0	U	0.042	0	SA
	K-40	15.8	3.4		0.203	0	Asphalt
		3.88	0.87		0.169	0	SA
	Ra-226	0.391	0.089		0.031	0.1	Asphalt
		0.412	0.093		0.026	0.1	SA
	Th-228	0.44	0.095		0.02	0.1	Asphalt
		0.155	0.036		0.018	0.1	SA
	Th-232	0.444	0.12		0.079	0.1	Asphalt
		0.132	0.06		0.061	0.1	SA
364S11	U-235	0	0	U	0.06	0	Asphalt
		0	0	U	0.064	0	SA
	U-238	0	0	U	2.13	0	Asphalt
		0	0	U	2.66	0	SA
	Zn-65	0	0	U	0.052	0	Asphalt
		0	0	U	0.039	0	SA
	Am-241	0	0	U	0.027	0	Asphalt
		0	0	U	0.034	0	SA
	Co-60	0	0	U	0.011	0.015	Asphalt
		0	0	U	0.01	0.015	SA
	Cs-137	0.171	0.038		0.011	0.01	Asphalt
		0	0	U	0.012	0.01	SA

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364S11	Eu-152	0	0	U	0.024	0.03	Asphalt
		0	0	U	0.023	0.03	SA
	Eu-154	0	0	U	0.039	0	Asphalt
		0	0	U	0.031	0	SA
	Eu-155	0	0	U	0.031	0	Asphalt
		0	0	U	0.027	0	SA
	K-40	16.5	3.5		0.083	0	Asphalt
		5.52	1.2		0.077	0	SA
	Ra-226	0.385	0.084		0.02	0.1	Asphalt
		0.205	0.048		0.018	0.1	SA
	Th-228	0.439	0.094		0.012	0.1	Asphalt
		0.18	0.04		0.012	0.1	SA
	Th-232	0.445	0.1		0.043	0.1	Asphalt
		0.200	0.059		0.04	0.1	SA
	U-235	0	0	U	0.051	0	Asphalt
		0	0	U	0.038	0	SA
	U-238	0	0	U	1.3	0	Asphalt
		0	0	U	1.16	0	SA
	Zn-65	0	0	U	0.031	0	Asphalt
		0	0	U	0.025	0	SA
364S12	Am-241	0	0	U	0.042	0	Asphalt
		0	0	U	0.032	0	SA
	Co-60	0	0	U	0.044	0.015	Asphalt
		0	0	U	0.01	0.015	SA
	Cs-137	0.05	0.031		0.033	0.01	Asphalt
		0	0	U	0.01	0.01	SA
	Eu-152	0	0	U	0.075	0.03	Asphalt
		0	0	U	0.025	0.03	SA
	Eu-154	0	0	U	0.142	0	Asphalt
		0	0	U	0.031	0	SA
	Eu-155	0	0	U	0.065	0	Asphalt
		0	0	U	0.026	0	SA
	K-40	15.6	3.4		0.348	0	Asphalt
		4.72	1		0.122	0	SA
	Ra-226	0.418	0.12		0.073	0.1	Asphalt
		0.335	0.075		0.02	0.1	SA
	Th-228	0.45	0.1		0.038	0.1	Asphalt
		0.197	0.044		0.013	0.1	SA

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364S12	Th-232	0.39	0.2		0.186	0.1	Asphalt
		0.225	0.065		0.044	0.1	SA
	U-235	0	0	U	0.109	0	Asphalt
		0	0	U	0.042	0	SA
	U-238	0	0	U	4.62	0	Asphalt
		0	0	U	1.23	0	SA
	Zn-65	0	0	U	0.122	0	Asphalt
		0	0	U	0.029	0	SA
364S13	Am-241	0	0	U	0.079	0	Asphalt
		0	0	U	0.012	0	SA
	Co-60	0	0	U	0.025	0.015	Asphalt
		0	0	U	0.011	0.015	SA
	Cs-137	0.052	0.027		0.026	0.01	Asphalt
		0	0	U	0.012	0.01	SA
	Eu-152	0	0	U	0.056	0.03	Asphalt
		0	0	U	0.024	0.03	SA
	Eu-154	0	0	U	0.09	0	Asphalt
		0	0	U	0.037	0	SA
	Eu-155	0	0	U	0.061	0	Asphalt
		0	0	U	0.023	0	SA
	K-40	16	3.5		0.266	0	Asphalt
		4.67	1.04		0.114	0	SA
	Ra-226	0.376	0.094		0.046	0.1	Asphalt
		0.191	0.046		0.020	0.1	SA
	Th-228	0.456	0.100		0.027	0.1	Asphalt
		0.15	0.034		0.012	0.1	SA
	Th-232	0.462	0.135		0.087	0.1	Asphalt
		0.16	0.058		0.047	0.1	SA
	U-235	0	0	U	0.081	0	Asphalt
		0	0	U	0.036	0	SA
	U-238	0	0	U	2.99	0	Asphalt
		0	0	U	1.32	0	SA
	Zn-65	0	0	U	0.093	0	Asphalt
		0	0	U	0.041	0	Asphalt
		0	0	U	0.029	0	SA

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364S14	Am-241	0	0	U	0.06	0	Asphalt
		0	0	U	0.028	0	SA
	Co-60	0	0	U	0.028	0.015	Asphalt
		0	0	U	0.017	0.015	SA
	Cs-137	0.386	0.091		0.032	0.01	Asphalt
		0.231	0.057		0.020	0.01	SA
	Eu-152	0	0	U	0.064	0.03	Asphalt
		0	0	U	0.042	0.03	SA
	Eu-154	0	0	U	0.101	0	Asphalt
		0	0	U	0.067	0	SA
	Eu-155	0	0	U	0.057	0	Asphalt
		0	0	U	0.035	0	SA
	K-40	15.3	3.3		0.374	0	Asphalt
		5.9	1.3		0.196	0	SA
	Ra-226	0.377	0.095		0.052	0.1	Asphalt
		0.259	0.067		0.034	0.1	SA
	Th-228	0.419	0.092		0.03	0.1	Asphalt
		0.209	0.049		0.020	0.1	SA
	Th-232	0.461	0.16		0.127	0.1	Asphalt
		0.261	0.115		0.085	0.1	SA
	U-235	0	0	U	0.085	0	Asphalt
		0	0	U	0.059	0	SA
	U-238	0	0	U	3.45	0	Asphalt
		0	0	U	2.44	0	SA
	Zn-65	0	0	U	0.082	0	Asphalt
		0	0	U	0.056	0	SA
364S15	Am-241	0	0	U	0.037	0	Asphalt
		0	0	U	0.093	0	SA
	Co-60	0	0	U	0.014	0.015	Asphalt
		0	0	U	0.028	0.015	SA
	Cs-137	0.058	0.02		0.017	0.01	Asphalt
		0.033	0.024		0.026	0.01	SA
	Eu-152	0	0	U	0.034	0.03	Asphalt
		0	0	U	0.063	0.03	SA
	Eu-154	0	0	U	0.053	0	Asphalt
		0	0	U	0.093	0	SA
	Eu-155	0	0	U	0.034	0	Asphalt

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364S15	Eu-155	0	0	U	0.065	0	SA
	K-40	16.6	3.5		0.152	0	Asphalt
		6.36	1.5		0.282	0	SA
	Ra-226	0.356	0.08		0.028	0.1	Asphalt
		0.382	0.095		0.041	0.1	SA
	Th-228	0.396	0.086		0.018	0.1	Asphalt
		0.191	0.048		0.031	0.1	SA
	Th-232	0.52	0.13		0.068	0.1	Asphalt
		0.341	0.13		0.108	0.1	SA
	U-235	0	0	U	0.047	0	Asphalt
		0	0	U	0.095	0	SA
	U-238	0	0	U	2.79	0	Asphalt
		0	0	U	3.4	0	SA
	Zn-65	0	0	U	0.044	0	Asphalt
		0	0	U	0.071	0	SA
364S16	Am-241	0	0	U	0.03	0	Asphalt
		0	0	U	0.041	0	SA
	Co-60	0	0	U	0.033	0.015	Asphalt
		0	0	U	0.013	0.015	SA
	Cs-137	0.115	0.035		0.028	0.01	Asphalt
		0	0	U	0.013	0.01	SA
	Eu-152	0	0	U	0.055	0.03	Asphalt
		0	0	U	0.031	0.03	SA
	Eu-154	0	0	U	0.104	0	Asphalt
		0	0	U	0.043	0	SA
	Eu-155	0	0	U	0.047	0	Asphalt
		0	0	U	0.032	0	SA
	K-40	17.6	3.8		0.279	0	Asphalt
		6.21	1.4		0.141	0	SA
	Ra-226	0.408	0.099		0.049	0.1	Asphalt
		0.256	0.061		0.025	0.1	SA
	Th-228	0.49	0.11		0.028	0.1	Asphalt
		0.236	0.053		0.016	0.1	SA
	Th-232	0.516	0.16		0.129	0.1	Asphalt
		0.259	0.079		0.054	0.1	SA
	U-235	0	0	U	0.079	0	Asphalt
		0	0	U	0.053	0	SA

TABLE D-1
BUILDING 364 CESIUM 137 SPILL SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
364S16	U-238	0	0	U	3.9	0	Asphalt
		0	0	U	1.68	0	SA
	Zn-65	0	0	U	0.087	0	Asphalt
		0	0	U	0.036	0	SA

Notes:

- Am-241 Americium 241
- Co-60 Cobalt 60
- Cs-137 Cesium 137
- Eu-152 Europium 152
- Eu-154 Europium 152
- J Estimated value
- K-40 Potassium 40
- MDA Minimum detectable activity
- pCi/g picoCurie per gram
- Ra-226 Radium 226
- RDL Required detection limit
- SA Soil aggregate (soil)
- Th-228 Thorium 228
- Th-232 Thorium 232
- U Nondetected value
- U-235 Uranium 235
- U-238 Uranium 238
- Zn-65 Zinc 65

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A1	Am-241	0.897	0.200		0.060	0.000	Concrete
		11.850	2.500		0.236	0.000	SA
	Co-60	0.014	0.010	J	0.011	0.015	Concrete
		0.088	0.042		0.033	0.015	SA
	Cs-137	5.920	1.250		0.025	0.010	Concrete
		84.200	18.000		0.084	0.010	SA
	Eu-152	0.000	0.000	U	0.142	0.030	Concrete
		0.000	0.000	U	0.280	0.030	SA
	Eu-154	0.000	0.000	U	0.052	0.000	Concrete
		0.250	0.110		0.103	0.000	SA
	Eu-155	0.000	0.000	U	0.050	0.000	Concrete
		0.000	0.000	U	0.183	0.000	SA
	K-40	4.180	0.930		0.141	0.000	Concrete
		14.300	3.100		0.240	0.000	SA
	Ra-226	0.255	0.066		0.037	0.100	Concrete
		0.396	0.135		0.134	0.100	SA
	Th-228	0.326	0.079		0.041	0.100	Concrete
		0.627	0.165		0.143	0.100	SA
	Th-232	0.270	0.085		0.062	0.100	Concrete
		0.392	0.145		0.124	0.100	SA
	U-235	0.157	0.078		0.095	0.000	Concrete
		0.838	0.275		0.312	0.000	SA
	U-238	0.000	0.000	U	1.920	0.000	Concrete
		0.000	0.000	U	3.740	0.000	SA
	Zn-65	0.000	0.000	U	0.047	0.000	Concrete
		0.000	0.000	U	0.076	0.000	SA
707A1-A	Am-241	0.268	0.130		0.130	0.000	Asphalt
		2.200	0.540		0.351	0.000	SA
	Co-60	0.000	0.000	U	0.022	0.015	Asphalt
		0.020	0.013		0.017	0.015	SA
	Cs-137	2.590	0.550		0.029	0.010	Asphalt
		17.800	3.800		0.035	0.010	SA
	Eu-152	0.000	0.000	U	0.071	0.030	Asphalt
		0.000	0.000	U	0.097	0.030	SA
	Eu-154	0.000	0.000	U	0.066	0.000	Asphalt
		0.000	0.000	U	0.070	0.000	SA
	Eu-155	0.000	0.000	U	0.065	0.000	Asphalt
		0.000	0.000	U	0.119	0.000	SA
	K-40	6.120	1.400		0.194	0.000	Asphalt
		18.000	3.800		0.155	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A1-A	Ra-226	0.274	0.074		0.048	0.100	Asphalt
		0.470	0.110		0.052	0.100	SA
	Th-228	0.292	0.067		0.031	0.100	Asphalt
		0.792	0.180		0.067	0.100	SA
	Th-232	0.230	0.084		0.081	0.100	Asphalt
		0.517	0.130		0.066	0.100	SA
	U-235	0.218	0.098		0.112	0.000	Asphalt
		0.374	0.140		0.159	0.000	SA
	U-238	0.000	0.000	U	2.350	0.000	Asphalt
		0.000	0.000	U	2.260	0.000	SA
	Zn-65	0.000	0.000	U	0.054	0.000	Asphalt
		0.000	0.000	U	0.049	0.000	SA
707A1-B	Am-241	0.000	0.000	U	0.042	0.000	Asphalt
		0.000	0.000	U	0.034	0.000	SA
	Co-60	0.000	0.000	U	0.012	0.015	Asphalt
		0.000	0.000	U	0.033	0.015	SA
	Cs-137	0.456	0.098		0.011	0.010	Asphalt
		0.115	0.036		0.029	0.010	SA
	Eu-152	0.059	0.028		0.034	0.030	Asphalt
		0.000	0.000	U	0.063	0.030	SA
	Eu-154	0.000	0.000	U	0.045	0.000	Asphalt
		0.000	0.000	U	0.114	0.000	SA
	Eu-155	0.000	0.000	U	0.044	0.000	Asphalt
		0.000	0.000	U	0.054	0.000	SA
	K-40	11.900	2.500		0.105	0.000	Asphalt
		19.100	4.100		0.270	0.000	SA
	Ra-226	0.429	0.094		0.020	0.100	Asphalt
		0.490	0.110		0.040	0.100	SA
	Th-228	0.490	0.100		0.016	0.100	Asphalt
		0.525	0.120		0.033	0.100	SA
	Th-232	0.584	0.140		0.053	0.100	Asphalt
		0.562	0.160		0.118	0.100	SA
	U-235	0.051	0.039	U	0.054	0.000	Asphalt
		0.000	0.000	U	0.091	0.000	SA
	U-238	0.000	0.000	U	1.570	0.000	Asphalt
		0.000	0.000	U	4.070	0.000	SA
	Zn-65	0.000	0.000	U	0.038	0.000	Asphalt
		0.000	0.000	U	0.094	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A1-C	Am-241	0.417	0.093		0.037	0.000	Concrete
		0.000	0.000	U	0.143	0.000	SA
	Co-60	0.000	0.000	U	0.025	0.015	Concrete
		0.000	0.000	U	0.030	0.015	SA
	Cs-137	2.650	0.560		0.027	0.010	Concrete
		1.040	0.220		0.034	0.010	SA
	Eu-152	0.077	0.051		0.068	0.030	Concrete
		0.000	0.000	U	0.077	0.030	SA
	Eu-154	0.000	0.000	U	0.072	0.000	Concrete
		0.000	0.000	U	0.100	0.000	SA
	Eu-155	0.000	0.000	U	0.053	0.000	Concrete
		0.000	0.000	U	0.079	0.000	SA
	K-40	4.330	0.990		0.238	0.000	Concrete
		16.100	3.500		0.283	0.000	SA
	Ra-226	0.273	0.072		0.044	0.100	Concrete
		0.430	0.110		0.055	0.100	SA
	Th-228	0.311	0.071		0.032	0.100	Concrete
		0.491	0.110		0.035	0.100	SA
	Th-232	0.309	0.130		0.109	0.100	Concrete
		0.533	0.150		0.106	0.100	SA
	U-235	0.000	0.000	U	0.134	0.000	Concrete
		0.118	0.092	U	0.123	0.000	SA
	U-238	0.000	0.000	U	2.700	0.000	Concrete
		0.000	0.000	U	3.510	0.000	SA
	Zn-65	0.000	0.000	U	0.068	0.000	Concrete
		0.000	0.000	U	0.079	0.000	SA
707A1-D	Am-241	0.000	0.000	U	0.032	0.000	Asphalt
		0.000	0.000	U	0.047	0.000	SA
	Co-60	0.015	0.011		0.012	0.015	Asphalt
		0.025	0.018		0.019	0.015	SA
	Cs-137	0.440	0.095		0.014	0.010	Asphalt
		2.120	0.450		0.020	0.010	SA
	Eu-152	0.000	0.000	U	0.031	0.030	Asphalt
		0.000	0.000	U	0.046	0.030	SA
	Eu-154	0.000	0.000	U	0.037	0.000	Asphalt
		0.000	0.000	U	0.056	0.000	SA
	Eu-155	0.000	0.000	U	0.032	0.000	Asphalt
		0.000	0.000	U	0.046	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A1-D	K-40	4.990	1.100		0.112	0.000	Asphalt
		17.000	3.600		0.148	0.000	SA
	Ra-226	0.223	0.054		0.023	0.100	Asphalt
		0.418	0.094		0.032	0.100	SA
	Th-228	0.202	0.046		0.016	0.100	Asphalt
		0.479	0.100		0.024	0.100	SA
	Th-232	0.196	0.062		0.050	0.100	Asphalt
		0.469	0.120		0.072	0.100	SA
	U-235	0.130	0.057		0.064	0.000	Asphalt
		0.210	0.081		0.089	0.000	SA
	U-238	0.000	0.000	U	1.310	0.000	Asphalt
		0.000	0.000	U	2.010	0.000	SA
	Zn-65	0.000	0.000	U	0.031	0.000	Asphalt
707A1-E	Am-241	0.000	0.000	U	0.036	0.000	Asphalt
		0.000	0.000	U	0.184	0.000	SA
	Co-60	0.000	0.000	U	0.032	0.015	Asphalt
		0.000	0.000	U	0.026	0.015	SA
	Cs-137	0.000	0.000	U	0.029	0.010	Asphalt
		0.000	0.000	U	0.022	0.010	SA
	Eu-152	0.000	0.000	U	0.065	0.030	Asphalt
		0.000	0.000	U	0.052	0.030	SA
	Eu-154	0.000	0.000	U	0.111	0.000	Asphalt
		0.000	0.000	U	0.088	0.000	SA
	Eu-155	0.000	0.000	U	0.057	0.000	Asphalt
		0.000	0.000	U	0.082	0.000	SA
	K-40	10.200	2.300		0.281	0.000	Asphalt
		22.900	4.900		0.201	0.000	SA
	Ra-226	0.443	0.110		0.052	0.100	Asphalt
		0.462	0.110		0.044	0.100	SA
	Th-228	0.489	0.110		0.034	0.100	Asphalt
		0.500	0.110		0.030	0.100	SA
	Th-232	0.597	0.210		0.153	0.100	Asphalt
		0.628	0.180		0.117	0.100	SA
	U-235	0.000	0.000	U	0.096	0.000	Asphalt
		0.000	0.000	U	0.100	0.000	SA
	U-238	0.000	0.000	U	3.720	0.000	Asphalt
		0.000	0.000	U	3.060	0.000	SA
	Zn-65	0.000	0.000	U	0.103	0.000	Asphalt
		0.000	0.000	U	0.070	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A1-F	Am-241	0.000	0.000	U	0.110	0.000	Asphalt
		0.000	0.000	U	0.035	0.000	SA
	Co-60	0.000	0.000	U	0.032	0.015	Asphalt
		0.000	0.000	U	0.033	0.015	SA
	Cs-137	0.000	0.000	U	0.031	0.010	Asphalt
		0.000	0.000	U	0.026	0.010	SA
	Eu-152	0.000	0.000	U	0.073	0.030	Asphalt
		0.000	0.000	U	0.062	0.030	SA
	Eu-154	0.000	0.000	U	0.100	0.000	Asphalt
		0.000	0.000	U	0.124	0.000	SA
	Eu-155	0.000	0.000	U	0.084	0.000	Asphalt
		0.000	0.000	U	0.054	0.000	SA
	K-40	10.800	2.300		0.339	0.000	Asphalt
		20.000	4.300		0.316	0.000	SA
	Ra-226	0.421	0.110		0.055	0.100	Asphalt
		0.458	0.110		0.050	0.100	SA
	Th-228	0.514	0.110		0.036	0.100	Asphalt
		0.516	0.110		0.031	0.100	SA
	Th-232	0.514	0.160		0.137	0.100	Asphalt
		0.560	0.170		0.128	0.100	SA
	U-235	0.000	0.000	U	0.109	0.000	Asphalt
		0.000	0.000	U	0.090	0.000	SA
	U-238	0.000	0.000	U	3.440	0.000	Asphalt
		0.000	0.000	U	7.860	0.000	SA
	Zn-65	0.000	0.000	U	0.082	0.000	Asphalt
		0.000	0.000	U	0.099	0.000	SA
707A1-G	Am-241	0.000	0.000	U	0.043	0.000	Asphalt
		0.000	0.000	U	0.082	0.000	SA
	Co-60	0.000	0.000	U	0.015	0.015	Asphalt
		0.000	0.000	U	0.024	0.015	SA
	Cs-137	0.079	0.023		0.017	0.010	Asphalt
		0.070	0.025		0.024	0.010	SA
	Eu-152	0.000	0.000	U	0.037	0.030	Asphalt
		0.000	0.000	U	0.053	0.030	SA
	Eu-154	0.000	0.000	U	0.052	0.000	Asphalt
		0.000	0.000	U	0.086	0.000	SA
	Eu-155	0.000	0.000	U	0.038	0.000	Asphalt
		0.000	0.000	U	0.062	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A1-G	K-40	9.050	2.000		0.152	0.000	Asphalt
		16.500	3.500		0.234	0.000	SA
	Ra-226	0.384	0.088		0.030	0.100	Asphalt
		0.418	0.097		0.038	0.100	SA
	Th-228	0.437	0.095		0.020	0.100	Asphalt
		0.457	0.100		0.027	0.100	SA
	Th-232	0.485	0.120		0.067	0.100	Asphalt
		0.479	0.150		0.109	0.100	SA
	U-235	0.061	0.047	U	0.064	0.000	Asphalt
		0.000	0.000	U	0.082	0.000	SA
	U-238	0.000	0.000	U	1.770	0.000	Asphalt
		0.000	0.000	U	2.630	0.000	SA
	Zn-65	0.000	0.000	U	0.044	0.000	Asphalt
		0.000	0.000	U	0.066	0.000	SA
707A1-H	Am-241	0.000	0.000	U	0.030	0.000	Asphalt
		0.000	0.000	U	0.040	0.000	SA
	Co-60	0.000	0.000	U	0.029	0.015	Asphalt
		0.000	0.000	U	0.016	0.015	SA
		0.050	0.033		0.031	0.010	Asphalt
	Cs-137	0.000	0.000	U	0.013	0.010	SA
		0.000	0.000	U	0.055	0.030	Asphalt
	Eu-152	0.000	0.000	U	0.033	0.030	SA
		0.000	0.000	U	0.094	0.000	Asphalt
	Eu-154	0.000	0.000	U	0.056	0.000	SA
	Eu-155	0.000	0.000	U	0.046	0.000	Asphalt
		0.000	0.000	U	0.037	0.000	SA
	K-40	10.700	2.300		0.244	0.000	Asphalt
		18.300	3.900		0.148	0.000	SA
	Ra-226	0.435	0.100		0.043	0.100	Asphalt
		0.422	0.093		0.024	0.100	SA
	Th-228	0.512	0.110		0.028	0.100	Asphalt
		0.478	0.100		0.019	0.100	SA
	Th-232	0.480	0.180		0.145	0.100	Asphalt
		0.575	0.150		0.075	0.100	SA
	U-235	0.000	0.000	U	0.076	0.000	Asphalt
		0.000	0.000	U	0.063	0.000	SA
	U-238	0.000	0.000	U	3.280	0.000	Asphalt
		0.000	0.000	U	1.910	0.000	SA
	Zn-65	0.000	0.000	U	0.081	0.000	Asphalt
		0.000	0.000	U	0.045	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A2	Am-241	0.000	0.000	U	0.097	0.000	Asphalt
		0.000	0.000	U	0.044	0.000	SA
	Co-60	0.000	0.000	U	0.019	0.015	Asphalt
		0.000	0.000	U	0.016	0.015	SA
	Cs-137	10.685	2.250		0.034	0.010	Asphalt
		1.655	0.355		0.018	0.010	SA
	Eu-152	0.000	0.000	U	0.097	0.030	Asphalt
		0.000	0.000	U	0.042	0.030	SA
	Eu-154	0.000	0.000	U	0.063	0.000	Asphalt
		0.000	0.000	U	0.056	0.000	SA
	Eu-155	0.000	0.000	U	0.074	0.000	Asphalt
		0.000	0.000	U	0.040	0.000	SA
	K-40	9.225	2.000		0.196	0.000	Asphalt
		21.200	4.500		0.127	0.000	SA
	Ra-226	0.380	0.101		0.062	0.100	Asphalt
		0.444	0.098		0.029	0.100	SA
	Th-228	0.475	0.110		0.043	0.100	Asphalt
		0.503	0.110		0.022	0.100	SA
	Th-232	0.487	0.135		0.076	0.100	Asphalt
		0.517	0.135		0.069	0.100	SA
	U-235	0.000	0.000	U	0.116	0.000	Asphalt
		0.000	0.000	U	0.072	0.000	SA
	U-238	0.000	0.000	U	2.240	0.000	Asphalt
		0.000	0.000	U	1.885	0.000	SA
	Zn-65	0.000	0.000	U	0.053	0.000	Asphalt
		0.000	0.000	U	0.043	0.000	SA
707A2-A	Am-241	0.000	0.000	U	0.076	0.000	Asphalt
		0.000	0.000	U	0.184	0.000	SA
	Co-60	0.000	0.000	U	0.021	0.015	Asphalt
		0.000	0.000	U	0.024	0.015	SA
	Cs-137	0.149	0.039		0.025	0.010	Asphalt
		0.066	0.025		0.024	0.010	SA
	Eu-152	0.000	0.000	U	0.051	0.030	Asphalt
		0.000	0.000	U	0.050	0.030	SA
	Eu-154	0.000	0.000	U	0.069	0.000	Asphalt
		0.000	0.000	U	0.087	0.000	SA
	Eu-155	0.000	0.000	U	0.053	0.000	Asphalt
		0.000	0.000	U	0.081	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A2-A	K-40	9.120	2.000		0.222	0.000	Asphalt
		21.800	4.600		0.191	0.000	SA
	Ra-226	0.383	0.089		0.036	0.100	Asphalt
		0.478	0.110		0.037	0.100	SA
	Th-228	0.496	0.110		0.024	0.100	Asphalt
		0.543	0.120		0.029	0.100	SA
	Th-232	0.503	0.140		0.093	0.100	Asphalt
		0.647	0.170		0.104	0.100	SA
	U-235	0.000	0.000	U	0.077	0.000	Asphalt
		0.000	0.000	U	0.100	0.000	SA
	U-238	0.000	0.000	U	2.630	0.000	Asphalt
		0.000	0.000	U	3.040	0.000	SA
	Zn-65	0.000	0.000	U	0.056	0.000	Asphalt
		0.000	0.000	U	0.068	0.000	SA
707A2-B	Am-241	0.000	0.000	U	0.040	0.000	Asphalt
		0.000	0.000	U	0.022	0.000	SA
	Co-60	0.000	0.000	U	0.011	0.015	Asphalt
		0.000	0.000	U	0.020	0.015	SA
	Cs-137	0.922	0.200		0.010	0.010	Asphalt
		0.121	0.033		0.021	0.010	SA
	Eu-152	0.000	0.000	U	0.032	0.030	Asphalt
		0.000	0.000	U	0.038	0.030	SA
	Eu-154	0.000	0.000	U	0.040	0.000	Asphalt
		0.000	0.000	U	0.076	0.000	SA
	Eu-155	0.000	0.000	U	0.032	0.000	Asphalt
		0.000	0.000	U	0.035	0.000	SA
	K-40	9.740	2.100		0.115	0.000	Asphalt
		20.400	4.400		0.168	0.000	SA
	Ra-226	0.393	0.087		0.022	0.100	Asphalt
		0.454	0.100		0.032	0.100	SA
	Th-228	0.476	0.100		0.017	0.100	Asphalt
		0.516	0.110		0.020	0.100	SA
	Th-232	0.531	0.130		0.051	0.100	Asphalt
		0.589	0.150		0.087	0.100	SA
	U-235	0.049	0.039	U	0.054	0.000	Asphalt
		0.000	0.000	U	0.057	0.000	SA
	U-238	0.000	0.000	U	2.170	0.000	Asphalt
		0.000	0.000	U	2.650	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A2-B	Zn-65	0.000	0.000	U	0.032	0.000	Asphalt
		0.000	0.000	U	0.061	0.000	SA
707A2-C	Am-241	0.000	0.000	U	0.058	0.000	Asphalt
		0.000	0.000	U	0.065	0.000	SA
	Co-60	0.000	0.000	U	0.013	0.015	Asphalt
		0.000	0.000	U	0.019	0.015	SA
	Cs-137	6.670	1.400		0.020	0.010	Asphalt
		0.623	0.130		0.021	0.010	SA
	Eu-152	0.000	0.000	U	0.061	0.030	Asphalt
		0.000	0.000	U	0.045	0.030	SA
	Eu-154	0.000	0.000	U	0.046	0.000	Asphalt
		0.000	0.000	U	0.071	0.000	SA
	Eu-155	0.000	0.000	U	0.053	0.000	Asphalt
		0.000	0.000	U	0.050	0.000	SA
	K-40	9.610	2.100		0.134	0.000	Asphalt
		21.700	4.600		0.192	0.000	SA
	Ra-226	0.390	0.091		0.039	0.100	Asphalt
		0.439	0.099		0.034	0.100	SA
	Th-228	0.419	0.092		0.029	0.100	Asphalt
		0.483	0.100		0.022	0.100	SA
	Th-232	0.441	0.110		0.062	0.100	Asphalt
		0.524	0.140		0.089	0.100	SA
	U-235	0.000	0.000	U	0.079	0.000	Asphalt
		0.000	0.000	U	0.066	0.000	SA
	U-238	0.000	0.000	U	1.600	0.000	Asphalt
		0.000	0.000	U	2.320	0.000	SA
	Zn-65	0.000	0.000	U	0.039	0.000	Asphalt
		0.000	0.000	U	0.038	0.000	Asphalt
		0.000	0.000	U	0.055	0.000	SA
707A2-D	Am-241	0.000	0.000	U	0.035	0.000	Asphalt
		0.000	0.000	U	0.027	0.000	SA
	Co-60	0.000	0.000	U	0.013	0.015	Asphalt
		0.000	0.000	U	0.011	0.015	SA
	Cs-137	0.045	0.016		0.014	0.010	Asphalt
		0.000	0.000	U	0.009	0.010	SA
	Eu-152	0.000	0.000	U	0.031	0.030	Asphalt
		0.000	0.000	U	0.023	0.030	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A2-D	Eu-154	0.000	0.000	U	0.044	0.000	Asphalt
		0.000	0.000	U	0.039	0.000	SA
	Eu-155	0.000	0.000	U	0.032	0.000	Asphalt
		0.000	0.000	U	0.037	0.000	SA
	K-40	10.600	2.300		0.122	0.000	Asphalt
		19.400	4.100		0.095	0.000	SA
	Ra-226	0.419	0.093		0.023	0.100	Asphalt
		0.453	0.098		0.019	0.100	SA
	Th-228	0.486	0.100		0.016	0.100	Asphalt
		0.522	0.110		0.012	0.100	SA
	Th-232	0.532	0.130		0.053	0.100	Asphalt
		0.544	0.120		0.046	0.100	SA
	U-235	0.042	0.040	U	0.054	0.000	Asphalt
		0.000	0.000	U	0.058	0.000	SA
	U-238	0.000	0.000	U	1.570	0.000	Asphalt
		0.000	0.000	U	1.330	0.000	SA
	Zn-65	0.000	0.000	U	0.031	0.000	SA
707A2-E	Am-241	0.000	0.000	U	0.082	0.000	Asphalt
		0.000	0.000	U	0.117	0.000	SA
	Co-60	0.000	0.000	U	0.023	0.015	Asphalt
		0.000	0.000	U	0.015	0.015	SA
	Cs-137	0.703	0.150		0.026	0.010	Asphalt
		0.000	0.000	U	0.014	0.010	SA
	Eu-152	0.000	0.000	U	0.059	0.030	Asphalt
		0.000	0.000	U	0.032	0.030	SA
	Eu-154	0.000	0.000	U	0.081	0.000	Asphalt
		0.000	0.000	U	0.055	0.000	SA
	Eu-155	0.000	0.000	U	0.063	0.000	Asphalt
		0.000	0.000	U	0.052	0.000	SA
	K-40	13.800	2.900		0.177	0.000	Asphalt
		20.800	4.400		0.126	0.000	SA
	Ra-226	0.392	0.094		0.044	0.100	Asphalt
		0.480	0.110		0.027	0.100	SA
	Th-228	0.499	0.110		0.028	0.100	Asphalt
		0.482	0.100		0.019	0.100	SA
	Th-232	0.537	0.140		0.094	0.100	Asphalt
		0.584	0.140		0.063	0.100	SA
	U-235	0.000	0.000	U	0.084	0.000	Asphalt
		0.000	0.000	U	0.092	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A2-E	U-238	0.000	0.000	U	2.730	0.000	Asphalt
		0.000	0.000	U	1.810	0.000	SA
	Zn-65	0.000	0.000	U	0.065	0.000	Asphalt
		0.000	0.000	U	0.041	0.000	SA
707A2-F	Am-241	0.000	0.000	U	0.034	0.000	Asphalt
		0.000	0.000	U	0.033	0.000	SA
	Co-60	0.000	0.000	U	0.011	0.015	Asphalt
		0.000	0.000	U	0.033	0.015	SA
	Cs-137	0.000	0.000	U	0.011	0.010	Asphalt
		0.000	0.000	U	0.025	0.010	SA
	Eu-152	0.000	0.000	U	0.029	0.030	Asphalt
		0.000	0.000	U	0.059	0.030	SA
	Eu-154	0.000	0.000	U	0.042	0.000	Asphalt
		0.000	0.000	U	0.119	0.000	SA
	Eu-155	0.000	0.000	U	0.036	0.000	Asphalt
		0.000	0.000	U	0.051	0.000	SA
	K-40	9.840	2.100		0.101	0.000	Asphalt
		20.500	4.400		0.316	0.000	SA
	Ra-226	0.388	0.086		0.023	0.100	Asphalt
		0.461	0.120		0.056	0.100	SA
	Th-228	0.512	0.110		0.015	0.100	Asphalt
		0.677	0.150		0.044	0.100	SA
	Th-232	0.500	0.120		0.049	0.100	Asphalt
		0.683	0.220		0.154	0.100	SA
	U-235	0.000	0.000	U	0.044	0.000	Asphalt
		0.000	0.000	U	0.086	0.000	SA
	U-238	0.000	0.000	U	1.480	0.000	Asphalt
		0.000	0.000	U	3.960	0.000	SA
	Zn-65	0.000	0.000	U	0.034	0.000	Asphalt
		0.000	0.000	U	0.093	0.000	SA
707A2-G	Am-241	0.000	0.000	U	0.073	0.000	SA
	Co-60	0.000	0.000	U	0.020	0.015	SA
	Cs-137	0.456	0.100		0.025	0.010	SA
	Eu-152	0.000	0.000	U	0.054	0.030	SA
	Eu-154	0.000	0.000	U	0.072	0.000	SA
	Eu-155	0.000	0.000	U	0.055	0.000	SA
	K-40	8.540	1.900		0.269	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A2-G	Ra-226	0.220	0.060		0.037	0.100	SA
	Th-228	0.221	0.051		0.025	0.100	SA
	Th-232	0.279	0.110		0.092	0.100	SA
	U-235	0.000	0.000	U	0.112	0.000	SA
	U-238	0.000	0.000	U	2.360	0.000	SA
	Zn-65	0.000	0.000	U	0.059	0.000	SA
707A2-H	Am-241	0.000	0.000	U	0.178	0.000	Asphalt
		0.000	0.000	U	0.038	0.000	SA
	Co-60	0.000	0.000	U	0.021	0.015	Asphalt
		0.000	0.000	U	0.016	0.015	SA
	Cs-137	0.000	0.000	U	0.022	0.010	Asphalt
		0.000	0.000	U	0.012	0.010	SA
	Eu-152	0.000	0.000	U	0.050	0.030	Asphalt
		0.000	0.000	U	0.034	0.030	SA
	Eu-154	0.000	0.000	U	0.071	0.000	Asphalt
		0.000	0.000	U	0.057	0.000	SA
	Eu-155	0.000	0.000	U	0.077	0.000	Asphalt
		0.000	0.000	U	0.036	0.000	SA
	K-40	9.850	2.100		0.224	0.000	Asphalt
		22.800	4.800		0.149	0.000	SA
	Ra-226	0.421	0.099		0.038	0.100	Asphalt
		0.414	0.092		0.025	0.100	SA
	Th-228	0.430	0.095		0.028	0.100	Asphalt
		0.499	0.110		0.018	0.100	SA
	Th-232	0.491	0.130		0.088	0.100	Asphalt
		0.520	0.130		0.063	0.100	SA
	U-235	0.000	0.000	U	0.093	0.000	Asphalt
		0.000	0.000	U	0.052	0.000	SA
	U-238	0.000	0.000	U	2.520	0.000	Asphalt
		0.000	0.000	U	1.870	0.000	SA
	Zn-65	0.000	0.000	U	0.057	0.000	Asphalt
		0.000	0.000	U	0.046	0.000	SA
707A3	Am-241	0.000	0.000	U	0.102	0.000	Asphalt
		0.000	0.000	U	0.273	0.000	SA
	Co-60	0.000	0.000	U	0.018	0.015	Asphalt
		0.000	0.000	U	0.023	0.015	SA
	Cs-137	19.045	4.050		0.037	0.010	Asphalt
		62.350	13.000		0.058	0.010	SA
	Eu-152	0.000	0.000	U	0.106	0.030	Asphalt
		0.000	0.000	U	0.199	0.030	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A3	Eu-154	0.000	0.000	U	0.061	0.000	Asphalt
		0.000	0.000	U	0.086	0.000	SA
	Eu-155	0.000	0.000	U	0.079	0.000	Asphalt
		0.000	0.000	U	0.168	0.000	SA
	K-40	9.605	2.050		0.188	0.000	Asphalt
		18.750	4.050		0.203		
	Ra-226	0.341	0.088		0.058	0.100	Asphalt
		0.465	0.125		0.097	0.100	SA
	Th-228	0.428	0.102		0.054	0.100	Asphalt
		0.457	0.125		0.104	0.100	SA
	Th-232	0.481	0.125		0.075	0.100	Asphalt
		0.546	0.155		0.103	0.100	SA
	U-235	0.102	0.070		0.098	0.000	Asphalt
		0.577	0.205		0.246	0.000	SA
	U-238	0.000	0.000	U	2.115	0.000	Asphalt
		0.000	0.000	U	2.890	0.000	SA
	Zn-65	0.000	0.000	U	0.049	0.000	Asphalt
		0.000	0.000	U	0.066	0.000	SA
707A3-A	Am-241	0.000	0.000	U	0.027	0.000	Asphalt
		0.000	0.000	U	0.142	0.000	SA
	Co-60	0.000	0.000	U	0.022	0.015	Asphalt
		0.000	0.000	U	0.025	0.015	SA
	Cs-137	1.480	0.320		0.025	0.010	Asphalt
		13.900	3.000		0.050	0.010	SA
	Eu-152	0.000	0.000	U	0.055	0.030	Asphalt
		0.000	0.000	U	0.131	0.030	SA
	Eu-154	0.000	0.000	U	0.077	0.000	Asphalt
		0.000	0.000	U	0.092	0.000	SA
	Eu-155	0.000	0.000	U	0.044	0.000	Asphalt
		0.000	0.000	U	0.106	0.000	SA
	K-40	10.000	2.200		0.216	0.000	Asphalt
		17.700	3.800		0.274	0.000	SA
	Ra-226	0.436	0.100		0.040	0.100	Asphalt
		0.457	0.120		0.081	0.100	SA
	Th-228	0.471	0.100		0.025	0.100	Asphalt
		0.513	0.120		0.055	0.100	SA
	Th-232	0.530	0.140		0.093	0.100	Asphalt
		0.518	0.150		0.115	0.100	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A3-A	U-235	0.083	0.059		0.077	0.000	Asphalt
		0.657	0.210		0.193	0.000	SA
	U-238	0.000	0.000	U	2.700	0.000	Asphalt
		0.000	0.000	U	3.260	0.000	SA
	Zn-65	0.000	0.000	U	0.066	0.000	Asphalt
		0.000	0.000	U	0.072	0.000	SA
707A3-B	Am-241	0.000	0.000	U	0.112	0.000	Asphalt
		0.000	0.000	U	0.016	0.000	SA
	Co-60	0.000	0.000	U	0.018	0.015	Asphalt
		0.000	0.000	U	0.015	0.015	SA
	Cs-137	11.600	2.400		0.038	0.010	Asphalt
		0.000	0.000	U	0.013	0.010	SA
	Eu-152	0.000	0.000	U	0.107	0.030	Asphalt
		0.000	0.000	U	0.028	0.030	SA
	Eu-154	0.000	0.000	U	0.063	0.000	Asphalt
		0.000	0.000	U	0.053	0.000	SA
	Eu-155	0.000	0.000	U	0.080	0.000	Asphalt
		0.000	0.000	U	0.038	0.000	SA
	K-40	9.250	2.000		0.209	0.000	Asphalt
		17.200	3.700		0.137	0.000	SA
	Ra-226	0.340	0.092		0.067	0.100	Asphalt
		0.448	0.098		0.025	0.100	SA
	Th-228	0.430	0.097		0.045	0.100	Asphalt
		0.516	0.110		0.015	0.100	SA
	Th-232	0.443	0.130		0.087	0.100	Asphalt
		0.539	0.140		0.067	0.100	SA
	U-235	0.160	0.096		0.131	0.000	Asphalt
		0.000	0.000	U	0.042	0.000	SA
	U-238	0.000	0.000	U	2.240	0.000	Asphalt
		0.000	0.000	U	1.950	0.000	SA
	Zn-65	0.000	0.000	U	0.052	0.000	Asphalt
		0.000	0.000	U	0.047	0.000	SA
707A3-C	Am-241	0.000	0.000	U	0.036	0.000	Asphalt
		0.000	0.000	U	0.046	0.000	SA
	Co-60	0.000	0.000	U	0.011	0.015	Asphalt
		0.000	0.000	U	0.014	0.015	SA
	Cs-137	0.246	0.054		0.013	0.010	Asphalt
		0.096	0.022		0.011	0.010	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A3-C	Eu-152	0.000	0.000	U	0.028	0.030	Asphalt
		0.000	0.000	U	0.030	0.030	SA
	Eu-154	0.000	0.000	U	0.038	0.000	Asphalt
		0.000	0.000	U	0.046	0.000	SA
	Eu-155	0.000	0.000	U	0.029	0.000	Asphalt
		0.000	0.000	U	0.044	0.000	SA
	K-40	8.400	1.800		0.104	0.000	Asphalt
		16.100	3.400		0.139	0.000	SA
	Ra-226	0.376	0.083		0.020	0.100	Asphalt
		0.417	0.092		0.023	0.100	SA
	Th-228	0.479	0.100		0.014	0.100	Asphalt
		0.467	0.100		0.015	0.100	SA
	Th-232	0.484	0.120		0.052	0.100	Asphalt
		0.492	0.120		0.056	0.100	SA
	U-235	0.000	0.000	U	0.046	0.000	Asphalt
		0.000	0.000	U	0.055	0.000	SA
	U-238	0.000	0.000	U	1.340	0.000	Asphalt
		0.000	0.000	U	1.550	0.000	SA
	Zn-65	0.000	0.000	U	0.032	0.000	Asphalt
		0.000	0.000	U	0.037	0.000	SA
707A3-D	Am-241	0.000	0.000	U	0.029	0.000	Asphalt
		0.000	0.000	U	0.021	0.000	SA
	Co-60	0.000	0.000	U	0.026	0.015	Asphalt
		0.000	0.000	U	0.008	0.015	SA
	Cs-137	0.227	0.056		0.026	0.010	Asphalt
		0.267	0.057		0.009	0.010	SA
	Eu-152	0.000	0.000	U	0.055	0.030	Asphalt
		0.000	0.000	U	0.018	0.030	SA
	Eu-154	0.000	0.000	U	0.089	0.000	Asphalt
		0.000	0.000	U	0.028	0.000	SA
	Eu-155	0.000	0.000	U	0.045	0.000	Asphalt
		0.000	0.000	U	0.026	0.000	SA
	K-40	8.660	1.900		0.234	0.000	Asphalt
		18.700	4.000		0.069	0.000	SA
	Ra-226	0.406	0.097		0.040	0.100	Asphalt
		0.460	0.099		0.014	0.100	SA
	Th-228	0.431	0.095		0.025	0.100	Asphalt
		0.512	0.110		0.009	0.100	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A3-D	Th-232	0.563	0.170		0.111	0.100	Asphalt
		0.530	0.120		0.033	0.100	SA
	U-235	0.000	0.000	U	0.074	0.000	Asphalt
		0.134	0.040		0.036	0.000	SA
	U-238	0.000	0.000	U	2.960	0.000	Asphalt
		0.000	0.000	U	0.967	0.000	SA
	Zn-65	0.000	0.000	U	0.077	0.000	Asphalt
		0.000	0.000	U	0.023	0.000	SA
707A3-E	Am-241	0.000	0.000	U	0.038	0.000	Asphalt
		0.000	0.000	U	0.093	0.000	SA
	Co-60	0.000	0.000	U	0.013	0.015	Asphalt
		0.000	0.000	U	0.012	0.015	SA
	Cs-137	0.032	0.014		0.014	0.010	Asphalt
		0.000	0.000	U	0.011	0.010	SA
	Eu-152	0.000	0.000	U	0.032	0.030	Asphalt
		0.000	0.000	U	0.025	0.030	SA
	Eu-154	0.000	0.000	U	0.049	0.000	Asphalt
		0.000	0.000	U	0.043	0.000	SA
	Eu-155	0.000	0.000	U	0.034	0.000	Asphalt
		0.000	0.000	U	0.055	0.000	SA
	K-40	8.760	1.900		0.140	0.000	Asphalt
		20.400	4.400		0.111	0.000	SA
	Ra-226	0.344	0.078		0.024	0.100	Asphalt
		0.475	0.100		0.023	0.100	SA
	Th-228	0.430	0.093		0.017	0.100	Asphalt
		0.524	0.110		0.015	0.100	SA
	Th-232	0.457	0.110		0.060	0.100	Asphalt
		0.591	0.130		0.050	0.100	SA
	U-235	0.000	0.000	U	0.050	0.000	Asphalt
		0.000	0.000	U	0.061	0.000	SA
	U-238	0.000	0.000	U	1.750	0.000	Asphalt
		0.000	0.000	U	1.460	0.000	SA
	Zn-65	0.000	0.000	U	0.038	0.000	Asphalt
		0.000	0.000	U	0.035	0.000	SA
707A3-F	Am-241	0.000	0.000	U	0.182	0.000	Asphalt
		0.000	0.000	U	0.031	0.000	SA
	Co-60	0.000	0.000	U	0.023	0.015	Asphalt
		0.000	0.000	U	0.030	0.015	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A3-F	Cs-137	0.152	0.041		0.024	0.010	Asphalt
		0.000	0.000	U	0.025	0.010	SA
	Eu-152	0.000	0.000	U	0.051	0.030	Asphalt
		0.000	0.000	U	0.056	0.030	SA
	Eu-154	0.000	0.000	U	0.077	0.000	Asphalt
		0.000	0.000	U	0.106	0.000	SA
	Eu-155	0.000	0.000	U	0.078	0.000	Asphalt
		0.000	0.000	U	0.047	0.000	SA
	K-40	11.900	2.500		0.233	0.000	Asphalt
		20.000	4.300		0.220	0.000	SA
	Ra-226	0.424	0.100		0.042	0.100	Asphalt
		0.442	0.100		0.046	0.100	SA
	Th-228	0.487	0.110		0.029	0.100	Asphalt
		0.542	0.120		0.031	0.100	SA
	Th-232	0.542	0.140		0.078	0.100	Asphalt
		0.493	0.160		0.124	0.100	SA
	U-235	0.000	0.000	U	0.099	0.000	Asphalt
		0.000	0.000	U	0.080	0.000	SA
	U-238	0.000	0.000	U	2.630	0.000	Asphalt
		0.000	0.000	U	3.730	0.000	SA
	Zn-65	0.000	0.000	U	0.065	0.000	Asphalt
		0.000	0.000	U	0.090	0.000	SA
707A3-G	Am-241	0.000	0.000	U	0.078	0.000	Concrete
		0.000	0.000	U	0.082	0.000	SA
	Co-60	0.000	0.000	U	0.021	0.015	Concrete
		0.000	0.000	U	0.024	0.015	SA
	Cs-137	0.000	0.000	U	0.025	0.010	Concrete
		0.000	0.000	U	0.022	0.010	SA
	Eu-152	0.000	0.000	U	0.054	0.030	Concrete
		0.000	0.000	U	0.053	0.030	SA
	Eu-154	0.000	0.000	U	0.072	0.000	Concrete
		0.000	0.000	U	0.087	0.000	SA
	Eu-155	0.000	0.000	U	0.058	0.000	Concrete
		0.000	0.000	U	0.062	0.000	SA
	K-40	7.120	1.600		0.209	0.000	Concrete
		18.600	4.000		0.248	0.000	SA
	Ra-226	0.337	0.083		0.042	0.100	Concrete
		0.418	0.097		0.039	0.100	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A3-G	Th-228	0.321	0.072		0.025	0.100	Concrete
		0.499	0.110		0.027	0.100	SA
	Th-232	0.408	0.130		0.099	0.100	Concrete
		0.564	0.150		0.093	0.100	SA
	U-235	0.000	0.000	U	0.079	0.000	Concrete
		0.000	0.000	U	0.082	0.000	SA
	U-238	0.000	0.000	U	2.460	0.000	Concrete
		0.000	0.000	U	2.840	0.000	SA
	Zn-65	0.000	0.000	U	0.057	0.000	Concrete
		0.000	0.000	U	0.070	0.000	SA
707A3-H	Am-241	0.000	0.000	U	0.034	0.000	Concrete
		0.000	0.000	U	0.035	0.000	SA
	Co-60	0.000	0.000	U	0.012	0.015	Concrete
		0.000	0.000	U	0.014	0.015	SA
	Cs-137	0.024	0.014		0.013	0.010	Concrete
		0.000	0.000	U	0.011	0.010	SA
	Eu-152	0.000	0.000	U	0.029	0.030	Concrete
		0.000	0.000	U	0.031	0.030	SA
	Eu-154	0.000	0.000	U	0.040	0.000	Concrete
		0.000	0.000	U	0.049	0.000	SA
	Eu-155	0.000	0.000	U	0.031	0.000	Concrete
		0.000	0.000	U	0.033	0.000	SA
	K-40	5.340	1.200		0.139	0.000	Concrete
		17.500	3.700		0.132	0.000	SA
	Ra-226	0.282	0.065		0.021	0.100	Concrete
		0.369	0.083		0.026	0.100	SA
	Th-228	0.324	0.070		0.015	0.100	Concrete
		0.454	0.098		0.016	0.100	SA
	Th-232	0.345	0.089		0.050	0.100	Concrete
		0.509	0.130		0.062	0.100	SA
	U-235	0.000	0.000	U	0.045	0.000	Concrete
		0.000	0.000	U	0.046	0.000	SA
	U-238	0.000	0.000	U	1.530	0.000	Concrete
		0.000	0.000	U	1.760	0.000	SA
	Zn-65	0.000	0.000	U	0.032	0.000	Concrete
		0.000	0.000	U	0.040	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707A3-I	Am-241	0.000	0.000	U	0.184	0.000	Asphalt
		0.000	0.000	U	0.155	0.000	SA
	Co-60	0.000	0.000	U	0.024	0.015	Asphalt
		0.000	0.000	U	0.022	0.015	SA
	Cs-137	0.033	0.021		0.023	0.010	Asphalt
		0.000	0.000	U	0.019	0.010	SA
	Eu-152	0.000	0.000	U	0.050	0.030	Asphalt
		0.000	0.000	U	0.043	0.030	SA
	Eu-154	0.000	0.000	U	0.073	0.000	Asphalt
		0.000	0.000	U	0.070	0.000	SA
	Eu-155	0.000	0.000	U	0.078	0.000	Asphalt
		0.000	0.000	U	0.070	0.000	SA
	K-40	12.300	2.600		0.235	0.000	Asphalt
		19.200	4.100		0.216	0.000	SA
	Ra-226	0.415	0.097		0.038	0.100	Asphalt
		0.491	0.110		0.040	0.100	SA
	Th-228	0.476	0.100		0.029	0.100	Asphalt
		0.510	0.110		0.025	0.100	SA
	Th-232	0.503	0.150		0.097	0.100	Asphalt
		0.532	0.140		0.085	0.100	SA
	U-235	0.000	0.000	U	0.098	0.000	Asphalt
		0.000	0.000	U	0.086	0.000	SA
	U-238	0.000	0.000	U	2.660	0.000	Asphalt
		0.000	0.000	U	2.420	0.000	SA
	Zn-65	0.000	0.000	U	0.062	0.000	Asphalt
		0.000	0.000	U	0.060	0.000	SA
707B1	Am-241	0.000	0.000	U	0.031	0.000	Asphalt
		0.000	0.000	U	0.033	0.000	SA
	Co-60	0.000	0.000	U	0.021	0.015	Asphalt
		0.000	0.000	U	0.033	0.015	SA
	Cs-137	0.000	0.000	U	0.022	0.010	Asphalt
		0.000	0.000	U	0.025	0.010	SA
	Eu-152	0.000	0.000	U	0.047	0.030	Asphalt
		0.000	0.000	U	0.058	0.030	SA
	Eu-154	0.000	0.000	U	0.079	0.000	Asphalt
		0.000	0.000	U	0.117	0.000	SA
	Eu-155	0.000	0.000	U	0.040	0.000	Asphalt
		0.000	0.000	U	0.052	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707B1	K-40	8.860	1.900		0.240	0.000	Asphalt
		18.800	4.000		0.293	0.000	SA
	Ra-226	0.422	0.100		0.040	0.100	Asphalt
		0.466	0.110		0.048	0.100	SA
	Th-228	0.520	0.110		0.023	0.100	Asphalt
		0.550	0.120		0.028	0.100	SA
	Th-232	0.508	0.140		0.098	0.100	Asphalt
		0.576	0.160		0.120	0.100	SA
	U-235	0.000	0.000	U	0.070	0.000	Asphalt
		0.000	0.000	U	0.087	0.000	SA
	U-238	0.000	0.000	U	2.900	0.000	Asphalt
		0.000	0.000	U	3.860	0.000	SA
	Zn-65	0.000	0.000	U	0.063	0.000	Asphalt
		0.000	0.000	U	0.095	0.000	SA
707B2	Am-241	0.000	0.000	U	0.076	0.000	Asphalt
		0.000	0.000	U	0.093	0.000	SA
	Co-60	0.000	0.000	U	0.021	0.015	Asphalt
		0.000	0.000	U	0.028	0.015	SA
	Cs-137	0.000	0.000	U	0.021	0.010	Asphalt
		0.000	0.000	U	0.025	0.010	SA
	Eu-152	0.000	0.000	U	0.049	0.030	Asphalt
		0.000	0.000	U	0.063	0.030	SA
	Eu-154	0.000	0.000	U	0.073	0.000	Asphalt
		0.000	0.000	U	0.096	0.000	SA
	Eu-155	0.000	0.000	U	0.057	0.000	Asphalt
		0.000	0.000	U	0.070	0.000	SA
	K-40	12.500	2.700		0.250	0.000	Asphalt
		19.900	4.300		0.286	0.000	SA
	Ra-226	0.408	0.094		0.036	0.100	Asphalt
		0.417	0.098		0.041	0.100	SA
	Th-228	0.490	0.110		0.023	0.100	Asphalt
		0.544	0.120		0.029	0.100	SA
	Th-232	0.597	0.160		0.100	0.100	Asphalt
		0.521	0.140		0.106	0.100	SA
	U-235	0.000	0.000	U	0.075	0.000	Asphalt
		0.000	0.000	U	0.091	0.000	SA
	U-238	0.000	0.000	U	2.400	0.000	Asphalt
		0.000	0.000	U	3.250	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707B2	Zn-65	0.000	0.000	U	0.054	0.000	Asphalt
		0.000	0.000	U	0.074	0.000	SA
707B3	Am-241	0.000	0.000	U	0.036	0.000	Asphalt
		0.000	0.000	U	0.039	0.000	SA
	Co-60	0.000	0.000	U	0.011	0.015	Asphalt
		0.000	0.000	U	0.016	0.015	SA
	Cs-137	0.000	0.000	U	0.011	0.010	Asphalt
		0.000	0.000	U	0.013	0.010	SA
	Eu-152	0.000	0.000	U	0.027	0.030	Asphalt
		0.000	0.000	U	0.034	0.030	SA
	Eu-154	0.000	0.000	U	0.037	0.000	Asphalt
		0.000	0.000	U	0.055	0.000	SA
	Eu-155	0.000	0.000	U	0.028	0.000	Asphalt
		0.000	0.000	U	0.036	0.000	SA
	K-40	8.580	1.800		0.110	0.000	Asphalt
		19.800	4.200		0.134	0.000	SA
	Ra-226	0.349	0.077		0.021	0.100	Asphalt
		0.418	0.094		0.028	0.100	SA
	Th-228	0.448	0.096		0.014	0.100	Asphalt
		0.477	0.100		0.018	0.100	SA
	Th-232	0.481	0.110		0.044	0.100	Asphalt
		0.526	0.130		0.061	0.100	SA
	U-235	0.000	0.000	U	0.046	0.000	Asphalt
		0.060	0.044		0.060	0.000	SA
	U-238	0.000	0.000	U	1.300	0.000	Asphalt
		0.000	0.000	U	1.840	0.000	SA
	Zn-65	0.000	0.000	U	0.031	0.000	Asphalt
		0.000	0.000	U	0.044	0.000	SA
707B4	Am-241	0.000	0.000	U	0.030	0.000	Asphalt
		0.000	0.000	U	0.169	0.000	SA
	Co-60	0.000	0.000	U	0.024	0.015	Asphalt
		0.000	0.000	U	0.022	0.015	SA
	Cs-137	0.000	0.000	U	0.022	0.010	Asphalt
		0.000	0.000	U	0.021	0.010	SA
	Eu-152	0.000	0.000	U	0.049	0.030	Asphalt
		0.000	0.000	U	0.048	0.030	SA
	Eu-154	0.000	0.000	U	0.086	0.000	Asphalt
		0.000	0.000	U	0.083	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707B4	Eu-155	0.000	0.000	U	0.060	0.000	Asphalt
		0.000	0.000	U	0.077	0.000	SA
	K-40	10.000	2.200		0.180	0.000	Asphalt
		19.600	4.200		0.215	0.000	SA
	Ra-226	0.371	0.088		0.036	0.100	Asphalt
		0.443	0.100		0.042	0.100	SA
	Th-228	0.479	0.100		0.025	0.100	Asphalt
		0.458	0.100		0.029	0.100	SA
	Th-232	0.453	0.140		0.100	0.100	Asphalt
		0.565	0.160		0.102	0.100	SA
	U-235	0.000	0.000	U	0.093	0.000	Asphalt
		0.000	0.000	U	0.095	0.000	SA
	U-238	0.000	0.000	U	4.800	0.000	Asphalt
		0.000	0.000	U	2.780	0.000	SA
	Zn-65	0.000	0.000	U	0.073	0.000	Asphalt
		0.000	0.000	U	0.064	0.000	SA
707B5	Am-241	0.000	0.000	U	0.048	0.000	Concrete
		0.000	0.000	U	0.054	0.000	SA
	Co-60	0.000	0.000	U	0.013	0.015	Concrete
		0.000	0.000	U	0.026	0.015	SA
	Cs-137	0.000	0.000	U	0.013	0.010	Concrete
		0.000	0.000	U	0.023	0.010	SA
	Eu-152	0.000	0.000	U	0.033	0.030	Concrete
		0.000	0.000	U	0.054	0.030	SA
	Eu-154	0.000	0.000	U	0.040	0.000	Concrete
		0.000	0.000	U	0.086	0.000	SA
	Eu-155	0.000	0.000	U	0.037	0.000	Concrete
		0.000	0.000	U	0.053	0.000	SA
	K-40	4.580	1.010		0.129	0.000	Asphalt
		9.080	1.950		0.243	0.000	SA
	Ra-226	0.243	0.059		0.027	0.100	Asphalt
		0.292	0.076		0.041	0.100	SA
	Th-228	0.275	0.061		0.017	0.100	Asphalt
		0.317	0.072		0.026	0.100	SA
	Th-232	0.316	0.087		0.053	0.100	Asphalt
		0.334	0.130		0.114	0.100	SA
	U-235	0.000	0.000	U	0.052	0.000	Concrete
		0.000	0.000	U	0.081	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707B5	U-238	0.000	0.000	U	1.600	0.000	Concrete
		0.000	0.000	U	3.030	0.000	SA
	Zn-65	0.000	0.000	U	0.035	0.000	Concrete
		0.000	0.000	U	0.069	0.000	SA
707B6	Am-241	0.000	0.000	U	0.026	0.000	Concrete
		0.000	0.000	U	0.033	0.000	SA
	Co-60	0.000	0.000	U	0.020	0.015	Concrete
		0.000	0.000	U	0.013	0.015	SA
	Cs-137	0.000	0.000	U	0.018	0.010	Concrete
		0.000	0.000	U	0.012	0.010	SA
	Eu-152	0.000	0.000	U	0.041	0.030	Concrete
		0.000	0.000	U	0.030	0.030	SA
	Eu-154	0.000	0.000	U	0.069	0.000	Concrete
		0.000	0.000	U	0.045	0.000	SA
	Eu-155	0.000	0.000	U	0.035	0.000	Concrete
		0.000	0.000	U	0.048	0.000	SA
	K-40	4.890	1.100		0.230	0.000	Concrete
		9.970	2.100		0.151	0.000	SA
	Ra-226	0.370	0.088		0.035	0.100	Concrete
		0.267	0.063		0.024	0.100	SA
	Th-228	0.270	0.061		0.020	0.100	Concrete
		0.291	0.063		0.015	0.100	SA
	Th-232	0.294	0.099		0.079	0.100	Concrete
		0.309	0.080		0.044	0.100	SA
	U-235	0.000	0.000	U	0.060	0.000	Concrete
		0.000	0.000	U	0.044	0.000	SA
	U-238	0.000	0.000	U	2.500	0.000	Concrete
		0.000	0.000	U	1.620	0.000	SA
	Zn-65	0.000	0.000	U	0.065	0.000	Concrete
		0.000	0.000	U	0.036	0.000	SA
707B7	Am-241	0.000	0.000	U	0.078	0.000	Asphalt
		0.000	0.000	U	0.181	0.000	SA
	Co-60	0.000	0.000	U	0.022	0.015	Asphalt
		0.000	0.000	U	0.026	0.015	SA
	Cs-137	0.000	0.000	U	0.024	0.010	Asphalt
		0.000	0.000	U	0.022	0.010	SA
	Eu-152	0.000	0.000	U	0.051	0.030	Asphalt
		0.000	0.000	U	0.051	0.030	SA
	Eu-154	0.000	0.000	U	0.072	0.000	Asphalt
		0.000	0.000	U	0.088	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707B7	Eu-155	0.000	0.000	U	0.058	0.000	Asphalt
		0.000	0.000	U	0.083	0.000	SA
	K-40	8.130	1.800		0.220	0.000	Asphalt
		21.000	4.500		0.232	0.000	SA
	Ra-226	0.375	0.090		0.041	0.100	Asphalt
		0.413	0.098		0.044	0.100	SA
	Th-228	0.454	0.099		0.024	0.100	Asphalt
		0.505	0.110		0.030	0.100	SA
	Th-232	0.472	0.140		0.097	0.100	Asphalt
		0.588	0.160		0.100	0.100	SA
	U-235	0.000	0.000	U	0.077	0.000	Asphalt
		0.000	0.000	U	0.099	0.000	SA
	U-238	0.000	0.000	U	2.400	0.000	Asphalt
		0.000	0.000	U	2.820	0.000	SA
	Zn-65	0.000	0.000	U	0.056	0.000	Asphalt
		0.000	0.000	U	0.068	0.000	SA
707B8	Am-241	0.000	0.000	U	0.030	0.000	Concrete
		0.000	0.000	U	0.025	0.000	SA
	Co-60	0.000	0.000	U	0.009	0.015	Concrete
		0.000	0.000	U	0.024	0.015	SA
	Cs-137	0.000	0.000	U	0.008	0.010	Concrete
		0.000	0.000	U	0.020	0.010	SA
	Eu-152	0.000	0.000	U	0.023	0.030	Concrete
		0.000	0.000	U	0.047	0.030	SA
	Eu-154	0.000	0.000	U	0.029	0.000	Concrete
		0.000	0.000	U	0.086	0.000	SA
	Eu-155	0.000	0.000	U	0.024	0.000	Concrete
		0.000	0.000	U	0.039	0.000	SA
	K-40	4.510	0.980		0.094	0.000	Concrete
		15.000	3.200		0.219	0.000	SA
	Ra-226	0.286	0.064		0.019	0.100	Concrete
		0.320	0.080		0.041	0.100	SA
	Th-228	0.291	0.063		0.012	0.100	Concrete
		0.400	0.088		0.023	0.100	SA
	Th-232	0.268	0.075		0.046	0.100	Concrete
		0.401	0.150		0.120	0.100	SA
	U-235	0.000	0.000	U	0.040	0.000	Concrete
		0.000	0.000	U	0.065	0.000	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707B8	U-238	0.000	0.000	U	1.100	0.000	Concrete
		0.000	0.000	U	3.150	0.000	SA
	Zn-65	0.000	0.000	U	0.025	0.000	Concrete
		0.000	0.000	U	0.069	0.000	SA
707B9	Am-241	0.000	0.000	U	0.021	0.000	Concrete
		0.000	0.000	U	0.070	0.000	SA
	Co-60	0.000	0.000	U	0.016	0.015	Concrete
		0.000	0.000	U	0.020	0.015	SA
	Cs-137	0.000	0.000	U	0.014	0.010	Concrete
		0.000	0.000	U	0.018	0.010	SA
	Eu-152	0.000	0.000	U	0.031	0.030	Concrete
		0.000	0.000	U	0.046	0.030	SA
	Eu-154	0.000	0.000	U	0.047	0.000	Concrete
		0.000	0.000	U	0.073	0.000	SA
	Eu-155	0.000	0.000	U	0.027	0.000	Concrete
		0.000	0.000	U	0.053	0.000	SA
	K-40	4.500	0.990		0.150	0.000	Concrete
		17.700	3.800		0.195	0.000	SA
	Ra-226	0.349	0.078		0.024	0.100	Concrete
		0.335	0.080		0.035	0.100	SA
	Th-228	0.291	0.064		0.016	0.100	Concrete
		0.387	0.084		0.022	0.100	SA
	Th-232	0.374	0.100		0.060	0.100	Concrete
		0.386	0.110		0.084	0.100	SA
	U-235	0.000	0.000	U	0.075	0.000	Concrete
		0.000	0.000	U	0.069	0.000	SA
	U-238	0.000	0.000	U	2.000	0.000	Concrete
		0.000	0.000	U	2.360	0.000	SA
	Zn-65	0.000	0.000	U	0.041	0.000	Concrete
		0.000	0.000	U	0.062	0.000	SA
707B10	Am-241	0.000	0.000	U	0.071	0.000	Concrete
		0.000	0.000	U	0.033	0.000	SA
	Co-60	0.000	0.000	U	0.019	0.015	Concrete
		0.000	0.000	U	0.013	0.015	SA
	Cs-137	0.000	0.000	U	0.030	0.010	Concrete
		0.016	0.012		0.014	0.010	SA
	Eu-152	0.000	0.000	U	0.047	0.030	Concrete
		0.000	0.000	U	0.028	0.030	SA

TABLE D-2
BUILDING 707 CONCRETE PAD SITE ANALYTICAL RESULTS

Sample Location	Nuclide	Result (pCi/g)	Total Error (pCi/g)	Qualifier	MDA	RDL	Matrix
707B10	Eu-154	0.000	0.000	U	0.060	0.000	Concrete
		0.000	0.000	U	0.047	0.000	SA
	Eu-155	0.000	0.000	U	0.048	0.000	Concrete
		0.029	0.019		0.029	0.000	SA
	K-40	6.640	1.500		0.180	0.000	Concrete
		20.700	4.400		0.115	0.000	SA
	Ra-226	0.261	0.067		0.038	0.100	Concrete
		0.438	0.096		0.022	0.100	SA
	Th-228	0.305	0.069		0.023	0.100	Concrete
		0.504	0.110		0.015	0.100	SA
	Th-232	0.356	0.110		0.082	0.100	Concrete
		0.551	0.130		0.056	0.100	SA
	U-235	0.000	0.000	U	0.068	0.000	Concrete
		0.000	0.000	U	0.078	0.000	SA
	U-238	0.000	0.000	U	2.300	0.000	Concrete
		0.000	0.000	U	1.600	0.000	SA
	Zn-65	0.000	0.000	U	0.048	0.000	Concrete
		0.000	0.000	U	0.037	0.000	SA

Notes:

- Am-241 Americium 241
- Co-60 Cobalt 60
- Cs-137 Cesium 137
- Eu-152 Europium 152
- Eu-154 Europium 152
- J Estimated value
- K-40 Potassium 40
- MDA Minimum detectable activity
- pCi/g picoCurie per gram
- Ra-226 Radium 226
- RDL Required detection limit
- SA Soil aggregate (soil)
- Th-228 Thorium 228
- Th-232 Thorium 232
- U Nondetected value
- U-235 Uranium 235
- U-238 Uranium 238
- Zn-65 Zinc 65

APPENDIX E

**POTENTIAL FEDERAL AND STATE ARARS AND TO BE CONSIDERED CRITERIA
FOR THE BUILDING 364, 707, 529, AND 509 SITES**

(2 Pages)

**POTENTIAL FEDERAL AND STATE ARARs AND TO BE CONSIDERED CRITERIA
FOR THE BUILDING 364, 707, 529, AND 509 SITES**

Type of ARAR	Regulation	Citation	Synopsis	Applicable or Relevant and Appropriate?	Comment
Federal ARARs and TBC Criteria					
Chemical	Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings	40 CFR 192.12(a)	This regulation establishes cleanup criteria for radium-226 averaged over 100 square meters not to exceed the background level by more than 5 pCi/g averaged over the first 15 cm.	Relevant and Appropriate	The Navy would select the health-based 5 pCi/g standard for all soils at the Building 364, 707, 529, and 509 sites. This requirement is relevant and appropriate for residual radioactivity in soils at the Building 364, 707, 529, and 509 sites
TBC	Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination	EPA OSWER No. 9200.4-18	This memorandum presents clarifying guidance for establishing protective cleanup levels for radioactive contamination at CERCLA sites. This memorandum establishes the maximum dose limit for humans at 15 mrem/yr.	TBC	This guidance provides a health-based criteria for residual radioactivity at the Building 364, 707, 529, and 509 sites
Action	Storage and Control of Licensed Material	10 CFR Part 20 Subpart I 20.1801	This regulation establishes security for stored material and control of material not in storage.	Relevant and Appropriate	This requirement is relevant and appropriate while waste material is awaiting off-site disposal.
Chemical	Dose Limits for Individual Members of the Public	10 CFR 20.1301	This regulation establishes a total effective dose equivalent (TEDE) to individual members of the public of 100 mrem/yr over background, exclusive of medical sources, from NRC-licensed operations.	Relevant and Appropriate	This requirement is a health-based standard that is relevant and appropriate for exposure to members of the public during the removal action.
Chemical	Radiological Criteria for unrestricted use at closing NRC licensed facilities	10 CFR 20.1402	This regulation sets a standard of 25 mrem/yr TEDE above background for average members of a critical group where residual radioactivity has been reduced to levels that are as low as reasonable achievable (ALARA)	Relevant and Appropriate	The Navy would apply this requirement, with the exception that 15 mrem/yr TEDE is substituted for 25 mrem as ALARA.

**POTENTIAL FEDERAL AND STATE ARARs AND TO BE CONSIDERED CRITERIA
FOR THE BUILDING 364, 707, 529, AND 509 SITES (Continued)**

Type of ARAR	Regulation	Citation	Synopsis	Applicable or Relevant and Appropriate?	Comment
Federal ARARs and TBC Criteria (Continued)					
Location	Federal Coastal Zone Management Act	16 USC 1456(c)(1)(A)	This act specifies that federal actions that affect the coastal zone must be consistent with the policies of the San Francisco Bay Conservation and Development Commission's federally approved coastal management program.	Applicable	This requirement is applicable to all excavation sites addressed by this removal action.
TBC	Guidelines for decontamination of facilities for unrestricted use	NRC Regulatory Guide 1.86	This NRC guidance establishes criteria for residual radioactivity in facilities that will be released for unrestricted use.	TBC	This information is considered useful by the Navy in determining what is protective for release at the Building 364, 707, 529, and 509 sites.
State ARARs and TBC Criteria					
Chemical	Identification and Listing of Hazardous Waste	22 CCR, Division 4.5, Chapter 11, Arts 2, 3, and 4	This regulation identifies and lists hazardous wastes. Article 2 includes criteria not found in 40 CFR.	Applicable	This requirement is applicable for determining whether the waste that is generated during the removal action is hazardous.
Chemical	Standards Applicable to Generators of Hazardous Waste, Applicability	22 CCR, Division 4.5, Chapter 12, Art 1	This regulation requires a generator to determine if waste is hazardous and to obtain an identification number.	Applicable	This requirement is applicable for waste generated during implementation of the removal action. If the waste is determined to be hazardous, it will be managed accordingly.
Chemical	Standards Applicable to Generators of Hazardous Waste, Pretransport Requirements	22 CCR, Division 4.5, Chapter 12, Art 3	This article identifies generator requirements, including pre-transport labeling, working, and limits on accumulation times.	Applicable	This requirement is applicable for waste that is determined to be hazardous and is transported off site for treatment or disposal.

Notes:

ARAR	Applicable or relevant and appropriate	pCi/g	picоАuries per gram
CFR	<i>Code of Federal Regulations</i>	pCi/L	picоАuries per liter
CCR	California Code of Regulations	TBC	To be considered
mrem/yr	millirem per year		