Naval Facilities Engineering Command Southwest
San Diego, California

FINAL
BACKGROUND SOIL STUDY REPORT

BASE REALIGNMENT AND CLOSURE PROGRAM MANAGEMENT OFFICE WEST

FORMER HUNTERS POINT NAVAL SHIPYARD,
SAN FRANCISCO, CALIFORNIA

June 2020

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Prepared for:

Department of the Navy
Naval Facilities Engineering Command Southwest
1220 Pacific Highway
San Diego, CA 92132

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San Diego, California

Contract Number: N62470-16-D-9000; Task Order No. FZ12
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Contract N62470-16-D-9000
CTO FZ12

Signature Quality Assurance Manager	06/11/2020 Date
Signature Radiation Safety Officer	06/11/2020 Date
Signature Project Manager	06/10/2020 Date

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Executive Summary

This report summarizes the field activities and evaluation of data for the radiological characterization of soil reference background areas (RBAs) for former Hunters Point Naval Shipyard (HPNS) in San Francisco, California. HPNS encompasses approximately 934 acres, including approximately 491 acres on land at the point of a high, rocky 2-mile-long peninsula projecting southeastward into the San Francisco Bay. HPNS was expanded over time using fill materials with a range of concentrations of naturally occurring radioactive material (NORM). Construction and remediation projects over the past 60 years have disturbed the soil, making a determination of background concentrations for anthropogenic radionuclides from fallout difficult. Previously, HPNS soil background values were only established for radium-226 (^{226}Ra) and not for other NORM or fallout radionuclides. Therefore, additional background data and evaluation were needed for the planned removal site evaluation activities at Parcels B, C, D-2, E, G, UC-1, UC-2, and UC-3 and for future site characterization and assessment.

Objective and Approach

The primary objective of the background soil study was to establish representative background soil concentrations for comparison and evaluation of future soil data collected at HPNS. Four onsite RBAs and one offsite RBA, located at San Bruno Mountain State and County Park, were identified for radiological characterization. The RBA characterization consisted of surface and subsurface soil sampling at various depths from 0 to 10 feet below ground surface for radiological analysis. Prior to sample collection, gamma walkover surveys were performed within each RBA to ensure that no radiological anomalies were present and that the RBA was suitable for sampling.

The evaluation process for RBA data included the following:

- Conducting preliminary data review, including descriptive statistics and distributions of background concentrations for the following soil radionuclides of concern (ROCs) at HPNS: cesium-137 (^{137}Cs), plutonium-239 (^{239}Pu), ^{226}Ra, strontium-90 (^{90}Sr), thorium-232 (^{232}Th), and uranium-235+D ($^{235+D}$U)
- Identifying outliers graphically or statistically
- Determining statistical difference between datasets
- Establishing background datasets
- Generating background threshold values (BTVs)

Additionally, other background studies were reviewed to determine if the observed background values at HPNS were consistent with values reported in literature. The BTVs and other background studies were evaluated to determine background values for comparison to site data.

Hunters Point Naval Shipyard Soil Background Threshold Values

Based on the expected variability, the surface and subsurface soil sample results were combined for development of the BTVs. The offsite BTVs were generally within or similar to the range of onsite BTVs[1] (**Table ES-1**).

[1] Based on comments received from the regulatory agencies on the Draft Report (**Appendix A**), data collected from RBA-3 will not be used for site data comparisons and were excluded from the range of BTVs presented in **Table ES-1**.

Table ES-1 Background Threshold Values

Radionuclide	Offsite BTVs (pCi/g)	Range of Onsite BTVs (pCi/g)
^{137}Cs	0.141	0.0523 - 0.477[a]
$^{239}Pu/^{240}Pu$	0.515	0.378 – 0.494
^{226}Ra	0.861	1.13 - 1.35
^{90}Sr	0.150	0.149 - 0.150
^{232}Th	1.63	1.42 - 2.21
$^{235}U/^{236}U$	0.145	0.129 - 0.245

Notes:

[a] The maximum onsite BTV, 0.477 pCi/g, is based on data collected from RBA-4 and will be considered for comparison to concentrations encountered in areas where topography and surface runoff may have caused ^{137}Cs from fallout to accumulate over time.

pCi/g = picocurie(s) per gram

Hunters Point Naval Shipyard Data Evaluation

For the planned removal site evaluation activities at Parcels B, C, D-2, E, G, UC-1, UC-2, and UC-3 the soil data evaluation process for demonstrating compliance with parcel-specific Record of Decision Remedial Action Objectives was established in Step 6 in Section 3.1 and detailed in Section 5 in the Parcel G Work Plan (Navy, 2019). Based on feedback received by the United States Environmental Protection Agency (USEPA) on the Draft version of this report (**Appendix A**), RBA-SanBruno will be used as the initial background data set for evaluation of site investigation data. In summary, the data evaluation process is as follows:

- Compare each ROC concentration for every sample to the corresponding remediation goal (RG).
  - If all concentrations for all ROCs for all samples are less than or equal to the RGs, then compliance with the Record of Decision Remedial Action Objectives is achieved.
- Compare sample data to BTVs calculated using RBA-SanBruno data (i.e., offsite BTVs). Additional analyses may consist of population-to-population comparisons between sample data and RBA-SanBruno data.
- If sample data suggest that RBA-SanBruno is not representative of site background conditions, compare sample data to appropriate RBA data from HPNS. Multiple lines of evidence will be evaluated to determine whether site conditions are consistent with NORM or anthropogenic background. The data evaluation may include, but is not limited to, the following:
  - Determination if the sample was collected in an area with a known or suspected release.
  - Use of a BTV, comparison with appropriate background soil concentrations of radionuclides reported in literature, population-to-population comparisons, graphical comparisons, or evaluation of equilibrium conditions.
  - If any result is greater than the RG and cannot be attributed to NORM or anthropogenic background, remediation will be performed prior to backfill.

If BTVs are used for site data comparisons, the offsite BTVs will be used for initial comparisons with HPNS site data collected during the removal site evaluations. The Navy may consider data collected from onsite RBA-1, RBA-2, and RBA-4 as part of a secondary evaluation when determining whether a sample result that exceeds both the RG and offsite BTV represents background or site-related contamination. Other background soil areas with similar soil

types, colors, geological conditions, or other characteristics may also be considered for use in a secondary evaluation.

For other future site characterization efforts, including human health or ecological risk screenings and assessments at HPNS, background data can be used to help determine whether a detected radionuclide is related to site use or history.

Cleanup action levels or RGs for sites undergoing remediation should be selected for each ROC as promulgated or risk-based concentrations. If background values are greater than regulatory or risk-based standards, the cleanup level may be established based on background (Navy, 2004 and USEPA, 2002).

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Contents

Appendixes (provided electronically on the enclosed CD-ROM)

Appendixes B-P are available through the Administrative Record.

Tables (embedded within text or provided at the end of the document)

Figures (provided at the end of the document)

Acronyms and Abbreviations

^{40}K	potassium-40
^{90}Sr	strontium-90
^{137}Cs	cesium-137
^{208}Tl	thallium-208
^{212}Pb	lead-212
^{214}Bi	bismuth-214
^{214}Pb	lead-214
^{226}Ra	radium-226
^{228}Ac	actinium-228
^{228}Th	thorium-228
^{230}Th	thorium-230
^{232}Th	thorium-232
^{234}U	uranium-234
^{235}U	uranium-235
^{236}U	uranium-236
^{238}U	uranium-238
^{239}Pu	plutonium-239
^{240}Pu	plutonium-240
^{241}Am	americium-241
ANOVA	analysis of variance
ASTM	ASTM International (formerly American Society for Testing and Materials)
bgs	below ground surface
BTV	background threshold value
CDPH	California Department of Public Health
CH2M	CH2M HILL, Inc.
cps	counts per second
DL	detection limit
DoD	Department of Defense
DOE	Department of Energy
DQA	data quality assessment
DTSC	Department of Toxic Substances Control
HPNS	Hunters Point Naval Shipyard
IDW	investigation-derived waste
IL	investigation level
IQR	interquartile range

keV	kiloelectron volt
KM	Kaplan-Meier
MDC	minimum detectable concentration
MS	matrix spike
Navy	Department of the Navy
NORM	naturally occurring radioactive material
NUREG	Nuclear Regulatory Commission Regulation
PARCSS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
pCi/g	picocurie(s) per gram
Perma-Fix	Perma-Fix Environmental Services
Q-Q	quantile-quantile
QC	quality control
RASO	Radiological Affairs Support Office
RBA	reference background area
RER	relative error ratio
RG	remediation goal
ROC	radionuclide of concern
RPD	relative percent difference
RPM	Remedial Project Manager
SAP	sampling and analysis plan
SOP	standard operating procedure
TPH	total petroleum hydrocarbons
TW	Tarone-Ware
USCS	United Soil Classification System
USEPA	United States Environmental Protection Agency
USL	upper simultaneous limit
WRS	Wilcoxon Rank Sum

SECTION 1

Introduction

This report summarizes the field activities and evaluation of data for the radiological characterization of soil reference background areas (RBAs) for former Hunters Point Naval Shipyard (HPNS) in San Francisco, California. HPNS encompasses approximately 934 acres, including approximately 491 acres on land at the point of a high, rocky 2-mile-long peninsula projecting southeastward into the San Francisco Bay (**Figure 1-1**). HPNS was expanded over time using fill materials with a range of concentrations of naturally occurring radioactive material (NORM). Construction and remediation projects over the past 60 years have disturbed the soil, making a determination of background concentrations for anthropogenic radionuclides from fallout difficult. Previously, HPNS soil background values were only established for radium-226 (^{226}Ra) and not for other NORM or fallout radionuclides . Therefore, additional background data and evaluation were needed for the planned removal site evaluation activities at Parcels B, C, D-2, E, G, UC-1, UC-2, and UC-3 (**Figure 1-2**) and for future site characterization and assessment.

The lead agency at HPNS is the Department of the Navy (Navy), the lead federal regulatory agency is the United States Environmental Protection Agency (USEPA), and the lead State of California regulatory agency is the Department of Toxic Substances Control (DTSC). The Navy will continue to work with USEPA and the State of California throughout the planning and site investigation process at HPNS. Comments and responses to comments from the agencies and public have been addressed and are included in **Appendix A**.

1.1 Objective and Approach

The primary objective of the background soil study was to establish representative background soil concentrations for comparison and evaluation of future soil data collected at HPNS. Four onsite RBAs and one offsite RBA, located at San Bruno Mountain State and County Park, were identified for radiological characterization, as described in **Section 1.2**. The RBA characterization consisted of surface and subsurface soil sampling at various depths from 0 to 10 feet below ground surface (bgs) for radiological analysis. The sample depths, spatial distribution, and number of samples collected were designed to be representative of the sample design for planned removal site evaluation activities (Navy, 2019). Prior to sample collection, gamma walkover surveys were performed within each RBA to ensure that no radiological anomalies were present and that the RBA was suitable for sampling.

The evaluation process for RBA data included the following:

- Conducting preliminary data review, including descriptive statistics and distributions of background concentrations for the following soil radionuclides of concern (ROCs) at HPNS: cesium-137 (^{137}Cs), plutonium-239 (^{239}Pu), ^{226}Ra, strontium-90 (^{90}Sr), thorium-232 (^{232}Th), and uranium-235+D ($^{235+D}$U)
- Identifying outliers graphically or statistically
- Determining statistical difference between datasets
- Establishing background datasets
- Generating background threshold values (BTVs)

Additionally, other background studies were reviewed to determine if the observed background values at HPNS were consistent with values reported in literature. The BTVs and other background studies were evaluated to determine background values for comparison to site data. The background values can be used during data evaluation for the planned removal site evaluation activities at Parcels B, C, D-2, E, G, UC-1, UC-2, and UC-3 and for future site characterization and assessment at HPNS.

1.2 Reference Background Area Identification

As part of previous HPNS activities, five areas were used as RBAs for soil and were characterized at different times beginning in 2005. Four of the previously established RBA soil areas were selected for this characterization effort because they are considered radiologically non-impacted and representative of soil at HPNS. To simplify the sampling design, the area of each onsite RBA was modified to establish approximately 2,500-square-foot areas within each of the four historical RBA footprints. The justification for selecting the onsite RBAs is as follows (**Figure 1-2**):

- RBA-1, located on Parcel B in the area southwest of Building 116, is considered to contain soil like that encountered in nearby soils and has been covered with asphalt since the early 2000s.
- RBA-2, located on Parcel C southeast of Lockwood Street, has no history of radiological use and has been covered with asphalt since approximately 2015.
- RBA-3, located on Parcel D-1 in the area between Building 526 and Berth 29, is considered to contain soil like that encountered in Parcel E survey units and has no history of radiological use. The area was paved with asphalt in early 2019.
- RBA-4, located on Parcel D-2 in the Building 813 parking lot, has no history of radiological use, is considered to contain soil like that encountered in the Parcel G survey units, and is paved with asphalt. The land area in Parcel G was originally part of Parcel D and is adjacent to RBA-4; therefore, RBA-4 is considered representative of Parcel G site conditions.

In addition to the four onsite RBAs, an offsite RBA at San Bruno Mountain State and County Park was identified for soil characterization to provide a dataset representative of undisturbed soil areas. San Bruno Mountain State and County Park occupies 2,416 acres and is located approximately 8 miles southwest of HPNS. The Park is not affected by the Navy radiological activities and contains areas where surface soil has remained undisturbed by construction activities since prior to atmospheric nuclear weapons testing. An area near the intersection of the Old Guadalupe and Bog Trails was selected as the location for the offsite RBA (RBA-SanBruno or RBA-S) during a site walk on February 11, 2019 with representatives from the Navy, United States Geological Survey (USGS), USEPA, and State of California DTSC. The area is nearly flat with no obvious signs of pedestrian traffic or litter, indicating minimal human disturbance. The location of RBA-SanBruno is shown on **Figure 1-3**.

SECTION 2

Field Activities

This section summarizes the RBA field activities conducted at HPNS from August through September 2019. The field activities presented in this report were conducted in accordance with the Sampling and Analysis Plan (SAP) (Appendix B of the Parcel G Work Plan [Navy, 2019]), the Soil Reference Background Area Work Plan (Appendix C of the Parcel G Work Plan [Navy, 2019]), and the Accident Prevention Plan/Site Safety And Health Plan [Navy, 2018]. Deviations from the site plans are described in **Section 2.7**. Photographs documenting the field activities are included in **Appendix B**.

2.1 Premobilization Activities

The primary premobilization activities included training of field personnel and procurement of support services. Prior to initiation of field activities, CH2M HILL, Inc. (CH2M) provided notifications to the Navy Remedial Project Manager (RPM), Resident Officer in Charge of Construction, Radiological Affairs Support Office (RASO), Caretaker Site Office, and HPNS security regarding the nature of the planned work. Perma-Fix Environmental Services (Perma-Fix) provided notification to the California Department of Public Health (CDPH) prior to initiation of activities involving their Radioactive Material License (**Section 2.4**). Notification was also provided to the San Bruno Mountain State and County Park 72 hours before work was initiated at RBA-SanBruno.

Additionally, pre-construction meetings were held prior to mobilization of equipment and personnel. The purpose of the meetings was to discuss the roles and responsibilities of project personnel, project schedule, and health and safety concerns before field mobilization. Representatives from the Navy (RPMs, Resident Officer in Charge of Construction, and Caretaker Site Office), CH2M (Project Manager, Field Quality Manager, field team lead, and Site Safety and Health Officer), Perma-Fix, USEPA, DTSC, CDPH, and San Francisco Department of Public Health were in attendance.

2.2 Land Survey and Utility Locate and Clearance

Prior to initiation of sampling, the sample locations and the four corners of each RBA boundary were staked by a California registered professional land surveyor. The horizontal and vertical datums for the coordinates are the North American Datum of 1983, State Plane Coordinate System for California, Zone 3, Federal Information Processing Standard 0403 United States Survey Feet.

Additionally, prior to initiation of sampling, USA North 811 dig alert was submitted and a third-party utility locate and clearance were performed at all five RBAs. Available as-built drawings were reviewed, and non-intrusive subsurface detection equipment was used to identify and mark utilities and subsurface anomalies within 20 feet of the proposed subsurface sample locations. Subsurface anomalies were identified in RBA-1, RBA-2, RBA-3, and RBA-4. None of the anomalies identified with ground-penetrating radar in RBA-1 and RBA-3 were attributed to buried utilities and did not affect proposed sample locations. In RBA-2, buried electrical lines and an assumed steam line were identified. In RBA-4, an assumed buried rail spur was identified. The utility locate did not identify any subsurface anomalies at RBA-SanBruno.

Four proposed sample locations in RBA-2 and one proposed sample location in RBA-4 were relocated within the respective historical RBA footprints in accordance with the Accident Prevention Plan/Site Safety and Health Plan (Navy, 2018). All sample locations, including the revised locations, are shown on **Figures 2-1** through **2-5**. The third-party utility locate report is provided in **Appendix C**.

2.3 Gamma Walkover Surveys

Once the corners of the RBA boundaries were staked, 100 percent of the accessible surface of each RBA was surveyed for gamma activity. Gamma walkover surveys were performed using the Perma-Fix Eagle iScan system, consisting of a Ludlum Model 44-20 (3- by 3-inch sodium iodide detector), coupled to a digiBASE (photo multiplier tube and multichannel analyzer) with automated data logging using MAESTRO Multichannel Analyzer Emulation Software. The system was configured to acquire a gamma spectral measurement every second providing both gross gamma and gamma energy-correlated datasets. Each measurement was logged with a date and time stamp. In addition to automated radiological data collection, the position of the detector was simultaneously logged using a global positioning system, configured to acquire a position every second. The MAESTRO software and global positioning system data were managed using a personal computer during the survey activities.

Each 3- by 3-inch detector and digiBASE system were calibrated using National Institute of Standards and Technology traceable sources. The detector systems were calibrated using a ^{137}Cs, cobalt-60, and a mixed gamma source that includes potassium-40 (^{40}K) and thallium-208 (^{208}Tl). Calibration certificates are included in **Appendix D**. Upon mobilization, all instruments underwent an initial instrument setup. Prior to use each day, at midday, and at the end of the day, an operational check, consisting of an alignment check, background count, and source response check was performed. Initial setup and daily instrument response logs are included in **Appendix E**.

The gamma walkover surveys at the RBAs were performed following Nuclear Regulatory Commission Regulation (NUREG)-1575 protocol (USEPA et al., 2000). During the scans, the radiation technician held the detector at a height of approximately 4 inches above the ground surface and traveled in straight lines (terrain permitting) at an average rate of approximately 0.4 meter per second in approximately 1-meter-wide transects. The technician completed the survey walking in one path (i.e., north to south) and then performed the survey again walking in the perpendicular direction (i.e., east to west) in order to provide adequate survey coverage. Additionally, the technician purposefully surveyed outside the RBA boundaries to ensure adequate coverage around the perimeter. Following the completion of survey activities at an RBA, the position-correlated scan datasets were assembled and plotted using ArcGIS computer software. Using the pre-established RBA boundaries, the gamma walkover survey dataset was cropped to ensure that only data within the boundary of the RBA was evaluated. Results of the gamma scan surveys are presented in **Section 4**.

Additionally, representatives from the USEPA performed an independent gamma walkover survey using similar instrumentation.

2.4 Soil Sampling

Following the completion of the gamma walkover survey and confirmation that radiological anomalies were not present, soil sampling was performed. A total of 273 soil samples were collected for radiological analysis, including 100 surface and 66 subsurface soil samples from RBA-1 through RBA-4. An additional seven samples were collected from material assumed to be road base in RBA-4 (see **Section 2.7**). Twenty-five surface and 75 subsurface soil samples were collected from the RBA-SanBruno. Soil sample locations are presented on **Figures 2-1** through **2-5**. A summary of all of the samples collected for radiological analysis, including laboratory quality control samples, is provided in **Table 2-1**, and the details are provided in **Table 2-2**. Soil descriptions and sample times are documented on boring logs included in **Appendix F**.

Soil samples were shipped under chain-of-custody via FedEx to GEL Laboratories in Charleston, South Carolina for radiological analysis. In addition to the soil samples collected in the field by the field team, representatives of USEPA collected split samples for independent radiological analysis. Split samples were collected from approximately 10 percent of the surface and subsurface soil samples.

Table 2-1. Radiological Sample Summary

Location	Sample Type	No. of Soil Samples Collected	No. of Field Duplicates	No. of Matrix Spike (MS) Samples[a]	No. of Equipment Blanks[b]	Total No. of Samples Sent to Laboratory
RBA-1	Surface soil	25	3	2	4	58
	Subsurface soil	23	3	1		
RBA-2	Surface soil	25	5	3	3	44
	Subsurface soil	11	0	1		
RBA-3	Surface soil	25	1	2	4	60
	Subsurface soil	25	5	1		
RBA-4	Surface soil	25	3	2	3	47
	Subsurface soil	7	2	1		
	Fill	7	0	0		
RBA-SanBruno	Surface soil	25	1	1	2	112
	Subsurface soil	75	9	5		

[a] The sample volume for MS samples was taken from the parent sample sent to the laboratory.

[b] Equipment blanks were collected once per day per RBA.

Soil removed from the ground were gamma-scanned by a radiation technician prior to containerization. Gamma measurements were collected for the retrieved surface or subsurface samples using the Perma-Fix Eagle iScan system. The system was configured to acquire five 4-second measurements of each sample. Results of the surveys were compared against the RBA-specific investigation levels (ILs) and are discussed in **Section 4**.

2.4.1 Onsite Sampling

A random-start triangular grid was used to place 25 systematic sample locations within each onsite RBA. Surface sampling locations were established at all 25 systematic sample locations, and subsurface sampling locations were established at 5 of the 25 systematic sample locations including one at the approximate center and at the four corners. Durable covers were present on the surface of each onsite RBA. To perform the sampling, the durable cover (asphalt) at each location was removed in a 6-inch-diameter core. The road base material was removed using hand tools to visually confirm the thickness of the road base. A summary of the onsite soil sampling process is presented in **Sections 2.4.1.1** through **2.4.1.3**.

2.4.1.1 Surface Soil

Surface soil samples were collected from the top 6 inches of soil beneath the asphalt and road base materials. For locations designated for collection of surface soil samples only, samples were collected using a hand auger. Soil was transferred directly from the hand auger to a stainless steel bowl and photographed (**Appendix B**). For locations where subsurface soil samples were collected, surface soil samples were collected as described in **Section 2.4.1.2**.

The soils were visually described using the United Soil Classification System (USCS), generally in accordance with ASTM International (ASTM) standard D 2487. Color, moisture, texture, and coarse clast composition (i.e., serpentine, shale, sandstone, chert, or gabbro) were identified. The soil was mixed by breaking the sample into

small pieces and removing overburden gravel and biological material (equivalent to approximately 3.5- to 4-mesh sieve size). Mixing by hand was conducted until there was consistency in texture and color.

A minimum of 300 grams of soil was removed and placed into 1-gallon Ziploc bags for radiological analyses. Each bag was weighed upon sample collection to verify that a sufficient amount of soil was collected. The bags were then affixed with self-adhesive labels, including the sample identification number, sample date and time, and the initials of the persons collecting the sample. The sample was then placed into a laboratory-provided cooler, pending shipment to the analytical laboratory. Radiological sample results are discussed in **Section 5**.

2.4.1.2 Subsurface Soil

The proposed subsurface sample depth intervals were the 1- to 2-foot, 3- to 4-foot, 5- to 6-foot, 7- to 8-foot, and 9- to 10-foot intervals beneath the asphalt and road base materials installed as part of the durable cover. Surface soil samples were also collected from the 0- to 6-inch-depth interval at the subsurface soil sample locations. In some cases, field conditions limited the collection of subsurface samples (**Section 2.7**). Subsurface soil samples were collected using a direct-push technology rig. Upon removal of the sampler from the ground, the 3.25-inch-diameter acetate sleeves were carefully cut open to maintain the material in the sleeve.

The soils were visually described using the USCS ASTM standard D 2487. Color, moisture, texture, and coarse clast composition (i.e., serpentine, shale, sandstone, chert, or gabbro) were identified. Soil from the sampling depth intervals were removed and placed into stainless steel bowls for homogenization and photographic documentation (**Appendix B**). The soil was then thoroughly mixed by hand, with clumps of soil being broken up and biological material (plant roots, wood fragments, shell fragments, etc.) removed to the extent practicable. Mixing by hand was conducted until there was consistency in texture and color.

The soil sample was prepared for radiological analysis sampling by removing fragments of material larger than coarse sand (equivalent to approximately 3.5- to 4-mesh sieve size). A minimum of 300 grams of soil was removed and placed into 1-gallon Ziploc bags for radiological analyses. Each bag was weighed upon sample collection to verify that a sufficient amount of soil was collected. The bags were then affixed with self-adhesive labels, including the sample identification number, sample date and time, and the initials of the persons collecting the sample. The sample was then placed into a laboratory-provided cooler, pending shipment to the analytical laboratory. Radiological sample results are discussed in **Section 5**.

2.4.1.3 Radiological Controls

During soil sampling activities at the onsite RBAs, radiological controls were implemented to monitor for radioactive contamination. An exclusion zone was established around the perimeter of each RBA to control the movement of personnel and equipment in and out of the area. Prior to leaving or removing materials and equipment from the exclusion zone, personnel and contamination frisks were performed by a radiation technician. All personnel and contamination frisk measurements were consistent with background. Disposable sampling equipment, personal protective equipment, and general site waste were surveyed by a radiation technician and released for disposal as municipal waste.

2.4.2 Offsite Sampling

A random-start triangular grid was used to place 25 systematic sample locations within RBA-SanBruno. Surface and subsurface soil samples were collected from each systematic sample location. Surface samples were collected from 0 to 6 inches bgs and subsurface samples were collected from 6 to 12 inches, 12 to 18 inches, and 18 to 24 inches bgs. All soil samples were collected using a hand auger. Soil was transferred directly from the hand auger to stainless steel bowls marked with the corresponding depth interval and photographed (**Appendix B**).

The soils were visually described using USCS ASTM standards. Color, moisture, texture, and coarse clast composition (i.e., serpentine, shale, sandstone, chert, or gabbro) were identified. The soil was mixed by breaking

the sample into small pieces and removing biological material (equivalent to approximately 3.5- to 4-mesh sieve size). Mixing by hand was conducted until there was consistency in texture and color.

A minimum of 300 grams of soil was removed and placed into 1-gallon Ziploc bags for radiological analyses. Each bag was weighed upon sample collection to verify that a sufficient amount of soil was collected. The bags were then affixed with self-adhesive labels, including the sample identification number, sample date and time, and the initials of the persons collecting the sample. The sample was then placed into a laboratory-provided cooler, pending shipment to the analytical laboratory. Radiological sample results are discussed in **Section 5**.

2.4.3 United States Environmental Protection Agency Split Sampling

Split samples were collected by USEPA for independent analysis during field activities. Locations for split samples were determined in the field to allow for a sufficient volume for Navy samples, Navy quality assurance/quality control (QC) samples, and USEPA split samples. The split samples were collected using an alternate spooning technique to split the soil between the Navy's primary sample container and USEPA's split sample container.

Split samples were collected from approximately 10 percent of the total number of samples collected, including five locations within each of the onsite RBAs (20 samples total) and 10 locations within the offsite RBA (10 samples total). Of the 30 split samples, 12 were collected from surface soil sample locations, 16 were collected from subsurface soil sample locations, and 2 were collected from material assumed to be road base in RBA-4 (**Section 2.7**). USEPA performed gamma scans of the soil once it was collected in the sample containers. For split samples collected at subsurface sample locations within the onsite RBAs, USEPA also performed scans of the soil core from which the split sample was collected. USEPA split sample results are discussed in **Section 5.5**.

2.5 Site Restoration

Following completion of field activities, the RBAs were restored to original conditions. Excess soil was returned to the hole from which it came, or spread to an adjacent sample location, or containerized.

For the onsite sampling locations, the durable cover was repaired following sample collection. The sample holes were backfilled to a depth no less than 6 inches bgs. Concrete was mixed in a wheelbarrow and applied to the holes. The surface was smoothed to grade with hand tools.

At RBA-SanBruno, for locations where there was not enough excess soil for backfill, a weed-free topsoil was used for backfill, and light grading was performed to blend the soil into the surroundings. The topsoil was approved by the San Bruno Mountain State and County Park Natural Resources prior to use.

2.6 Investigation-derived Waste Management

Investigation-derived waste (IDW) was generated during this field effort. Solid IDW was placed into four Department of Transportation-rated 55-gallon steel drums by the type of material, including one drum of excess sample volume, two drums of asphalt cores and excess road base, and one drum of drilling expendables. Aqueous IDW consisting of decontamination fluids was generated and placed into two Department of Transportation-rated 55-gallon polyethylene drums.

IDW samples were collected and analyzed for the following: 1) volatile organic compounds, semivolatile organic compounds, metals, herbicides, and pesticides using the Toxicity Characteristic Leaching Procedure method; 2) chromium and nickel using the soluble threshold limit concentrations method; 3) ignitability, corrosivity, and reactivity; 4) radiological analyses (gamma spectroscopy, alpha spectroscopy, gas flow proportional counting, and radon emanation); and 5) total petroleum hydrocarbon (TPH)-gas, TPH-diesel-range organics, and TPH-oil-range organics. Additionally, a soil IDW sample was analyzed for asbestos based on serpentinite encountered at some onsite locations (see **Section 2.7**). The IDW analytical results are included in **Appendix G**.

The results characterized the IDW as non-hazardous. Additionally, asbestos was not detected in the solid IDW sample. The IDW drums was transported as non-hazardous waste to a permitted disposal facility: Waste Management – Kettleman Hills Hazardous Waste Facility.

2.7 Deviations from Work Plan

The fieldwork was conducted in accordance with the Parcel G Work Plan (Navy, 2019), with limited exceptions as follows:

- According to direction from RASO representatives who were onsite on August 21, 2019, additional samples were collected from RBA-4 to characterize what was believed to be a specific type of road base or fill material that was anecdotally observed in sanitary sewer and storm drain lines in this part of HPNS and thought to contain higher ^{137}Cs concentrations. Seven additional samples were collected.
- During subsurface sampling in RBA-2, bedrock was encountered at approximately 6 feet below the bottom of the road base. The material observed at this depth was identified by the professional geologist as potentially being serpentinite, which contains naturally occurring asbestos. Because of health and safety concerns, the material was sprayed with water and placed back into the hole from which it was collected. Additionally, a soil waste characterization sample was sent to the laboratory for asbestos analysis (see **Section 2.6**). Because of the health and safety concerns and concerns with damaging drilling equipment, no subsurface samples beyond 6 feet below the bottom of the road base were collected.
- During subsurface sampling in RBA-4, bedrock was encountered at depths as shallow as 1.5 feet bgs. To preserve drilling equipment, drilling was only performed past approximately 5 feet bgs at one location. At another location, refusal was encountered at approximately 2.5 feet bgs. Therefore, samples were collected from depth intervals where there was sufficient volume/recovery for a sample, even if the sample consisted of crushed bedrock. Although the Parcel G Work Plan states that if bedrock is encountered during future resampling no samples will be collected from the bedrock, there is difficulty in determining the exact depth of bedrock during drilling. Therefore, drilling was performed to depths to collect a full boring or until the drilling subcontractor believed that bedrock was encountered. Several of the subsurface samples collected from RBA-4 contained crushed bedrock, identified as shale or sandstone on the soil boring logs in **Appendix F**.
- Several sample locations were adjusted because of the presence of underground utilities. At RBA-2, four sample locations were adjusted because of the identification of underground electrical lines and steam lines. At RBA-4, one sample location was revised because of an unknown subsurface anomaly, assumed to be a former rail spur. The revised locations were located within the respective RBA boundaries and therefore comply with the objectives of the study.
- The suitability of the previously selected off-site location at RBA-McLaren to provide representative data for radionuclides associated with atmospheric radioactive fallout was questioned based on that site's slope, tree canopy, and accessibility to human foot traffic. A site walk was conducted at RBA-McLaren and RBA-SanBruno on February 11, 2019, with representatives from the Navy, USGS, USEPA, and DTSC. The consensus among the participants at the site walk was that RBA-SanBruno was more appropriate for the intended data collection based on the following rationale: the site is nearly flat, there are no obvious signs of pedestrian traffic or litter, indicating that there is minimal human disturbance at the location, and the site is adjacent to drainage but with enough space to establish a systematic sampling grid.
- Boring logs were completed for only the four corner locations at the offsite RBA, RBA-SanBruno. The professional geologist determined that the soil logged at these locations was representative of the entire RBA. There were no significant differences observed in the lithology at the other sample locations; therefore, logs were not completed for the other locations.

- As noted in Section 5.6 of the Parcel G Work Plan (Navy, 2019), analyses to evaluate the equilibrium status of the long-lived NORM radionuclides (i.e., uranium-238 [^{238}U], uranium-234 [^{234}U], thorium-230 [^{230}Th], and ^{226}Ra) were to be performed, if practical, using the same sample aliquot to reduce potential sampling uncertainty. GEL laboratory attempted to perform the digestion and analysis by alpha spectroscopy using the same aliquot but encountered insufficient yields. Therefore, separate aliquots were used for the reported alpha spectroscopy data.

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SECTION 3

Geology

The concentrations of NORM and fallout radionuclides in soil at HPNS are variable because of the natural variability of native soil and the variability in erosion and deposition of surface soil and fallout radionuclides. During the historical expansion of HPNS in the 1940s, the geography of HPNS was modified by cutting, filling, and re-grading the existing geography while also using fill material originating from multiple offsite sources to reclaim shoreline areas from the San Francisco Bay. Much of the fill was obtained by grading the hilltop immediately north of HPNS. The source of fill derived from the hilltop is the Hunters Point Shear Zone, a complex structural mixture of serpentinite, shale, sandstone, chert, and gabbro. Fill soil was also obtained from sediment dredged from San Francisco Bay and imported from local quarries and construction sites. Fill soil was generally placed in layers; however, the layering is not contiguous across the shipyard. Soil lithology in filled areas is not readily known at any given location. Thus, the concentrations of NORM and fallout radionuclides in soil vary by location and depth.

Concentrations of NORM radionuclides and fallout radionuclides have not been evaluated previously at San Bruno Mountain State and County Park. The Park has some developed facilities; however, much of the park is inaccessible due to steep slopes. A trail system provides access to key recreational and scenic areas. The majority of the Park consists of open space dedicated to the preservation and enhancement of habitat for endangered species. San Bruno Mountain is made up of Franciscan sandstone and shale, with sandstone comprising up to 90 percent of the bedrock. Two types of loamy soil are present. The Gaviota-eroded Rockland association is a rocky loam found on steep slopes. The Los Gatos Hills association is a clay loam found on the more gentle slopes. The native soil structure commonly holds slopes of 30 degrees or more if undisturbed. Less stable soil areas have been found along the Hillside Fault (flanking the southern slope and crossing the Park between the golf course and Pacific Nursery) (County of San Mateo Parks Department, 2001).

Site-specific geological information is available from the boring logs provided in **Appendix F**. Lithology was documented to a maximum depth of 10 feet bgs and is summarized for each RBA below.

3.1 Onsite Geology

At the onsite background areas RBA-1 through RBA-4, an asphalt durable cover or pre-existing asphalt pavement was present on the ground surface during the investigation. The thickness of the asphalt layer varied from approximately 0.2 foot to 0.8 foot. A layer of sandy gravel or clayey gravel base material was typically present beneath the asphalt, ranging from approximately 0.3 foot to 1.1 feet in thickness. Soils beneath the durable cover and gravel road base material are considered “native” for the purposes of the study.

During the historical expansion at HPNS, the pre-existing geography was modified. A review of the comparison of pre-development and post-development shorelines at HPNS indicated background areas RBA-2 and RBA-4 (located in Parcels C and D-2, respectively) are located in areas upslope of the pre-development shoreline, while background areas RBA-1 and RBA-3 (located in areas Parcels B and D-1, respectively) are located in areas that were reclaimed from the bay (PRC Environmental Management, Inc., 1996). Therefore, the soils encountered varied from background area to background area. Summaries of the geologic observations for each RBA are presented in **Sections 3.1.1** through **3.1.4.**

3.1.1 Reference Background Area-1

At RBA-1, the durable cover and the underlying gravel road base material extend to approximately 0.5 to 1.3 feet bgs, including an asphalt layer approximately 0.2 foot thick and road base between approximately 0.3 and 1.1 feet thick. The durable cover appeared to be in good condition.

Native soils beneath the durable cover consist primarily of a sand and gravel mixture or a silt and gravel mixture, with varying amounts of sand/gravel or silt/gravel from location to location within the RBA. At some locations near the southeastern end of the RBA, sandy fat clay was observed beneath the durable cover to a depth of about 2 feet bgs, but with silt/gravel and clay/gravel mixtures further below. Location SB-13 at the center of the RBA exhibits soils that are mainly silt with sand, with minor amounts of gravel. The gravel encountered at RBA-1 typically consists of fragments of limestone, greenstone, and serpentinite, about 0.5 inch to 1.75 inches in size but as large as 3 inches.

Typically at 9 feet bgs, the soils become less gravelly, with more silt and clay. Weathered serpentinite was observed at location SB-18, and some sand/silt size sediments consisting of serpentinite were observed at location SB-01. Each of the soil borings at RBA-1 extended to a depth of about 12 feet bgs. Groundwater was encountered at depths ranging from about 5 feet bgs at location SB-18 to about 8 feet bgs at location SB-01. Northwest to southeast-oriented and west-northwest to east-southeast cross sections depicting the soils encountered in the RBA-1 soil borings are presented on **Figures 3-1** and **3-2**, respectively.

It is understood that the portion of HPNS that includes RBA-1 was reclaimed from San Francisco Bay when HPNS was expanded in about 1940, with RBA-1 located about 300-400 feet from the pre-expansion shoreline. The mixture of various soils and the presence of gravel at all depths observed in the soils at RBA-1 can be interpreted to reflect imported soil placed as fill material during the expansion of HPNS and/or during past construction activities. Fill encountered near the pre-development shoreline in Parcel D consists of material sourced from grading on the Hunters Point peninsula during development of HPNS. The fill material at RBA-1 therefore was likely similarly sourced from grading activities during HPNS development, and would be generally similar to soils in re-graded areas and near the pre-development shoreline at HPNS (PRC Environmental Management, Inc., 1996).

In some borings, construction debris was observed at depths as deep as 5 feet bgs. Wood and glass fragments were observed at location SB-13 at 1.1 to 2.4 feet bgs. Concrete fragments were observed at about 2.2 to 2.5 feet bgs at location SB-08. A fragment of what appeared to be geotextile fabric was observed at about 5.6 feet bgs at location SB-18. This debris indicates that some reworking of the soils has occurred since placement. It is understood that a building once stood on the RBA-1 area, and some of the debris could be from the demolition of that building.

3.1.2 Reference Background Area-2

At RBA-2, the durable cover and underlying gravel road base extends to approximately 0.8 to 1 foot bgs, including an asphalt layer approximately 0.2 foot thick and a road base of approximately 0.6 to 0.8 foot thick. The durable cover is in good condition.

The native soils immediately beneath the durable cover consist of black to dark brown, high-plasticity clay and sandy clay, extending to a depth of 1.5 to 3 feet bgs. Sand within the clay is fine grained, and small rock fragments were observed within the clay in some borings.

Beneath the clay typically lies a sand and gravel mixture, with the relative proportions of sand and gravel varying from location to location. The sand and gravel typically extend to depths from 2.8 to 5.8 feet bgs. The gravel consists of fragments of greenstone and chert, with some fragments of serpentinite.

The sand and gravel mixture overlies soil that was field-identified as silt with gravel based upon particle sizes. However, the silt with gravel soil appeared more likely to be weathered serpentinite, mechanically broken up into silt- and gravel-sized fragments by the drilling process. The weathered serpentinite was encountered at depths ranging from 3.2 feet bgs at location SB-25 to 7 feet bgs at location SB-05. All the soil borings at RBA-2 were terminated in the weathered serpentinite. The total depths of the borings ranged from 6.5 feet bgs for location SB-25 to 11 feet bgs for location SB-13. Groundwater was not encountered in any of the RBA-2 soil borings. North to south-oriented and east to west-oriented cross sections depicting the soils encountered in the RBA-2 soil borings are presented on **Figures 3-3** and **3-4**, respectively.

It is understood that the RBA-2 area was already developed as part of the shipyard when HPNS was expanded in the 1940s, with the RBA-2 area located above the pre-development shoreline of Hunters Point. The presence of weathered serpentinite at a depth of only a few feet suggests that the soils overlying the serpentinite may represent soils or fill reworked by grading activities on the Hunters Point peninsula during expansion of HPNS. It is not clear how much additional grading or filling work, if any, was performed at RBA-2 at that time, or since.

3.1.3 Reference Background Area-3

At RBA-3, the durable cover and underlying gravel road base extends to approximately 0.6 to 0.8 foot bgs, including an asphalt layer approximately 0.2 foot thick and road base of approximately 0.4 to 0.6 foot thick. The durable cover is in good condition.

Immediately beneath the durable cover, the native soils consist of weak red to olive-brown well-graded sand with gravel. This sand and gravel interval ranges from about 0.5 to 0.9 foot in thickness, extending to depths of approximately 1.1 to 1.7 feet bgs. The gravel was observed to consist of shell fragments up to 1.5 inch in size. Some coarse-sand-sized fragments of serpentinite and some small plant roots were also observed in the sand and gravel interval.

Soils beneath the sand and gravel consist of a reddish-brown to dark greyish brown, medium- to fine-grained sand, extending to a depth of about 9.5 feet bgs. Some rounded gravel up to 0.5-inch size was present in the upper 4 to 5 feet of this interval, while a trace of shell fragments was observed throughout the soil. The sand was dry, becoming moist at about 3.5 feet bgs, then wet at about 6.5 to 7.5 feet bgs.

Soils below 9.5 feet bgs consist of very dark grey to dark olive-gray, fine-grained sand. Gravel is generally absent, but abundant medium to coarse sand-sized shell fragments were observed. All five soil borings at RBA-3 extended to a depth of approximately 12 feet bgs. A north to south-oriented cross section is representative of RBA-3 soils and is presented on **Figure 3-5**.

It is understood that the portion of HPNS that includes RBA-3 was reclaimed from the San Francisco Bay, with the RBA-3 area located about 2,500 feet from the pre-development shoreline. Based upon the observation of shell fragments, uniformity of the sandy soil (the sand present above 9.5 feet bgs resembles beach sand), the general lack of gravel, and the roundness of the gravel that is present, it appears likely that the RBA-3 area soils consist of fill material that was sourced from bay sediments during the expansion of HPNS in about 1940. The slight difference in appearance between the sand above 9.5 feet bgs and the sand below 9.5 feet bgs may reflect slightly different sources for the material. It is likely that the uppermost layer of native soil (the well-graded sand and gravel) was placed as a wearing surface over the sand fill used to create this part of HPNS. The general uniformity of the subsurface soil suggests that re-working of the soil (involving excavation and backfilling with various materials) has not occurred in the RBA-3 location since the time of original placement. Historical boring logs from near RBA-3 indicate the presence of sand fill to a depths of 30 to 40 feet bgs, overlaying bay mud deposits (PRC Environmental Management, Inc., 1996).

During the surface soil sampling activity at RBA-3 (performed several days prior to the soil boring activity), the top of “native” soil was mis-interpreted. The well-graded sand with gravel that was assumed to be the top of native soil during the soil boring activity was initially assumed to be part of the gravel base for the durable cover. Therefore, the surface soil sampling logs and the collected surface soil samples (locations SB-02 through SB-04, SB-06 through SB-12, SB-14 through SB-20, and SB-22 through SB-24) reflect the upper portion of the medium- to fine-grained sand rather than the well-graded sand and gravel above.

3.1.4 Reference Background Area-4

At RBA-4, the ground surface was covered with pre-existing asphalt pavement, rather than the engineered durable cover that was present at the other onsite RBAs. The asphalt ranged from approximately 0.3 to 0.8 foot in thickness. The asphalt exhibited physical damage in part of the northeastern portion of RBA-4 and was not

completely intact. In locations where the asphalt was thickest, up to three distinct layers of asphalt, were observed in the cores removed from the soil sampling locations.

Soil consisting of dark reddish-brown to dark olive-grey sandy gravel and gravelly clay was observed beneath the asphalt pavement. The sandy gravel/gravelly clay extends to depths of approximately 0.6 to 1.6 feet bgs, although the material did not appear to be present at surface soil sampling locations SS-03 and SS-04, where the asphalt exhibited the most damage. The gravel consists of sandstone and greenstone rock fragments up to approximately 2 inches in size. The clay has high plasticity, is moist, and has a consistency ranging from moderately soft to firm. It is likely that this sandy and gravelly clay was placed as the road base to support the asphalt pavement.

At locations SB-01 and SB-05, there is an additional thin (0.2- to 0.3-foot-thick) interval of gravel and sandy gravel between the asphalt and the gravelly clay base material. From site observations, a railroad line was formerly located near the northeast edge of the RBA. It is possible that this additional gravel interval reflects ballast laid along the railroad tracks.

An interval of silt/gravel mixture was observed at locations SB-13 and SB-25, beneath the gravelly clay base material. This silt/gravel soil was moist, very dark grey to dark reddish grey in color, and was present to a depth of approximately 1.5 to 1.7 feet bgs. The gravel appears to be crushed rock up to 1 inch in size. This material may have been placed as part of the road base beneath the asphalt, or it may represent native material that was re-worked during the construction of the pavement area.

Apparent bedrock material was encountered in the RBA-4 borings at depths ranging from only 1.1 to 1.7 feet bgs. Although the soil below these depths was field-identified as silt with gravel or gravel, based upon particle grain size, the material appeared to be bedrock mechanically broken and pulverized into silt through gravel size particles by the drilling process. At borings SB-01, SB-05, and SB-25, the soil appeared to consist of fragments of shale or weak slate, very dark grey to very dark greyish-brown in color. Some serpentinite was also observed at boring SB-25. At borings SB-13 and SB-21, the soil appeared to consist of fragments of a slightly metamorphosed fine-grained sandstone, grey in color, with SB-13 further exhibiting very dark grey shale or slate fragments below the sandstone.

All five soil borings at RBA-4 were terminated before reaching the planned total depth of 10 feet bgs because of boring refusal in bedrock. Total depths ranged from 2.5 feet bgs at boring SB-21 to 8.6 feet bgs at boring SB-25. North to south-oriented and west to east-oriented cross sections depicting the soils encountered in the RBA-4 soil borings are presented on **Figures 3-6** and **3-7**, respectively.

At RBA-4, water and/or moist soil was encountered below the asphalt as shallow as 0.4 feet bgs, and above the bedrock.

RBA-4 is located about 400 feet inland from the pre-development shoreline of Hunters Point. The shallow depth to bedrock at RBA-4, together with what appears to be a cut slope adjacent to the RBA, indicate that the RBA-4 area was likely excavated to its current level during construction of that portion of HPNS. Historical boring logs from near the northeast corner of what is now Parcel G, and located about 400 feet southeast of RBA-4, similarly indicate sepentinite at shallow depths, although covered by increasing amounts of sandy clay and sandy gravel fill with increasing distance to the southeast from RBA-4 (PRC Environmental Management, Inc., 1996).

3.2 Offsite Geology - Reference Background Area-SanBruno

The offsite RBA location at San Bruno Mountain State and County Park was selected as an undisturbed, natural area. The ground surface at RBA-SanBruno consisted of native grasses, scrub, and other plants. Native soils encountered in the offsite RBA-SanBruno consist of yellowish-brown, fine-grained, silty sand. In some borings, a trace amount of small (0.25-inch or smaller) rock fragments was observed in the 0- to 1-foot-bgs interval. In most borings, the amount of silt tended to slightly decrease, and the size of the sand grains slightly increased (but still remaining fine-grained) with depth. In many of the borings, the soil color changed to a slightly darker shade of

yellowish-brown below 1 foot bgs, and small (up to 2 inches in size) clumps of very weakly cemented sand were also encountered below 1 foot bgs in some borings. Small plant roots were common through the total depth of the borings. All of the RBA-SanBruno soil borings were terminated at a depth of 2 feet bgs. Groundwater was not encountered in any of the borings.

A northwest to southeast-oriented cross section is representative of RBA-SanBruno soils and is presented on **Figure 3-8**.

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SECTION 4

Gamma Walkover Survey and Soil Scanning Results

This section presents the summary of data collected during the gamma walkover surveys and soil scanning.

4.1 Gamma Walkover Survey Results

The gamma walkover survey results for RBA-1 through RBA-4 are shown on **Figures 4-1** through **4-4**, respectively. The results for RBA-SanBruno are shown on **Figure 4-5**. Raw data from the gamma walkover survey at all five RBAs are included in **Appendix H**.

Gamma walkover survey data were evaluated as individual datasets using the gross gamma results in units of counts per second (cps) collected within the boundaries of each RBA. The data evaluation consisted of the compilation of basic statistics, graphical data review, and outlier tests. Gamma walkover survey dataset evaluations are described in **Appendix I** and summarized below.

The basic statistics of the RBAs, including number of measurements; minimum, maximum, mean, median, and standard deviation; and coefficient of variation are summarized in **Table 4-1**. As a comparison metric of the RBAs, a box plot was created to present the radiological datasets from each RBA (**Appendix I**). RBA-1, RBA-2, and RBA-3 have similar data distributions and basic statistics. These RBAs each contained a durable cover, including a layer of asphalt (approximately 0.2 foot thick) and underlying layer of gravel road base material (approximately 0.3 to 1.1 feet thick). The thickness of asphalt at RBA-4 was approximately 0.3 to 0.8 foot. The asphalt exhibited physical damage in part of the northeastern portion of the RBA and was not completely intact. The differences in data distribution and basic statistics for RBA-4 compared to the other onsite RBAs may be due to the varying thickness of asphalt. RBA-SanBruno was the only RBA without a man-made cover (i.e., asphalt, gravel, road base, etc.). The RBA-SanBruno results contained the highest minimum, maximum, mean, and median values.

Table 4-1. Statistical Parameters of RBA Gamma Walkover Survey Datasets

Statistic	RBA-1	RBA-2	RBA-3	RBA-4	RBA-SanBruno
Minimum (cps)	76	81	93	103	197
Maximum (cps)	196	198	214	323	361
Mean (cps)	138	135	154	217	281
Median (cps)	140	138	157	214	294
Standard Deviation (cps)	21	25	23	45	41
Coefficient of Variation	15	19	15	21	15
Number of Measurements	1,252	1,400	1,416	1,401	1,171

4.1.1 Investigation Levels

Site-specific gamma scan ILs for site ROC and gross gamma (i.e., full-energy spectrum) measurements were determined based on the evaluation of the gamma walkover survey over asphalt for the onsite RBAs and native vegetation for RBA-SanBruno. The data collected in each RBA were compiled, and the mean and standard deviations were calculated (**Table 4-1**). The IL was defined as the mean plus three standard deviations from each dataset. The RBA-specific ILs are shown in **Table 4-2** in units of cps.

Table 4-2. Investigation Levels from RBA Gamma Walkover Survey Datasets

Statistic	RBA-1	RBA-2	RBA-3	RBA-4	RBA-SanBruno
Mean (cps)	138	135	154	217	281
Standard Deviation (σ) (cps)	21	25	23	45	41
Investigation Level (cps)	**201**	**210**	**221**	**353**	**405**

4.1.2 Data Evaluation Summary

No elevated gamma walkover survey measurements above the designated ILs were observed. Therefore, the RBAs were determined to be viable background locations. Additionally, the gamma scan minimum detectable concentration was recalculated based on the site- and instrument-specific data. The calculation is provided in **Appendix I**.

4.2 Soil Sample Scanning Results and Evaluation

The ILs were used during the soil sampling activities, specifically when performing the gamma measurements of the retrieved soil samples prior to containerization. The soil scanning of the sample material included collection of five 4-second measurements. Comparison to the IL, derived using 1-second measurements, required multiplying the ILs by 4 to allow for accurate field comparisons. Results of each RBA sample scan survey dataset are presented in **Appendix H**. No surface samples or core segments exceeded the ILs during the soil sampling.

SECTION 5

Analytical Results

Soil samples were analyzed for the analytical methods and the radionuclides summarized in **Table 5-1**. This section details the data quality evaluation, data validation process, and summarizes the validated analytical results.

Table 5-1. Analytical Sample Summary

Analytical Group	Analytical Method	Radionuclide
Gamma Spectroscopy (gamma-emitting ROCs and naturally occurring radionuclides)	Department of Energy (DOE) HASL 300, 4.5.2.3/Ga-01-R[a]	^{137}Cs ^{226}Ra (equilibrated; via the 609 keV ^{214}Bi emission following 21-day ingrowth) ^{238}U Series (^{238}U via protactinium-234m, ^{214}Pb, ^{214}Bi) ^{232}Th Series (^{228}Ac, ^{212}Pb, ^{212}Bi, ^{208}Tl) ^{40}K ^{241}Am
Alpha Spectroscopy (alpha-emitting ROCs and naturally occurring radionuclides)	DOE EML HASL-300, Pu-11-RC Modified	^{239}Pu /^{240}Pu
	DOE EML HASL-300, Am-05-RC Modified	^{241}Am
	Eichrom Industries, AN-1421[a]	^{226}Ra
	DOE EML HASL-300, Th-01-RC Modified	Thorium (^{232}Th, ^{230}Th, ^{228}Th)
	DOE EML HASL-300, U-02-RC Modified	Uranium (^{238}U, ^{235}U, ^{234}U)
Radon Emanation (Lucas Cell) (to support future NORM evaluations)	USEPA 903.1 Modified	^{226}Ra
Gas Flow Proportional Counting	USEPA 905.0 Modified/DOE RP501 Rev. 1 Modified	^{90}Sr

Notes:

[a] The analytical methods detailed in the SAP (Navy, 2019) included analysis of soil samples by gamma spectroscopy following USEPA Method 901.1 and analysis of soil samples for ^{226}Ra by alpha spectroscopy following method HASL-300 A-01-R. Because of the updates in laboratory procedures between the submittal of the SAP and the beginning of the fieldwork, the DOE HASL 300, 4.5.2.3/Ga-01-R method was used for gamma spectroscopy analysis, and Eichrom Industries AN-1421 was used for ^{226}Ra analysis by alpha spectroscopy.

^{212}Bi = bismuth-212
^{212}Pb = lead-212
^{214}Bi = bismuth-214
^{214}Pb = lead-214
^{228}Ac = actinium-228
^{228}Th = thorium-228
^{240}Pu = plutonium-240
^{241}Am = americium-241
keV = kiloelectron volt

5.1 Data Quality Evaluation

This section presents a summary of the field QC samples collected and the data quality assessment (DQA).

5.1.1 Quality Control Samples and Sample Receipt

QC samples collected during this investigation consisted of the following types:

- Equipment blank samples – One per day per area of field sampling for decontaminated equipment
- Field duplicates – 1 for every 10 field samples
- MS – 1 for every 20 field samples (for radon emanation only)

Upon sample receipt, the laboratory measured and documented each of the sample temperatures. The sample temperatures in the coolers met validation criteria.

5.1.2 Data Quality Assessment

The DQA process consists of a systematic review, verification, validation, and usability assessment of the data generated during this investigation. The purpose of the DQA is to evaluate and monitor the performance of the field sampling and analytical procedures, and to assess the quality of the data. Data review and verification were performed by the project chemist on 100 percent of the analytical data. Validata Chemical Services, Inc. performed the independent third-party data validation on the analytical data.

The data were reviewed, verified, and validated consistent with the procedures presented in the following documents:

- *USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA, 2017)
- *Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories* (DoD, 2017)
- *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP)* (USEPA et al., 2004)
- *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* (USEPA et al., 2000)
- SAP (Appendix B of the Parcel G Work Plan [Navy, 2019])

Because of the data validation process, some analytical results were qualified as detected but estimated ("J" qualified) and estimated but not detected ("UJ"). All results are still considered usable. Approximately 22 percent of the results were qualified as estimated ("J" and "UJ") during the data validation process. The analytical results were qualified during data validation (see **Tables 5-2** through **5-7**) as estimated for one or more of the following reasons:

- For analytes qualified with J-MBL/EBL, quantitation limits are estimated, and concentrations were less than 10 times the contamination found in the method blank/equipment blank.
- Field duplicate results qualified with UJ/J-FD are estimated because the relative error ratio (RER) is greater than 1.
- For analytes qualified with UJ/J-OT, results or quantitation limits are estimated because of other concerns during validation listed below:
  - Tracer uncertainties were greater than 10 percent at the 2-sigma level.
  - The full width at half maximum of the tracer peak was greater than 100 keV.
  - The tracer peak was ±50 keV of the known peak energy.

- Results flagged as "uncertain identification" by the laboratory were considered a false positive for one of the following reasons: high peak-width, high counting uncertainty, interference, low abundance, no valid peak, or not detected above the detection limit (DL).
- Negative sample result was greater than its respective 3-sigma total propagated uncertainty.

5.1.3 Data Validation Findings

The data quality indicators, otherwise known as precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCSS), defined in the SAP (Navy, 2019), were met for the objectives of this work and were assessed as follows:

- **Precision** was assessed by evaluating the relative percent difference (RPD) laboratory control samples/laboratory control sample duplicates, field duplicate samples, and laboratory duplicates.

  The RPD is calculated as follows:

$$RPD = \frac{|C_1 - C_2|}{(C_1 + C_2)/2} \times 100$$

  where:

  RPD = relative percent difference
  C_1 = concentration of sample or MS
  C_2 = concentration of duplicate or MSD

  For the evaluation of precision between the native sample and its associated field duplicate, the sample results must be greater than 5 times the minimum detectable concentration (MDC) for the RPD criteria (i.e., less than 25 percent, per SAP Worksheet #12) to apply. When either the sample or field duplicate results are less than 5 times the MDC, then the RER must be less than 1 using the following equation:

$$RER = \frac{|S - D|}{2\sigma_s + 2\sigma_d}$$

  where:

  RER = relative error ratio
  S = concentration of sample
  D = concentration of duplicate
  σ_s = uncertainty of sample result
  σ_d = uncertainty of duplicate results

  Approximately 0.35 percent of the usable analytical results were qualified as estimated or estimated non-detect ("J" or "UJ") because of RPD and RER outliers, indicating that the analytical methods were consistently precise (see **Table 5-8**).

- **Accuracy** was assessed by evaluating percent recoveries of MSs, laboratory control samples, continuing calibration verification, and tracers for each applicable analytical method. None of the usable analytical results were qualified as estimated or estimated non-detect ("J" or "UJ") because of MS, continuing calibration verification, or tracer outliers.
- **Representativeness** was assessed using established field and laboratory procedures and their consistent application. Representativeness was maintained by using standard operating procedures, including chain-of-custody protocol and documentation, sample labeling, sample packaging and transport, as well as maintaining good condition of the samples upon receipt at the laboratory.

The target analyte concentrations in the field and laboratory blanks were reviewed. When target analyte concentrations in the field and laboratory blanks were reported, the associated sample results were evaluated according to the guidelines in the SAP (Navy, 2019). **Table 5-9** presents a summary of results that were qualified as estimated ("J" qualified) because of field and laboratory blank contamination.

- **Comparability** was assessed by using well-documented analytical methods approved by USEPA and DoD/DOE; following standard operating procedures and standard reference materials; collecting QC samples; and reporting each data type in consistent units. Laboratory accreditation through the DoD Environmental Laboratory Accreditation Program and DOE Consolidated Audit Program (GEL Laboratories, LLC – 2567.01) as detailed in Version 5.1 of the DoD/DOE *Quality Systems Manual for Environmental Laboratories* (DoD, 2017) and a standardized DQA process give the data a high degree of analytical comparability**.**
- **Completeness** was assessed by evaluating the validity of data obtained because of the DQA process (i.e., the amount of valid data obtained as compared to the amount that was expected to be obtained under normal conditions). Estimated data ("J" and "UJ") are considered valid and usable; however, rejected data ("R" qualified) are considered unusable. No results were rejected. Of 10,370 analytical results considered in the analytical completeness calculation, 100 percent are considered usable, which meets the completeness goal of 90 percent defined in the SAP (Navy, 2019).
- **Sensitivity** was assessed by evaluating the use of laboratory reporting limits. The data review process included evaluations of whether MDCs in the samples were elevated relative to the project remediation goals (RGs) and project quantitation limit goals specified in the SAP. The laboratory MDCs met all of the project RGs.

Quality assurance data presented in the analytical data packages (**Appendix G**) and third-party data validation reports (**Appendix J**) indicate that the analytical data, other than any rejected data, are of acceptable PARCSS. Based on the types of qualifiers added and the general level of data qualification, all data for this investigation are considered acceptable for use, meeting the data quality objectives established in the SAP (Navy, 2019).

5.2 Summary of Results

A summary of the validated analytical results is presented in **Sections 5.2.1** through **5.2.5**. The results presented below were used as tools for general review of data. Details regarding the statistical results and evaluation are included in **Section 6**.

5.2.1 Reference Background Area-1

The validated soil sample results for RBA-1 are presented in **Tables 5-10** through **5-13**. The gamma spectroscopy results for RBA-1 are presented in **Table 5-10**. The alpha spectroscopy results are presented in **Table 5-11**. The gas flow proportional counting results are presented in **Table 5-12**, and the radon emanation results are presented in **Table 5-13**.

Basic statistics were calculated for the validated results from RBA-1 for each analytical method and are included in **Tables 5-14** through **5-16**. **Table 5-14** includes the summary of basic statistics for the combined surface and subsurface soil sample results. **Table 5-15** includes the summary of basic statistics for surface soil sample results. **Table 5-16** includes the summary of basic statistics for the subsurface soil sample results. The statistics calculated in these tables used the reported analytical results, regardless of whether or not the radionuclide was reported as detected.

5.2.2 Reference Background Area-2

The validated soil sample results for RBA-2 are presented in **Tables 5-17** through **5-20**. The gamma spectroscopy results for RBA-2 are presented in **Table 5-17**. The alpha spectroscopy results are presented in **Table 5-18**. The gas

flow proportional counting results are presented in **Table 5-19**, and the radon emanation results are presented in **Table 5-20**.

Basic statistics were calculated for the validated results from RBA-2 for each analytical method and are included in **Tables 5-21** through **5-23**. **Table 5-21** includes the summary of basic statistics for the combined surface and subsurface soil sample results. **Table 5-22** includes the summary of basic statistics for surface soil sample results. **Table 5-23** includes the summary of basic statistics for the subsurface soil sample results. The statistics calculated in these tables used the reported analytical results, regardless of whether or not the radionuclide was reported as detected.

5.2.3 Reference Background Area-3

The validated soil sample results for RBA-3 are presented in **Tables 5-24** through **5-27**. The gamma spectroscopy results for RBA-3 are presented in **Table 5-27**. The alpha spectroscopy results are presented in **Table 5-25**. The gas flow proportional counting results are presented in **Table 5-26**, and the radon emanation results are presented in **Table 5-27**.

Basic statistics were calculated for the validated results from RBA-3 for each analytical method and are included in **Tables 5-28** through **5-30**. **Table 5-28** includes the summary of basic statistics for the combined surface and subsurface soil sample results. **Table 5-29** includes the summary of basic statistics for surface soil sample results. **Table 5-30** includes the summary of basic statistics for the subsurface soil sample results. The statistics calculated in these tables used the reported analytical results, regardless of whether or not the radionuclide was reported as detected.

5.2.4 Reference Background Area-4

The validated soil sample results for RBA-4 are presented in **Tables 5-31** through **5-34**. The gamma spectroscopy results for RBA-4 are presented in **Table 5-31**. The alpha spectroscopy results are presented in **Table 5-32**. The gas flow proportional counting results are presented in **Table 5-33**, and the radon emanation results are presented in **Table 5-34**.

Basic statistics were calculated for the validated results from RBA-14 for each analytical method and are included in **Tables 5-35** through **5-38**. **Table 5-35** includes the summary of basic statistics for the combined surface and subsurface soil sample results. **Table 5-36** includes the summary of basic statistics for the assumed to be fill material sample results. **Table 5-37** includes the summary of basic statistics for surface soil sample results. **Table 5-38** includes the summary of basic statistics for the subsurface soil sample results. The statistics calculated in these tables used the reported analytical results, regardless of whether or not the radionuclide was reported as detected.

5.2.5 Reference Background Area-SanBruno

The validated soil sample results for RBA-SanBruno are presented in **Tables 5-39** through **5-42**. The gamma spectroscopy results for RBA-SanBruno are presented in **Table 5-39**. The alpha spectroscopy results are presented in **Table 5-40**. The gas flow proportional counting results are presented in **Table 5-41**, and the radon emanation results are presented in **Table 5-42**.

Basic statistics were calculated for the validated results from RBA-1 for each analytical method and are included in **Tables 5-43** through **5-45**. **Table 5-43** includes the summary of basic statistics for the combined surface and subsurface soil sample results. **Table 5-44** includes the summary of basic statistics for surface soil sample results. **Table 5-45** includes the summary of basic statistics for the subsurface soil sample results. The statistics calculated in these tables used the reported analytical results, regardless of whether or not the radionuclide was reported as detected.

5.3 Comparison of Analytical Methods

The analytical results for ^{226}Ra by gamma spectroscopy, alpha spectroscopy, and radon emanation and analytical results for ^{232}Th by gamma spectroscopy and alpha spectroscopy were evaluated to determine potential differences in the data reported from the different analytical methods. The evaluation included the nonparametric analysis of variance (ANOVA) Kruskal-Wallis test (comparison of ^{226}Ra results) and two-sample central tendency tests (comparison of ^{232}Th results), as well as graphical comparisons of the data. The Kruskal-Wallis method tests for differences among average population ranks equivalent to the medians, assuming observations in each group are identically and independently distributed apart from location. When observations represent very different distributions, the method is a test of dominance between distributions.

The evaluation of the ^{226}Ra results are presented on **Table 5-46** and the evaluation of the ^{232}Th results are presented on **Table 5-47**. For ^{226}Ra, post-hoc testing indicates alpha spectroscopy results are, on average, higher than results from gamma spectroscopy and radon emanation for RBA-3 and radon emanation for RBA-SanBruno. For ^{232}Th, gamma spectroscopy results appear, on average, greater than results from alpha spectroscopy for both RBA-3 and RBA-SanBruno. Graphical comparisons of the ^{226}Ra and ^{232}Th results for each RBA and method are provided in **Appendix K**. These graphical comparisons include overlapping index plots, stacked histograms, overlapping probability plots, and side-side box plots. With the exception of ^{232}Th at RBA-3, visual inspection of these plots do not suggest significant, systematic differences in results between the methods. The results for ^{232}Th by gamma spectroscopy at RBA-3 appear to be consistently higher than ^{232}Th by alpha spectroscopy.

5.4 Review of Equilibrium Conditions

The RBA datasets for ^{226}Ra and other naturally occurring ROCs were selected to represent as much of the soil at HPNS as practical. However, the history of HPNS shows that a wide variety of fill materials have been used as part of construction and maintenance activities over the life of the site. In areas where storm drain and sanitary sewer removals or other radiological remediation occurred, fill was removed, radiologically screened, and placed back into excavations, further mixing soil types. These fill materials may have a wide range of naturally occurring radioactivity and could result in an incorrect identification of fill material with higher levels of NORM being identified as contamination. To avoid this situation, the Navy may perform additional evaluation of investigation samples where the ^{226}Ra gamma spectroscopy result exceeds the RG and the expected range of background but could still be associated with NORM instead of contamination.

The uranium natural decay series is one of the primordial natural decay series that are collectively referred to as NORM. The members of the uranium natural decay series may be present in background at concentrations that are approximately equal, a situation referred to as secular equilibrium. Secular equilibrium for the uranium natural decay series is established over hundreds of thousands of years. Concentrations of ^{226}Ra higher than the concentrations of other members of the uranium natural decay series may indicate contamination, while ^{226}Ra concentrations consistent with other members of the series indicate natural background.

To evaluate equilibrium conditions, radionuclides from the uranium natural decay series with ^{226}Ra as a decay product (i.e., ^{238}U, ^{234}U, and ^{230}Th) were analyzed by alpha spectroscopy, along with ^{226}Ra. It is not necessary to analyze for the decay products of ^{226}Ra because these radionuclides re-establish secular equilibrium with ^{226}Ra over a period of several weeks. In addition, most of the ^{226}Ra decay products are not readily analyzed by alpha spectroscopy.

Plots showing the relationships between ^{238}U and ^{226}Ra and between ^{230}Th and ^{226}Ra for individual sample results were developed and are provided in **Appendix L**. The plots show little, if any, secular equilibrium relationships between the ^{226}Ra and the parent radionuclides in individual samples at the low activity levels observed at HPNS. The highest correlations as measured by the coefficient of determination, or R-squared value, between ^{238}U and ^{226}Ra were observed for the subsurface samples at RBA-1 (R-squared value of 0.78), at RBA-2 (R-squared value of

0.84), and RBA-4 (R-squared value of 0.92). The highest agreement between ^{230}Th and ^{226}Ra was also in the RBA-4 subsurface samples (R-squared value of 0.75).

True secular equilibrium would be observed as 1 to 1 ratios of the parent and progeny concentrations. Ratios greater or less than 1 to 1 may represent a deficit of the parent or progeny attributable to various environmental processes, such as weathering. In addition to environmental factors which may contribute to various physical and chemical transport mechanisms, variability within the analysis and sample preparation is a potential contributor to apparent disequilibrium in the decay series. Additional statistical evaluations consisting of population to population comparisons were performed to evaluate populations of uranium decay series radionuclides from each RBA (Appendix L). The results for each analysis from all the samples in a data grouping (RBA-1 Surface, RBA-1 Subsurface, etc.) were compared using the Kruskal-Wallis analysis of variance test. A p-value greater than 0.05 indicated that there was not a significant difference between the populations. If the Kruskal-Wallis test identified that at least one of the populations was statistically significant (p-value less than 0.05), then the populations of each individual nuclide were compared with the others in pairs (e.g., ^{226}Ra to ^{230}Th, ^{226}Ra to ^{234}U, etc.) using the Wilcoxon Rank Sum test.

The key observations from this additional testing were as follows:

- **RBA-1:** The ^{230}Th population was statistically different than the ^{234}U and ^{238}U populations in surface soil. There were no statistically significant differences in subsurface soil populations.
- **RBA-2:** The ^{230}Th population was statistically different than the ^{226}Ra, ^{234}U, and ^{238}U populations in surface soil. There were no statistically significant differences in subsurface soil populations.
- **RBA-3:** The ^{226}Ra population was statistically different than the ^{234}U and ^{238}U populations in surface soil. ^{226}Ra and ^{230}Th populations were statistically different than the ^{234}U and ^{238}U populations in subsurface soil.
- **RBA-4:** There are no statistically significant differences in surface and subsurface soil populations.
- **RBA-SanBruno:** There are no statistically significant differences in surface and subsurface soil populations.

For RBA surface and subsurface soil groupings other than RBA-3, the data generally support the conclusion that there is a predictive relationship between ^{226}Ra and the parent uranium isotopes, although secular equilibrium may not be apparent in individual sample results. Secular equilibrium and other predictive relationships for surface and subsurface soil for other areas at HPNS may similarly exist, and both individual and population comparisons are recommended to evaluate equilibrium conditions.

5.5 United States Environmental Protection Agency Split Sample Results

Analytical results for ROCs from USEPA split soil samples will be compared with the results of the Navy's investigation. The USEPA is conducting a statistical comparison of the results and sources of discrepancies identified in the evaluation will be investigated and addressed.

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SECTION 6

Statistical Data Evaluation

An objective of any background investigation is the development of a background dataset. The background dataset represents background conditions of an area and is used to distinguish background concentrations in an environmental medium from site-related contamination. This section summarizes the statistical evaluations that were performed to identify appropriate soil background datasets for ROCs and calculate descriptive statistics to facilitate comparisons with site-specific data. After the statistical evaluation, the final background datasets were used to calculate BTVs for ROCs. The raw analytical results for all background samples are provided in **Section 5.2**.

6.1 Data Conditioning

This section describes the methods used to process and prepare the data for statistical evaluation.

6.1.1 Managing Duplicate Data

Duplicate samples were collected for quality assurance and QC purposes. For ROCs with duplicate sample results, only the parent sample was used for statistical analyses to avoid bias from these locations. Although duplicate sample results can provide valuable information about the level of measurement variability attributable to sampling or analytical techniques, they should not be used as separate observations in estimating background (USEPA, 2009).

6.1.2 Managing Censored Data

USEPA discourages substitution of censored or non-detect observations with an arbitrary value (e.g., one-half the DL) (USEPA, 2015). For datasets consisting of non-detects with multiple censoring limits, several estimation methods are available, including maximum likelihood estimate, the Kaplan-Meier (KM) product-limit estimator, bootstrap methods, and regression on order statistics. For this evaluation, the KM product-limit estimator was used to compute descriptive statistics with the censoring limit set at the DL. The USEPA (2009) recommends the use of the KM method when evaluating datasets containing multiple censoring limits.

The KM method (Kaplan and Meier, 1958) is a standard nonparametric method for computing descriptive statistics of censored data. It is widely used in survival or lifetime data analysis to incorporate data with multiple censoring levels and does not require specification of an assumed distribution. A percentile is assigned to each detected observation, starting at the largest detected value and working down the dataset, based on the number of detects and non-detects above and below each observation. Percentiles are not assigned to non-detects, but non-detects affect the percentiles calculated for detected observations. The survival curve, a step function plot of the cumulative distribution function, gives the shape of the dataset. Estimates of the mean and standard deviation are computed from the estimated cumulative distribution function, and these estimates then can be used in parametric statistical tests. The details of the various estimation methods, including the KM method, can be found in USEPA (2015), Helsel (2005), and Singh et al. (2006).

6.1.3 Data Qualifiers

Estimated concentrations (parameter concentrations denoted with the “J” qualifier) were treated as qualified detected concentrations for the purposes of statistical analysis. No data rejected through analytical data validation were identified in the datasets; therefore, no data were rejected from the datasets used for statistical evaluation.

6.2 Statistical Evaluation

A statistical data evaluation was conducted to identify appropriate soil background datasets prior to calculating descriptive statistics. The statistical data evaluation had the following purposes:

- Identify outliers or data that are not representative of background conditions.
- Determine whether statistical differences exist in levels of ROCs between RBAs.
- Compare surface and subsurface soil data.

This section presents final background datasets used to calculate descriptive statistics, including BTVs.

6.2.1 Graphical Presentation of the Data

Graphical presentations of the background soil data were made using various statistical plotting methods. Graphical displays provide added insight into datasets that are not possible to visualize and understand by reviewing test statistics. Statistical plotting methods that were used include index plots, box-and-whisker plots, histograms, and probability plots. Graphical presentations of the data are provided in **Appendixes M** through **P**.

Box-and-whisker plots (referred to as box plots) show the central tendency, degree of symmetry, range of variation, and potential outliers of a dataset. The upper value of the box represents the 75th percentile for the data, and the lower value of the box represents the 25th percentile for the data. Thus, 50 percent of the data fall within the box. The top of the whisker represents the 75th percentile plus 1.5 times the interquartile range (IQR), where the IQR is the 75th percentile minus the 25th percentile. The bottom of the whisker is the 25th percentile minus 1.5 times the IQR. Any value outside of this range is considered a potential statistical outlier, which is represented by a dot on the plot.

The outlying concentrations of box plots only serve the definition of falling relatively far from the middle 50 percent of the data. If the data are drawn from a highly skewed distribution, or a symmetrical one with long tails, multiple outliers of this type are expected. Although it is common vernacular to refer to these points as outliers, they should not be confused with the outlier definitions described in the outlier evaluation discussion of this section.

Various interpretations are possible by examining the box plots. For example, if extensive overlap exists between the box plots from different data groups, then the measurements from each group, on average, are similar. Conversely, little overlap between data groups suggests that the measurements from the groups are, on average, quite different.

Normal probability plots show the ordered sample results versus the corresponding quantiles of a theoretical data distribution, such as the normal distribution, and are described as quantile-quantile or Q-Q plots. Because quantiles are associated with cumulative probabilities, Q-Q plots are also referred to as probability plots. A normal probability plot is used to evaluate the normality of the distribution of a variable (i.e., whether, and to what extent, the distribution of the variable follows the normal distribution). If the data are not normally distributed, they will deviate systematically from a straight line. Variability in the data will cause the data to scatter randomly around this line, but the data will still appear to follow a single straight line. Outliers may also be evident in this plot.

A histogram is a visual representation of the data collected into groups. The data range is divided into several bins or classes, and the data are sorted into the bins. A histogram is a bar graph conveying the bins and the frequency of data points in each bin. Histograms provide a visual method of accessing location, shape, and spread of the data; the shape of a histogram helps determine whether the distribution is symmetric or skewed. The visual impression of a histogram is sensitive to the number of bins selected. A large number of bins will increase data detail, while fewer bins will increase the smoothness of the histogram.

Index plots show the concentration of each parameter plotted against the sample identification, where each sample identification represents a different sample location. Color-coded index plots provide insight into outlying observations and patterns of multiple groups (e.g., data from the various RBAs) that may be present in a dataset, which are not easy to identify by looking at statistical test results.

6.2.2 Evaluation of Outliers

Prior to the calculation of the descriptive statistics, the background soil data were evaluated for statistical outliers using Rosner's (Rosner, 1983) outlier test. Rosner's test is recommended for larger datasets, typically greater than 25 observations (USEPA, 2009). Rosner's outlier test assumes that the data values (aside from those being tested as potential outliers) are normally distributed. Because environmental data tend to be right-skewed, a test that relies on an assumption of a normal distribution may identify a relatively large number of statistical outliers. Thus, statistical outliers were further evaluated by applying a logarithmic transformation of the data to improve adherence to normality (USEPA, 2009).

A list of statistical outliers identified at the 5 percent significance level is presented in **Table 6-1**. Graphical presentations of the data are provided in **Appendixes M** and **N**. These include index plots, color coded by RBA (see **Appendix M**), and normal and lognormal Q-Q plots (see **Appendix N**). For censored datasets, Q-Q plots were developed using the KM method to determine the plotting positions of the censored (non-detect) results.

The presence of statistical outliers in the background data is not by itself reason to exclude those constituents from the background datasets. The USEPA (2009) recommends that statistical outliers generally not be removed unless some basis for a likely error or discrepancy can be identified. Such possible errors or discrepancies could include data recording errors, unusual sampling and laboratory procedures or conditions, inconsistent sample turbidity, and values significantly outside the expected ranges of background data.

Because extreme outliers can adversely affect the results of statistical calculations, it may be advisable at times to remove high-magnitude outliers in background, even if the reasons for these apparently extreme observations are not known. High-magnitude outliers were not identified in the background datasets; thus, no data were removed prior to calculation of the descriptive statistics.

6.2.3 Determination of Soil Groupings

Both formal testing and graphical comparisons were used to evaluate differences in ^{226}Ra concentrations (as measured by gamma spectroscopy) and ^{232}Th concentrations (as measured by alpha spectroscopy) between the five RBAs and the two (surface and subsurface) soil depth intervals. The other ROCs had too few detections to evaluate, although levels of ^{137}Cs and ^{235}U/uranium-236 (^{236}U) appear to be higher in the offsite area (RBA-SanBruno) than in the onsite areas (RBA-1 through RBA-4) based on frequency of detections.

Graphical comparisons were made using index plots, histograms, box plots (see **Appendix O**), and overlapping probability plots (see **Appendix P**). These plots were visually inspected to see which datasets appear similar and which ones differ.

6.2.3.1 Reference Background Area Evaluation

A nonparametric ANOVA method, the Kruskal-Wallis test, was applied to the data to test for differences between the RBAs. While the parametric ANOVA method is a statistical procedure used to determine whether there are statistically significant differences in mean concentrations among a group, the Kruskal-Wallis method tests for differences among average population ranks equivalent to the medians, assuming observations in each group are identically and independently distributed apart from location. When observations represent very different distributions, the method is a test of dominance between distributions. When the Kruskal-Wallis test is applied to censored data, all observations below the highest DL are assigned to the same value. When ranked, these observations become tied at the lowest rank.

Table 6-2 presents results of the RBA variability analysis using the Kruskal-Wallis test. The calculated probabilities from the test were compared with a significance level of 0.05. When the probability is below this level, a significant difference in the distribution of at least one of the RBAs and the other RBAs is suggested. The results indicate that ^{226}Ra and ^{232}Th levels are statistically different across the five RBAs. Post hoc tests were also conducted during the analysis to confirm where the differences occurred between groups. The post-hoc tests suggest that ^{226}Ra and ^{232}Th levels are generally lower in RBA-3 and higher in RBA-2. For the subsurface soil depth intervals, RBA-SanBruno generally exhibit higher levels of ^{226}Ra and ^{232}Th. This pattern is shown graphically in the index plots and the side-by-side box plots by RBA, included as **Apendixes M** and **P**, respectively.

6.2.3.2 Soil Depth Interval Evaluation

Differences in ^{226}Ra concentrations and ^{232}Th concentrations between the surface and subsurface depth intervals were evaluated using a central tendency test. The appropriate type of central tendency comparison test was determined based on the statistical distribution of the two datasets. For cases where both datasets appeared to be normally distributed, a t-test was run on the data to determine whether the means of the two populations appeared to be different from one another. The specific form of t-test (Student's t-test or Welch's t-test) was determined based upon whether the variances of the datasets could be considered equal.

For datasets where the distributions did not coincide, the nonparametric Wilcoxon Rank Sum (WRS) test was used for comparison of central tendency. WRS is a nonparametric version of a two-sample t-test and calculates whether the medians of the two distributions are different or similar. For datasets that contained greater than 10 percent non-detects, the Tarone-Ware (TW) two-sample test was used instead of the WRS test. The TW test is specifically designed to accommodate censored datasets with multiple censoring limits (USEPA, 2009). Because the nonparametric WRS and TW tests assume equal variance, when this assumption was not satisfied, the data were compared using the two-sample Kolmogorov-Smirnov test. The two-sample Kolmogorov-Smirnov test is a nonparametric method that compares the cumulative distributions of two datasets.

Comparisons were performed using a common null hypothesis that concentrations of each constituent in the surface and subsurface soil datasets are equal. For this method, a probability is calculated to assess the degree to which any deviation in the combined ranking distribution would be due solely to chance; any such deviation, if not due solely to chance, would indicate a shift from the null hypothesis, and a finding that concentrations in one dataset are greater than concentrations in the other dataset. The tests were conducted using a significance level of 0.05.

Results of the central tendency comparison tests for ^{226}Ra and ^{232}Th are presented in **Tables 6-3** and **6-4**, respectively. The central tendency conclusions suggest that levels of ^{226}Ra and ^{232}Th are different in the two soil depth intervals for three (RBA-1, RBA-2, and RBA-4) of the five areas. Inspection of the index plots and side-by-side box plots (see **Appendix O**) reveals that concentrations of these two ROCS are, on average, higher in the surface soil.

6.2.4 Development of Background Threshold Values

BTVs were developed using the combined data from the surface and subsurface soil for each RBA. Pooling of the data from the two soil depth intervals was determined based on how the background values would be applied and recognizing the variability of NORM and fallout radionuclide concentrations from historical backfilling and mixing of soil at HPNS.

BTVs were developed with a 95 percent upper simultaneous limit (USL) being the target statistic to control the false positive error rate. Calculations were conducted using the algorithms provided in the USEPA's ProUCL software (Version 5.1) as discussed in the ProUCL Version 5.1 Technical Guide (USEPA, 2015). USLs were calculated using either a distributional assumption (when deemed appropriate for the background constituent data) or using a nonparametric (no distributional assumption) approach when evidence for a distribution was not

available. The ProUCL software computes statistics using several parametric and nonparametric methods for datasets with and without non-detect observations.

Sample distribution assumptions are important in determining how the USLs for the background data are calculated. Goodness-of-fit tests were performed to determine the probability that a particular background dataset could have come from the tested distribution. Because a dataset can pass a goodness-of-fit test for more than one distribution, the following hierarchy was used to choose a parametric distribution with which to calculate the background statistics:

- Normal distribution assumed – data pass the test for normality.
- Gamma distribution assumed – data fail the test for normality but pass the test for the gamma distribution.
- Lognormal distribution assumed – data are neither normal nor gamma but pass the test for lognormality.
- Nonparametric methods used – data fail the test for all three distributions.

USEPA (2015) warns that use of a parametric lognormal distribution on a lognormally distributed dataset may yield impractically large background values, especially when the standard deviation of the log-transformed data becomes greater than 1.0 for small datasets (less than 30 to 50 measurements). Because environmental datasets typically can be modeled by a gamma distribution, gamma distribution limits were given preference over lognormal distribution limits, where appropriate.

For datasets containing at least 8 detections and 50 percent or fewer non-detects, the detected results were used to attempt a fit to a distribution. If a reasonable fit was found, a USL was calculated based on the estimated mean and standard deviation adjusted for the presence of left-censored values using the KM method. If a reasonable fit could not be determined, a nonparametric USL was determined. For datasets containing less than eight detections, the number of samples was too small for goodness-of-fit testing and the maximum detected result was assigned as the BTV. For datasets containing no detectable concentrations (i.e., all non-detects), the highest DL was assigned as the BTV. Nonparametric methods were used when non-detect data exceeded 50 percent (USEPA, 2009).

Results of the BTV calculations for ROCs in soil for each RBA are provided in **Table 6-5**. Descriptive statistics also provided in **Table 6-5** also include the total number of samples, the number of detected results, and the frequency of detection; the minimum and maximum concentrations for detected and non-detected observations; and the mean, median, standard deviation, and upper percentiles for each background dataset. The range of BTVs in soil across all RBAs are provided in **Table 6-6** and are further described in **Section 7**.

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SECTION 7

Use of Background Data

The primary purpose of the background soil study was to establish representative background soil concentrations for comparison and evaluation of soil data collected from HPNS. **Section 7.1** presents a summary of available background data, including the HPNS BTVs for soil and an evaluation of other background studies to determine if the observed background values at HPNS were consistent with values reported in literature. Background values are provided for comparison and use during data evaluation for the planned removal site evaluation activities at Parcels B, C, D-2, E, G, UC-1, UC-2, and UC-3 and for future site characterization and assessment at HPNS (**Section 7.2**).

7.1 Hunters Point Naval Shipyard Soil Background Threshold Values and Comparison to Other Background Values

HPNS was created from fill materials originating from multiple offsite sources, including fill from the hilltop immediately north of HPNS, sediment dredged from San Francisco Bay, and material imported from local quarries and construction sites. The original distribution of background radioactivity in the fill material has changed over time because of backfilling and mixing. Concentrations from NORM and fallout radionuclides in former surface soil may be situated in subsurface soil today. Based on the expected variability, the surface and subsurface soil sample results were combined for development of the BTVs. The offsite BTVs were generally within or similar to the range of onsite BTVs[2] (**Table 7-1**).

Table 7-1 Background Threshold Values

Radionuclide	Offsite BTV (pCi/g)	Range of Onsite BTVs (pCi/g)
^{137}Cs	0.141	0.0523 - 0.477[a]
^{239}Pu/^{240}Pu	0.515	0.378 – 0.494
^{226}Ra	0.861	1.13 - 1.35
^{90}Sr	0.150	0.149 - 0.150
^{232}Th	1.63	1.42 - 2.21
^{235}U/^{236}U	0.145	0.129 - 0.245

Notes:

[a] The maximum onsite BTV, 0.477 pCi/g, is based on data collected from RBA-4 and will be considered for comparison to concentrations encountered in areas where topography and surface runoff may have caused ^{137}Cs from fallout to accumulate over time.

pCi/g = picocurie(s) per gram

Additional background data from a literature review were evaluated to determine if the observed background values at HPNS were consistent with values reported in literature. This evaluation included review of analytical results of ROCs and NORM constituents, analytical methods, soil lithology, and geographic latitude. The ROCs for future investigations at HPNS include naturally occurring (primordial) and man-made radionuclides. Reported

[2] Based on comments received from the regulatory agencies on the Draft Report (**Appendix A**), data collected from RBA-3 will not be used for site data comparisons and were excluded from the range of BTVs presented in **Table 7-1**.

concentrations of these ROCs in background soil for the United States, including regional data collected in California, and the HPNS RGs are provided in **Table 7-2** for comparison to the BTVs.

Table 7-2. Concentrations of Radionuclides Reported in Literature and Remediation Goals

Radionuclide	Range of Literature Values (pCi/g)[a]	HPNS Remediation Goal (pCi/g)[b]
^{137}Cs	0.083 - 1.67	0.113
^{239}Pu	0.00344 - 0.02	2.59
^{226}Ra	0.1 - 3.8	1.0[c]
^{90}Sr	0.069 - 0.75	0.331
^{232}Th	0.1 - 3.5	1.69
^{235}U	0.1 - 0.63	0.195

Notes:

[a] Concentrations of ^{137}Cs and ^{90}Sr are decay-corrected based on the historical study or sampling date.

[b] From Navy, 2006.

[c] Limit is 1 pCi/g above background, per agreement with USEPA.

References: Cabrera Services, 2004; Litaor, 1995; LLNL, 1999; McArthur and Miller, 1989; Tykva and Sabol, 1995; USEPA, 2011; Volkle et al., 1989; Wallo et al., 1994

Concentrations of ^{226}Ra and ^{232}Th across the United States have been reported with concentrations ranging from 0.1 to 3.8 pCi/g for ^{226}Ra and 0.1 to 3.5 pCi/g for ^{232}Th (Tyvka and Sabol, 1995). Concentrations on the higher end of this range have been reported in California, including 1.88 pCi/g for ^{226}Ra and 2.87 pCi/g for ^{232}Th (USEPA, 2011). The ranges of HPNS ^{226}Ra, ^{232}Th, and ^{235}U BTVs are consistent with values reported in literature.

For the anthropogenic radionuclides, additional consideration must be made. There were no detections of ^{239}Pu or ^{90}Sr in samples collected during this investigation, and as described in **Section 6.2**, the BTVs were established using the highest DL for the respective radionuclide. The range of the HPNS BTV for ^{90}Sr is generally consistent with values reported in literature. Although the range of the HPNS BTVs for ^{239}Pu is higher than the reported values in literature, the DLs reported for the analyses of RBA samples are consistent with the quantitation limit goals presented in the SAP and are approximately an order of magnitude below the respective RG for HPNS (Navy, 2019).

Concentrations of ^{137}Cs in soil as a result of radioactive fallout from atmospheric nuclear testing vary across the United States. Variability has been documented through estimations of potential ^{137}Cs deposition by latitude (UNSCEAR, 1977, 1982) and regional differences in deposition (United States Department of Health and Human Services Centers for Disease Control and Prevention and National Cancer Institute, 2005). The range of HPNS ^{137}Cs BTVs are generally consistent with values reported in literature. Additionally, although there were only six detections of ^{137}Cs in the onsite RBAs, the results represent concentrations from non-impacted areas, including concentrations that may be encountered in areas where surface runoff may cause ^{137}Cs from fallout to accumulate over time.

The BTVs in **Table 7-1** are estimates of the upper range of background levels based on the available data and should be considered approximate. This is particularly true for those ROCs with a low percentage of detection. Increased uncertainty is associated with the estimation of upper bound statistics for datasets with a limited sample size and containing a low frequency of detectable concentrations. An individual site concentration exceeding the ambient BTV may be a signal that the background population and site population are not equivalent, or it may simply be an extreme value of ambient background. Based on the uncertainty in the BTV estimates and the potential for false positives (e.g., with a 5 percent false positive rate; assuming 1,000

comparisons, 50 exceedances would be expected), an exceedance of a BTV for an ROC should not automatically be considered site-related contamination; rather, an exceedance in this case warrants further consideration with the project team and evaluation of other lines of evidence, including site history and applicable literature values.

7.2 Hunters Point Naval Shipyard Site Data Evaluation

This section discusses data evaluation for the planned removal site evaluation activities at Parcels B, C, D-2, E, G, UC-1, UC-2, and UC-3 and for any future site characterization efforts at HPNS.

7.2.1 Removal Site Evaluation

The soil data evaluation process for demonstrating compliance with parcel-specific Record of Decision Remedial Action Objectives was established in Step 6 in Section 3.1 and detailed in Section 5 in the Parcel G Work Plan (Navy, 2019). Based on feedback received by USEPA on the Draft version of this report (**Appendix A**), RBA-SanBruno will be used as the initial background data set for evaluation of site investigation data. In summary, the data evaluation process is as follows:

- Compare each ROC concentration for every sample to the corresponding RG.
  - If all concentrations for all ROCs for all samples are less than or equal to the RGs, then compliance with the Record of Decision Remedial Action Objectives is achieved.
- Compare sample data to BTVs calculated using RBA-SanBruno data (i.e., offsite BTVs). Additional analyses may consist of population-to-population comparisons between sample data and RBA-SanBruno data.
- If sample data suggest that RBA-SanBruno is not representative of site background conditions, compare sample data to appropriate RBA data from HPNS. Multiple lines of evidence will be evaluated to determine whether site conditions are consistent with NORM or anthropogenic background. The data evaluation may include, but is not limited to, the following:
  - Determination if the sample was collected in an area with a known or suspected release.
  - Use of a BTV, comparison with appropriate background soil concentrations of radionuclides reported in literature, population-to-population comparisons, graphical comparisons, or evaluation of equilibrium conditions.
  - If any result is greater than the RG and cannot be attributed to NORM or anthropogenic background, remediation will be performed prior to backfill.

Sections 7.2.1.1 through **7.2.1.4** provide more detail regarding the background data evaluations.

7.2.1.1 Comparison with BTVs and Other Background Data

If BTVs are used for site data comparisons, the offsite BTVs will be used for initial comparisons with HPNS site data collected. The Navy may consider data collected from onsite RBA-1, RBA-2, and RBA-4 as part of a secondary evaluation when determining whether a sample result that exceeds both the RG and offsite BTV represents background or site-related contamination. Other background soil areas with similar soil types, colors, geological conditions, or other characteristics may also be considered for use in a secondary evaluation.

The background values will be used to indicate which site locations have concentrations of ROCs that would have a low probability of coming from a population equivalent to the ambient population. If ROC concentrations found at a site are less than or equal to the background values, then site ROC concentrations will not be considered reflective of site-related contamination. If ROC concentrations at a site are greater than the background values, further consideration with respect to literature values may be warranted. If background values are exceeded in greater than 5 percent of the samples, central tendency (population-to-population) comparisons between site and background sample results may be conducted.

7.2.1.2 Population-to-population Comparisons

Site datasets may be compared initially with RBA-SanBruno, and then with data collected from appropriate onsite RBAs (RBA-1, RBA-2, RBA-4, or others that may be identified in the future) using parametric or nonparametric tests, depending on the distributions of the data. Specific statistical tests and decision errors associated with these comparisons will be established during the planning phase and will be subject to regulatory approval.

7.2.1.3 Graphical Comparisons

Graphical representations of site and RBA data may be useful in visually comparing two or more datasets. Typical graphical tools include histograms, box-and-whisker plots, and overlapping probability plots. Graphical displays provide added insight (e.g., presence of outliers, data distributions and patterns, mixture populations) into datasets that is not possible to visualize and understand by reviewing the tabulated descriptive statistics generated for each constituent and media. Graphical representations of background ROC data collected during this evaluation are presented in **Appendixes M** through **P**. Posting plots that display the results and sample locations may also be useful in identifying spatial trends and relationships, such as different background concentrations or potentially elevated localized concentrations.

Consistent with USEPA guidance (USEPA, 2015), Q-Q plots will be used to inspect on-site concentrations for those ROCs that exceed offsite BTVs. A Q-Q plot compares quantiles of one distribution against the quantiles of another distribution to determine similarities between the two distributions. Q-Q plots are used to assess the normality of a dataset, to identify outliers, to examine potential multiple populations, and to define the breaks or inflection points at which to subdivide a dataset into subsets representing different populations. The apparent jumps and breaks in the Q-Q plot suggest the presence of multiple statistical populations (Fowlkes, 1979). Onsite ROC data will be compared using both normal and lognormal Q-Q plots. If the Q-Q plot for an ROC represents a continuous display without breaks or inflection points of significant magnitude, then the entire dataset represented by the Q-Q plot is considered to represent a single statistical population (Singh et al., 2014). It is important to note that the Q-Q plot does not have to be linear or normally distributed. If the dataset displays a continuous Q-Q plot with no significant breaks, the dataset is considered to represent a background population.

7.2.1.4 Evaluation of Equilibrium Conditions

Site and RBA data may be used to evaluate the relationships between long-lived NORM radionuclides to determine whether individual elevated results are consistent with naturally elevated conditions. Analysis of individual sample results using linear regression or other analyses may be used to determine whether sample data reflect secular equilibrium or other conditions. Population-to-population testing between data sets of parent and progeny radionuclides may also be effective in evaluating equilibrium conditions while reducing the potential effects of variability within the analytical method and sample preparation. The equilibrium evaluation of RBA data is included in **Appendix L**.

7.2.2 Site Characterization and Assessment

For site data collected as part of an investigation, background data can be used to help determine whether a detected radionuclide is related to site use or history. This can be done by comparing the individual site results to the BTVs in **Table 7-1**.

During human health or ecological risk screenings and assessments, the background data will be used after all detected constituents have been compared to their respective risk screening criteria and potential risks have been identified. If a radionuclide is detected at a concentration below the relevant BTV and/or other background data, it may be removed from further consideration as an ROC.

Cleanup action levels or RGs for sites undergoing remediation should be selected for each ROC as promulgated or risk-based concentrations. If background values are greater than regulatory or risk-based standards, the cleanup level may be established based on background (Navy, 2004 and USEPA, 2002).

SECTION 8

References

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Tables

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Table 2-2. Radiological Sample Details

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Location	Sample ID	Station ID	Proposed Depth Interval (feet bgs)	Actual Top Depth (feet bgs)	Actual Bottom Depth (feet bgs)	Date Collected	Matrix	Soil Type	USEPA Split Sample	MS Sample
					RBA-1					
RBA1	HPRBA1-EB01-082219	HPRBA1-EB01				8/22/2019	EB			
RBA1	HPRBA1-EB01-082319	HPRBA1-EB01				8/23/2019	EB			
RBA1	HPRBA1-EB01-083019	HPRBA1-EB01				8/30/2019	EB			
RBA1	HPRBA1-EB01-090319	HPRBA1-EB01				9/3/2019	EB			
RBA1	HPRBA1-SB01-0102-0819	HPRBA1-SO01	1-2	1.8	2.8	8/30/2019	SB	silty sand with gravel (SM)		
RBA1	HPRBA1-SB01-0304-0819	HPRBA1-SO01	3-4	3.8	4.8	8/30/2019	SB	silty sand with gravel (SM)		
RBA1	HPRBA1-SB01-0506-0819	HPRBA1-SO01	5-6	5.8	6.8	8/30/2019	SB	silty sand with gravel (SM), silt (ML)		
RBA1	HPRBA1-SB01-0708-0819	HPRBA1-SO01	7-8	7.8	8.8	8/30/2019	SB	silt (ML), well-graded gravel with sand (GW)		
RBA1	HPRBA1-SB01-0910-0819	HPRBA1-SO01	9-10	9.8	10.8	8/30/2019	SB	silt (ML)		
RBA1	HPRBA1-SB08-0102-0819	HPRBA1-SO08	1-2	1.6	2.6	8/30/2019	SB	fat clay with sand (CH), silt with gravel (ML)		
RBA1	HPRBA1-SB08-0304-0819	HPRBA1-SO08	3-4	3.6	4.6	8/30/2019	SB	silt with gravel (ML)		
RBA1	HPRBA1-SB08-0506-0819	HPRBA1-SO08	5-6	5.6	6.6	8/30/2019	SB	silt with gravel (ML)		
RBA1	HPRBA1-SB08-0708-0819	HPRBA1-SO08	7-8	7.6	8.6	8/30/2019	SB	gravelly silt (ML)	X	
RBA1	HPRBA1-SB08-0910-0819	HPRBA1-SO08	9-10	9.6	10.6	8/30/2019	SB	clayey sand with gravel (SC)		
RBA1	HPRBA1-SB08P-0506-0819	HPRBA1-SO08	5-6	5.6	6.6	8/23/2019	D	silt with gravel (ML)		
RBA1	HPRBA1-SB13-0102-0919	HPRBA1-SO13	1-2	2.1	3.1	9/3/2019	SB	silt with sand (ML)		
RBA1	HPRBA1-SB13-0304-0919	HPRBA1-SO13	3-4	4.1	5.1	9/3/2019	SB	silt with sand (ML)		
RBA1	HPRBA1-SB13-0506-0919	HPRBA1-SO13	5-6	6.1	7.1	9/3/2019	SB	silt with sand (ML)		
RBA1	HPRBA1-SB13-0708-0919	HPRBA1-SO13	7-8	8.1	9.1	9/3/2019	SB	silt (ML)		
RBA1	HPRBA1-SB13-0910-0919	HPRBA1-SO13	9-10	10.1	11.1	9/3/2019	SB	silt with gravel (ML)		
RBA1	HPRBA1-SB18-0102-0919	HPRBA1-SO18	1-2	1.9	2.9	9/3/2019	SB	well graded sand with gravel (SW)		
RBA1	HPRBA1-SB18-0304-0919	HPRBA1-SO18	3-4	3.9	4.9	9/3/2019	SB	well graded sand with gravel (SW)	X	
RBA1	HPRBA1-SB18-0506-MMYY	HPRBA1-SO18	5-6	--	--	--	SB			
RBA1	HPRBA1-SB18-0708-MMYY	HPRBA1-SO18	7-8	--	--	--	SB			
RBA1	HPRBA1-SB18-0910-0919	HPRBA1-SO18	9-10	9.9	10.9	9/3/2019	SB	silt with gravel (ML)		
RBA1	HPRBA1-SB18P-0910-0919	HPRBA1-SO18	9-10	9.9	10.9	9/3/2019	D	silt with gravel (ML)		
RBA1	HPRBA1-SB25-0102-0819	HPRBA1-SO25	1-2	2.1	3.1	8/30/2019	SB	well graded sand with gravel (SW)	X	X
RBA1	HPRBA1-SB25-0304-0819	HPRBA1-SO25	3-4	4.1	5.1	8/30/2019	SB	silt with gravel (ML)		
RBA1	HPRBA1-SB25-0506-0819	HPRBA1-SO25	5-6	6.1	7.1	8/30/2019	SB	silt with gravel (ML)		
RBA1	HPRBA1-SB25-0708-0819	HPRBA1-SO25	7-8	8.1	9.1	8/30/2019	SB	silt with gravel (ML)		
RBA1	HPRBA1-SB25-0910-0819	HPRBA1-SO25	9-10	10.1	11.1	8/30/2019	SB	gravelly silt (ML)		
RBA1	HPRBA1-SB25P-0708-0819	HPRBA1-SO25	7-8	8.1	9.1	8/30/2019	D	silt with gravel (ML)		

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Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Location	Sample ID	Station ID	Proposed Depth Interval (feet bgs)	Actual Top Depth (feet bgs)	Actual Bottom Depth (feet bgs)	Date Collected	Matrix	Soil Type	USEPA Split Sample	MS Sample
RBA1	HPRBA1-SS01-000H-0819	HPRBA1-SO01	0.0-0.5	0.8	1.3	8/30/2019	SS	silty sand with gravel (SM)		
RBA1	HPRBA1-SS02-000H-0819	HPRBA1-SO02	0.0-0.5	0.8	1.3	8/23/2019	SS	well graded sand (SW)		
RBA1	HPRBA1-SS03-000H-0819	HPRBA1-SO03	0.0-0.5	1	1.5	8/22/2019	SS	poorly graded sand (SP)	X	
RBA1	HPRBA1-SS04-000H-0819	HPRBA1-SO04	0.0-0.5	1.3	1.8	8/22/2019	SS	well graded sand with silt and gravel (SW-SM)		
RBA1	HPRBA1-SS05-000H-0819	HPRBA1-SO05	0.0-0.5	0.6	1.1	8/22/2019	SS	fat clay with sand (CH)		
RBA1	HPRBA1-SS05P-000H-0819	HPRBA1-SO05	0.0-0.5	0.6	1.1	8/22/2019	D	fat clay with sand (CH)		
RBA1	HPRBA1-SS06-000H-0819	HPRBA1-SO06	0.0-0.5	0.7	1.2	8/22/2019	SS	fat clay with sand (CH)		
RBA1	HPRBA1-SS07-000H-0819	HPRBA1-SO07	0.0-0.5	0.5	1	8/22/2019	SS	fat clay with sand (CH)		
RBA1	HPRBA1-SS08-000H-0819	HPRBA1-SO08	0.0-0.5	0.6	1.1	8/30/2019	SS	fat clay with sand (CH)		
RBA1	HPRBA1-SS09-000H-0819	HPRBA1-SO09	0.0-0.5	1	1.5	8/23/2019	SS	well graded sand with gravel (SW)		
RBA1	HPRBA1-SS10-000H-0819	HPRBA1-SO10	0.0-0.5	1	1.5	8/23/2019	SS	well graded sand with silt and gravel (SW-SM)		
RBA1	HPRBA1-SS11-000H-0819	HPRBA1-SO11	0.0-0.5	0.7	1.2	8/23/2019	SS	well graded sand with gravel (SW)		
RBA1	HPRBA1-SS12-000H-0819	HPRBA1-SO12	0.0-0.5	0.6	1.1	8/23/2019	SS	well graded sand (SW)		
RBA1	HPRBA1-SS12P-000H-0819	HPRBA1-SO12	0.0-0.5	0.6	1.1	8/23/2019	D	well graded sand (SW)		
RBA1	HPRBA1-SS13-000H-0819	HPRBA1-SO13	0.0-0.5	0.7	1.2	8/22/2019	SS	silty sand (SM)		
RBA1	HPRBA1-SS14-000H-0819	HPRBA1-SO14	0.0-0.5	0.9	1.4	8/22/2019	SS	silty sand with gravel (SM)		
RBA1	HPRBA1-SS15-000H-0819	HPRBA1-SO15	0.0-0.5	0.7	1.2	8/22/2019	SS	silty sand with gravel (SM)		X
RBA1	HPRBA1-SS16-000H-0819	HPRBA1-SO16	0.0-0.5	0.5	1	8/22/2019	SS	silty sand with gravel (SM)		
RBA1	HPRBA1-SS17-000H-0819	HPRBA1-SO17	0.0-0.5	1	1.5	8/22/2019	SS	sandy fat clay (CH)	X	
RBA1	HPRBA1-SS18-000H-0919	HPRBA1-SO18	0.0-0.5	0.9	1.4	9/3/2019	SS	well graded sand with gravel (SW)		
RBA1	HPRBA1-SS19-000H-0819	HPRBA1-SO19	0.0-0.5	1.2	1.7	8/23/2019	SS	well graded sand with gravel (SW)		
RBA1	HPRBA1-SS20-000H-0819	HPRBA1-SO20	0.0-0.5	0.7	1.2	8/23/2019	SS	well graded sand with gravel (SW)		
RBA1	HPRBA1-SS21-000H-0819	HPRBA1-SO21	0.0-0.5	0.6	1.1	8/23/2019	SS	well graded sand with silt and gravel (SW-SM)		X
RBA1	HPRBA1-SS21P-000H-0819	HPRBA1-SO21	0.0-0.5	0.6	1.1	8/23/2019	D	well graded sand with silt and gravel (SW-SM)		
RBA1	HPRBA1-SS22-000H-0819	HPRBA1-SO22	0.0-0.5	0.8	1.3	8/23/2019	SS	well graded sand with silt and gravel (SW-SM)		
RBA1	HPRBA1-SS23-000H-0819	HPRBA1-SO23	0.0-0.5	0.8	1.3	8/22/2019	SS	silty sand (SM)		
RBA1	HPRBA1-SS24-000H-0819	HPRBA1-SO24	0.0-0.5	0.9	1.4	8/22/2019	SS	silty sand (SM)		
RBA1	HPRBA1-SS25-000H-0819	HPRBA1-SO25	0.0-0.5	1.1	1.6	8/30/2019	SS	well graded sand with gravel (SW)		
					RBA-2					
RBA2	HPRBA2-EB01-082619	HPRBA2-EB01				8/26/2019	EB			
RBA2	HPRBA2-EB01-083019	HPRBA2-EB01				8/30/2019	EB			

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Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Location	Sample ID	Station ID	Proposed Depth Interval (feet bgs)	Actual Top Depth (feet bgs)	Actual Bottom Depth (feet bgs)	Date Collected	Matrix	Soil Type	USEPA Split Sample	MS Sample
RBA2	HPRBA2-EB01-090519	HPRBA2-EB01				9/5/2019	EB			
RBA2	HPRBA2-SB01-0102-0919	HPRBA2-SO01	1-2	1.9	2.9	9/5/2019	SB	fat clay with sand (CH), well graded sand with gravel (SW), well graded gravel with sand (GW)	X	
RBA2	HPRBA2-SB01-0304-0919	HPRBA2-SO01	3-4	3.9	4.9	9/5/2019	SB	well graded gravel with sand (GW)		
RBA2	HPRBA2-SB01-0506-MMYY	HPRBA2-SO01	5-6	--	--	--	SB			
RBA2	HPRBA2-SB01-0708-MMYY	HPRBA2-SO01	7-8	--	--	--	SB			
RBA2	HPRBA2-SB01-0910-MMYY	HPRBA2-SO01	9-10	--	--	--	SB			
RBA2	HPRBA2-SB05-0102-0919	HPRBA2-SO05	1-2	1.8	2.8	9/5/2019	SB	fat clay (CH)		
RBA2	HPRBA2-SB05-0304-0919	HPRBA2-SO05	3-4	3.8	4.8	9/5/2019	SB	well graded sand with gravel (SW), clayey sand (SC)		
RBA2	HPRBA2-SB05-0506-0919	HPRBA2-SO05	5-6	5.8	6.8	9/5/2019	SB	clayey sand (SC)		
RBA2	HPRBA2-SB05-0708-MMYY	HPRBA2-SO05	7-8	--	--	--	SB			
RBA2	HPRBA2-SB05-0910-MMYY	HPRBA2-SO05	9-10	--	--	--	SB			
RBA2	HPRBA2-SB13-0102-0819	HPRBA2-SO13	1-2	1.8	2.8	8/30/2019	SB	fat clay (CH)		X
RBA2	HPRBA2-SB13-0304-0819	HPRBA2-SO13	3-4	3.8	4.8	8/30/2019	SB	well graded gravel with sand (GW)	X	
RBA2	HPRBA2-SB13-0506-MMYY	HPRBA2-SO13	5-6	--	--	--	SB			
RBA2	HPRBA2-SB13-0708-MMYY	HPRBA2-SO13	7-8	--	--	--	SB			
RBA2	HPRBA2-SB13-0910-MMYY	HPRBA2-SO13	9-10	--	--	--	SB			
RBA2	HPRBA2-SB21-0102-0919	HPRBA2-SO21	1-2	3	4	9/5/2019	SB	well graded sand with gravel (SW)		
RBA2	HPRBA2-SB21-0304-0919	HPRBA2-SO21	3-4	5	6	9/5/2019	SB	well graded sand with gravel (SW), silt with gravel (ML)		
RBA2	HPRBA2-SB21-0506-MMYY	HPRBA2-SO21	5-6	--	--	--	SB			
RBA2	HPRBA2-SB21-0708-MMYY	HPRBA2-SO21	7-8	--	--	--	SB			
RBA2	HPRBA2-SB21-0910-MMYY	HPRBA2-SO21	9-10	--	--	--	SB			
RBA2	HPRBA2-SB25-0102-0919	HPRBA2-SO25	1-2	1.8	2.8	9/5/2019	SB	fat clay (CH), well graded sand with gravel (SW)	X	
RBA2	HPRBA2-SB25-0304-0919	HPRBA2-SO25	3-4	3.8	4.8	9/5/2019	SB	silt with gravel (ML)		
RBA2	HPRBA2-SB25-0506-MMYY	HPRBA2-SO25	5-6	--	--	--	SB			
RBA2	HPRBA2-SB25-0708-MMYY	HPRBA2-SO25	7-8	--	--	--	SB			
RBA2	HPRBA2-SB25-0910-MMYY	HPRBA2-SO25	9-10	--	--	--	SB			
RBA2	HPRBA2-SS01-000H-0919	HPRBA2-SO01	0.0-0.5	0.9	1.4	9/5/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS01P-000H-0919	HPRBA2-SO01	0.0-0.5	0.9	1.4	9/5/2019	D	fat clay with sand (CH)		
RBA2	HPRBA2-SS02-000H-0819	HPRBA2-SO02	0.0-0.5	1	1.5	8/26/2019	SS	silt with sand (ML)		
RBA2	HPRBA2-SS02P-000H-0819	HPRBA2-SO02	0.0-0.5	1	1.5	8/26/2019	D	silt with sand (ML)		
RBA2	HPRBA2-SS03-000H-0819	HPRBA2-SO03	0.0-0.5	1.1	1.6	8/26/2019	SS	sandy silt (ML)		

Table 2-2. Radiological Sample Details

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Location	Sample ID	Station ID	Proposed Depth Interval (feet bgs)	Actual Top Depth (feet bgs)	Actual Bottom Depth (feet bgs)	Date Collected	Matrix	Soil Type	USEPA Split Sample	MS Sample
RBA2	HPRBA2-SS04-000H-0819	HPRBA2-SO04	0.0-0.5	1	1.5	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS05-000H-0919	HPRBA2-SO05	0.0-0.5	0.8	1.3	9/5/2019	SS	fat clay (CH)		
RBA2	HPRBA2-SS06-000H-0819	HPRBA2-SO06	0.0-0.5	1	1.5	8/26/2019	SS	fat clay (CH)		
RBA2	HPRBA2-SS07-000H-0819	HPRBA2-SO07	0.0-0.5	1	1.5	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS08-000H-0819	HPRBA2-SO08	0.0-0.5	0.9	1.4	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS09-000H-0819	HPRBA2-SO09	0.0-0.5	1	1.5	8/26/2019	SS	silt with sand (ML)		X
RBA2	HPRBA2-SS10-000H-0819	HPRBA2-SO10	0.0-0.5	1	1.5	8/26/2019	SS	silt with sand (ML)		
RBA2	HPRBA2-SS11-000H-0819	HPRBA2-SO11	0.0-0.5	1	1.5	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS11P-000H-0819	HPRBA2-SO11	0.0-0.5	1	1.5	8/26/2019	D	fat clay with sand (CH)		
RBA2	HPRBA2-SS12-000H-0819	HPRBA2-SO12	0.0-0.5	1.1	1.6	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS13-000H-0819	HPRBA2-SO13	0.0-0.5	0.8	1.3	8/30/2019	SS	fat clay (CH)		
RBA2	HPRBA2-SS14-000H-0819	HPRBA2-SO14	0.0-0.5	1	1.5	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS15-000H-0819	HPRBA2-SO15	0.0-0.5	1	1.5	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS16-000H-0819	HPRBA2-SO16	0.0-0.5	1.3	1.8	8/26/2019	SS	fat clay with sand (CH)	X	
RBA2	HPRBA2-SS17-000H-0819	HPRBA2-SO17	0.0-0.5	1	1.5	8/26/2019	SS	fat clay with sand (CH)	X	
RBA2	HPRBA2-SS18-000H-0819	HPRBA2-SO18	0.0-0.5	1.1	1.6	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS19-000H-0819	HPRBA2-SO19	0.0-0.5	0.9	1.4	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS19P-000H-0819	HPRBA2-SO19	0.0-0.5	0.9	1.4	8/26/2019	D	fat clay with sand (CH)		
RBA2	HPRBA2-SS20-000H-0819	HPRBA2-SO20	0.0-0.5	0.8	1.3	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS21-000H-0919	HPRBA2-SO21	0.0-0.5	2	2.5	9/5/2019	SS	fat clay (CH)		X
RBA2	HPRBA2-SS22-000H-0819	HPRBA2-SO22	0.0-0.5	1.3	1.8	8/26/2019	SS	fat clay with sand (CH)		X
RBA2	HPRBA2-SS23-000H-0819	HPRBA2-SO23	0.0-0.5	0.9	1.4	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS24-000H-0819	HPRBA2-SO24	0.0-0.5	0.9	1.4	8/26/2019	SS	fat clay with sand (CH)		
RBA2	HPRBA2-SS25-000H-0919	HPRBA2-SO25	0.0-0.5	0.8	1.3	9/5/2019	SS	fat clay (CH)		
RBA2	HPRBA2-SS25P-000H-0919	HPRBA2-SO25	0.0-0.5	0.8	1.3	9/5/2019	D	fat clay (CH)		
					RBA-3					
RBA3	HPRBA3-EB01-081519	HPRBA3-EB01				8/15/2019	EB			
RBA3	HPRBA3-EB01-081919	HPRBA3-EB01				8/19/2019	EB			
RBA3	HPRBA3-EB01-082819	HPRBA3-EB01				8/28/2019	EB			
RBA3	HPRBA3-EB01-082919	HPRBA3-EB01				8/29/2019	EB			
RBA3	HPRBA3-SB01-0102-0819	HPRBA3-SO01	1-2	1.1	2.1	8/29/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB01-0304-0819	HPRBA3-SO01	3-4	3	4	8/29/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB01-0506-0819	HPRBA3-SO01	5-6	5	6	8/29/2019	SB	well graded sand (SW)	X	
RBA3	HPRBA3-SB01-0708-0819	HPRBA3-SO01	7-8	7	8	8/29/2019	SB	well graded sand (SW)		

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Location	Sample ID	Station ID	Proposed Depth Interval (feet bgs)	Actual Top Depth (feet bgs)	Actual Bottom Depth (feet bgs)	Date Collected	Matrix	Soil Type	USEPA Split Sample	MS Sample
RBA3	HPRBA3-SB01-0910-0819	HPRBA3-SO01	9-10	9	10	8/29/2019	SB	well graded sand (SW), poorly graded sand (SP)		
RBA3	HPRBA3-SB01P-0910-0819	HPRBA3-SO01	9-10	9	10	8/29/2019	D	well graded sand (SW), poorly graded sand (SP)		
RBA3	HPRBA3-SB05-0102-0819	HPRBA3-SO05	1-2	1.8	2.8	8/29/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB05-0304-0819	HPRBA3-SO05	3-4	3	4	8/29/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB05-0506-0819	HPRBA3-SO05	5-6	5	6	8/29/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB05-0708-0819	HPRBA3-SO05	7-8	7	8	8/29/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB05-0910-0819	HPRBA3-SO05	9-10	9	10	8/29/2019	SB	well graded sand (SW), poorly graded sand (SP)		
RBA3	HPRBA3-SB05P-0304-0819	HPRBA3-SO05	3-4	3	4	8/29/2019	D	well graded sand (SW)		
RBA3	HPRBA3-SB13-0102-0819	HPRBA3-SO13	1-2	1.1	2	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB13-0304-0819	HPRBA3-SO13	3-4	3	4	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB13-0506-0819	HPRBA3-SO13	5-6	5	6	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB13-0708-0819	HPRBA3-SO13	7-8	7	8	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB13-0910-0819	HPRBA3-SO13	9-10	9	10	8/28/2019	SB	well graded sand (SW), poorly graded sand (SP)		
RBA3	HPRBA3-SB13P-0304-0819	HPRBA3-SO13	3-4	3	4	8/28/2019	D	well graded sand (SW)		
RBA3	HPRBA3-SB21-0102-0819	HPRBA3-SO21	1-2	1.1	2	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB21-0304-0819	HPRBA3-SO21	3-4	3	4	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB21-0506-0819	HPRBA3-SO21	5-6	5	6	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB21-0708-0819	HPRBA3-SO21	7-8	7	8	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB21-0910-0819	HPRBA3-SO21	9-10	9	10	8/28/2019	SB	well graded sand (SW), poorly graded sand (SP)		
RBA3	HPRBA3-SB21P-0506-0819	HPRBA3-SO21	5-6	5	6	8/28/2019	D	well graded sand (SW)		
RBA3	HPRBA3-SB25-0102-0819	HPRBA3-SO25	1-2	1.1	2	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB25-0304-0819	HPRBA3-SO25	3-4	3	4	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB25-0506-0819	HPRBA3-SO25	5-6	5	6	8/28/2019	SB	well graded sand (SW)		X
RBA3	HPRBA3-SB25-0708-0819	HPRBA3-SO25	7-8	7	8	8/28/2019	SB	well graded sand (SW)		
RBA3	HPRBA3-SB25-0910-0819	HPRBA3-SO25	9-10	9	10	8/28/2019	SB	well graded sand (SW), poorly graded sand (SP)		
RBA3	HPRBA3-SB25P-0102-0819	HPRBA3-SO25	1-2	1.1	2	8/28/2019	D	well graded sand (SW)		
RBA3	HPRBA3-SS01-000H-0819	HPRBA3-SO01	0.0-0.5	0.6	1.1	8/29/2019	SS	well graded sand with gravel (SW)		
RBA3	HPRBA3-SS02-000H-0819	HPRBA3-SO02	0.0-0.5	1.5	2	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS03-000H-0819	HPRBA3-SO03	0.0-0.5	1.6	2.1	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS04-000H-0819	HPRBA3-SO04	0.0-0.5	1.7	2.2	8/19/2019	SS	well graded sand (SW)		

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RBA3	HPRBA3-SS05-000H-0819	HPRBA3-SO05	0.0-0.5	0.8	1.3	8/29/2019	SS	well graded sand with gravel (SW)		
RBA3	HPRBA3-SS06-000H-0819	HPRBA3-SO06	0.0-0.5	1.8	2.3	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS07-000H-0819	HPRBA3-SO07	0.0-0.5	1.8	2.3	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS08-000H-0819	HPRBA3-SO08	0.0-0.5	1.6	2.1	8/19/2019	SS	well graded sand (SW)	X	X
RBA3	HPRBA3-SS09-000H-0819	HPRBA3-SO09	0.0-0.5	1.4	1.9	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS10-000H-0819	HPRBA3-SO10	0.0-0.5	1.7	2.2	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS11-000H-0819	HPRBA3-SO11	0.0-0.5	1.5	2	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS12-000H-0819	HPRBA3-SO12	0.0-0.5	1.5	2	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS13-000H-0819	HPRBA3-SO13	0.0-0.5	0.6	1.1	8/28/2019	SS	well graded sand with gravel (SW)		
RBA3	HPRBA3-SS14-000H-0819	HPRBA3-SO14	0.0-0.5	1.7	2.2	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS15-000H-0819	HPRBA3-SO15	0.0-0.5	1.5	2	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS16-000H-0819	HPRBA3-SO16	0.0-0.5	1	1.5	8/15/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS16P-000H-0819	HPRBA3-SO16	0.0-0.5	1	1.5	8/15/2019	D	well graded sand (SW)		
RBA3	HPRBA3-SS17-000H-0819	HPRBA3-SO17	0.0-0.5	1	1.5	8/15/2019	SS	well graded sand (SW)	X	
RBA3	HPRBA3-SS18-000H-0819	HPRBA3-SO18	0.0-0.5	1	1.5	8/15/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS19-000H-0819	HPRBA3-SO19	0.0-0.5	1.5	2	8/19/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS20-000H-0819	HPRBA3-SO20	0.0-0.5	1.5	2	8/19/2019	SS	well graded sand (SW)	X	
RBA3	HPRBA3-SS21-000H-0819	HPRBA3-SO21	0.0-0.5	0.6	1.1	8/28/2019	SS	well graded sand with gravel (SW)		
RBA3	HPRBA3-SS22-000H-0819	HPRBA3-SO22	0.0-0.5	1	1.5	8/15/2019	SS	well graded sand (SW)	X	X
RBA3	HPRBA3-SS23-000H-0819	HPRBA3-SO23	0.0-0.5	1	1.5	8/15/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS24-000H-0819	HPRBA3-SO24	0.0-0.5	1	1.5	8/15/2019	SS	well graded sand (SW)		
RBA3	HPRBA3-SS25-000H-0819	HPRBA3-SO25	0.0-0.5	0.6	1.1	8/28/2019	SS	well graded sand with gravel (SW)		
					RBA-4					
RBA4	HPRBA4-EB01-082019	HPRBA4-EB01				8/20/2019	EB			
RBA4	HPRBA4-EB01-082119	HPRBA4-EB01				8/21/2019	EB			
RBA4	HPRBA4-EB01-090419	HPRBA4-EB01				9/4/2019	EB			
RBA4	HPRBA4-Fill13-0919	HPRBA4-SO13	--	0.5	1	9/4/2019	Top Fill	gravelly fat clay (CH)		
RBA4	HPRBA4-Fill18-0819	HPRBA4-SO18	--	0.8	1.6	8/21/2019	Top Fill	well graded gravel (GW)	X	
RBA4	HPRBA4-Fill19-0819	HPRBA4-SO19	--	0.8	1.6	8/21/2019	Top Fill	well graded gravel (GW)		
RBA4	HPRBA4-Fill20-0819	HPRBA4-SO20	--	0.8	1.6	8/21/2019	Top Fill	well graded gravel (GW)		
RBA4	HPRBA4-Fill21-0919	HPRBA4-SO21	--	0.3	1.1	9/4/2019	Top Fill	gravelly fat clay (CH)	X	
RBA4	HPRBA4-Fill24-0819	HPRBA4-SO24	--	0.6	1.4	8/21/2019	Top Fill	well graded gravel (GW)		
RBA4	HPRBA4-Fill25-0919	HPRBA4-SO25	--	0.6	1.1	9/4/2019	Top Fill	gravelly fat clay (CH)		
RBA4	HPRBA4-SB01-0102-0919	HPRBA4-SO01	1-2	1.7	2.7	9/4/2019	SB	silt with gravel (ML)		X
RBA4	HPRBA4-SB01-0304-0919	HPRBA4-SO01	3-4	3.7	4.7	9/4/2019	SB	silt with gravel (ML)		

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Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

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RBA4	HPRBA4-SB01-0506-MMYY	HPRBA4-SO01	5-6	--	--	--	SB			
RBA4	HPRBA4-SB01-0708-MMYY	HPRBA4-SO01	7-8	--	--	--	SB			
RBA4	HPRBA4-SB01-0910-MMYY	HPRBA4-SO01	9-10	--	--	--	SB			
RBA4	HPRBA4-SB01P-0304-0919	HPRBA4-SO01	3-4	3.7	4.7	9/4/2019	D	silt with gravel (ML)		
RBA4	HPRBA4-SB05-0102-0919	HPRBA4-SO05	1-2	1.6	2.6	9/4/2019	SB	silt with gravel (ML)		
RBA4	HPRBA4-SB05-0304-0919	HPRBA4-SO05	3-4	3.6	4.6	9/4/2019	SB	silt with gravel (ML)		
RBA4	HPRBA4-SB05-0506-MMYY	HPRBA4-SO05	5-6	--	--	--	SB			
RBA4	HPRBA4-SB05-0708-MMYY	HPRBA4-SO05	7-8	--	--	--	SB			
RBA4	HPRBA4-SB05-0910-MMYY	HPRBA4-SO05	9-10	--	--	--	SB			
RBA4	HPRBA4-SB13-0102-MMYY	HPRBA4-SO13	1-2	--	--	--	SB			
RBA4	HPRBA4-SB13-0304-0919	HPRBA4-SO13	3-4	4	5	9/4/2019	SB	silt with gravel (ML)		
RBA4	HPRBA4-SB13-0506-MMYY	HPRBA4-SO13	5-6	--	--	--	SB			
RBA4	HPRBA4-SB13-0708-MMYY	HPRBA4-SO13	7-8	--	--	--	SB			
RBA4	HPRBA4-SB13-0910-MMYY	HPRBA4-SO13	9-10	--	--	--	SB			
RBA4	HPRBA4-SB21-0102-MMYY	HPRBA4-SO21	1-2	--	--	--	SB			
RBA4	HPRBA4-SB21-0304-MMYY	HPRBA4-SO21	3-4	--	--	--	SB			
RBA4	HPRBA4-SB21-0506-MMYY	HPRBA4-SO21	5-6	--	--	--	SB			
RBA4	HPRBA4-SB21-0708-MMYY	HPRBA4-SO21	7-8	--	--	--	SB			
RBA4	HPRBA4-SB21-0910-MMYY	HPRBA4-SO21	9-10	--	--	--	SB			
RBA4	HPRBA4-SB25-0102-0919	HPRBA4-SO25	1-2	2.1	3.1	9/4/2019	SB	silt with gravel (ML)		
RBA4	HPRBA4-SB25-0304-0919	HPRBA4-SO25	3-4	4.1	5.1	9/4/2019	SB	silt with gravel (ML)		
RBA4	HPRBA4-SB25-0506-MMYY	HPRBA4-SO25	5-6	--	--	--	SB			
RBA4	HPRBA4-SB25-0708-MMYY	HPRBA4-SO25	7-8	--	--	--	SB			
RBA4	HPRBA4-SB25-0910-MMYY	HPRBA4-SO25	9-10	--	--	--	SB			
RBA4	HPRBA4-SB25P-0304-0919	HPRBA4-SO25	3-4	4.1	5.1	9/4/2019	D	silt with gravel (ML)		
RBA4	HPRBA4-SS01-000H-0919	HPRBA4-SO01	0.0-0.5	0.7	1.2	9/4/2019	SS	fat clay with gravel (CH)		
RBA4	HPRBA4-SS02-000H-0819	HPRBA4-SO02	0.0-0.5	1.2	1.7	8/20/2019	SS	silt with sand (ML)		
RBA4	HPRBA4-SS03-000H-0819	HPRBA4-SO03	0.0-0.5	0.4	0.9	8/21/2019	SS	gravelly silt (ML)		
RBA4	HPRBA4-SS04-000H-0819	HPRBA4-SO04	0.0-0.5	0.4	0.9	8/21/2019	SS	gravelly silt (ML)		
RBA4	HPRBA4-SS05-000H-0919	HPRBA4-SO05	0.0-0.5	0.6	1.1	9/4/2019	SS	fat clay with gravel (CH)		
RBA4	HPRBA4-SS06-000H-0819	HPRBA4-SO06	0.0-0.5	0.8	1.3	8/20/2019	SS	sandy silt with gravel (ML)	X	
RBA4	HPRBA4-SS07-000H-0819	HPRBA4-SO07	0.0-0.5	1.4	1.9	8/20/2019	SS	gravelly silt with sand (ML)		
RBA4	HPRBA4-SS08-000H-0819	HPRBA4-SO08	0.0-0.5	1.1	1.6	8/20/2019	SS	well graded gravel with sand (GW)		X
RBA4	HPRBA4-SS09-000H-0819	HPRBA4-SO09	0.0-0.5	0.8	1.3	8/20/2019	SS	silt with gravel (ML)	X	
RBA4	HPRBA4-SS10-000H-0819	HPRBA4-SO10	0.0-0.5	0.7	1.2	8/20/2019	SS	gravelly silt with sand (ML)		

Table 2-2. Radiological Sample Details

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Location	Sample ID	Station ID	Proposed Depth Interval (feet bgs)	Actual Top Depth (feet bgs)	Actual Bottom Depth (feet bgs)	Date Collected	Matrix	Soil Type	USEPA Split Sample	MS Sample
RBA4	HPRBA4-SS10P-000H-0819	HPRBA4-SO10	0.0-0.5	0.7	1.2	8/20/2019	D	gravelly silt with sand (ML)		
RBA4	HPRBA4-SS11-000H-0819	HPRBA4-SO11	0.0-0.5	1.2	1.7	8/20/2019	SS	gravelly silt with sand (ML)		
RBA4	HPRBA4-SS12-000H-0819	HPRBA4-SO12	0.0-0.5	1.2	1.7	8/20/2019	SS	sandy silt with gravel (ML)		
RBA4	HPRBA4-SS13-000H-0919	HPRBA4-SO13	0.0-0.5	1	1.5	9/4/2019	SS	silt with gravel (ML)		X
RBA4	HPRBA4-SS14-000H-0819	HPRBA4-SO14	0.0-0.5	1.3	1.8	8/20/2019	SS	sandy silt with gravel (ML)	X	
RBA4	HPRBA4-SS15-000H-0819	HPRBA4-SO15	0.0-0.5	1.2	1.7	8/20/2019	SS	sandy silt with gravel (ML)		
RBA4	HPRBA4-SS16-000H-0819	HPRBA4-SO16	0.0-0.5	1.2	1.7	8/21/2019	SS	well graded gravel (GW)		
RBA4	HPRBA4-SS16P-000H-0819	HPRBA4-SO16	0.0-0.5	1.2	1.7	8/21/2019	D	well graded gravel (GW)		
RBA4	HPRBA4-SS17-000H-0819	HPRBA4-SO17	0.0-0.5	1.5	2	8/21/2019	SS	well graded gravel (GW)		
RBA4	HPRBA4-SS18-000H-0819	HPRBA4-SO18	0.0-0.5	1.6	2.1	8/21/2019	SS	gravelly silt (ML)		
RBA4	HPRBA4-SS19-000H-0819	HPRBA4-SO19	0.0-0.5	1.6	2.1	8/21/2019	SS	silt with gravel (ML)		
RBA4	HPRBA4-SS19P-000H-0819	HPRBA4-SO19	0.0-0.5	1.6	2.1	8/21/2019	D	silt with gravel (ML)		
RBA4	HPRBA4-SS20-000H-0819	HPRBA4-SO20	0.0-0.5	1.6	2.1	8/21/2019	SS	gravelly silt (ML)		
RBA4	HPRBA4-SS21-000H-0919	HPRBA4-SO21	0.0-0.5	1.1	1.6	9/4/2019	SS	well graded gravel (GW)		
RBA4	HPRBA4-SS22-000H-0819	HPRBA4-SO22	0.0-0.5	0.8	1.3	8/20/2019	SS	gravelly silt (ML)		
RBA4	HPRBA4-SS23-000H-0819	HPRBA4-SO23	0.0-0.5	1.3	1.8	8/20/2019	SS	gravelly silt (ML)		
RBA4	HPRBA4-SS24-000H-0819	HPRBA4-SO24	0.0-0.5	1.4	1.9	8/21/2019	SS	silt with gravel (ML)		
RBA4	HPRBA4-SS25-000H-0919	HPRBA4-SO25	0.0-0.5	1.1	1.6	9/4/2019	SS	silt with gravel (ML)		
					RBA-SanBruno					
RBAS	HPRBAS-EB01-090619	HPRBAS-EB01				9/6/2019	EB			
RBAS	HPRBAS-EB01-090919	HPRBAS-EB01				9/9/2019	EB			
RBAS	HPRBAS-SB01-011H-0919	HPRBAS-SO01	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB01-0H01-0919	HPRBAS-SO01	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB01-1H02-0919	HPRBAS-SO01	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB02-011H-0919	HPRBAS-SO02	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)	X	
RBAS	HPRBAS-SB02-0H01-0919	HPRBAS-SO02	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB02-1H02-0919	HPRBAS-SO02	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB03-011H-0919	HPRBAS-SO03	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB03-0H01-0919	HPRBAS-SO03	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB03-1H02-0919	HPRBAS-SO03	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB04-011H-0919	HPRBAS-SO04	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		X
RBAS	HPRBAS-SB04-0H01-0919	HPRBAS-SO04	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB04-1H02-0919	HPRBAS-SO04	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)	X	
RBAS	HPRBAS-SB05-011H-0919	HPRBAS-SO05	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB05-0H01-0919	HPRBAS-SO05	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		

Table 2-2. Radiological Sample Details

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Location	Sample ID	Station ID	Proposed Depth Interval (feet bgs)	Actual Top Depth (feet bgs)	Actual Bottom Depth (feet bgs)	Date Collected	Matrix	Soil Type	USEPA Split Sample	MS Sample
RBAS	HPRBAS-SB05-1H02-0919	HPRBAS-SO05	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB06-011H-0919	HPRBAS-SO06	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB06-0H01-0919	HPRBAS-SO06	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)	X	
RBAS	HPRBAS-SB06-1H02-0919	HPRBAS-SO06	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB07-011H-0919	HPRBAS-SO07	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		X
RBAS	HPRBAS-SB07-0H01-0919	HPRBAS-SO07	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB07-1H02-0919	HPRBAS-SO07	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB07P-0H01-0919	HPRBAS-SO07	0.5-1	0.5	1	9/6/2019	D	poorly graded sand (SP)		
RBAS	HPRBAS-SB08-011H-0919	HPRBAS-SO08	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB08-0H01-0919	HPRBAS-SO08	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB08-1H02-0919	HPRBAS-SO08	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB09-011H-0919	HPRBAS-SO09	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB09-0H01-0919	HPRBAS-SO09	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB09-1H02-0919	HPRBAS-SO09	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB10-011H-0919	HPRBAS-SO10	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB10-0H01-0919	HPRBAS-SO10	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)	X	X
RBAS	HPRBAS-SB10-1H02-0919	HPRBAS-SO10	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB11-011H-0919	HPRBAS-SO11	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB11-0H01-0919	HPRBAS-SO11	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB11-1H02-0919	HPRBAS-SO11	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)	X	
RBAS	HPRBAS-SB11P-011H-0919	HPRBAS-SO11	1-1.5	1	1.5	9/9/2019	D	poorly graded sand (SP)		
RBAS	HPRBAS-SB12-011H-0919	HPRBAS-SO12	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)	X	
RBAS	HPRBAS-SB12-0H01-0919	HPRBAS-SO12	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB12-1H02-0919	HPRBAS-SO12	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB13-011H-0919	HPRBAS-SO13	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB13-0H01-0919	HPRBAS-SO13	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB13-1H02-0919	HPRBAS-SO13	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB13P-011H-0919	HPRBAS-SO13	1-1.5	1	1.5	9/9/2019	D	poorly graded sand (SP)		
RBAS	HPRBAS-SB14-011H-0919	HPRBAS-SO14	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB14-0H01-0919	HPRBAS-SO14	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB14-1H02-0919	HPRBAS-SO14	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB15-011H-0919	HPRBAS-SO15	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)	X	
RBAS	HPRBAS-SB15-0H01-0919	HPRBAS-SO15	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB15-1H02-0919	HPRBAS-SO15	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB16-011H-0919	HPRBAS-SO16	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)		

Table 2-2. Radiological Sample Details

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Location	Sample ID	Station ID	Proposed Depth Interval (feet bgs)	Actual Top Depth (feet bgs)	Actual Bottom Depth (feet bgs)	Date Collected	Matrix	Soil Type	USEPA Split Sample	MS Sample
RBAS	HPRBAS-SB16-0H01-0919	HPRBAS-SO16	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB16-1H02-0919	HPRBAS-SO16	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB16P-1H02-0919	HPRBAS-SO16	1.5-2	1.5	2	9/9/2019	D	poorly graded sand (SP)		
RBAS	HPRBAS-SB17-011H-0919	HPRBAS-SO17	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB17-0H01-0919	HPRBAS-SO17	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB17-1H02-0919	HPRBAS-SO17	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB17P-0H01-0919	HPRBAS-SO17	0.5-1	0.5	1	9/9/2019	D	poorly graded sand (SP)		
RBAS	HPRBAS-SB18-011H-0919	HPRBAS-SO18	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)		X
RBAS	HPRBAS-SB18-0H01-0919	HPRBAS-SO18	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB18-1H02-0919	HPRBAS-SO18	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB18P-011H-0919	HPRBAS-SO18	1-1.5	1	1.5	9/9/2019	D	poorly graded sand (SP)		
RBAS	HPRBAS-SB19-011H-0919	HPRBAS-SO19	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB19-0H01-0919	HPRBAS-SO19	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)	X	
RBAS	HPRBAS-SB19-1H02-0919	HPRBAS-SO19	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB20-011H-0919	HPRBAS-SO20	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB20-0H01-0919	HPRBAS-SO20	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB20-1H02-0919	HPRBAS-SO20	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB21-011H-0919	HPRBAS-SO21	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB21-0H01-0919	HPRBAS-SO21	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB21-1H02-0919	HPRBAS-SO21	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB22-011H-0919	HPRBAS-SO22	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB22-0H01-0919	HPRBAS-SO22	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB22-1H02-0919	HPRBAS-SO22	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)	X	
RBAS	HPRBAS-SB23-011H-0919	HPRBAS-SO23	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB23-0H01-0919	HPRBAS-SO23	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB23-1H02-0919	HPRBAS-SO23	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)		X
RBAS	HPRBAS-SB23P-011H-0919	HPRBAS-SO23	1-1.5	1	1.5	9/9/2019	D	poorly graded sand (SP)		
RBAS	HPRBAS-SB24-011H-0919	HPRBAS-SO24	1-1.5	1	1.5	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB24-0H01-0919	HPRBAS-SO24	0.5-1	0.5	1	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB24-1H02-0919	HPRBAS-SO24	1.5-2	1.5	2	9/9/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB25-011H-0919	HPRBAS-SO25	1-1.5	1	1.5	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB25-0H01-0919	HPRBAS-SO25	0.5-1	0.5	1	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SB25-1H02-0919	HPRBAS-SO25	1.5-2	1.5	2	9/6/2019	SB	poorly graded sand (SP)		
RBAS	HPRBAS-SS01-000H-0919	HPRBAS-SO01	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS02-000H-0919	HPRBAS-SO02	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		

Table 2-2. Radiological Sample Details

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Location	Sample ID	Station ID	Proposed Depth Interval (feet bgs)	Actual Top Depth (feet bgs)	Actual Bottom Depth (feet bgs)	Date Collected	Matrix	Soil Type	USEPA Split Sample	MS Sample
RBAS	HPRBAS-SS03-000H-0919	HPRBAS-SO03	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS03P-000H-0919	HPRBAS-SO03	0.0-0.5	0	0.5	9/6/2019	D	poorly graded sand (SP)		
RBAS	HPRBAS-SS04-000H-0919	HPRBAS-SO04	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS05-000H-0919	HPRBAS-SO05	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS06-000H-0919	HPRBAS-SO06	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS07-000H-0919	HPRBAS-SO07	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS08-000H-0919	HPRBAS-SO08	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)	X	
RBAS	HPRBAS-SS09-000H-0919	HPRBAS-SO09	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS10-000H-0919	HPRBAS-SO10	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS11-000H-0919	HPRBAS-SO11	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS12-000H-0919	HPRBAS-SO12	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS12P-000H-0919	HPRBAS-SO12	0.0-0.5	0	0.5	9/9/2019	D	poorly graded sand (SP)		
RBAS	HPRBAS-SS13-000H-0919	HPRBAS-SO13	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		X
RBAS	HPRBAS-SS14-000H-0919	HPRBAS-SO14	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS15-000H-0919	HPRBAS-SO15	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS16-000H-0919	HPRBAS-SO16	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS17-000H-0919	HPRBAS-SO17	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS18-000H-0919	HPRBAS-SO18	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS19-000H-0919	HPRBAS-SO19	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS19P-000H-0919	HPRBAS-SO19	0.0-0.5	0	0.5	9/9/2019	D	poorly graded sand (SP)		
RBAS	HPRBAS-SS20-000H-0919	HPRBAS-SO20	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS21-000H-0919	HPRBAS-SO21	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS22-000H-0919	HPRBAS-SO22	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS23-000H-0919	HPRBAS-SO23	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS24-000H-0919	HPRBAS-SO24	0.0-0.5	0	0.5	9/9/2019	SS	poorly graded sand (SP)		
RBAS	HPRBAS-SS25-000H-0919	HPRBAS-SO25	0.0-0.5	0	0.5	9/6/2019	SS	poorly graded sand (SP)		

Notes:

Shaded cells indicate samples that were planned but not collected based on field conditions.

bgs - below ground surface

D - duplicate sample

EB - equipment blank

MS - matrix spike

SB - subsurface soil

SS - surface soil

Table 5-2. Percentage of Data Qualified for Complete Dataset

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Validator_Qualifier	Count	Percent
NULL	4167	40.18%
U	3878	37.40%
UJ	1362	13.13%
J	963	9.29%
	10370	100.00%

Notes:

100.00% not R-flagged and available for use

NULL - No qualifier

J - Analyte present. Reported value may or may not be accurate or precise

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-3. Percentage of Data Qualified for Complete Dataset with Quality Control Narrative

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Validator Qualifier	QC Narrative	Count	Percent
NULL	NULL	4167	40.18%
U	NULL	3878	37.40%
UJ	OT	1353	13.05%
J	OT	835	8.05%
J	MBL	91	0.88%
J	FD	27	0.26%
J	EBL	10	0.10%
UJ	FD	9	0.09%
		10370	100.00%

Notes:

100.00% not R-flagged and available for use

NULL - No qualifier

EBL - Equipment Blank Contamination

MBL - Method Blank Contamination

OT - Other

FD - Field Duplicate

J - Analyte present. Reported value may or may not be accurate or precise

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-4. Percentage of Data Qualified for Radon Emanation with Quality Control Narrative

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analysis Group	Validator Qualifier	QC Narrative	Count	Percent
RAD	NULL	NULL	270	88.52%
RAD	J	MBL	18	5.90%
RAD	U	NULL	13	4.26%
RAD	J	FD	4	1.31%
			305	100.00%

Notes:

100.00% not R-flagged and available for use

NULL - No qualifier

MBL - Method Blank Contamination

FD - Field Duplicate

J - Analyte present. Reported value may or may not be accurate or precise

U - Not Detected

Table 5-5. Percentage of Data Qualified for Gamma Spectroscopy with Quality Control Narrative

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analysis Group	Validator Qualifier	QC Narrative	Count	Percent
RAD	U	NULL	3308	49.30%
RAD	NULL	NULL	3084	45.96%
RAD	UJ	OT	295	4.40%
RAD	J	EBL	10	0.15%
RAD	UJ	FD	6	0.09%
RAD	J	FD	6	0.09%
RAD	J	MBL	1	0.01%
			6710	100.00%

Notes:

100.00% not R-flagged and available for use

NULL - No qualifier

EBL - Equipment Blank Contamination

MBL - Method Blank Contamination

OT - Other

FD - Field Duplicate

J - Analyte present. Reported value may or may not be accurate or precise

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-6. Percentage of Data Qualified for Gas Flow Proportional Counting with Quality Control Narrative

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analysis Group	Validator Qualifier	QC Narrative	Count	Percent
RAD	U	NULL	303	99.34%
RAD	UJ	FD	2	0.66%
			305	100.00%

Notes:

100.00% not R-flagged and available for use

NULL - No qualifier

FD - Field Duplicate

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-7. Percentage of Data Qualified for Alpha Spectroscopy with Quality Control Narrative

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analysis Group	Validator Qualifier	QC Narrative	Count	Percent
RAD	UJ	OT	1058	34.69%
RAD	J	OT	835	27.38%
RAD	NULL	NULL	813	26.66%
RAD	U	NULL	254	8.33%
RAD	J	MBL	72	2.36%
RAD	J	FD	17	0.56%
RAD	UJ	FD	1	0.03%
			3050	100.00%

Notes:

100.00% not R-flagged and available for use

NULL - No qualifier

MBL - Method Blank Contamination

OT - Other

FD - Field Duplicate

J - Analyte present. Reported value may or may not be accurate or precise

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-8. Percentage of Data Qualified based on Precision Criteria with Quality Control Narrative

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analysis Group	Validator Qualifier	QC Narrative	Count	Percent
RAD (Alpha Spec)	J	FD	17	47.22%
RAD (Gamma Spec)	UJ	FD	6	16.67%
RAD (Gamma Spec)	J	FD	6	16.67%
RAD (Radon Emanation)	J	FD	4	11.11%
RAD (GFPC)	UJ	FD	2	5.56%
RAD (Alpha Spec)	UJ	FD	1	2.78%
			36	100.00%

Notes:

100.00% not R-flagged and available for use

FD - Field Duplicate

J - Analyte present. Reported value may or may not be accurate or precise

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-9. Percentage of Data Qualified based on Associated Blank Detections with Quality Control Narrative

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analysis Group	Validator Qualifier	QC Narrative	Count	Percent
RAD (Alpha Spec)	J	MBL	72	71.29%
RAD (Radon Emanation)	J	MBL	18	17.82%
RAD (Gamma Spec)	J	EBL	10	9.90%
RAD (Gamma Spec)	J	MBL	1	0.99%
			101	100.00%

Notes:

100.00% not R-flagged and available for use

EBL - Equipment Blank Contamination

MBL - Method Blank Contamination

J - Analyte present. Reported value may or may not be accurate or precise

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Actinium-228	0.863		0.167	0.255
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Americium-241	-0.000197	U	0.188	0.0927
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Bismuth-212	1.16		0.501	0.665
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Bismuth-214	0.698		0.0746	0.137
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Cesium-137	0.0281	U	0.048	0.0228
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Cobalt-60	0.00457	U	0.0523	0.0267
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Europium-152	-0.00334	U	0.0981	0.0698
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Europium-154	0.021	U	0.161	0.0822
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Europium-155	0.0759	U	0.115	0.0548
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Lead-212	0.987		0.0593	0.0878
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Lead-214	0.859		0.0743	0.145
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Potassium-40	15.7		0.49	1.2
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Protactinium-231	0	UJ	0.494	0.475
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Protactinium-234	-0.179	U	0.31	0.18
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Protactinium-234m	1.34	U	5.63	2.74
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Radium-223	-0.206	U	0.616	0.366
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Radium-224	0.565	U	0.636	0.959
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Radium-226	0.698		0.0746	0.137
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Thallium-208	0.254		0.0405	0.0555
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Thorium-227	-0.024	U	0.265	0.148
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Thorium-228	0.987		0.0593	0.0878
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Thorium-232	0.863		0.167	0.255
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Actinium-228	0.851		0.16	0.255
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Americium-241	0.0595	U	0.254	0.126
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Bismuth-212	0.835		0.598	0.654
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Bismuth-214	0.721		0.0786	0.145
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Cesium-137	-0.00537	U	0.0479	0.0259
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Cobalt-60	-0.0192	U	0.0498	0.0296
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Europium-152	0.0129	U	0.112	0.057
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Europium-154	-0.00988	U	0.14	0.0758
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Europium-155	0.0849	U	0.144	0.0724
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Lead-212	1.15		0.0704	0.106
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Lead-214	0.868		0.0808	0.142
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Potassium-40	16.4		0.355	1.22
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Protactinium-231	0	UJ	0.539	0.503
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Protactinium-234	-0.155	U	0.313	0.182
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Protactinium-234m	3.73	U	6.77	3.25
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Radium-223	-0.274	U	0.741	0.457
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Radium-224	0	UJ	0.754	1.29
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Radium-226	0.721		0.0786	0.145
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Thallium-208	0.305		0.0439	0.0684
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Thorium-227	-0.101	U	0.29	0.155
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Thorium-228	1.15		0.0704	0.106
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Thorium-232	0.851		0.16	0.255
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Actinium-228	0.912		0.154	0.237
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Americium-241	0.0499	U	0.124	0.133
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Bismuth-212	0.925		0.471	0.626
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Bismuth-214	0.764		0.0642	0.104
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Cesium-137	0.0185	U	0.041	0.0208
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Cobalt-60	-0.0176	U	0.0305	0.0183
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Europium-152	-0.0485	U	0.0843	0.0516
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Europium-154	-0.00831	U	0.119	0.062
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Europium-155	0.00967	U	0.105	0.053
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Lead-212	1.03		0.0531	0.0827

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Lead-214	0.806		0.0698	0.112
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Potassium-40	12.7		0.284	0.974
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Protactinium-231	0	UJ	0.389	0.497
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Protactinium-234	-0.00789	U	0.276	0.149
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Protactinium-234m	3.49	U	3.87	3.29
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Radium-223	0.29	U	0.608	0.331
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Radium-224	0	UJ	0.569	0.785
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Radium-226	0.764		0.0642	0.104
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Thallium-208	0.301		0.0303	0.0514
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Thorium-227	0.0499	U	0.243	0.128
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Thorium-228	1.03		0.0531	0.0827
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Thorium-232	0.912		0.154	0.237
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Actinium-228	1.37		0.137	0.203
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Americium-241	-0.0352	U	0.192	0.104
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Bismuth-212	0.783		0.535	0.638
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Bismuth-214	0.603		0.0734	0.118
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Cesium-137	0.00394	U	0.0407	0.0224
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Cobalt-60	0.0291	U	0.0573	0.0254
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Europium-152	-0.0177	U	0.0975	0.0523
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Europium-154	-0.00217	U	0.102	0.0499
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Europium-155	0.0493	U	0.114	0.0591
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Lead-212	0.947		0.0724	0.0956
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Lead-214	0.658		0.0753	0.117
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Potassium-40	5.31		0.385	0.745
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Protactinium-231	0	UJ	0.507	0.476
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Protactinium-234	0.0314	U	0.348	0.207
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Protactinium-234m	1.27	U	4.93	2.42
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Radium-223	-0.0283	U	0.615	0.357
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Radium-224	0	UJ	0.768	0.746
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Radium-226	0.603		0.0734	0.118
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Thallium-208	0.254		0.0382	0.0603
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Thorium-227	-0.0769	U	0.246	0.148
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Thorium-228	0.947		0.0724	0.0956
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Thorium-232	1.37		0.137	0.203
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Actinium-228	0.795		0.137	0.194
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Americium-241	0.0583	U	0.162	0.0855
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Bismuth-212	0.929		0.57	0.701
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Bismuth-214	0.565		0.0668	0.118
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Cesium-137	-0.0162	U	0.0327	0.0223
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Cobalt-60	0.0165	U	0.0464	0.021
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Europium-152	0.0239	U	0.11	0.0555
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Europium-154	-0.0263	U	0.0966	0.0553
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Europium-155	0.0985	U	0.108	0.102
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Lead-212	0.93		0.0538	0.0834
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Lead-214	0.64		0.0747	0.119
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Potassium-40	8.48		0.402	0.868
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Protactinium-231	0	UJ	0.474	0.525
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Protactinium-234	0.0532	U	0.32	0.175
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Protactinium-234m	-0.0441	U	5.53	2.91
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Radium-223	0.555	U	0.717	0.572
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Radium-224	1.42		0.576	0.815
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Radium-226	0.565		0.0668	0.118
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Thallium-208	0.276		0.037	0.0591
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Thorium-227	0.248	U	0.249	0.278

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Thorium-228	0.93		0.0538	0.0834
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Thorium-232	0.795		0.137	0.194
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Actinium-228	0.593		0.152	0.205
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Americium-241	0.0389	U	0.267	0.14
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Bismuth-212	0.598	U	0.825	0.398
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Bismuth-214	0.543		0.0852	0.112
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Cesium-137	0.0832		0.0455	0.0469
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Cobalt-60	0.0105	U	0.0516	0.0248
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Europium-152	-0.000336	U	0.105	0.0536
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Europium-154	0.0788	U	0.148	0.146
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Europium-155	0.0214	U	0.122	0.0626
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Lead-212	0.786		0.064	0.0877
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Lead-214	0.554		0.0836	0.14
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Potassium-40	8.9		0.452	0.968
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Protactinium-231	0	UJ	0.493	0.525
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Protactinium-234	-0.15	U	0.309	0.177
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Protactinium-234m	0.572	U	5.8	2.99
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Radium-223	0.274	U	0.793	0.424
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Radium-224	0	UJ	0.686	0.932
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Radium-226	0.543		0.0852	0.112
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Thallium-208	0.222		0.0433	0.0587
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Thorium-227	-0.104	U	0.271	0.162
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Thorium-228	0.786		0.064	0.0877
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Thorium-232	0.593		0.152	0.205
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Actinium-228	0	UJ	0.281	0.168
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Americium-241	-0.0258	U	0.266	0.153
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Bismuth-212	0.448	U	0.731	0.329
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Bismuth-214	0.197		0.0677	0.0766
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Cesium-137	0.00626	U	0.0428	0.0213
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Cobalt-60	0.000999	U	0.0468	0.0223
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Europium-152	-0.0181	U	0.104	0.0554
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Europium-154	-0.0277	U	0.129	0.0684
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Europium-155	-0.0189	U	0.114	0.0636
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Lead-212	0.29		0.0672	0.0722
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Lead-214	0.153		0.141	0.0963
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Potassium-40	1.9		0.397	0.566
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Protactinium-231	0.187	U	0.571	0.277
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Protactinium-234	0.00799	U	0.303	0.153
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Protactinium-234m	-0.598	U	5.65	2.97
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Radium-223	-0.0635	U	0.724	0.379
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Radium-224	0.475	U	0.858	0.45
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Radium-226	0.197		0.0677	0.0766
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Thallium-208	0.0732		0.0433	0.0468
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Thorium-227	-0.107	U	0.267	0.146
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Thorium-228	0.29		0.0672	0.0722
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Thorium-232	0	UJ	0.281	0.168
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Actinium-228	0.105	U	0.105	0.117
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Americium-241	-0.0716	U	0.152	0.0848
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Bismuth-212	0.251	U	0.432	0.201
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Bismuth-214	0.117		0.055	0.0605
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Cesium-137	-0.00365	U	0.025	0.0134
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Cobalt-60	-0.00989	U	0.0256	0.0228
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Europium-152	0.0392	U	0.0818	0.0406
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Europium-154	-0.00656	U	0.0835	0.0446

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Europium-155	-0.0208	U	0.078	0.0442
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Lead-212	0.156	J	0.0429	0.0475
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Lead-214	0.101		0.0546	0.0715
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Potassium-40	1.21		0.243	0.369
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Protactinium-231	0	UJ	0.327	0.344
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Protactinium-234	-0.0288	U	0.22	0.121
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Protactinium-234m	3.76	U	4.25	3.4
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Radium-223	0.019	U	0.492	0.261
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Radium-224	0.26	U	0.524	0.413
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Radium-226	0.117		0.055	0.0605
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Thallium-208	0.0422		0.0254	0.0334
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Thorium-227	0.0092	U	0.187	0.0976
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Thorium-228	0.156		0.0429	0.0475
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Thorium-232	0.105	U	0.105	0.117
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Actinium-228	0.102	U	0.164	0.0781
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Americium-241	-0.0133	U	0.0688	0.0384
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Bismuth-212	-0.0354	U	0.398	0.22
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Bismuth-214	0.0652	U	0.0787	0.0843
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Cesium-137	0.00742	U	0.0277	0.0178
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Cobalt-60	-0.00835	U	0.0221	0.0128
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Europium-152	-0.0176	U	0.0697	0.042
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Europium-154	0.0013	U	0.0806	0.0384
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Europium-155	0.00846	U	0.0625	0.0334
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Lead-212	0.06		0.0419	0.0393
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Lead-214	0.0316	U	0.0633	0.0441
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Potassium-40	0.572		0.292	0.323
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Protactinium-231	0.0327	U	0.347	0.177
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Protactinium-234	-0.0411	U	0.215	0.113
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Protactinium-234m	-0.656	U	3.61	1.9
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Radium-223	0.104	U	0.463	0.252
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Radium-224	0.168	U	0.478	0.258
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Radium-226	0.0652	U	0.0787	0.0843
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Thallium-208	0.0388		0.0229	0.0311
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Thorium-227	0.0913	U	0.2	0.0952
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Thorium-228	0.06		0.0419	0.0393
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Thorium-232	0.102	U	0.164	0.0781
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Actinium-228	0.436		0.112	0.19
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Americium-241	-0.00239	U	0.0819	0.0441
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Bismuth-212	0.71		0.403	0.436
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Bismuth-214	0.316		0.063	0.0841
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Cesium-137	0.0161	U	0.0367	0.0177
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Cobalt-60	-0.00639	U	0.0358	0.0195
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Europium-152	0.00519	U	0.0859	0.0448
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Europium-154	0.0116	U	0.098	0.0468
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Europium-155	0.0217	U	0.082	0.0434
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Lead-212	0.399		0.0531	0.0695
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Lead-214	0.353		0.0661	0.0909
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Potassium-40	3.09		0.311	0.553
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Protactinium-231	0.121	U	0.445	0.423
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Protactinium-234	0.0186	U	0.274	0.137
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Protactinium-234m	3.12	U	5.27	3.36
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Radium-223	-0.104	U	0.55	0.299
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Radium-224	0.444	U	0.766	0.542
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Radium-226	0.316		0.063	0.0841

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Thallium-208	0.16		0.0289	0.0364
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Thorium-227	-0.00531	U	0.234	0.123
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Thorium-228	0.399		0.0531	0.0695
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Thorium-232	0.436		0.112	0.19
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Actinium-228	0.164		0.136	0.117
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Americium-241	0.0309	U	0.144	0.0712
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Bismuth-212	0.181	U	0.552	0.295
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Bismuth-214	0.0577	U	0.113	0.119
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Cesium-137	-0.00504	U	0.0376	0.0207
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Cobalt-60	0.0265	U	0.0587	0.0254
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Europium-152	0.031	U	0.0987	0.0514
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Europium-154	0.0721	U	0.155	0.0651
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Europium-155	-0.0261	U	0.0741	0.044
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Lead-212	0	UJ	0.0599	0.0827
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Lead-214	0.161		0.112	0.0628
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Potassium-40	1.18		0.36	0.395
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Protactinium-231	0	UJ	0.401	0.371
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Protactinium-234	0.0358	U	0.319	0.152
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Protactinium-234m	1.3	U	5.96	2.93
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Radium-223	-0.0666	U	0.538	0.31
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Radium-224	0.171	U	0.676	0.45
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Radium-226	0.0577	U	0.113	0.119
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Thallium-208	0.0365	U	0.039	0.036
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Thorium-227	0.0457	U	0.254	0.137
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Thorium-228	0	UJ	0.0599	0.0827
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Thorium-232	0.164		0.136	0.117
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Actinium-228	0.345		0.133	0.197
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Americium-241	0.0396	U	0.151	0.078
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Bismuth-212	0	UJ	0.443	0.604
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Bismuth-214	0.324		0.0653	0.101
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Cesium-137	0.0252	U	0.046	0.0219
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Cobalt-60	-0.00727	U	0.0345	0.0181
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Europium-152	-0.0112	U	0.089	0.0471
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Europium-154	0.00494	U	0.127	0.0619
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Europium-155	0.0224	U	0.0973	0.0515
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Lead-212	0.331		0.0491	0.0705
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Lead-214	0.173		0.0776	0.0952
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Potassium-40	2.07		0.226	0.525
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Protactinium-231	0.0627	U	0.481	0.383
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Protactinium-234	0.0298	U	0.317	0.162
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Protactinium-234m	-3.32	U	4.72	2.8
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Radium-223	-0.0253	U	0.603	0.358
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Radium-224	0.3	U	0.526	0.664
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Radium-226	0.324		0.0653	0.101
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Thallium-208	0.107		0.0352	0.052
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Thorium-227	0.0287	U	0.248	0.138
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Thorium-228	0.331		0.0491	0.0705
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Thorium-232	0.345		0.133	0.197
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Actinium-228	0.508		0.15	0.175
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Americium-241	-0.0397	U	0.168	0.0924
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Bismuth-212	0	UJ	0.643	0.485
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Bismuth-214	0.308		0.0801	0.127
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Cesium-137	0.00206	U	0.0406	0.0205
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Cobalt-60	0.00169	U	0.0473	0.0224

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Europium-152	0.0713	U	0.126	0.0587
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Europium-154	-0.0887	U	0.137	0.0909
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Europium-155	0.0293	U	0.124	0.0667
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Lead-212	0.509		0.0595	0.0805
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Lead-214	0.398		0.0775	0.102
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Potassium-40	2.51		0.461	0.664
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Protactinium-231	0.131	U	0.587	0.291
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Protactinium-234	0.0395	U	0.335	0.164
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Protactinium-234m	-1.25	U	5.6	3.03
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Radium-223	0.163	U	0.758	0.374
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Radium-224	0.455	U	0.638	1.02
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Radium-226	0.308		0.0801	0.127
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Thallium-208	0.146		0.0351	0.0524
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Thorium-227	-0.000431	U	0.259	0.145
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Thorium-228	0.509		0.0595	0.0805
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Thorium-232	0.508		0.15	0.175
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Actinium-228	0.201	U	0.24	0.125
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Americium-241	0.0217	U	0.249	0.15
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Bismuth-212	0.0631	U	0.733	0.404
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Bismuth-214	0	UJ	0.146	0.114
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Cesium-137	0.00254	U	0.0504	0.0259
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Cobalt-60	-0.0345	U	0.0431	0.0366
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Europium-152	0.0155	U	0.134	0.0726
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Europium-154	0.0115	U	0.161	0.0809
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Europium-155	-0.0139	U	0.124	0.0667
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Lead-212	0.168		0.0714	0.0983
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Lead-214	0	UJ	0.14	0.099
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Potassium-40	0.789		0.607	0.614
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Protactinium-231	-0.179	U	0.645	0.432
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Protactinium-234	-0.0535	U	0.353	0.19
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Protactinium-234m	0.516	U	6.36	3.75
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Radium-223	-0.0887	U	0.838	0.47
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Radium-224	0.505	U	0.949	0.54
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Radium-226	0	UJ	0.146	0.114
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Thallium-208	0.033	U	0.0421	0.0534
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Thorium-227	-0.14	U	0.31	0.182
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Thorium-228	0.168		0.0714	0.0983
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Thorium-232	0.201	U	0.24	0.125
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Actinium-228	0.15	U	0.214	0.143
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Americium-241	-0.0617	U	0.113	0.0705
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Bismuth-212	0.364	U	0.484	0.406
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Bismuth-214	0	UJ	0.124	0.107
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Cesium-137	-0.00157	U	0.0353	0.0188
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Cobalt-60	-0.0173	U	0.0322	0.0198
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Europium-152	-0.0172	U	0.0902	0.0543
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Europium-154	0.0284	U	0.119	0.0529
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Europium-155	0.0225	U	0.0872	0.0449
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Lead-212	0.139		0.0535	0.0571
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Lead-214	0.237		0.111	0.0837
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Potassium-40	1.07		0.351	0.469
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Protactinium-231	0.137	U	0.458	0.224
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Protactinium-234	-0.0444	U	0.324	0.196
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Protactinium-234m	-1.42	U	4.61	2.59
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Radium-223	0.098	U	0.645	0.326

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Radium-224	0.00795	U	0.596	0.369
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Radium-226	0	UJ	0.124	0.107
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Thallium-208	0.0633		0.0297	0.0304
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Thorium-227	0.07	U	0.237	0.178
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Thorium-228	0.139		0.0535	0.0571
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Thorium-232	0.15	U	0.214	0.143
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Actinium-228	0.327		0.13	0.163
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Americium-241	0.0143	U	0.187	0.0958
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Bismuth-212	0.474	U	0.599	0.666
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Bismuth-214	0.219		0.0708	0.0851
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Cesium-137	0.000161	U	0.0416	0.0226
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Cobalt-60	0.0191	U	0.0539	0.0242
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Europium-152	0.0378	U	0.107	0.0544
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Europium-154	0.0512	U	0.141	0.0617
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Europium-155	0.0277	U	0.109	0.0566
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Lead-212	0.283		0.061	0.0688
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Lead-214	0.253		0.14	0.0986
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Potassium-40	2.66		0.451	0.553
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Protactinium-231	0.0692	U	0.532	0.272
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Protactinium-234	0.0488	U	0.353	0.173
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Protactinium-234m	-1.44	U	5.62	3.21
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Radium-223	-0.135	U	0.6	0.326
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Radium-224	0.813		0.653	0.719
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Radium-226	0.219		0.0708	0.0851
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Thallium-208	0.0714		0.0388	0.0503
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Thorium-227	-0.0365	U	0.271	0.144
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Thorium-228	0.283		0.061	0.0688
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Thorium-232	0.327		0.13	0.163
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Actinium-228	1.19		0.158	0.224
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Americium-241	-0.0218	U	0.328	0.185
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Bismuth-212	1.53		0.568	0.629
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Bismuth-214	0.794		0.0819	0.171
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Cesium-137	0.00386	U	0.0523	0.0288
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Cobalt-60	0.0045	U	0.0483	0.0243
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Europium-152	0.039	U	0.136	0.0714
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Europium-154	0.00308	U	0.16	0.0843
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Europium-155	-0.00913	U	0.15	0.0779
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Lead-212	1.23		0.0671	0.105
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Lead-214	0.911		0.0882	0.161
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Potassium-40	17.9		0.497	1.32
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Protactinium-231	0	UJ	0.528	0.571
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Protactinium-234	-0.111	U	0.368	0.204
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Protactinium-234m	1.18	U	7.61	4.44
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Radium-223	0.0865	U	0.766	0.452
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Radium-224	0.641	U	0.719	1.01
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Radium-226	0.794		0.0819	0.171
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Thallium-208	0.387		0.0446	0.0704
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Thorium-227	-0.0365	U	0.294	0.159
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Thorium-228	1.23		0.0671	0.105
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Thorium-232	1.19		0.158	0.224
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Actinium-228	1.18		0.167	0.226
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Americium-241	0.00686	U	0.244	0.134
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Bismuth-212	1.42		0.524	0.626
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Bismuth-214	0.869		0.0705	0.107

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Cesium-137	0.0155	U	0.041	0.024
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Cobalt-60	0.00533	U	0.0459	0.0236
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Europium-152	-0.0212	U	0.101	0.0556
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Europium-154	0.0235	U	0.135	0.0691
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Europium-155	0.0325	U	0.131	0.0685
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Lead-212	1.22		0.0611	0.0931
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Lead-214	1.04		0.208	0.132
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Potassium-40	19.8		0.303	1.17
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Protactinium-231	0	UJ	0.522	0.599
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Protactinium-234	0.0144	U	0.343	0.186
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Protactinium-234m	0	UJ	4.48	4.14
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Radium-223	-0.174	U	0.669	0.414
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Radium-224	1.94		0.654	1.02
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Radium-226	0.869		0.0705	0.107
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Thallium-208	0.296		0.0339	0.0579
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Thorium-227	0.0247	U	0.264	0.137
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Thorium-228	1.22		0.0611	0.0931
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Thorium-232	1.18		0.167	0.226
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Actinium-228	0.16		0.136	0.153
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Americium-241	-0.0325	U	0.146	0.0739
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Bismuth-212	0.437	U	0.525	0.307
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Bismuth-214	0.0408	U	0.121	0.0611
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Cesium-137	-0.00329	U	0.044	0.0236
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Cobalt-60	0.00426	U	0.0664	0.0335
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Europium-152	-0.00934	U	0.098	0.0503
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Europium-154	-0.0319	U	0.135	0.075
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Europium-155	0.00896	U	0.0857	0.0423
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Lead-212	0.00272	U	0.0895	0.067
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Lead-214	0.074	U	0.121	0.105
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Potassium-40	1.52	J	0.395	0.493
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Protactinium-231	-0.033	U	0.482	0.272
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Protactinium-234	0.157	U	0.35	0.253
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Protactinium-234m	1.18	U	7.04	3.42
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Radium-223	-0.242	U	0.662	0.363
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Radium-224	-0.216	U	0.648	0.422
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Radium-226	0.0408	U	0.121	0.0611
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Thallium-208	0.00954	U	0.0431	0.039
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Thorium-227	-0.0437	U	0.226	0.129
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Thorium-228	0.00272	U	0.0895	0.067
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Thorium-232	0.16		0.136	0.153
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Actinium-228	0.146	U	0.259	0.133
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Americium-241	0.0509	U	0.335	0.171
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Bismuth-212	0.0196	U	0.67	0.34
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Bismuth-214	0.0695	U	0.102	0.0916
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Cesium-137	0.01	U	0.0463	0.0211
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Cobalt-60	0.0244	U	0.0705	0.0285
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Europium-152	-0.0134	U	0.13	0.0681
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Europium-154	-0.0203	U	0.128	0.0634
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Europium-155	0.0372	U	0.142	0.0732
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Lead-212	0.127		0.0771	0.0859
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Lead-214	0.0349	U	0.105	0.097
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Potassium-40	0	UJ	0.117	0.649
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Protactinium-231	-0.124	U	0.578	0.308
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Protactinium-234	0.0706	U	0.421	0.197

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Protactinium-234m	-0.372	U	6.28	3.06
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Radium-223	0.11	U	0.803	0.391
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Radium-224	0.116	U	0.721	0.416
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Radium-226	0.0695	U	0.102	0.0916
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Thallium-208	0.0153	U	0.0452	0.052
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Thorium-227	0.0956	U	0.345	0.165
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Thorium-228	0.127		0.0771	0.0859
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Thorium-232	0.146	U	0.259	0.133
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Actinium-228	0.0984	U	0.198	0.145
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Americium-241	0.0524	U	0.163	0.0839
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Bismuth-212	0.097	U	0.48	0.232
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Bismuth-214	0.211		0.0559	0.0878
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Cesium-137	0.0118	U	0.039	0.0186
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Cobalt-60	0.011	U	0.0412	0.0173
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Europium-152	0.0622	U	0.0887	0.0735
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Europium-154	-0.0107	U	0.0933	0.0463
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Europium-155	0.00166	U	0.0943	0.0503
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Lead-212	0.0525		0.0498	0.0479
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Lead-214	0	UJ	0.106	0.0919
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Potassium-40	0.713		0.335	0.371
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Protactinium-231	0.0812	U	0.456	0.224
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Protactinium-234	0.163	U	0.315	0.129
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Protactinium-234m	1.34	U	6.36	3.08
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Radium-223	-0.202	U	0.573	0.312
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Radium-224	0.179	U	0.638	0.418
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Radium-226	0.211		0.0559	0.0878
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Thallium-208	0.0621		0.0347	0.0474
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Thorium-227	0.0297	U	0.224	0.121
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Thorium-228	0.0525		0.0498	0.0479
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Thorium-232	0.0984	U	0.198	0.145
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Actinium-228	0.329		0.112	0.157
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Americium-241	-0.0152	U	0.18	0.0948
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Bismuth-212	0.229	U	0.545	0.272
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Bismuth-214	0.226		0.0731	0.0838
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Cesium-137	-0.00976	U	0.0301	0.0171
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Cobalt-60	-0.00934	U	0.028	0.0155
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Europium-152	-0.0562	U	0.0833	0.0486
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Europium-154	0.0454	U	0.12	0.0478
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Europium-155	0.0203	U	0.0863	0.0468
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Lead-212	0.277		0.0459	0.0645
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Lead-214	0.172		0.07	0.092
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Potassium-40	1.01		0.444	0.505
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Protactinium-231	0.0994	U	0.494	0.245
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Protactinium-234	-0.0534	U	0.249	0.14
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Protactinium-234m	-0.791	U	5.45	2.84
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Radium-223	-0.0422	U	0.596	0.343
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Radium-224	0.386	U	0.492	0.61
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Radium-226	0.226		0.0731	0.0838
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Thallium-208	0.0757		0.0376	0.0389
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Thorium-227	0.0586	U	0.252	0.134
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Thorium-228	0.277		0.0459	0.0645
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Thorium-232	0.329		0.112	0.157
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Actinium-228	1.46		0.178	0.254
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Americium-241	-0.00163	U	0.0659	0.0374

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Bismuth-212	1.41		0.654	0.763
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Bismuth-214	1.1		0.0896	0.146
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Cesium-137	0.00239	U	0.0494	0.0299
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Cobalt-60	0.0384	U	0.0643	0.0275
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Europium-152	0.0296	U	0.125	0.0699
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Europium-154	0.0249	U	0.157	0.0776
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Europium-155	0	UJ	0.106	0.123
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Lead-212	1.49		0.0688	0.107
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Lead-214	1.26		0.098	0.165
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Potassium-40	5.72		0.526	0.918
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Protactinium-231	0.612	U	0.618	0.537
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Protactinium-234	-0.079	U	0.404	0.22
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Protactinium-234m	-2.21	U	6.84	3.86
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Radium-223	0.148	U	0.72	0.4
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Radium-224	0.656	U	0.738	0.961
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Radium-226	1.1		0.0896	0.146
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Thallium-208	0.448		0.0513	0.0764
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Thorium-227	0.109	U	0.32	0.175
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Thorium-228	1.49		0.0688	0.107
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Thorium-232	1.46		0.178	0.254
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Actinium-228	1.31		0.145	0.204
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Americium-241	-0.0337	U	0.0517	0.0311
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Bismuth-212	1.32		0.508	0.697
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Bismuth-214	0.85		0.0723	0.127
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Cesium-137	-0.00223	U	0.0418	0.0227
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Cobalt-60	-0.0134	U	0.0367	0.021
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Europium-152	-0.0573	U	0.0872	0.0527
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Europium-154	-0.012	U	0.113	0.0593
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Europium-155	0	UJ	0.0856	0.0897
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Lead-212	1.16		0.0599	0.09
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Lead-214	0.967		0.0726	0.114
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Potassium-40	5.53		0.39	0.818
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Protactinium-231	0.407	U	0.469	0.386
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Protactinium-234	0.134	U	0.377	0.177
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Protactinium-234m	1.61	U	6.05	2.97
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Radium-223	-0.0893	U	0.627	0.369
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Radium-224	0	UJ	0.642	1.11
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Radium-226	0.85		0.0723	0.127
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Thallium-208	0.362		0.0405	0.0599
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Thorium-227	0.0158	U	0.26	0.146
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Thorium-228	1.16		0.0599	0.09
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Thorium-232	1.31		0.145	0.204
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Actinium-228	0.624		0.139	0.184
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Americium-241	-0.0499	U	0.217	0.12
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Bismuth-212	1.15		0.509	0.553
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Bismuth-214	0.362		0.069	0.0895
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Cesium-137	-0.00252	U	0.0363	0.0187
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Cobalt-60	0.0234	U	0.05	0.0205
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Europium-152	-0.0283	U	0.0944	0.055
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Europium-154	0.00476	U	0.141	0.0702
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Europium-155	0.0333	U	0.103	0.0513
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Lead-212	0.624		0.0535	0.0752
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Lead-214	0.514		0.169	0.104
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Potassium-40	3.01		0.385	0.615

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Protactinium-231	0.437	U	0.445	0.62
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Protactinium-234	0.122	U	0.346	0.16
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Protactinium-234m	0.0577	U	5.57	2.92
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Radium-223	0.0184	U	0.615	0.353
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Radium-224	0.458	U	0.574	0.64
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Radium-226	0.362		0.069	0.0895
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Thallium-208	0.174		0.0338	0.0443
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Thorium-227	0.0359	U	0.26	0.131
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Thorium-228	0.624		0.0535	0.0752
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Thorium-232	0.624		0.139	0.184
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Actinium-228	0.892		0.154	0.248
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Americium-241	0.0444	U	0.165	0.0906
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Bismuth-212	0.859		0.451	0.528
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Bismuth-214	0.778		0.073	0.116
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Cesium-137	-0.013	U	0.0364	0.021
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Cobalt-60	-0.00925	U	0.0374	0.0202
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Europium-152	0.00414	U	0.108	0.056
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Europium-154	0.00514	U	0.124	0.061
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Europium-155	0.0434	U	0.118	0.0611
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Lead-212	1.17		0.0594	0.1
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Lead-214	0.868		0.0843	0.143
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Potassium-40	5.21		0.459	0.822
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Protactinium-231	0.434	U	0.474	0.513
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Protactinium-234	0.0384	U	0.354	0.186
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Protactinium-234m	-1.49	U	4.06	2.18
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Radium-223	-0.208	U	0.646	0.399
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Radium-224	0	UJ	0.636	1.13
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Radium-226	0.778		0.073	0.116
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Thallium-208	0.344		0.038	0.0678
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Thorium-227	0.075	U	0.288	0.143
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Thorium-228	1.17		0.0594	0.1
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Thorium-232	0.892		0.154	0.248
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Actinium-228	0.918		0.171	0.23
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Americium-241	-0.0557	U	0.3	0.166
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Bismuth-212	0.805		0.601	0.644
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Bismuth-214	0.791		0.0741	0.117
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Cesium-137	-0.012	U	0.0423	0.023
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Cobalt-60	0.000409	U	0.0482	0.0252
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Europium-152	-0.0154	U	0.113	0.0614
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Europium-154	0.0375	U	0.164	0.0827
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Europium-155	0.0825	U	0.145	0.184
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Lead-212	0.82		0.0894	0.125
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Lead-214	0.819		0.0922	0.137
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Potassium-40	16.1		0.492	1.24
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Protactinium-231	0.0811	U	0.69	0.414
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Protactinium-234	-0.141	U	0.413	0.235
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Protactinium-234m	0.522	U	6.49	3.49
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Radium-223	-0.569	U	0.738	0.502
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Radium-224	0	UJ	1.15	0.796
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Radium-226	0.791		0.0741	0.117
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Thallium-208	0.235		0.0468	0.0632
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Thorium-227	0.0559	U	0.329	0.171
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Thorium-228	0.82		0.0894	0.125
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Thorium-232	0.918		0.171	0.23

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Actinium-228	1.2		0.163	0.281
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Americium-241	-0.0878	U	0.23	0.138
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Bismuth-212	2.06		0.526	0.686
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Bismuth-214	1.07		0.0904	0.133
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Cesium-137	-0.0233	U	0.038	0.0232
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Cobalt-60	0.0136	U	0.0507	0.0238
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Europium-152	-0.0257	U	0.123	0.0665
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Europium-154	-0.0278	U	0.162	0.088
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Europium-155	0.0625	U	0.142	0.0749
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Lead-212	1.44		0.0653	0.103
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Lead-214	1.16		0.0878	0.139
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Potassium-40	18.3		0.36	1.3
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Protactinium-231	0	UJ	0.585	0.569
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Protactinium-234	-0.0581	U	0.321	0.183
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Protactinium-234m	0.821	U	6.19	3.34
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Radium-223	0.188	U	0.743	0.512
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Radium-224	1.73		0.7	1.15
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Radium-226	1.07		0.0904	0.133
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Thallium-208	0.449		0.0404	0.0641
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Thorium-227	0.049	U	0.313	0.177
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Thorium-228	1.44		0.0653	0.103
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Thorium-232	1.2		0.163	0.281
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Actinium-228	0.851		0.173	0.211
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Americium-241	-0.00312	U	0.198	0.136
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Bismuth-212	0.966		0.592	0.748
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Bismuth-214	0.758		0.0752	0.113
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Cesium-137	0.0177	U	0.0502	0.025
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Cobalt-60	0.00969	U	0.0525	0.0253
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Europium-152	0.00816	U	0.108	0.0625
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Europium-154	0.0251	U	0.135	0.0639
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Europium-155	-0.0221	U	0.141	0.0725
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Lead-212	0.916		0.0629	0.0876
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Lead-214	0.782		0.193	0.119
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Potassium-40	14.6		0.36	1.14
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Protactinium-231	0.512	U	0.543	0.436
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Protactinium-234	-0.0117	U	0.372	0.202
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Protactinium-234m	2.14	U	5.88	3.04
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Radium-223	-0.254	U	0.692	0.381
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Radium-224	1.54		0.674	1.02
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Radium-226	0.758		0.0752	0.113
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Thallium-208	0.211		0.0449	0.0768
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Thorium-227	0.193	U	0.279	0.244
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Thorium-228	0.916		0.0629	0.0876
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Thorium-232	0.851		0.173	0.211
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Actinium-228	0.482		0.125	0.153
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Americium-241	-0.0212	U	0.121	0.0681
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Bismuth-212	0.415	U	0.613	0.285
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Bismuth-214	0.341		0.0655	0.116
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Cesium-137	0.0104	U	0.0375	0.0186
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Cobalt-60	-0.00691	U	0.0408	0.022
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Europium-152	0.0118	U	0.0904	0.0453
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Europium-154	0.0115	U	0.129	0.0648
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Europium-155	0.0312	U	0.103	0.0529
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Lead-212	0.502		0.0444	0.0677

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Lead-214	0.325		0.0767	0.0925
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Potassium-40	7.32		0.308	0.81
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Protactinium-231	0.357	U	0.447	0.352
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Protactinium-234	0.0393	U	0.285	0.163
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Protactinium-234m	-0.186	U	5.29	2.72
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Radium-223	0.0903	U	0.572	0.284
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Radium-224	0.647	U	0.692	0.708
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Radium-226	0.341		0.0655	0.116
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Thallium-208	0.153		0.0303	0.0482
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Thorium-227	-0.058	U	0.199	0.117
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Thorium-228	0.502		0.0444	0.0677
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Thorium-232	0.482		0.125	0.153
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Actinium-228	0.652		0.156	0.191
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Americium-241	0.00854	U	0.244	0.136
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Bismuth-212	1.57		0.412	0.499
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Bismuth-214	0.742		0.0791	0.116
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Cesium-137	-0.00869	U	0.0466	0.0259
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Cobalt-60	0.00496	U	0.0441	0.0212
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Europium-152	0.026	U	0.122	0.0639
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Europium-154	0.0268	U	0.148	0.0722
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Europium-155	0.0922	U	0.137	0.135
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Lead-212	1.01		0.0689	0.0951
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Lead-214	0.77		0.0888	0.146
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Potassium-40	15.8		0.339	1.18
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Protactinium-231	0	UJ	0.528	0.672
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Protactinium-234	-0.0882	U	0.309	0.205
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Protactinium-234m	-0.726	U	6.24	3.42
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Radium-223	0.343	U	0.781	0.392
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Radium-224	1.23		0.738	1.09
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Radium-226	0.742		0.0791	0.116
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Thallium-208	0.241		0.0427	0.0589
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Thorium-227	0.013	U	0.314	0.177
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Thorium-228	1.01		0.0689	0.0951
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Thorium-232	0.652		0.156	0.191
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Actinium-228	1.04		0.164	0.254
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Americium-241	-0.00465	U	0.0536	0.0303
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Bismuth-212	1.22		0.623	0.547
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Bismuth-214	0.663		0.0836	0.11
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Cesium-137	0.00523	U	0.0419	0.0218
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Cobalt-60	-0.0155	U	0.0472	0.0269
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Europium-152	-0.0134	U	0.101	0.0595
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Europium-154	0.00618	U	0.145	0.0747
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Europium-155	0	UJ	0.0851	0.0823
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Lead-212	0.95		0.0487	0.0829
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Lead-214	0.845		0.202	0.111
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Potassium-40	14.8		0.39	1.16
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Protactinium-231	0	UJ	0.457	0.472
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Protactinium-234	-0.00702	U	0.378	0.196
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Protactinium-234m	3.94	U	6.4	2.91
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Radium-223	-0.197	U	0.645	0.391
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Radium-224	1.31		0.522	0.995
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Radium-226	0.663		0.0836	0.11
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Thallium-208	0.271		0.0414	0.0633
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Thorium-227	0.0922	U	0.265	0.154

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Thorium-228	0.95		0.0487	0.0829
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Thorium-232	1.04		0.164	0.254
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Actinium-228	0.679		0.135	0.192
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Americium-241	0.00578	U	0.11	0.0656
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Bismuth-212	0.892		0.433	0.401
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Bismuth-214	0.467		0.0801	0.0899
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Cesium-137	0.0348	U	0.0377	0.0379
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Cobalt-60	-0.00985	U	0.0318	0.021
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Europium-152	-0.0161	U	0.0865	0.0475
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Europium-154	0.0997	U	0.145	0.124
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Europium-155	0.0368	U	0.108	0.0591
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Lead-212	0.718		0.05	0.0689
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Lead-214	0.642		0.0671	0.103
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Potassium-40	12.3		0.352	0.994
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Protactinium-231	-0.0511	U	0.473	0.256
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Protactinium-234	-0.024	U	0.289	0.151
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Protactinium-234m	1.22	U	5.6	2.85
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Radium-223	-0.0521	U	0.606	0.328
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Radium-224	0	UJ	0.535	0.756
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Radium-226	0.467		0.0801	0.0899
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Thallium-208	0.19		0.0386	0.046
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Thorium-227	0.0121	U	0.239	0.126
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Thorium-228	0.718		0.05	0.0689
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Thorium-232	0.679		0.135	0.192
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Actinium-228	0.651		0.124	0.211
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Americium-241	-0.00739	U	0.146	0.0765
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Bismuth-212	0.438	U	0.589	0.482
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Bismuth-214	0.419		0.0664	0.0999
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Cesium-137	0.0201	U	0.043	0.0223
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Cobalt-60	5.46E-05	U	0.0449	0.0226
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Europium-152	0.0156	U	0.102	0.0536
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Europium-154	-0.0068	U	0.121	0.062
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Europium-155	0.0197	U	0.101	0.0529
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Lead-212	0.594		0.0515	0.0824
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Lead-214	0.489		0.0707	0.108
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Potassium-40	10.7		0.356	0.98
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Protactinium-231	0.108	U	0.457	0.524
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Protactinium-234	-0.061	U	0.277	0.158
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Protactinium-234m	1.19	U	4.87	2.28
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Radium-223	0.037	U	0.635	0.338
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Radium-224	0	UJ	0.552	0.822
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Radium-226	0.419		0.0664	0.0999
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Thallium-208	0.189		0.038	0.046
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Thorium-227	-0.0113	U	0.246	0.14
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Thorium-228	0.594		0.0515	0.0824
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Thorium-232	0.651		0.124	0.211
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Actinium-228	0.584		0.172	0.2
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Americium-241	-0.0374	U	0.197	0.101
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Bismuth-212	0.184	U	0.631	0.501
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Bismuth-214	0.556		0.0744	0.102
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Cesium-137	0.0239	U	0.0528	0.0257
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Cobalt-60	-0.00727	U	0.0433	0.0259
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Europium-152	0.00976	U	0.112	0.065
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Europium-154	-0.0114	U	0.132	0.0672

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

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Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Europium-155	0	UJ	0.128	0.152
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Lead-212	0.637		0.0571	0.0812
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Lead-214	0.565		0.0775	0.12
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Potassium-40	15		0.411	1.23
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Protactinium-231	0.227	U	0.548	0.473
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Protactinium-234	0.15	U	0.405	0.197
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Protactinium-234m	3.15	U	6.43	4.16
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Radium-223	-0.3	U	0.678	0.398
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Radium-224	0.553	U	0.612	0.842
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Radium-226	0.556		0.0744	0.102
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Thallium-208	0.184		0.0468	0.0632
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Thorium-227	-0.0687	U	0.271	0.148
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Thorium-228	0.637		0.0571	0.0812
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Thorium-232	0.584		0.172	0.2
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Actinium-228	1.12		0.139	0.234
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Americium-241	0	UJ	0.132	0.158
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Bismuth-212	0.808	U	0.876	0.46
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Bismuth-214	0.7		0.0851	0.118
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Cesium-137	-0.0222	U	0.0392	0.0234
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Cobalt-60	-0.022	U	0.0423	0.0264
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Europium-152	0.0178	U	0.108	0.0551
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Europium-154	-0.022	U	0.117	0.0623
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Europium-155	0	UJ	0.103	0.109
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Lead-212	1.22		0.0606	0.0935
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Lead-214	0.913		0.0835	0.13
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Potassium-40	17.2		0.357	1.2
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Protactinium-231	0	UJ	0.546	0.537
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Protactinium-234	0.0251	U	0.368	0.198
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Protactinium-234m	0.718	U	5.92	3.21
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Radium-223	-0.132	U	0.645	0.384
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Radium-224	1.52		0.649	1
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Radium-226	0.7		0.0851	0.118
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Thallium-208	0.386		0.0398	0.0604
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Thorium-227	0.00319	U	0.268	0.153
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Thorium-228	1.22		0.0606	0.0935
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Thorium-232	1.12		0.139	0.234
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Actinium-228	0.846		0.155	0.219
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Americium-241	-0.0118	U	0.125	0.0769
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Bismuth-212	1.21		0.562	0.517
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Bismuth-214	0.715		0.0736	0.113
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Cesium-137	-0.0201	U	0.0422	0.0257
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Cobalt-60	0.000301	U	0.0472	0.0247
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Europium-152	0.0952	U	0.11	0.0715
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Europium-154	-8.28E-05	U	0.148	0.0788
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Europium-155	0.0756	U	0.121	0.065
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Lead-212	1.06		0.0635	0.0879
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Lead-214	0.955		0.207	0.132
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Potassium-40	18.4		0.423	1.29
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Protactinium-231	0	UJ	0.478	0.478
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Protactinium-234	-0.0681	U	0.352	0.192
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Protactinium-234m	-3.52	U	4.87	3.43
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Radium-223	-0.0567	U	0.731	0.448
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Radium-224	0	UJ	0.68	0.935
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Radium-226	0.715		0.0736	0.113

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Thallium-208	0.336		0.0392	0.0606
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Thorium-227	-0.146	U	0.265	0.152
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Thorium-228	1.06		0.0635	0.0879
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Thorium-232	0.846		0.155	0.219
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Actinium-228	0.867		0.171	0.217
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Americium-241	0.0485	U	0.194	0.106
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Bismuth-212	1.32		0.589	0.547
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Bismuth-214	0.775		0.0808	0.118
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Cesium-137	0.0254	U	0.0463	0.0247
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Cobalt-60	0.0251	U	0.0589	0.0281
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Europium-152	-0.0895	U	0.0982	0.0583
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Europium-154	-0.0093	U	0.153	0.0826
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Europium-155	0.0576	U	0.118	0.0935
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Lead-212	1.05		0.0593	0.0874
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Lead-214	0.857		0.0807	0.121
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Potassium-40	16.9		0.466	1.27
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Protactinium-231	0.187	U	0.572	0.319
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Protactinium-234	-0.2	U	0.353	0.207
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Protactinium-234m	-0.483	U	6.23	3.46
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Radium-223	0.13	U	0.742	0.422
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Radium-224	1.09		0.636	1.03
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Radium-226	0.775		0.0808	0.118
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Thallium-208	0.315		0.0401	0.0542
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Thorium-227	0.0662	U	0.268	0.148
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Thorium-228	1.05		0.0593	0.0874
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Thorium-232	0.867		0.171	0.217
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Actinium-228	0.921		0.153	0.21
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Americium-241	0.0408	U	0.181	0.0934
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Bismuth-212	1.01		0.508	0.635
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Bismuth-214	0.644		0.0767	0.111
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Cesium-137	-0.000462	U	0.0514	0.0283
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Cobalt-60	0.0028	U	0.0382	0.0181
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Europium-152	0.0389	U	0.12	0.0604
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Europium-154	0.0483	U	0.148	0.0685
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Europium-155	0.0164	U	0.114	0.0611
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Lead-212	0.814		0.0642	0.087
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Lead-214	0.721		0.081	0.142
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Potassium-40	11		0.564	1.15
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Protactinium-231	0.0723	U	0.598	0.632
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Protactinium-234	0.0345	U	0.352	0.187
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Protactinium-234m	-0.517	U	6.01	3.34
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Radium-223	0.0419	U	0.702	0.363
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Radium-224	0.617	U	0.688	1.24
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Radium-226	0.644		0.0767	0.111
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Thallium-208	0.165		0.0477	0.0492
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Thorium-227	-0.153	U	0.26	0.164
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Thorium-228	0.814		0.0642	0.087
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Thorium-232	0.921		0.153	0.21
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Actinium-228	0.82		0.167	0.245
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Americium-241	0.00562	U	0.261	0.145
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Bismuth-212	1.11		0.637	0.789
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Bismuth-214	0.559		0.0804	0.137
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Cesium-137	0.0112	U	0.0442	0.0226
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Cobalt-60	0.0131	U	0.0533	0.0253

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Europium-152	-0.0289	U	0.106	0.0626
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Europium-154	-0.00118	U	0.15	0.0777
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Europium-155	0.0717	U	0.135	0.115
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Lead-212	0.743		0.0671	0.0873
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Lead-214	0.826		0.221	0.142
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Potassium-40	11.6		0.419	1.17
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Protactinium-231	0.538	U	0.613	0.75
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Protactinium-234	-0.0164	U	0.35	0.181
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Protactinium-234m	0	UJ	6.91	5.41
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Radium-223	0.0917	U	0.798	0.471
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Radium-224	0	UJ	0.718	1.07
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Radium-226	0.559		0.0804	0.137
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Thallium-208	0.264		0.0396	0.0496
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Thorium-227	0.0294	U	0.308	0.163
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Thorium-228	0.743		0.0671	0.0873
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Thorium-232	0.82		0.167	0.245
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Actinium-228	0.935		0.169	0.203
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Americium-241	0.0809	U	0.284	0.165
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Bismuth-212	0.984		0.581	0.576
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Bismuth-214	0.59		0.0787	0.116
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Cesium-137	0.117		0.0411	0.0426
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Cobalt-60	0.0474	U	0.0552	0.0709
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Europium-152	0.00391	U	0.11	0.0653
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Europium-154	0.0307	U	0.145	0.0701
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Europium-155	0.0159	U	0.137	0.0695
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Lead-212	0.836		0.0713	0.0909
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Lead-214	0.884		0.203	0.14
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Potassium-40	9.39		0.48	0.96
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Protactinium-231	0	UJ	0.544	0.52
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Protactinium-234	-0.179	U	0.281	0.196
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Protactinium-234m	3.43	U	5.96	4.76
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Radium-223	-0.286	U	0.747	0.476
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Radium-224	0	UJ	0.764	1.07
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Radium-226	0.59		0.0787	0.116
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Thallium-208	0.252		0.0366	0.0504
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Thorium-227	0.082	U	0.322	0.166
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Thorium-228	0.836		0.0713	0.0909
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Thorium-232	0.935		0.169	0.203
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Actinium-228	0.734		0.176	0.249
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Americium-241	0.106	U	0.283	0.158
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Bismuth-212	1.35		0.639	0.692
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Bismuth-214	0.512		0.0898	0.115
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Cesium-137	0.00834	U	0.0524	0.0266
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Cobalt-60	-0.00102	U	0.0498	0.0284
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Europium-152	-0.004	U	0.131	0.0716
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Europium-154	0.0133	U	0.167	0.0869
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Europium-155	-0.0205	U	0.137	0.0746
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Lead-212	0.774		0.0749	0.103
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Lead-214	0.602		0.0926	0.122
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Potassium-40	9.37		0.426	1.01
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Protactinium-231	0.522	U	0.645	0.509
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Protactinium-234	0.103	U	0.352	0.243
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Protactinium-234m	-1.6	U	5.73	3.25
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Radium-223	-0.133	U	0.784	0.49

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Radium-224	0.619	U	0.803	0.919
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Radium-226	0.512		0.0898	0.115
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Thallium-208	0.147		0.0497	0.0583
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Thorium-227	-0.0728	U	0.327	0.19
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Thorium-228	0.774		0.0749	0.103
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Thorium-232	0.734		0.176	0.249
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Actinium-228	0.724		0.163	0.207
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Americium-241	0.133	U	0.23	0.232
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Bismuth-212	1.04		0.482	0.84
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Bismuth-214	0.564		0.0714	0.0988
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Cesium-137	0.00767	U	0.0432	0.0215
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Cobalt-60	-0.0027	U	0.0413	0.0209
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Europium-152	-0.0365	U	0.0852	0.0478
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Europium-154	-0.0141	U	0.133	0.0694
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Europium-155	0.0142	U	0.104	0.0534
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Lead-212	0.769		0.0557	0.0819
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Lead-214	0.67		0.0715	0.116
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Potassium-40	0	UJ	2.17	0.899
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Protactinium-231	0.352	U	0.487	0.282
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Protactinium-234	0.325	U	0.345	0.441
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Protactinium-234m	0.384	U	5.75	2.96
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Radium-223	0.273	U	0.649	0.417
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Radium-224	0	UJ	0.597	1.1
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Radium-226	0.564		0.0714	0.0988
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Thallium-208	0.177		0.0394	0.0545
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Thorium-227	-0.011	U	0.236	0.121
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Thorium-228	0.769		0.0557	0.0819
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Thorium-232	0.724		0.163	0.207
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Actinium-228	0.958		0.116	0.168
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Americium-241	0.0527	U	0.22	0.12
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Bismuth-212	1.31		0.403	0.481
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Bismuth-214	0.596		0.0649	0.104
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Cesium-137	0.00529	U	0.0367	0.0249
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Cobalt-60	-0.00259	U	0.0377	0.0202
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Europium-152	0.00751	U	0.0912	0.0488
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Europium-154	-0.0299	U	0.0971	0.0636
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Europium-155	0.0546	U	0.118	0.0616
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Lead-212	1.06		0.0547	0.0807
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Lead-214	0.886		0.0629	0.104
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Potassium-40	8.55		0.33	0.739
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Protactinium-231	0	UJ	0.425	0.503
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Protactinium-234	-0.0464	U	0.262	0.147
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Protactinium-234m	1.69	U	4.13	2.31
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Radium-223	0.0113	U	0.585	0.35
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Radium-224	1.46		0.585	0.914
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Radium-226	0.596		0.0649	0.104
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Thallium-208	0.263		0.0326	0.0468
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Thorium-227	0.0217	U	0.253	0.133
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Thorium-228	1.06		0.0547	0.0807
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Thorium-232	0.958		0.116	0.168
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Actinium-228	0.536		0.349	0.206
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Americium-241	-0.191	U	0.329	0.203
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Bismuth-212	0.657		0.582	0.577
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Bismuth-214	0.474		0.0892	0.126

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Cesium-137	0.0128	U	0.0517	0.0261
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Cobalt-60	-0.0122	U	0.0428	0.0234
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Europium-152	0.00184	U	0.12	0.062
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Europium-154	-0.0342	U	0.133	0.0722
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Europium-155	-0.0261	U	0.123	0.068
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Lead-212	0.771		0.0742	0.0925
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Lead-214	0.611		0.0913	0.145
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Potassium-40	9.14		0.42	1.03
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Protactinium-231	0.316	U	0.596	0.445
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Protactinium-234	0.114	U	0.403	0.198
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Protactinium-234m	-1.17	U	5.77	3.16
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Radium-223	-0.0628	U	0.794	0.415
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Radium-224	0	UJ	0.795	1.19
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Radium-226	0.474		0.0892	0.126
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Thallium-208	0.209		0.0432	0.052
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Thorium-227	-0.0665	U	0.317	0.167
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Thorium-228	0.771		0.0742	0.0925
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Thorium-232	0.536		0.349	0.206
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Actinium-228	0.976		0.196	0.213
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Americium-241	0.0574	U	0.283	0.147
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Bismuth-212	0.953		0.589	0.558
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Bismuth-214	0.827		0.0842	0.127
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Cesium-137	-0.00661	U	0.0485	0.0259
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Cobalt-60	-0.0102	U	0.056	0.0305
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Europium-152	-0.062	U	0.108	0.0615
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Europium-154	0.00376	U	0.18	0.0944
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Europium-155	0.0449	U	0.129	0.0651
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Lead-212	1.16		0.0697	0.0985
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Lead-214	1.11		0.232	0.122
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Potassium-40	19.1		0.442	1.38
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Protactinium-231	0	UJ	0.559	0.586
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Protactinium-234	-0.207	U	0.359	0.218
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Protactinium-234m	1.02	U	6.85	3.6
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Radium-223	-0.131	U	0.738	0.444
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Radium-224	0.729	U	0.748	0.953
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Radium-226	0.827		0.0842	0.127
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Thallium-208	0.288		0.0426	0.0582
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Thorium-227	0.135	U	0.32	0.158
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Thorium-228	1.16		0.0697	0.0985
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Thorium-232	0.976		0.196	0.213
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Actinium-228	0.865		0.172	0.263
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Americium-241	-0.114	U	0.309	0.183
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Bismuth-212	1.57		0.586	0.674
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Bismuth-214	0.757		0.0798	0.131
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Cesium-137	0.0212	U	0.0514	0.0262
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Cobalt-60	0.00543	U	0.0532	0.0286
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Europium-152	0.0496	U	0.127	0.0713
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Europium-154	-0.0036	U	0.151	0.0836
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Europium-155	0.0137	U	0.138	0.0768
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Lead-212	1.23		0.0725	0.103
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Lead-214	1		0.0829	0.129
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Potassium-40	19.7		0.391	1.22
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Protactinium-231	0	UJ	0.564	0.525
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Protactinium-234	-0.214	U	0.374	0.261

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Protactinium-234m	0.0451	U	5.54	3.13
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Radium-223	0.0362	U	0.76	0.471
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Radium-224	1.27		0.777	1.25
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Radium-226	0.757		0.0798	0.131
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Thallium-208	0.319		0.0413	0.0608
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Thorium-227	0.0519	U	0.331	0.192
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Thorium-228	1.23		0.0725	0.103
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Thorium-232	0.865		0.172	0.263
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Actinium-228	0.972		0.144	0.201
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Americium-241	-0.0564	U	0.0923	0.0561
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Bismuth-212	0.612		0.604	0.514
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Bismuth-214	0.723		0.0779	0.134
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Cesium-137	-0.00944	U	0.0425	0.0249
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Cobalt-60	0.0234	U	0.0406	0.0401
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Europium-152	-0.0301	U	0.1	0.0558
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Europium-154	-0.0131	U	0.128	0.0709
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Europium-155	0.0582	U	0.106	0.0543
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Lead-212	0.896		0.0602	0.0828
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Lead-214	0.773		0.0793	0.114
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Potassium-40	16		0.34	1.17
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Protactinium-231	0	UJ	0.457	0.44
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Protactinium-234	-0.134	U	0.356	0.205
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Protactinium-234m	0.827	U	5.6	3.45
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Radium-223	0.131	U	0.665	0.344
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Radium-224	0.915		0.645	0.765
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Radium-226	0.723		0.0779	0.134
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Thallium-208	0.292		0.033	0.06
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Thorium-227	0.076	U	0.272	0.15
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Thorium-228	0.896		0.0602	0.0828
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Thorium-232	0.972		0.144	0.201
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Actinium-228	0.625		0.159	0.21
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Americium-241	0.0212	U	0.186	0.105
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Bismuth-212	0.852		0.528	0.603
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Bismuth-214	0.477		0.0776	0.101
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Cesium-137	0.0193	U	0.0466	0.0252
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Cobalt-60	0.00783	U	0.044	0.0203
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Europium-152	0.0142	U	0.106	0.0568
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Europium-154	0.0239	U	0.134	0.0634
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Europium-155	0.00714	U	0.11	0.0598
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Lead-212	0.683		0.0566	0.0766
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Lead-214	0.705		0.191	0.105
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Potassium-40	12.1		0.455	1.1
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Protactinium-231	0.422	U	0.499	0.394
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Protactinium-234	-0.0292	U	0.34	0.19
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Protactinium-234m	3.38	U	6.54	4.53
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Radium-223	-0.138	U	0.619	0.374
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Radium-224	0	UJ	0.606	0.778
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Radium-226	0.477		0.0776	0.101
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Thallium-208	0.228		0.0365	0.051
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Thorium-227	0.0722	U	0.257	0.14
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Thorium-228	0.683		0.0566	0.0766
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Thorium-232	0.625		0.159	0.21
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Actinium-228	0.71		0.168	0.196
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Americium-241	0.0403	U	0.169	0.0984

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Bismuth-212	0.929		0.664	0.516
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Bismuth-214	0.546		0.0932	0.122
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Cesium-137	-0.0247	U	0.0435	0.0273
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Cobalt-60	0.00239	U	0.0487	0.025
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Europium-152	-0.0262	U	0.125	0.07
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Europium-154	0.00674	U	0.141	0.0727
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Europium-155	0.0327	U	0.126	0.0696
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Lead-212	0.602		0.0789	0.115
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Lead-214	0.613		0.0865	0.135
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Potassium-40	12.1		0.344	1.04
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Protactinium-231	0.215	U	0.598	0.339
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Protactinium-234	-0.0212	U	0.396	0.211
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Protactinium-234m	-0.929	U	5.73	3.16
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Radium-223	0.0146	U	0.779	0.42
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Radium-224	0.717	U	0.983	1.34
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Radium-226	0.546		0.0932	0.122
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Thallium-208	0.217		0.0363	0.0496
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Thorium-227	0.00861	U	0.316	0.169
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Thorium-228	0.602		0.0789	0.115
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Thorium-232	0.71		0.168	0.196
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Actinium-228	0.823		0.128	0.197
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Americium-241	0.0521	U	0.117	0.0666
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Bismuth-212	1.12		0.586	0.65
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Bismuth-214	0.701		0.0805	0.127
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Cesium-137	0.00965	U	0.0489	0.0264
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Cobalt-60	0.0139	U	0.0528	0.0259
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Europium-152	0.00794	U	0.112	0.0597
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Europium-154	0.0054	U	0.158	0.084
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Europium-155	0.0219	U	0.106	0.0586
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Lead-212	0.824		0.0632	0.0817
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Lead-214	0.791		0.205	0.116
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Potassium-40	19.8		0.393	1.33
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Protactinium-231	0	UJ	0.563	0.437
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Protactinium-234	-0.344	U	0.329	0.214
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Protactinium-234m	-0.131	U	6.4	3.47
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Radium-223	-0.469	U	0.648	0.386
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Radium-224	1.68		0.678	0.831
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Radium-226	0.701		0.0805	0.127
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Thallium-208	0.23		0.0383	0.0569
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Thorium-227	-0.0152	U	0.266	0.143
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Thorium-228	0.824		0.0632	0.0817
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Thorium-232	0.823		0.128	0.197
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Actinium-228	0.736		0.15	0.196
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Americium-241	0.0119	U	0.0451	0.028
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Bismuth-212	1.19		0.466	0.567
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Bismuth-214	0.519		0.0694	0.0958
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Cesium-137	0.0413		0.0401	0.0367
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Cobalt-60	0.0191	U	0.0372	0.0361
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Europium-152	0.0163	U	0.0891	0.048
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Europium-154	0.0246	U	0.117	0.0576
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Europium-155	0.0106	U	0.0774	0.0415
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Lead-212	0.617		0.0467	0.0641
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Lead-214	0.576		0.0593	0.0918
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Potassium-40	10.6		0.392	0.955

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Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Protactinium-231	0.241	U	0.462	0.228
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Protactinium-234	0.0594	U	0.307	0.153
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Protactinium-234m	0.0982	U	5.59	3.28
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Radium-223	0.196	U	0.538	0.293
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Radium-224	0.891		0.501	0.749
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Radium-226	0.519		0.0694	0.0958
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Thallium-208	0.232		0.0347	0.0528
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Thorium-227	-0.052	U	0.198	0.106
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Thorium-228	0.617		0.0467	0.0641
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Thorium-232	0.736		0.15	0.196
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Actinium-228	0.792		0.128	0.226
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Americium-241	-0.00312	U	0.146	0.0761
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Bismuth-212	1.16		0.427	0.555
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Bismuth-214	0.612		0.0672	0.104
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Cesium-137	0.0215	U	0.0449	0.0245
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Cobalt-60	-0.00599	U	0.0343	0.0179
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Europium-152	0.0569	U	0.0878	0.065
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Europium-154	0.0272	U	0.121	0.069
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Europium-155	0.0595	U	0.103	0.0553
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Lead-212	0.822		0.0555	0.0774
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Lead-214	0.688		0.164	0.102
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Potassium-40	12		0.362	0.964
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Protactinium-231	0	UJ	0.451	0.454
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Protactinium-234	0.106	U	0.289	0.14
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Protactinium-234m	-0.829	U	4.32	2.44
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Radium-223	0.121	U	0.577	0.314
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Radium-224	0.934		0.594	0.836
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Radium-226	0.612		0.0672	0.104
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Thallium-208	0.205		0.0349	0.0492
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Thorium-227	0.0283	U	0.236	0.129
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Thorium-228	0.822		0.0555	0.0774
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Thorium-232	0.792		0.128	0.226
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Actinium-228	0.801		0.147	0.239
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Americium-241	-0.0517	U	0.273	0.138
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Bismuth-212	0.9		0.514	0.535
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Bismuth-214	0.601		0.0752	0.124
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Cesium-137	0.0865		0.041	0.0466
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Cobalt-60	0.0105	U	0.037	0.016
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Europium-152	0.0214	U	0.112	0.0649
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Europium-154	-0.0532	U	0.116	0.0679
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Europium-155	0.0327	U	0.132	0.0658
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Lead-212	0.662		0.0651	0.111
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Lead-214	0.641		0.0922	0.124
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Potassium-40	7.92		0.416	0.837
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Protactinium-231	0	UJ	0.501	0.534
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Protactinium-234	-0.0793	U	0.305	0.166
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Protactinium-234m	0.689	U	5.21	2.61
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Radium-223	-0.0209	U	0.654	0.391
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Radium-224	0.859	U	1.01	0.698
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Radium-226	0.601		0.0752	0.124
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Thallium-208	0.232		0.0337	0.0548
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Thorium-227	-0.00192	U	0.289	0.153
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Thorium-228	0.662		0.0651	0.111
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Thorium-232	0.801		0.147	0.239

Table 5-10. RBA-1 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

J - Analyte present. Reported value may or may not be accurate or precise

pCi/g - picocure per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-11. RBA-1 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Radium-226	0.537		0.0389	0.0868
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Americium-241	0.0431	UJ	0.129	0.121
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Plutonium-238	-0.0176	UJ	0.203	0.0779
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Plutonium-239/240	0.00147	UJ	0.242	0.109
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Thorium-228	0.848	J	0.272	0.359
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Thorium-230	0.661	J	0.296	0.324
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Thorium-232	0.832	J	0.196	0.342
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Uranium-233/234	0.653		0.135	0.185
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Uranium-235/236	0.0287	U	0.104	0.0622
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Uranium-238	0.336		0.104	0.134
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Radium-226	0.7		0.0614	0.115
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Americium-241	0	UJ	0.124	0.0831
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Plutonium-238	-0.00919	UJ	0.184	0.0792
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Plutonium-239/240	0.0199	UJ	0.212	0.111
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Thorium-228	0.612	J	0.429	0.345
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Thorium-230	0.437	J	0.372	0.29
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Thorium-232	0.757	J	0.372	0.35
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Uranium-233/234	0.539		0.109	0.159
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Uranium-235/236	0.0579	U	0.0846	0.067
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Uranium-238	0.487		0.0832	0.148
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Radium-226	0.734		0.0468	0.111
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Americium-241	-0.0126	UJ	0.251	0.108
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Plutonium-238	-0.0203	UJ	0.234	0.0896
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Plutonium-239/240	0.0742	UJ	0.202	0.146
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Thorium-228	1.14	J	0.27	0.417
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Thorium-230	0.432	J	0.315	0.282
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Thorium-232	0.688	J	0.203	0.319
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Uranium-233/234	0.54		0.121	0.18
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Uranium-235/236	0.0681	U	0.121	0.0869
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Uranium-238	0.601		0.139	0.191
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Radium-226	0.71		0.0665	0.131
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Americium-241	0.038	UJ	0.241	0.13
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Plutonium-238	0.00145	UJ	0.239	0.107
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Plutonium-239/240	0.0651	UJ	0.254	0.148
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Thorium-228	0.364	UJ	0.527	0.38
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Thorium-230	0.443	UJ	0.47	0.386
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Thorium-232	0.689	J	0.478	0.456
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Uranium-233/234	0.839		0.115	0.208
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Uranium-235/236	0.169		0.118	0.117
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Uranium-238	0.598		0.119	0.179
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Radium-226	0.606		0.0461	0.109
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Americium-241	-0.0627	UJ	0.448	0.178
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Plutonium-238	-0.0275	UJ	0.233	0.083
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Plutonium-239/240	-0.026	UJ	0.296	0.117
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Thorium-228	0.508	J	0.205	0.249
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Thorium-230	0.502	J	0.249	0.254
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Thorium-232	0.572	J	0.155	0.252
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Uranium-233/234	0.469		0.168	0.18
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Uranium-235/236	0.153		0.136	0.119
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Uranium-238	0.795		0.137	0.219
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Radium-226	0.509		0.0603	0.111

Table 5-11. RBA-1 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Americium-241	-0.0221	UJ	0.372	0.153
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Plutonium-238	-0.0622	UJ	0.311	0.118
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Plutonium-239/240	-0.0574	UJ	0.241	0.0722
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Thorium-228	0.441	J	0.386	0.317
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Thorium-230	0.589	J	0.324	0.334
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Thorium-232	0.484	J	0.248	0.294
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Uranium-233/234	0.35		0.178	0.162
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Uranium-235/236	0.0392	U	0.108	0.0707
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Uranium-238	0.605		0.127	0.189
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Radium-226	0.289	J	0.146	0.128
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Americium-241	0.122	UJ	0.264	0.181
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Plutonium-238	-0.0324	UJ	0.339	0.14
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Plutonium-239/240	-0.0604	UJ	0.329	0.118
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Thorium-228	0.341	UJ	0.546	0.386
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Thorium-230	0.02	UJ	0.5	0.235
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Thorium-232	0.128	UJ	0.246	0.226
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Uranium-233/234	0.255		0.105	0.124
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Uranium-235/236	0.0106	U	0.088	0.0489
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Uranium-238	0.152		0.084	0.0963
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Radium-226	0.114	J	0.112	0.0832
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Americium-241	-0.0805	UJ	0.312	0.0917
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Plutonium-238	-0.00476	UJ	0.25	0.11
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Plutonium-239/240	-0.0345	UJ	0.249	0.0936
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Thorium-228	-0.0241	UJ	0.398	0.191
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Thorium-230	0.178	UJ	0.31	0.206
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Thorium-232	0.108	UJ	0.273	0.171
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Uranium-233/234	0.0359	U	0.166	0.091
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Uranium-235/236	-0.00151	U	0.132	0.0585
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Uranium-238	0.0292	U	0.106	0.0634
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Radium-226	0.24	J	0.133	0.12
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Americium-241	0.0211	UJ	0.225	0.117
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Plutonium-238	-0.0306	UJ	0.508	0.222
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Plutonium-239/240	0.116	UJ	0.312	0.206
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Thorium-228	0.00413	UJ	0.564	0.256
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Thorium-230	-0.0629	UJ	0.538	0.205
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Thorium-232	0.0348	UJ	0.507	0.246
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Uranium-233/234	0.0893	U	0.139	0.0949
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Uranium-235/236	-0.025	U	0.132	0.0436
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Uranium-238	0.106	U	0.107	0.0897
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Radium-226	0.377	J	0.0786	0.117
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Americium-241	-0.00858	UJ	0.171	0.074
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Plutonium-238	0.123	UJ	0.255	0.171
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Plutonium-239/240	0.00413	UJ	0.317	0.147
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Thorium-228	0.127	UJ	0.561	0.309
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Thorium-230	0.295	UJ	0.477	0.337
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Thorium-232	0.293	J	0.224	0.286
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Uranium-233/234	0.281	J	0.175	0.172
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Uranium-235/236	0.0535	UJ	0.0802	0.0927
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Uranium-238	0.417	J	0.135	0.196
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Radium-226	0.256	J	0.105	0.104
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Americium-241	0.101	UJ	0.265	0.164

Table 5-11. RBA-1 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Plutonium-238	-0.0259	UJ	0.22	0.0783
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Plutonium-239/240	0.036	UJ	0.108	0.101
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Thorium-228	0.0402	UJ	0.446	0.231
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Thorium-230	0.0698	UJ	0.52	0.273
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Thorium-232	0.0748	UJ	0.287	0.219
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Uranium-233/234	0.04	U	0.159	0.0891
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Uranium-235/236	0.0256	U	0.125	0.0721
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Uranium-238	0.0575	U	0.123	0.0817
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Radium-226	0.205		0.132	0.115
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Americium-241	-0.0282	UJ	0.194	0.0654
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Plutonium-238	0.0653	UJ	0.312	0.18
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Plutonium-239/240	0.0163	UJ	0.395	0.186
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Thorium-228	0.108	U	0.362	0.21
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Thorium-230	0.381		0.324	0.243
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Thorium-232	0.229		0.173	0.163
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Uranium-233/234	0.292		0.0725	0.105
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Uranium-235/236	0.00704	U	0.0583	0.0324
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Uranium-238	0.213		0.0622	0.0898
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Radium-226	0.271		0.148	0.127
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Americium-241	0.051	UJ	0.242	0.134
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Plutonium-238	0.0347	UJ	0.219	0.13
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Plutonium-239/240	0.0931	UJ	0.301	0.185
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Thorium-228	0.385		0.354	0.248
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Thorium-230	0.447		0.24	0.213
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Thorium-232	0.51		0.223	0.218
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Uranium-233/234	0.172	J	0.101	0.0952
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Uranium-235/236	0.0328	UJ	0.0975	0.0597
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Uranium-238	0.324	J	0.0845	0.12
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Radium-226	0.147		0.0936	0.0786
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Americium-241	0.0239	U	0.239	0.12
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Plutonium-238	-0.0239	UJ	0.272	0.108
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Plutonium-239/240	-0.0154	UJ	0.259	0.107
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Thorium-228	0.107	U	0.407	0.233
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Thorium-230	0.33		0.322	0.233
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Thorium-232	0.247		0.172	0.167
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Uranium-233/234	0.0966		0.0793	0.0665
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Uranium-235/236	0.00574	U	0.0779	0.0383
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Uranium-238	0.0852		0.0518	0.0572
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Radium-226	0.155		0.0647	0.0713
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Americium-241	0.00816	UJ	0.178	0.0853
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Plutonium-238	0	UJ	0.0929	0.0624
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Plutonium-239/240	-0.0446	UJ	0.229	0.0718
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Thorium-228	0.0867	U	0.459	0.256
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Thorium-230	0.358	U	0.439	0.3
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Thorium-232	0.311		0.229	0.219
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Uranium-233/234	0.141		0.113	0.089
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Uranium-235/236	-0.0106	U	0.102	0.0465
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Uranium-238	0.0858	U	0.0949	0.0713
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Radium-226	0.205		0.0608	0.0819
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Americium-241	0.0761	UJ	0.204	0.135
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Plutonium-238	0.0208	UJ	0.221	0.116

Table 5-11. RBA-1 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Plutonium-239/240	0.0112	UJ	0.244	0.117
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Thorium-228	0.311	U	0.437	0.29
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Thorium-230	0.316	U	0.391	0.27
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Thorium-232	0.241	U	0.308	0.222
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Uranium-233/234	0.131		0.074	0.0688
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Uranium-235/236	0.0135	U	0.0659	0.0366
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Uranium-238	0.104		0.0695	0.0619
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Radium-226	0.795		0.126	0.152
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Americium-241	-0.0219	UJ	0.25	0.0992
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Plutonium-238	0.0219	UJ	0.233	0.122
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Plutonium-239/240	-0.0404	UJ	0.277	0.0936
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Thorium-228	1.06	J	0.414	0.538
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Thorium-230	0.487	J	0.394	0.381
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Thorium-232	0.806	J	0.378	0.466
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Uranium-233/234	0.721		0.0839	0.161
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Uranium-235/236	0.0209	U	0.0762	0.0454
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Uranium-238	0.475		0.0762	0.132
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Radium-226	0.703		0.0856	0.124
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Americium-241	-0.0125	UJ	0.209	0.086
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Plutonium-238	-0.00869	UJ	0.174	0.075
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Plutonium-239/240	0.127	UJ	0.201	0.161
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Thorium-228	0.825	J	0.484	0.455
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Thorium-230	0.292	UJ	0.384	0.29
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Thorium-232	0.69	J	0.379	0.397
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Uranium-233/234	0.571		0.0805	0.148
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Uranium-235/236	0.054	U	0.0618	0.0571
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Uranium-238	0.631		0.0658	0.154
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Radium-226	0.13		0.0871	0.0721
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Americium-241	0.133	UJ	0.389	0.229
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Plutonium-238	-0.0251	UJ	0.29	0.111
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Plutonium-239/240	-0.0125	UJ	0.251	0.108
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Thorium-228	0.0972	U	0.373	0.218
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Thorium-230	0.178	U	0.39	0.246
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Thorium-232	0.0895	U	0.256	0.168
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Uranium-233/234	0.00821	UJ	0.0923	0.046
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Uranium-235/236	-0.00984	UJ	0.0855	0.0316
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Uranium-238	0.151	J	0.0586	0.0846
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Radium-226	0.1		0.0882	0.0689
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Americium-241	-0.0294	UJ	0.305	0.126
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Plutonium-238	-0.018	UJ	0.208	0.0798
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Plutonium-239/240	0.0947	UJ	0.208	0.15
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Thorium-228	-0.0312	U	0.493	0.249
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Thorium-230	0.203	U	0.439	0.269
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Thorium-232	-0.00793	U	0.263	0.129
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Uranium-233/234	0.0108	U	0.0744	0.0388
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Uranium-235/236	0.0181	U	0.0657	0.0392
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Uranium-238	0.0569	U	0.0692	0.0518
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Radium-226	0.0639	UJ	0.122	0.078
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Americium-241	0.0114	UJ	0.276	0.13
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Plutonium-238	0.047	UJ	0.223	0.124
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Plutonium-239/240	-0.0783	UJ	0.3	0.101

Table 5-11. RBA-1 - Alpha Spectroscopy Analytical Results

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Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Thorium-228	0.1	UJ	0.419	0.235
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Thorium-230	0.168	UJ	0.349	0.221
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Thorium-232	0.0577	UJ	0.124	0.112
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Uranium-233/234	0.137		0.109	0.0945
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Uranium-235/236	-0.00121	U	0.106	0.047
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Uranium-238	0.0626	U	0.116	0.0764
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Radium-226	0.314	J	0.0847	0.104
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Americium-241	0.11	UJ	0.296	0.195
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Plutonium-238	0.0277	UJ	0.276	0.138
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Plutonium-239/240	-0.123	UJ	0.412	0.154
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Thorium-228	0.21	UJ	0.555	0.343
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Thorium-230	0.237	UJ	0.483	0.328
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Thorium-232	0.184	UJ	0.473	0.303
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Uranium-233/234	0.136		0.0898	0.071
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Uranium-235/236	-0.0138	U	0.085	0.0383
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Uranium-238	0.212		0.0688	0.0759
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Radium-226	0.619	J	0.0687	0.131
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Americium-241	0.0767	UJ	0.248	0.153
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Plutonium-238	0.181	UJ	0.461	0.274
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Plutonium-239/240	0.0955	UJ	0.21	0.152
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Thorium-228	0.716	J	0.39	0.41
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Thorium-230	1.36	J	0.401	0.537
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Thorium-232	0.656	J	0.277	0.372
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Uranium-233/234	0.55		0.162	0.165
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Uranium-235/236	0	U	0.0899	0.0461
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Uranium-238	0.523		0.146	0.157
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Radium-226	0.621		0.0731	0.115
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Americium-241	0.075	UJ	0.242	0.149
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Plutonium-238	-0.0169	UJ	0.284	0.117
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Plutonium-239/240	0.06	UJ	0.284	0.158
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Thorium-228	0.881	J	0.492	0.455
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Thorium-230	0.641	J	0.383	0.374
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Thorium-232	0.574	J	0.297	0.34
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Uranium-233/234	0.64	J	0.164	0.234
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Uranium-235/236	0.0407	UJ	0.132	0.0878
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Uranium-238	0.447	J	0.126	0.194
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Radium-226	0.39	J	0.0763	0.0982
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Americium-241	0.016	UJ	0.17	0.0889
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Plutonium-238	0.0665	UJ	0.259	0.151
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Plutonium-239/240	0.168	UJ	0.273	0.197
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Thorium-228	0.33		0.156	0.172
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Thorium-230	0.642		0.281	0.256
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Thorium-232	0.353		0.208	0.188
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Uranium-233/234	0.464		0.163	0.185
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Uranium-235/236	0.0591		0.0591	0.0785
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Uranium-238	0.418		0.13	0.17
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Radium-226	0.866		0.0527	0.124
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Americium-241	0.0994	UJ	0.218	0.158
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Plutonium-238	0.0106	UJ	0.257	0.121
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Plutonium-239/240	-0.0265	UJ	0.365	0.162
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Thorium-228	1.54	J	0.459	0.568

Table 5-11. RBA-1 - Alpha Spectroscopy Analytical Results

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Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Thorium-230	1.14	J	0.382	0.481
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Thorium-232	1.07	J	0.36	0.463
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Uranium-233/234	0.489	J	0.212	0.265
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Uranium-235/236	0	UJ	0.121	0.0839
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Uranium-238	0.682	J	0.228	0.31
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Radium-226	0.791		0.0603	0.121
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Americium-241	-0.0274	UJ	0.313	0.124
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Plutonium-238	0.00288	UJ	0.291	0.133
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Plutonium-239/240	-0.0952	UJ	0.323	0.0919
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Thorium-228	1.07	J	0.191	0.383
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Thorium-230	1.17	J	0.323	0.415
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Thorium-232	0.885	J	0.237	0.352
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Uranium-233/234	0.504		0.126	0.178
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Uranium-235/236	0.0362	U	0.0543	0.0627
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Uranium-238	0.575		0.0916	0.185
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Radium-226	1.14		0.0591	0.15
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Americium-241	-0.0117	U	0.197	0.0811
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Plutonium-238	-0.0121	UJ	0.106	0.0408
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Plutonium-239/240	-0.0021	UJ	0.11	0.0486
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Thorium-228	1.44	J	0.37	0.5
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Thorium-230	1.16	J	0.372	0.451
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Thorium-232	0.973	J	0.262	0.399
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Uranium-233/234	0.767		0.105	0.181
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Uranium-235/236	0.0894		0.0383	0.0714
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Uranium-238	0.808		0.0842	0.183
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Radium-226	0.629		0.0774	0.145
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Americium-241	0.0301	UJ	0.0974	0.06
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Plutonium-238	0	UJ	0.0464	0.0312
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Plutonium-239/240	0	UJ	0.0463	0.0311
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Thorium-228	1.49		0.163	0.299
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Thorium-230	0.795		0.2	0.231
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Thorium-232	1.33		0.128	0.276
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Uranium-233/234	0.569		0.0757	0.139
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Uranium-235/236	0.0167	U	0.0541	0.0361
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Uranium-238	0.549		0.0627	0.135
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Radium-226	0.701		0.119	0.188
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Americium-241	0.0476	UJ	0.105	0.0756
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Plutonium-238	0.0153	UJ	0.382	0.181
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Plutonium-239/240	-0.0187	UJ	0.315	0.129
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Thorium-228	0.147	U	0.217	0.142
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Thorium-230	0.323		0.174	0.159
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Thorium-232	0.267		0.12	0.134
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Uranium-233/234	0.335		0.0823	0.107
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Uranium-235/236	0.0281		0.0281	0.041
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Uranium-238	0.326		0.058	0.102
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Radium-226	0.627		0.0861	0.149
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Americium-241	-0.0822	UJ	0.263	0.0853
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Plutonium-238	0.011	UJ	0.159	0.0775
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Plutonium-239/240	0.0933	UJ	0.148	0.105
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Thorium-228	1.07	J	0.177	0.269
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Thorium-230	0.889		0.182	0.246

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Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Thorium-232	1.27	J	0.113	0.279
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Uranium-233/234	0.549		0.0849	0.137
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Uranium-235/236	0.026	U	0.0771	0.0472
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Uranium-238	0.606		0.0573	0.141
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Radium-226	0.662		0.089	0.166
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Americium-241	-0.00238	UJ	0.125	0.0551
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Plutonium-238	0.0386	UJ	0.129	0.0762
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Plutonium-239/240	-0.0472	UJ	0.169	0.0562
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Thorium-228	0.477	J	0.338	0.282
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Thorium-230	0.734	J	0.36	0.333
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Thorium-232	0.579	J	0.23	0.273
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Uranium-233/234	0.708		0.0722	0.149
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Uranium-235/236	0.00886	U	0.0673	0.0354
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Uranium-238	0.495		0.0593	0.125
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Radium-226	0.513		0.0687	0.121
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Americium-241	0.015	UJ	0.131	0.067
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Plutonium-238	0.00175	UJ	0.288	0.13
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Plutonium-239/240	-0.028	UJ	0.392	0.165
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Thorium-228	0.617		0.169	0.214
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Thorium-230	0.673		0.181	0.223
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Thorium-232	0.708		0.102	0.216
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Uranium-233/234	0.374	J	0.102	0.134
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Uranium-235/236	-0.0147	UJ	0.095	0.0328
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Uranium-238	0.463	J	0.105	0.148
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Radium-226	0.45		0.0942	0.127
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Americium-241	0.0234	UJ	0.205	0.105
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Plutonium-238	0.025	UJ	0.114	0.0628
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Plutonium-239/240	-0.0147	UJ	0.141	0.0597
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Thorium-228	0.401	UJ	0.432	0.342
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Thorium-230	0.333	UJ	0.48	0.336
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Thorium-232	0.486	J	0.25	0.328
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Uranium-233/234	0.517	J	0.122	0.156
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Uranium-235/236	0.0299	UJ	0.0819	0.0538
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Uranium-238	0.57	J	0.0915	0.158
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Radium-226	0.545		0.054	0.101
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Americium-241	0.0709	UJ	0.467	0.244
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Plutonium-238	-0.0674	UJ	0.33	0.117
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Plutonium-239/240	-0.043	UJ	0.251	0.0815
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Thorium-228	0.292	UJ	0.509	0.347
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Thorium-230	0.539	J	0.449	0.402
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Thorium-232	0.713	J	0.362	0.431
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Uranium-233/234	0.3	J	0.201	0.18
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Uranium-235/236	0.0254	UJ	0.0761	0.0725
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Uranium-238	0.195	J	0.187	0.151
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Radium-226	0.788		0.0797	0.152
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Americium-241	0.0196	UJ	0.283	0.138
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Plutonium-238	0.0393	UJ	0.0917	0.059
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Plutonium-239/240	-0.00852	UJ	0.0723	0.0257
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Thorium-228	2.58	J	0.338	0.673
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Thorium-230	0.729	J	0.38	0.386
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Thorium-232	1.85	J	0.213	0.558

Table 5-11. RBA-1 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Uranium-233/234	0.555	J	0.113	0.17
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Uranium-235/236	0.0194	UJ	0.095	0.0548
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Uranium-238	0.461	J	0.0934	0.154
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Radium-226	0.57		0.0583	0.116
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Americium-241	-0.019	UJ	0.265	0.112
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Plutonium-238	0.00741	UJ	0.107	0.0521
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Plutonium-239/240	-0.0262	UJ	0.117	0.0405
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Thorium-228	1.07	J	0.325	0.448
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Thorium-230	0.909	J	0.425	0.434
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Thorium-232	0.94	J	0.349	0.423
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Uranium-233/234	0.606		0.0879	0.142
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Uranium-235/236	0.0387	U	0.0684	0.0494
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Uranium-238	0.384		0.0786	0.114
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Radium-226	0.442		0.0585	0.11
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Americium-241	0.0109	UJ	0.271	0.128
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Plutonium-238	-0.0225	UJ	0.14	0.0547
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Plutonium-239/240	0.0253	UJ	0.0987	0.0575
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Thorium-228	0.783	J	0.205	0.368
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Thorium-230	0.718	J	0.288	0.36
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Thorium-232	0.762	J	0.205	0.358
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Uranium-233/234	0.851	J	0.0994	0.211
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Uranium-235/236	0	UJ	0.0483	0.0336
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Uranium-238	0.695	J	0.0815	0.19
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Radium-226	0.564		0.0716	0.126
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Americium-241	-0.0226	UJ	0.316	0.133
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Plutonium-238	-0.00213	UJ	0.0746	0.0319
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Plutonium-239/240	0.00851	UJ	0.0746	0.0381
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Thorium-228	0.669	J	0.38	0.382
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Thorium-230	0.817	J	0.382	0.411
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Thorium-232	0.662	J	0.296	0.36
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Uranium-233/234	0.49		0.0642	0.128
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Uranium-235/236	0.0373	U	0.0544	0.0461
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Uranium-238	0.445		0.044	0.121
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Radium-226	0.466		0.0536	0.108
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Americium-241	0.00242	UJ	0.244	0.111
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Plutonium-238	0.0118	UJ	0.104	0.053
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Plutonium-239/240	-0.00295	UJ	0.104	0.0443
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Thorium-228	0.704	J	0.311	0.382
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Thorium-230	0.932	J	0.407	0.446
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Thorium-232	0.709	J	0.261	0.373
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Uranium-233/234	0.542	J	0.102	0.155
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Uranium-235/236	0.0472	UJ	0.0688	0.0583
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Uranium-238	0.465	J	0.0657	0.14
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Radium-226	0.503		0.0917	0.134
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Americium-241	-0.0125	UJ	0.106	0.0379
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Plutonium-238	0.0386	UJ	0.245	0.132
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Plutonium-239/240	0.0119	UJ	0.287	0.135
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Thorium-228	0.7		0.158	0.202
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Thorium-230	0.799		0.142	0.209
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Thorium-232	0.792		0.0803	0.2
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Uranium-233/234	0.632		0.0718	0.15

Table 5-11. RBA-1 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Uranium-235/236	-0.00392	U	0.0577	0.0239
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Uranium-238	0.459		0.0717	0.129
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Radium-226	0.583		0.101	0.162
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Americium-241	0.0535	UJ	0.155	0.0952
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Plutonium-238	0.0667	UJ	0.391	0.209
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Plutonium-239/240	-0.0465	UJ	0.408	0.157
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Thorium-228	0.644		0.378	0.294
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Thorium-230	0.585		0.301	0.257
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Thorium-232	0.476		0.234	0.219
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Uranium-233/234	0.56		0.0725	0.149
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Uranium-235/236	0.00338	U	0.0755	0.0366
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Uranium-238	0.546		0.0682	0.146
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Radium-226	0.365		0.0716	0.124
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Americium-241	-0.00324	UJ	0.114	0.0486
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Plutonium-238	0.036	UJ	0.108	0.101
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Plutonium-239/240	-0.0245	UJ	0.279	0.111
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Thorium-228	0.589		0.113	0.213
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Thorium-230	0.465		0.2	0.205
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Thorium-232	0.555		0.175	0.214
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Uranium-233/234	0.404		0.104	0.131
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Uranium-235/236	0.00755	U	0.0625	0.0347
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Uranium-238	0.404		0.108	0.132
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Radium-226	0.858		0.106	0.175
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Americium-241	0.0135	UJ	0.0854	0.0508
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Plutonium-238	0.0309	UJ	0.231	0.119
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Plutonium-239/240	0.0297	UJ	0.188	0.102
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Thorium-228	1.07	J	0.178	0.312
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Thorium-230	1.02	J	0.262	0.318
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Thorium-232	1.13	J	0.133	0.313
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Uranium-233/234	0.75		0.0947	0.173
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Uranium-235/236	0.0827	U	0.0835	0.0723
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Uranium-238	0.782		0.0835	0.175
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Radium-226	0.517		0.0851	0.126
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Americium-241	-0.0326	UJ	0.19	0.0618
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Plutonium-238	-0.00813	UJ	0.426	0.188
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Plutonium-239/240	0.0325	UJ	0.494	0.241
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Thorium-228	0.591		0.157	0.202
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Thorium-230	0.562		0.172	0.199
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Thorium-232	0.439		0.112	0.168
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Uranium-233/234	0.455		0.0847	0.122
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Uranium-235/236	0.0375		0.0281	0.0416
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Uranium-238	0.45		0.0475	0.117
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Radium-226	0.842		0.0656	0.13
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Americium-241	-0.0674	UJ	0.284	0.0848
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Plutonium-238	-0.1	UJ	0.421	0.126
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Plutonium-239/240	-0.0855	UJ	0.467	0.168
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Thorium-228	1.2	J	0.533	0.538
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Thorium-230	0.555	J	0.41	0.37
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Thorium-232	0.766	J	0.321	0.402
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Uranium-233/234	0.498		0.0811	0.133
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Uranium-235/236	0.0449	U	0.0656	0.0519

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Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Uranium-238	0.452		0.0531	0.124
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Radium-226	0.429		0.0633	0.096
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Americium-241	0.00988	UJ	0.239	0.113
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Plutonium-238	-0.00571	UJ	0.096	0.0394
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Plutonium-239/240	0.0301	UJ	0.101	0.0594
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Thorium-228	0.867	J	0.24	0.363
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Thorium-230	1.15	J	0.292	0.417
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Thorium-232	0.923	J	0.221	0.367
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Uranium-233/234	0.629		0.082	0.157
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Uranium-235/236	0.0261	U	0.0967	0.0559
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Uranium-238	0.534		0.073	0.144
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Radium-226	0.461		0.063	0.117
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Americium-241	0.0838	UJ	0.146	0.121
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Plutonium-238	-0.00937	UJ	0.107	0.0424
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Plutonium-239/240	-0.00992	UJ	0.0841	0.0299
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Thorium-228	0.748	J	0.277	0.327
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Thorium-230	0.559	J	0.282	0.289
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Thorium-232	0.789	J	0.179	0.317
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Uranium-233/234	0.545		0.112	0.157
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Uranium-235/236	-0.00103	U	0.0896	0.0399
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Uranium-238	0.364		0.0987	0.129
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Radium-226	0.451		0.0953	0.119
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Americium-241	0.0101	UJ	0.243	0.115
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Plutonium-238	0.0222	UJ	0.12	0.0646
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Plutonium-239/240	0.00111	UJ	0.112	0.051
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Thorium-228	0.269	UJ	0.275	0.216
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Thorium-230	0.54	J	0.242	0.269
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Thorium-232	0.186	J	0.168	0.163
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Uranium-233/234	0.348	J	0.0686	0.106
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Uranium-235/236	-0.00762	U	0.0776	0.0311
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Uranium-238	0.462		0.0538	0.119
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Radium-226	0.542		0.0635	0.116
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Americium-241	0.0267	UJ	0.168	0.1
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Plutonium-238	-0.0237	UJ	0.109	0.0334
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Plutonium-239/240	-0.0259	UJ	0.143	0.0551
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Thorium-228	0.591	J	0.336	0.337
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Thorium-230	1.03	J	0.294	0.415
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Thorium-232	0.595	J	0.306	0.329
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Uranium-233/234	0.648	J	0.08	0.128
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Uranium-235/236	0.026	U	0.0436	0.0342
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Uranium-238	0.349		0.0424	0.0919
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Radium-226	0.622	J	0.0603	0.117
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Americium-241	0.0381	U	0.334	0.171
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Plutonium-238	-0.012	UJ	0.105	0.0406
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Plutonium-239/240	-0.0219	UJ	0.101	0.0309
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Thorium-228	1.01	J	0.232	0.382
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Thorium-230	0.637	J	0.322	0.325
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Thorium-232	0.585	J	0.214	0.293
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Uranium-233/234	0.581		0.0942	0.147
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Uranium-235/236	0.014	U	0.0685	0.0395
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Uranium-238	0.795		0.0877	0.169

Table 5-11. RBA-1 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Radium-226	0.658		0.029	0.158
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Americium-241	-0.00951	UJ	0.11	0.042
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Plutonium-238	0.095	UJ	0.37	0.216
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Plutonium-239/240	0.0696	UJ	0.409	0.218
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Thorium-228	0.551		0.132	0.207
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Thorium-230	0.547		0.177	0.212
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Thorium-232	0.735		0.131	0.234
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Uranium-233/234	0.477		0.0989	0.141
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Uranium-235/236	0.0307	U	0.0912	0.0559
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Uranium-238	0.319		0.0838	0.116
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Radium-226	0.345		0.0766	0.11
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Americium-241	-0.00427	UJ	0.0852	0.0368
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Plutonium-238	0.0464	UJ	0.15	0.0922
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Plutonium-239/240	0.0182	UJ	0.159	0.0814
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Thorium-228	0.871		0.189	0.239
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Thorium-230	0.728		0.156	0.213
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Thorium-232	0.837		0.105	0.219
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Uranium-233/234	0.613	J	0.094	0.175
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Uranium-235/236	0.0755	J	0.0453	0.0732
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Uranium-238	0.557	J	0.0647	0.165
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Radium-226	0.668		0.0652	0.122
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Americium-241	0.0294	UJ	0.313	0.163
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Plutonium-238	-0.0261	UJ	0.222	0.079
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Plutonium-239/240	-0.00726	UJ	0.255	0.109
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Thorium-228	0.698	J	0.342	0.356
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Thorium-230	0.483	J	0.295	0.295
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Thorium-232	0.694	J	0.188	0.327
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Uranium-233/234	0.494	J	0.149	0.178
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Uranium-235/236	0.0112	UJ	0.0929	0.0516
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Uranium-238	0.729	J	0.129	0.208

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

J - Analyte present. Reported value may or may not be accurate or precise

pCi/g - picocure per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-12. RBA-1 - Gas Flow Proportional Counting Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Strontium-90	-0.037	U	0.0996	0.0459
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Strontium-90	-0.0376	U	0.148	0.0777
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Strontium-90	-0.00666	U	0.112	0.0564
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Strontium-90	-0.0828	U	0.144	0.0672
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Strontium-90	-0.0539	U	0.149	0.0731
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Strontium-90	-0.0245	U	0.145	0.0767
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Strontium-90	-0.00649	U	0.148	0.0792
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Strontium-90	-0.0383	U	0.148	0.077
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Strontium-90	0.0024	U	0.148	0.0801
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Strontium-90	-0.0763	U	0.137	0.0629
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Strontium-90	-0.0459	U	0.144	0.072
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Strontium-90	0.061	U	0.139	0.0818
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Strontium-90	-0.035	U	0.131	0.0684
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Strontium-90	0.0574	U	0.146	0.0851
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Strontium-90	0.0015	U	0.144	0.0797
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Strontium-90	-0.0975	U	0.144	0.0698
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Strontium-90	0.0631	U	0.146	0.0853
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Strontium-90	-0.0573	U	0.147	0.0729
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Strontium-90	0.076	U	0.119	0.0734
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Strontium-90	0.0314	U	0.145	0.0796
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Strontium-90	-0.0711	U	0.15	0.0754
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Strontium-90	-0.0227	U	0.147	0.0773
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Strontium-90	-0.00591	U	0.14	0.075
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Strontium-90	-0.0537	U	0.148	0.0741
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Strontium-90	-0.0657	U	0.149	0.0722
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Strontium-90	0.0863	U	0.149	0.0895
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Strontium-90	-0.0151	U	0.148	0.0784
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Strontium-90	0.0225	U	0.141	0.0766
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Strontium-90	-0.0279	U	0.118	0.0563
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Strontium-90	0.00923	U	0.148	0.0802
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Strontium-90	0.0254	U	0.145	0.0812
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Strontium-90	0.0145	U	0.144	0.0783
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Strontium-90	0.0424	U	0.139	0.0794
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Strontium-90	-0.0338	U	0.143	0.0718
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Strontium-90	-0.032	U	0.143	0.0751
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Strontium-90	0.0185	U	0.0881	0.0477
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Strontium-90	0.11	U	0.147	0.0894
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Strontium-90	-0.00912	U	0.145	0.0744
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Strontium-90	-0.00552	U	0.124	0.0645
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Strontium-90	0.0515	U	0.144	0.0833
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Strontium-90	0.0241	U	0.147	0.0807
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Strontium-90	-0.0128	U	0.146	0.0774
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Strontium-90	0.0065	U	0.146	0.0789
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Strontium-90	-0.00252	U	0.148	0.0822
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Strontium-90	0.0548	U	0.146	0.0845
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Strontium-90	-0.0427	U	0.139	0.0673

Table 5-12. RBA-1 - Gas Flow Proportional Counting Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Strontium-90	-0.0031	U	0.145	0.0784
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Strontium-90	-0.0631	U	0.143	0.0725
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Strontium-90	0.0226	U	0.144	0.0785
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Strontium-90	0.0574	U	0.147	0.0863
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Strontium-90	0.0987	U	0.147	0.0894
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Strontium-90	0.0847	U	0.146	0.0873
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Strontium-90	0.00772	U	0.147	0.0807
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Strontium-90	-0.0755	U	0.146	0.0724

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

pCi/g - picocure per gram

U - Not Detected

Table 5-13. RBA-1 - Radon Emanation Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SB01-0102-0819	08/30/2019 17:12	Radium-226	0.666		0.0809	0.167
HPRBA1-SB01-0304-0819	08/30/2019 17:14	Radium-226	0.846		0.108	0.184
HPRBA1-SB01-0506-0819	08/30/2019 17:16	Radium-226	0.589		0.123	0.16
HPRBA1-SB01-0708-0819	08/30/2019 17:18	Radium-226	0.561		0.0728	0.146
HPRBA1-SB01-0910-0819	08/30/2019 17:20	Radium-226	0.949		0.153	0.204
HPRBA1-SB08-0102-0819	08/30/2019 13:32	Radium-226	0.694		0.175	0.198
HPRBA1-SB08-0304-0819	08/30/2019 13:34	Radium-226	0.241		0.0962	0.104
HPRBA1-SB08-0506-0819	08/30/2019 13:36	Radium-226	0.122	U	0.16	0.104
HPRBA1-SB08-0708-0819	08/30/2019 13:40	Radium-226	0.0699	U	0.153	0.0897
HPRBA1-SB08-0910-0819	08/30/2019 13:42	Radium-226	0.385		0.0797	0.127
HPRBA1-SB08P-0506-0819	08/30/2019 13:38	Radium-226	0.143	U	0.16	0.11
HPRBA1-SB13-0102-0919	09/03/2019 15:20	Radium-226	0.226		0.108	0.117
HPRBA1-SB13-0304-0919	09/03/2019 15:22	Radium-226	0.613		0.259	0.24
HPRBA1-SB13-0506-0919	09/03/2019 15:24	Radium-226	0.151	U	0.152	0.111
HPRBA1-SB13-0708-0919	09/03/2019 15:26	Radium-226	0.237		0.199	0.148
HPRBA1-SB13-0910-0919	09/03/2019 15:28	Radium-226	0.127	U	0.135	0.0998
HPRBA1-SB18-0102-0919	09/03/2019 13:02	Radium-226	1.05		0.164	0.243
HPRBA1-SB18-0304-0919	09/03/2019 13:04	Radium-226	0.644		0.173	0.195
HPRBA1-SB18-0910-0919	09/03/2019 13:06	Radium-226	0.0268	U	0.103	0.0525
HPRBA1-SB18P-0910-0919	09/03/2019 13:08	Radium-226	0.217		0.139	0.124
HPRBA1-SB25-0102-0819	08/30/2019 14:42	Radium-226	0.194		0.153	0.116
HPRBA1-SB25-0304-0819	08/30/2019 14:44	Radium-226	0.257		0.158	0.137
HPRBA1-SB25-0506-0819	08/30/2019 14:46	Radium-226	0.526		0.224	0.199
HPRBA1-SB25-0708-0819	08/30/2019 14:48	Radium-226	0.758		0.0995	0.179
HPRBA1-SB25-0910-0819	08/30/2019 14:50	Radium-226	0.328		0.117	0.133
HPRBA1-SB25P-0708-0819	08/30/2019 14:52	Radium-226	0.686		0.146	0.197
HPRBA1-SS01-000H-0819	08/30/2019 17:10	Radium-226	0.903		0.0833	0.197
HPRBA1-SS02-000H-0819	08/23/2019 11:20	Radium-226	1.12		0.147	0.236
HPRBA1-SS03-000H-0819	08/22/2019 16:25	Radium-226	-0.04	U	0.204	0.0866
HPRBA1-SS04-000H-0819	08/22/2019 15:55	Radium-226	0.387		0.148	0.155
HPRBA1-SS05-000H-0819	08/22/2019 09:50	Radium-226	0.751		0.197	0.232
HPRBA1-SS05P-000H-0819	08/22/2019 09:52	Radium-226	0.63		0.192	0.206
HPRBA1-SS06-000H-0819	08/22/2019 09:35	Radium-226	0.482		0.185	0.187
HPRBA1-SS07-000H-0819	08/22/2019 09:05	Radium-226	0.398		0.23	0.185
HPRBA1-SS08-000H-0819	08/30/2019 13:30	Radium-226	0.494		0.151	0.155
HPRBA1-SS09-000H-0819	08/23/2019 10:45	Radium-226	0.836		0.19	0.215
HPRBA1-SS10-000H-0819	08/23/2019 10:30	Radium-226	0.903		0.173	0.226
HPRBA1-SS11-000H-0819	08/23/2019 10:00	Radium-226	0.687		0.198	0.212
HPRBA1-SS12-000H-0819	08/23/2019 09:25	Radium-226	0.661		0.161	0.181
HPRBA1-SS12P-000H-0819	08/23/2019 09:27	Radium-226	0.951		0.163	0.224
HPRBA1-SS13-000H-0819	08/22/2019 14:30	Radium-226	0.566		0.166	0.187
HPRBA1-SS14-000H-0819	08/22/2019 14:05	Radium-226	0.506		0.101	0.149
HPRBA1-SS15-000H-0819	08/22/2019 13:50	Radium-226	0.617		0.11	0.189
HPRBA1-SS16-000H-0819	08/22/2019 12:05	Radium-226	0.713		0.0758	0.167
HPRBA1-SS17-000H-0819	08/22/2019 11:35	Radium-226	0.601		0.18	0.221
HPRBA1-SS18-000H-0919	09/03/2019 13:00	Radium-226	0.572		0.274	0.238
HPRBA1-SS19-000H-0819	08/23/2019 11:05	Radium-226	0.915		0.0934	0.21
HPRBA1-SS20-000H-0819	08/23/2019 09:00	Radium-226	0.483		0.164	0.162
HPRBA1-SS21-000H-0819	08/23/2019 08:10	Radium-226	0.676		0.114	0.182

Table 5-13. RBA-1 - Radon Emanation Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA1-SS21P-000H-0819	08/23/2019 08:12	Radium-226	0.582		0.175	0.184
HPRBA1-SS22-000H-0819	08/23/2019 08:35	Radium-226	0.527		0.147	0.169
HPRBA1-SS23-000H-0819	08/22/2019 15:30	Radium-226	0.698		0.114	0.204
HPRBA1-SS24-000H-0819	08/22/2019 14:50	Radium-226	0.697		0.186	0.206
HPRBA1-SS25-000H-0819	08/30/2019 14:40	Radium-226	0.716		0.117	0.17

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

pCi/g - picocure per gram

U - Not Detected

Table 5-14. RBA-1 - Summary of Combined Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	42 / 48	0	1.46	0.712	0.355	0.0513	0.764
	Am-241	0/48	-0.191	0.133	-0.00177	0.0567	0.00818	-0.00201
	Bi-212	32 / 48	-0.0354	2.06	0.843	0.486	0.0701	0.896
	Bi-214	44 / 48	0	1.1	0.538	0.268	0.0386	0.578
	Co-60	0/48	-0.0345	0.0474	0.00271	0.0157	0.00227	0.00134
	Cs-137	4 / 48	-0.0233	0.117	0.0117	0.0265	0.00382	0.00684
	Eu-152	0/48	-0.0895	0.0952	0.0032	0.0359	0.00518	0.00635
	Eu-154	0/48	-0.0887	0.0997	0.00497	0.0321	0.00463	0.00342
	Eu-155	0/48	-0.0261	0.0985	0.0259	0.0317	0.00458	0.0216
	K-40	47 / 48	0	19.8	9.705	6.522	0.941	9.38
	Pa-231	0/48	-0.179	0.612	0.115	0.177	0.0256	0.0164
	Pa-234	0/48	-0.344	0.325	-0.0211	0.122	0.0176	-0.0264
	Pa-234m	0/48	-3.52	3.76	0.492	1.713	0.247	0.519
	Pb-212	47 / 48	0.00272	1.49	0.752	0.38	0.0549	0.8
	Pb-214	44 / 48	0	1.26	0.624	0.327	0.0471	0.664
	Ra-223	0/48	-0.569	0.555	-0.0193	0.207	0.0299	-0.0268
	Ra-224	14 / 48	-0.216	1.94	0.578	0.57	0.0823	0.49
	Ra-226	44 / 48	0	1.1	0.538	0.268	0.0386	0.578
	Tl-208	46 / 48	0.00954	0.449	0.214	0.108	0.0156	0.225
	Th-227	0/48	-0.153	0.248	0.00622	0.0813	0.0117	0.0107
	Th-228	47 / 48	0.00272	1.49	0.752	0.38	0.0549	0.8
	Th-232	42 / 48	0	1.46	0.712	0.355	0.0513	0.764
Alpha Spectroscopy	Am-241	0/48	-0.0822	0.133	0.015	0.0478	0.00691	0.0112
	Pu-238	0/48	-0.1	0.181	0.0101	0.0471	0.00681	0.000725
	Pu-239/240	0/48	-0.123	0.168	0.00516	0.059	0.00852	-0.00105
	Ra-226	47 / 48	0.0639	1.14	0.51	0.229	0.033	0.527
	Th-228	32 / 48	-0.0241	2.58	0.646	0.48	0.0693	0.615
	Th-230	36 / 48	-0.0629	1.36	0.563	0.299	0.0432	0.544
	Th-232	41 / 48	0.0348	1.85	0.61	0.362	0.0522	0.659
	U-233/234	45 / 48	0.00821	0.851	0.448	0.214	0.0308	0.496
	U-235/236	7 / 48	-0.025	0.169	0.0293	0.0384	0.00554	0.0257
	U-238	44 / 48	0.0292	0.808	0.433	0.21	0.0303	0.456
Gas Flow Proportional Counting	Sr-90	0/48	-0.0975	0.11	-0.0064	0.0492	0.0071	-0.00658
Radon Emanation	Ra-226	42 / 48	-0.04	1.12	0.544	0.277	0.0399	0.581

Notes:

pCi/g - picocurie per gram

Table 5-15. RBA-1 - Summary of Surface Soil Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	25/25	0.482	1.2	0.81	0.174	0.0348	0.823
	Am-241	0/25	-0.191	0.133	-0.0008724	0.0699	0.014	0
	Bi-212	21/25	0.184	2.06	1.015	0.404	0.0809	0.984
	Bi-214	25/25	0.341	1.07	0.637	0.157	0.0314	0.612
	Co-60	0/25	-0.022	0.0474	0.00415	0.0145	0.0029	0.000409
	Cs-137	3/23	-0.0233	0.117	0.0152	0.0315	0.0063	0.0104
	Eu-152	0/25	-0.0895	0.0952	0.00494	0.0374	0.00748	0.00816
	Eu-154	0/25	-0.0532	0.0997	0.00609	0.0317	0.00634	0.00376
	Eu-155	0/25	-0.0261	0.0922	0.0296	0.0324	0.00649	0.0219
	K-40	24/25	0	19.8	13.09	4.816	0.963	12.3
	Pa-231	0/25	-0.0511	0.522	0.134	0.181	0.0362	0
	Pa-234	0/25	-0.344	0.325	-0.0371	0.142	0.0283	-0.0464
	Pa-234m	0/25	-3.52	3.43	0.486	1.574	0.315	0.522
	Pb-212	25/25	0.502	1.44	0.875	0.229	0.0458	0.822
	Pb-214	25/25	0.325	1.16	0.757	0.191	0.0382	0.77
	Ra-223	0/25	-0.569	0.343	-0.0402	0.219	0.0438	-0.0209
	Ra-224	11/25	0	1.73	0.731	0.607	0.121	0.729
	Ra-226	25/25	0.341	1.07	0.637	0.157	0.0314	0.612
	Tl-208	25/25	0.147	0.449	0.245	0.0732	0.0146	0.232
	Th-227	0/25	-0.153	0.193	0.00812	0.0794	0.0159	0.0121
	Th-228	25/25	0.502	1.44	0.875	0.229	0.0458	0.822
	Th-232	25/25	0.482	1.2	0.81	0.174	0.0348	0.823
Alpha Spectroscopy	Am-241	0/25	-0.0822	0.0838	0.00653	0.0384	0.00768	0.01
	Pu-238	0/25	-0.1	0.095	0.00692	0.0395	0.0079	0.00288
	Pu-239/240	0/25	-0.0952	0.0933	-0.00447	0.0412	0.00825	-0.00726
	Ra-226	25/25	0.345	1.14	0.602	0.18	0.036	0.57
	Th-228	21/25	0.147	2.58	0.857	0.494	0.0988	0.748
	Th-230	24/25	0.323	1.17	0.707	0.24	0.048	0.673
	Th-232	25/25	0.186	1.85	0.79	0.35	0.07	0.762
	U-233/234	25/25	0.3	0.851	0.536	0.133	0.0266	0.545
	U-235/236	4/25	-0.0147	0.0894	0.0261	0.0266	0.00533	0.026
	U-238	25/25	0.195	0.808	0.517	0.156	0.0313	0.463
Gas Flow Proportional Counting	Sr-90	0/25	-0.0755	0.11	0.00816	0.0456	0.00912	0.0065
Radon Emanation	Ra-226	20/25	-0.04	1.12	0.635	0.225	0.045	0.661

Notes:

pCi/g - picocurie per gram

Table 5-16. RBA-1 - Summary of Subsurface Soil Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	17/23	0	1.46	0.605	0.462	0.0963	0.508
	Am-241	0/23	-0.0716	0.0595	-0.00275	0.0392	0.00817	-0.00239
	Bi-212	11/23	-0.0354	1.53	0.656	0.505	0.105	0.598
	Bi-214	19/23	0	1.1	0.43	0.321	0.0669	0.324
	Co-60	0/23	-0.0345	0.0384	0.00114	0.0172	0.00358	0.00169
	Cs-137	1/23	-0.0162	0.0832	0.00793	0.0196	0.00409	0.00254
	Eu-152	0/23	-0.0573	0.0713	0.00132	0.0349	0.00728	-0.00334
	Eu-154	0/23	-0.0887	0.0788	0.00375	0.0331	0.00691	0.00308
	Eu-155	0/23	-0.0208	0.0985	0.022	0.0312	0.00651	0.0214
	K-40	23/23	0.572	19.8	6.025	6.195	1.292	3.01
	Pa-231	0/23	-0.179	0.612	0.0941	0.175	0.0364	0.0327
	Pa-234	0/23	-0.179	0.163	-0.00363	0.0954	0.0199	0.00799
	Pa-234m	0/23	-3.32	3.76	0.497	1.888	0.394	0.516
	Pb-212	22/23	0.00272	1.49	0.618	0.465	0.0969	0.509
	Pb-214	19/23	0	1.26	0.479	0.382	0.0796	0.398
	Ra-223	0/23	-0.274	0.555	0.00355	0.196	0.0408	-0.0283
	Ra-224	3/23	-0.216	1.94	0.411	0.487	0.102	0.386
	Ra-226	19/23	0	1.1	0.43	0.321	0.0669	0.324
	Tl-208	21/23	0.00954	0.448	0.181	0.13	0.0271	0.16
	Th-227	0/23	-0.14	0.248	0.00415	0.0851	0.0177	0.0092
	Th-228	22/23	0.00272	1.49	0.618	0.465	0.0969	0.509
	Th-232	17/23	0	1.46	0.605	0.462	0.0963	0.508
Alpha Spectroscopy	Am-241	0/23	-0.0805	0.133	0.0242	0.0558	0.0116	0.016
	Pu-238	0/23	-0.0622	0.181	0.0135	0.055	0.0115	-0.00476
	Pu-239/240	0/23	-0.123	0.168	0.0156	0.0733	0.0153	0.00413
	Ra-226	22/23	0.0639	0.795	0.41	0.238	0.0496	0.377
	Th-228	11/23	-0.0241	1.14	0.416	0.348	0.0726	0.341
	Th-230	12/23	-0.0629	1.36	0.406	0.281	0.0586	0.381
	Th-232	16/23	0.0348	0.832	0.415	0.263	0.0548	0.353
	U-233/234	20/23	0.00821	0.839	0.353	0.245	0.0511	0.292
	U-235/236	3/23	-0.025	0.169	0.0327	0.0484	0.0101	0.0209
	U-238	19/23	0.0292	0.795	0.342	0.225	0.0469	0.336
Gas Flow Proportional Counting	Sr-90	0/23	-0.0975	0.076	-0.0222	0.049	0.0102	-0.035
Radon Emanation	Ra-226	22/23	0.0268	1.05	0.446	0.298	0.0621	0.385

Notes:

pCi/g - picocurie per gram

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Actinium-228	0.508		0.116	0.164
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Americium-241	-0.00329	U	0.19	0.106
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Bismuth-212	0.476		0.412	0.423
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Bismuth-214	0.457		0.0563	0.0875
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Cesium-137	0.00762	U	0.0319	0.0181
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Cobalt-60	0.00746	U	0.0324	0.0157
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Europium-152	-0.0375	U	0.0736	0.0423
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Europium-154	0.0408	U	0.105	0.0562
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Europium-155	0.0434	U	0.101	0.0517
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Lead-212	0.625		0.0461	0.0648
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Lead-214	0.498		0.0552	0.0849
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Potassium-40	7.88		0.278	0.656
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Protactinium-231	0	UJ	0.335	0.261
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Protactinium-234	0.158	U	0.217	0.272
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Protactinium-234m	0.85	U	3.83	1.98
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Radium-223	0.0357	U	0.522	0.306
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Radium-224	0	UJ	0.493	0.729
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Radium-226	0.457		0.0563	0.0875
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Thallium-208	0.175		0.0248	0.0395
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Thorium-227	0.00452	U	0.207	0.108
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Thorium-228	0.625		0.0461	0.0648
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Thorium-232	0.508		0.116	0.164
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Actinium-228	0.222		0.102	0.123
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Americium-241	-0.0191	U	0.0639	0.0335
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Bismuth-212	0.102	U	0.4	0.201
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Bismuth-214	0.111		0.0567	0.0758
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Cesium-137	-0.0155	U	0.0287	0.0198
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Cobalt-60	0.0104	U	0.0309	0.0148
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Europium-152	-0.00645	U	0.0702	0.0364
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Europium-154	0.0165	U	0.0883	0.0448
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Europium-155	0.0177	U	0.071	0.0359
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Lead-212	0.105		0.0446	0.048
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Lead-214	0.11		0.0939	0.0732
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Potassium-40	11.1		0.278	0.831
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Protactinium-231	0	UJ	0.309	0.307
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Protactinium-234	0.0102	U	0.213	0.118
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Protactinium-234m	2.65	U	3.88	2.16
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Radium-223	0.0412	U	0.486	0.244
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Radium-224	0.226	U	0.368	0.447
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Radium-226	0.111		0.0567	0.0758
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Thallium-208	0.0319		0.0244	0.0262
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Thorium-227	-0.0373	U	0.173	0.0897
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Thorium-228	0.105		0.0446	0.048
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Thorium-232	0.222		0.102	0.123
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Actinium-228	0.793		0.125	0.174
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Americium-241	0.0516	U	0.156	0.0766
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Bismuth-212	0.998		0.481	0.535
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Bismuth-214	0.74		0.0675	0.114
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Cesium-137	0.00588	U	0.0385	0.0221

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Cobalt-60	-0.00294	U	0.0381	0.0198
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Europium-152	0.003	U	0.0937	0.053
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Europium-154	-0.0395	U	0.0923	0.0534
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Europium-155	0.00174	U	0.103	0.0544
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Lead-212	0.762		0.058	0.0815
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Lead-214	0.712		0.0801	0.107
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Potassium-40	8.32		0.318	0.898
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Protactinium-231	0	UJ	0.442	0.518
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Protactinium-234	-0.0271	U	0.282	0.166
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Protactinium-234m	1.64	U	5.87	2.92
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Radium-223	-0.201	U	0.58	0.446
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Radium-224	0.364	U	0.622	0.825
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Radium-226	0.74		0.0675	0.114
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Thallium-208	0.233		0.028	0.0492
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Thorium-227	-0.055	U	0.241	0.14
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Thorium-228	0.762		0.058	0.0815
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Thorium-232	0.793		0.125	0.174
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Actinium-228	0.913		0.151	0.251
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Americium-241	0.0202	U	0.261	0.139
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Bismuth-212	1.33		0.519	0.587
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Bismuth-214	0.723		0.0763	0.11
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Cesium-137	0.00347	U	0.0438	0.0235
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Cobalt-60	0.00701	U	0.0438	0.0213
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Europium-152	-0.0451	U	0.0959	0.054
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Europium-154	-0.0113	U	0.125	0.0672
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Europium-155	0.000813	U	0.13	0.0651
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Lead-212	1.02		0.0625	0.0919
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Lead-214	0.969		0.205	0.135
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Potassium-40	8.95		0.358	0.853
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Protactinium-231	0	UJ	0.539	0.516
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Protactinium-234	-0.0572	U	0.277	0.147
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Protactinium-234m	3.14	U	4.9	2.84
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Radium-223	-0.036	U	0.721	0.428
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Radium-224	0	UJ	0.669	1.1
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Radium-226	0.723		0.0763	0.11
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Thallium-208	0.301		0.0367	0.0599
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Thorium-227	0.0982	U	0.308	0.156
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Thorium-228	1.02		0.0625	0.0919
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Thorium-232	0.913		0.151	0.251
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Actinium-228	0.885		0.0979	0.189
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Americium-241	0.00422	U	0.0445	0.0215
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Bismuth-212	1.08		0.43	0.394
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Bismuth-214	0.614		0.0654	0.0917
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Cesium-137	-0.00985	U	0.0299	0.019
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Cobalt-60	-0.00358	U	0.0319	0.0165
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Europium-152	-0.0248	U	0.0808	0.0473
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Europium-154	-0.0354	U	0.0846	0.0483
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Europium-155	0.0182	U	0.0758	0.0382
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Lead-212	0.863		0.0458	0.0733

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Lead-214	0.784		0.0574	0.101
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Potassium-40	7.82		0.268	0.791
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Protactinium-231	0.333	U	0.385	0.409
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Protactinium-234	-0.000301	U	0.261	0.139
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Protactinium-234m	-0.579	U	4.41	2.85
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Radium-223	-0.0895	U	0.553	0.339
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Radium-224	1.11		0.491	0.785
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Radium-226	0.614		0.0654	0.0917
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Thallium-208	0.264		0.0295	0.0436
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Thorium-227	-0.00356	U	0.186	0.109
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Thorium-228	0.863		0.0458	0.0733
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Thorium-232	0.885		0.0979	0.189
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Actinium-228	1.18		0.214	0.277
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Americium-241	0.106	U	0.367	0.177
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Bismuth-212	0	UJ	0.748	0.876
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Bismuth-214	0.975		0.0975	0.169
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Cesium-137	-0.00372	U	0.0488	0.0277
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Cobalt-60	-0.00355	U	0.0594	0.031
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Europium-152	0.0518	U	0.156	0.0765
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Europium-154	0.0271	U	0.179	0.0937
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Europium-155	0.0329	U	0.16	0.0818
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Lead-212	1.33		0.0871	0.123
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Lead-214	1.18		0.296	0.199
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Potassium-40	8.81		0.578	1.15
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Protactinium-231	0.301	U	0.775	0.377
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Protactinium-234	0.243	U	0.49	0.218
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Protactinium-234m	1.38	U	6.94	3.35
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Radium-223	0.29	U	0.941	0.458
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Radium-224	1.43		0.934	1.31
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Radium-226	0.975		0.0975	0.169
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Thallium-208	0.33		0.0539	0.0821
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Thorium-227	0.0614	U	0.383	0.209
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Thorium-228	1.33		0.0871	0.123
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Thorium-232	1.18		0.214	0.277
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Actinium-228	0.551		0.141	0.19
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Americium-241	-0.00602	U	0.0466	0.0267
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Bismuth-212	0.519	U	0.578	0.515
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Bismuth-214	0.381		0.0753	0.112
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Cesium-137	0.000159	U	0.0399	0.0213
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Cobalt-60	-0.00698	U	0.0392	0.021
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Europium-152	-0.037	U	0.0809	0.0452
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Europium-154	0.00613	U	0.12	0.0594
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Europium-155	0.0273	U	0.0826	0.0426
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Lead-212	0.445		0.06	0.0723
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Lead-214	0.487		0.163	0.0925
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Potassium-40	7.57		0.377	0.868
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Protactinium-231	0.128	U	0.472	0.234
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Protactinium-234	-0.295	U	0.228	0.162
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Protactinium-234m	2.33	U	5.48	2.49

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Radium-223	0.628	U	0.704	0.326
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Radium-224	0.437	U	0.554	0.552
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Radium-226	0.381		0.0753	0.112
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Thallium-208	0.118		0.0331	0.0467
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Thorium-227	0.0139	U	0.233	0.13
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Thorium-228	0.445		0.06	0.0723
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Thorium-232	0.551		0.141	0.19
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Actinium-228	0.22		0.106	0.139
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Americium-241	-0.0283	U	0.111	0.0654
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Bismuth-212	0.39	U	0.567	0.261
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Bismuth-214	0.19		0.0588	0.079
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Cesium-137	-0.00247	U	0.0274	0.0144
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Cobalt-60	0.00709	U	0.0409	0.0194
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Europium-152	0	UJ	0.0939	0.0792
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Europium-154	-0.0278	U	0.0951	0.056
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Europium-155	0.0536	U	0.0861	0.0732
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Lead-212	0.221		0.0456	0.0515
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Lead-214	0.214		0.106	0.094
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Potassium-40	4.19		0.331	0.585
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Protactinium-231	0.115	U	0.411	0.201
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Protactinium-234	-0.139	U	0.237	0.17
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Protactinium-234m	-1.7	U	4.65	2.71
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Radium-223	-0.0458	U	0.534	0.277
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Radium-224	0.453	U	0.489	0.568
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Radium-226	0.19		0.0588	0.079
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Thallium-208	0.0508		0.0338	0.0372
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Thorium-227	-0.0314	U	0.2	0.116
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Thorium-228	0.221		0.0456	0.0515
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Thorium-232	0.22		0.106	0.139
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Actinium-228	0.155		0.0901	0.0871
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Americium-241	0.0369	U	0.142	0.0697
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Bismuth-212	-0.0484	U	0.377	0.203
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Bismuth-214	0.12		0.0605	0.06
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Cesium-137	-0.0205	U	0.0249	0.0176
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Cobalt-60	0.00382	U	0.0365	0.0169
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Europium-152	0.0292	U	0.0842	0.0401
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Europium-154	-0.0475	U	0.0836	0.0507
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Europium-155	-0.0292	U	0.0706	0.0403
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Lead-212	0.102		0.0426	0.0547
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Lead-214	0.164		0.0537	0.0811
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Potassium-40	3		0.316	0.555
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Protactinium-231	-0.0184	U	0.395	0.214
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Protactinium-234	-0.0642	U	0.237	0.137
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Protactinium-234m	-2.07	U	3.45	2.21
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Radium-223	0.161	U	0.534	0.256
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Radium-224	-0.0592	U	0.481	0.301
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Radium-226	0.12		0.0605	0.06
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Thallium-208	0.0333		0.0272	0.0267
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Thorium-227	0.0324	U	0.175	0.0993

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Thorium-228	0.102		0.0426	0.0547
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Thorium-232	0.155		0.0901	0.0871
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Actinium-228	0.53		0.131	0.165
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Americium-241	-0.101	U	0.221	0.124
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Bismuth-212	0.479		0.476	0.456
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Bismuth-214	0.484		0.0827	0.102
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Cesium-137	0.000218	U	0.0421	0.0216
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Cobalt-60	0.00433	U	0.0426	0.021
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Europium-152	-0.0497	U	0.094	0.0545
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Europium-154	-0.0198	U	0.117	0.0753
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Europium-155	0.00999	U	0.107	0.0577
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Lead-212	0.56		0.0545	0.0776
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Lead-214	0.512		0.166	0.114
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Potassium-40	9		0.353	0.903
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Protactinium-231	-0.25	U	0.491	0.329
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Protactinium-234	0.0307	U	0.342	0.174
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Protactinium-234m	-1.98	U	5.43	3.11
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Radium-223	0.21	U	0.686	0.342
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Radium-224	0	UJ	0.584	0.89
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Radium-226	0.484		0.0827	0.102
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Thallium-208	0.135		0.0378	0.0556
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Thorium-227	0.116	U	0.298	0.148
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Thorium-228	0.56		0.0545	0.0776
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Thorium-232	0.53		0.131	0.165
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Actinium-228	0.222		0.117	0.154
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Americium-241	-0.0143	U	0.101	0.0529
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Bismuth-212	0.59		0.494	0.384
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Bismuth-214	0.244		0.0636	0.0872
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Cesium-137	0.0272	U	0.0369	0.0248
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Cobalt-60	0.00552	U	0.0409	0.0189
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Europium-152	-0.00204	U	0.0856	0.0484
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Europium-154	-0.0414	U	0.0954	0.0552
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Europium-155	-0.000844	U	0.0804	0.0425
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Lead-212	0.294		0.0434	0.0598
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Lead-214	0.333		0.14	0.0892
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Potassium-40	1.92		0.366	0.588
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Protactinium-231	0	UJ	0.387	0.446
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Protactinium-234	0.0593	U	0.28	0.133
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Protactinium-234m	0.143	U	5.43	2.74
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Radium-223	-0.165	U	0.532	0.32
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Radium-224	0.128	U	0.465	0.635
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Radium-226	0.244		0.0636	0.0872
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Thallium-208	0.0914		0.034	0.0451
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Thorium-227	0.0106	U	0.215	0.118
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Thorium-228	0.294		0.0434	0.0598
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Thorium-232	0.222		0.117	0.154
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Actinium-228	1.41		0.159	0.248
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Americium-241	-0.0637	U	0.312	0.173
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Bismuth-212	1.73		0.636	0.806

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Bismuth-214	0.905		0.0913	0.137
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Cesium-137	-0.00892	U	0.0451	0.0253
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Cobalt-60	-0.00786	U	0.0436	0.0237
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Europium-152	-0.0247	U	0.115	0.0642
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Europium-154	0.12	U	0.171	0.0731
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Europium-155	0	UJ	0.133	0.144
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Lead-212	1.48		0.0765	0.113
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Lead-214	1.26		0.0962	0.169
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Potassium-40	6.77		0.46	0.93
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Protactinium-231	0	UJ	0.563	0.536
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Protactinium-234	0.0347	U	0.322	0.157
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Protactinium-234m	0.442	U	5.89	3.06
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Radium-223	-0.204	U	0.766	0.456
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Radium-224	1.97		0.819	1.32
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Radium-226	0.905		0.0913	0.137
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Thallium-208	0.455		0.0412	0.0643
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Thorium-227	0.0537	U	0.329	0.18
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Thorium-228	1.48		0.0765	0.113
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Thorium-232	1.41		0.159	0.248
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Actinium-228	1.53		0.144	0.242
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Americium-241	-0.0295	U	0.184	0.0956
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Bismuth-212	1.43		0.507	0.643
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Bismuth-214	1.07		0.0753	0.139
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Cesium-137	-0.00901	U	0.0392	0.0223
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Cobalt-60	0.00105	U	0.0394	0.0203
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Europium-152	-0.0114	U	0.105	0.0555
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Europium-154	0.0107	U	0.12	0.0613
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Europium-155	0.0583	U	0.105	0.0914
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Lead-212	1.51		0.0624	0.101
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Lead-214	1.28		0.0776	0.154
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Potassium-40	6.5		0.403	0.732
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Protactinium-231	0	UJ	0.473	0.533
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Protactinium-234	0.0981	U	0.345	0.169
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Protactinium-234m	-1.31	U	4.98	2.66
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Radium-223	0.117	U	0.708	0.4
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Radium-224	1.64		0.669	1.12
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Radium-226	1.07		0.0753	0.139
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Thallium-208	0.444		0.0391	0.0638
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Thorium-227	0.0273	U	0.277	0.141
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Thorium-228	1.51		0.0624	0.101
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Thorium-232	1.53		0.144	0.242
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Actinium-228	1.13		0.181	0.235
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Americium-241	-0.0926	U	0.245	0.144
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Bismuth-212	0.951		0.702	0.596
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Bismuth-214	1.01		0.0831	0.131
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Cesium-137	-0.0299	U	0.0418	0.0244
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Cobalt-60	0.00343	U	0.0491	0.0251
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Europium-152	0.00671	U	0.131	0.069
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Europium-154	0.00647	U	0.144	0.0774

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Europium-155	0.0579	U	0.149	0.0773
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Lead-212	1.62		0.0694	0.12
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Lead-214	1.19		0.25	0.164
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Potassium-40	7.83		0.557	0.919
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Protactinium-231	0	UJ	0.644	0.707
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Protactinium-234	-0.127	U	0.303	0.175
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Protactinium-234m	2.07	U	6.63	3.29
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Radium-223	0.204	U	0.904	0.515
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Radium-224	1.61		0.744	1.14
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Radium-226	1.01		0.0831	0.131
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Thallium-208	0.344		0.0526	0.071
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Thorium-227	-0.0588	U	0.316	0.168
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Thorium-228	1.62		0.0694	0.12
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Thorium-232	1.13		0.181	0.235
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Actinium-228	1.51		0.144	0.255
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Americium-241	-0.0363	U	0.127	0.0642
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Bismuth-212	1.79		0.462	0.557
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Bismuth-214	0.928		0.0602	0.121
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Cesium-137	-0.0187	U	0.0404	0.0228
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Cobalt-60	0.00526	U	0.0392	0.019
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Europium-152	-0.0459	U	0.086	0.0523
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Europium-154	0.00425	U	0.119	0.0604
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Europium-155	0.0416	U	0.107	0.0528
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Lead-212	1.53		0.0556	0.0968
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Lead-214	1.23		0.221	0.129
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Potassium-40	8.03		0.339	0.79
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Protactinium-231	0.298	U	0.541	0.3
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Protactinium-234	-0.0588	U	0.266	0.152
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Protactinium-234m	0	UJ	5.42	4.5
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Radium-223	-0.0639	U	0.611	0.431
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Radium-224	1.45		0.596	1.11
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Radium-226	0.928		0.0602	0.121
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Thallium-208	0.412		0.0343	0.059
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Thorium-227	-0.0107	U	0.261	0.144
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Thorium-228	1.53		0.0556	0.0968
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Thorium-232	1.51		0.144	0.255
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Actinium-228	1.42		0.134	0.279
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Americium-241	0.0368	U	0.239	0.129
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Bismuth-212	1.73		0.496	0.682
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Bismuth-214	0.876		0.0694	0.125
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Cesium-137	-0.0288	U	0.0399	0.0244
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Cobalt-60	0.0202	U	0.0498	0.0222
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Europium-152	-0.0135	U	0.0997	0.0579
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Europium-154	-0.0177	U	0.112	0.0636
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Europium-155	0	UJ	0.124	0.138
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Lead-212	1.28		0.0884	0.124
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Lead-214	1.05		0.0871	0.15
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Potassium-40	7.43		0.339	0.804
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Protactinium-231	0	UJ	0.564	0.56

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Protactinium-234	-0.0606	U	0.329	0.211
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Protactinium-234m	-0.205	U	5.75	3.06
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Radium-223	0.0228	U	0.694	0.39
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Radium-224	0.915	U	1.01	0.905
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Radium-226	0.876		0.0694	0.125
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Thallium-208	0.43		0.0367	0.0628
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Thorium-227	-0.0685	U	0.282	0.163
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Thorium-228	1.28		0.0884	0.124
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Thorium-232	1.42		0.134	0.279
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Actinium-228	1.02		0.159	0.204
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Americium-241	-0.00224	U	0.0512	0.0285
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Bismuth-212	1.29		0.574	0.615
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Bismuth-214	0.777		0.0768	0.137
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Cesium-137	-0.00188	U	0.0393	0.0239
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Cobalt-60	0.0069	U	0.0411	0.0218
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Europium-152	0.0269	U	0.108	0.054
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Europium-154	0.018	U	0.127	0.0621
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Europium-155	0.0621	U	0.0882	0.0908
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Lead-212	1.22		0.0551	0.0883
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Lead-214	0.939		0.209	0.137
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Potassium-40	7.07		0.281	0.83
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Protactinium-231	0	UJ	0.423	0.638
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Protactinium-234	-0.00185	U	0.327	0.166
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Protactinium-234m	2.68	U	5.7	2.63
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Radium-223	0.119	U	0.606	0.332
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Radium-224	1.53		0.591	0.91
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Radium-226	0.777		0.0768	0.137
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Thallium-208	0.338		0.0436	0.062
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Thorium-227	0.00218	U	0.26	0.147
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Thorium-228	1.22		0.0551	0.0883
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Thorium-232	1.02		0.159	0.204
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Actinium-228	0.806		0.145	0.258
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Americium-241	0.0141	U	0.159	0.0886
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Bismuth-212	1.01		0.498	0.631
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Bismuth-214	0.702		0.0736	0.115
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Cesium-137	-0.00355	U	0.0387	0.021
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Cobalt-60	0.0157	U	0.0483	0.022
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Europium-152	-0.00409	U	0.0898	0.0515
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Europium-154	0.0355	U	0.113	0.0486
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Europium-155	-0.0298	U	0.108	0.0604
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Lead-212	0.843		0.082	0.119
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Lead-214	0.792		0.195	0.13
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Potassium-40	5.55		0.367	0.78
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Protactinium-231	0	UJ	0.453	0.485
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Protactinium-234	-0.14	U	0.214	0.141
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Protactinium-234m	0.111	U	5.82	2.94
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Radium-223	-0.224	U	0.618	0.383
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Radium-224	0.961	U	1.07	0.674
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Radium-226	0.702		0.0736	0.115

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Thallium-208	0.32		0.0341	0.0591
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Thorium-227	-0.0735	U	0.261	0.138
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Thorium-228	0.843		0.082	0.119
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Thorium-232	0.806		0.145	0.258
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Actinium-228	1.04		0.136	0.194
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Americium-241	0.0698	U	0.168	0.0915
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Bismuth-212	1.12		0.416	0.469
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Bismuth-214	0.774		0.0674	0.109
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Cesium-137	0.00118	U	0.0383	0.0226
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Cobalt-60	0.0124	U	0.0431	0.0201
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Europium-152	0.0187	U	0.102	0.0518
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Europium-154	-0.0184	U	0.1	0.057
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Europium-155	0	UJ	0.108	0.132
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Lead-212	1.19		0.0519	0.0879
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Lead-214	0.941		0.0713	0.122
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Potassium-40	7.13		0.291	0.754
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Protactinium-231	0	UJ	0.435	0.365
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Protactinium-234	-0.13	U	0.243	0.148
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Protactinium-234m	0.0197	U	4.15	2.21
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Radium-223	-0.423	U	0.626	0.352
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Radium-224	2.11		0.556	1.06
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Radium-226	0.774		0.0674	0.109
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Thallium-208	0.304		0.0382	0.0543
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Thorium-227	-0.104	U	0.24	0.144
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Thorium-228	1.19		0.0519	0.0879
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Thorium-232	1.04		0.136	0.194
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Actinium-228	1.41		0.146	0.231
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Americium-241	0.00236	U	0.117	0.0689
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Bismuth-212	1.93		0.46	0.486
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Bismuth-214	0.848		0.0745	0.113
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Cesium-137	0.00372	U	0.037	0.0198
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Cobalt-60	0.00586	U	0.0454	0.0231
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Europium-152	-0.000847	U	0.0976	0.0519
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Europium-154	0.03	U	0.0911	0.0412
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Europium-155	0.0841	U	0.098	0.102
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Lead-212	1.37		0.0588	0.093
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Lead-214	1.12		0.21	0.121
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Potassium-40	6.05		0.342	0.69
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Protactinium-231	0.369	U	0.559	0.302
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Protactinium-234	-0.064	U	0.274	0.149
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Protactinium-234m	3.37	U	5.38	4.92
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Radium-223	0.00433	U	0.679	0.403
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Radium-224	1.89		0.629	1.16
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Radium-226	0.848		0.0745	0.113
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Thallium-208	0.409		0.0386	0.052
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Thorium-227	-0.0669	U	0.245	0.133
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Thorium-228	1.37		0.0588	0.093
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Thorium-232	1.41		0.146	0.231
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Actinium-228	0.902		0.168	0.242

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Americium-241	0.00193	U	0.0546	0.0315
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Bismuth-212	1.25		0.568	0.515
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Bismuth-214	0.909		0.0691	0.116
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Cesium-137	0.00353	U	0.046	0.0287
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Cobalt-60	0.0141	U	0.0484	0.0239
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Europium-152	-0.00613	U	0.105	0.0632
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Europium-154	0.0402	U	0.143	0.0718
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Europium-155	0.0535	U	0.0858	0.0815
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Lead-212	1.22		0.0524	0.0811
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Lead-214	1		0.0705	0.112
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Potassium-40	6.21		0.402	0.821
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Protactinium-231	0	UJ	0.477	0.573
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Protactinium-234	0.00744	U	0.329	0.172
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Protactinium-234m	2.14	U	6.47	5.07
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Radium-223	-0.126	U	0.682	0.418
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Radium-224	1.67		0.562	0.87
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Radium-226	0.909		0.0691	0.116
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Thallium-208	0.382		0.0401	0.0572
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Thorium-227	-0.03	U	0.241	0.129
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Thorium-228	1.22		0.0524	0.0811
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Thorium-232	0.902		0.168	0.242
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Actinium-228	1.37		0.153	0.263
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Americium-241	-0.0103	U	0.0553	0.0306
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Bismuth-212	1.68		0.586	0.655
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Bismuth-214	0.954		0.0822	0.123
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Cesium-137	0.00858	U	0.05	0.026
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Cobalt-60	0.0114	U	0.0483	0.0252
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Europium-152	-0.0575	U	0.107	0.0587
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Europium-154	0.0358	U	0.156	0.0758
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Europium-155	0.0306	U	0.103	0.0527
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Lead-212	1.39		0.064	0.101
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Lead-214	1.1		0.0849	0.141
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Potassium-40	6.83		0.44	0.848
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Protactinium-231	0	UJ	0.484	0.596
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Protactinium-234	-0.136	U	0.346	0.208
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Protactinium-234m	3.5	U	6.8	3.18
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Radium-223	0.062	U	0.784	0.479
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Radium-224	1.85		0.686	1.25
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Radium-226	0.954		0.0822	0.123
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Thallium-208	0.403		0.0472	0.0705
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Thorium-227	0.107	U	0.306	0.163
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Thorium-228	1.39		0.064	0.101
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Thorium-232	1.37		0.153	0.263
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Actinium-228	1.46		0.131	0.248
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Americium-241	-0.0189	U	0.0955	0.0535
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Bismuth-212	1.36		0.529	0.544
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Bismuth-214	0.83		0.0726	0.112
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Cesium-137	-0.00125	U	0.0394	0.022
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Cobalt-60	0.00755	U	0.0419	0.0215

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Europium-152	0.0273	U	0.102	0.0521
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Europium-154	0.044	U	0.123	0.0601
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Europium-155	0.0284	U	0.104	0.0538
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Lead-212	1.35		0.0559	0.0911
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Lead-214	1.05		0.0761	0.111
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Potassium-40	6.83		0.329	0.752
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Protactinium-231	0	UJ	0.462	0.5
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Protactinium-234	0.0645	U	0.306	0.154
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Protactinium-234m	-0.922	U	5.48	2.98
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Radium-223	0.0446	U	0.621	0.357
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Radium-224	1.64		0.599	0.909
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Radium-226	0.83		0.0726	0.112
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Thallium-208	0.361		0.0373	0.0633
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Thorium-227	-0.0284	U	0.245	0.137
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Thorium-228	1.35		0.0559	0.0911
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Thorium-232	1.46		0.131	0.248
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Actinium-228	1.32		0.167	0.264
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Americium-241	-0.0295	U	0.202	0.103
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Bismuth-212	1.53		0.622	0.612
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Bismuth-214	1.04		0.0839	0.124
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Cesium-137	0.0084	U	0.0447	0.023
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Cobalt-60	0.00103	U	0.0467	0.0238
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Europium-152	-0.0576	U	0.101	0.0564
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Europium-154	0.0395	U	0.142	0.0742
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Europium-155	0.0406	U	0.127	0.0642
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Lead-212	1.45		0.0662	0.107
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Lead-214	1.22		0.239	0.142
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Potassium-40	8.39		0.357	0.857
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Protactinium-231	0	UJ	0.468	0.781
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Protactinium-234	-0.106	U	0.321	0.177
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Protactinium-234m	-0.0429	U	5.7	2.98
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Radium-223	-0.0186	U	0.752	0.43
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Radium-224	1.75		0.71	1.03
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Radium-226	1.04		0.0839	0.124
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Thallium-208	0.417		0.0411	0.0627
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Thorium-227	0.0827	U	0.282	0.15
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Thorium-228	1.45		0.0662	0.107
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Thorium-232	1.32		0.167	0.264
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Actinium-228	1.3		0.169	0.247
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Americium-241	-0.0768	U	0.175	0.0958
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Bismuth-212	1.4		0.556	0.671
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Bismuth-214	0.86		0.082	0.116
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Cesium-137	-0.00677	U	0.0362	0.02
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Cobalt-60	0.0131	U	0.0464	0.0213
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Europium-152	-0.0243	U	0.107	0.0574
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Europium-154	0.0785	U	0.15	0.0657
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Europium-155	0.055	U	0.133	0.0694
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Lead-212	1.56		0.0641	0.11
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Lead-214	1.15		0.0861	0.147

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Potassium-40	8.27		0.41	0.898
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Protactinium-231	0	UJ	0.546	0.634
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Protactinium-234	-0.0116	U	0.338	0.185
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Protactinium-234m	2.47	U	5.54	4.33
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Radium-223	-0.101	U	0.717	0.462
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Radium-224	1.82		0.687	1.4
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Radium-226	0.86		0.082	0.116
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Thallium-208	0.406		0.0389	0.0636
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Thorium-227	0.0226	U	0.293	0.149
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Thorium-228	1.56		0.0641	0.11
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Thorium-232	1.3		0.169	0.247
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Actinium-228	1.28		0.186	0.24
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Americium-241	0.153	U	0.266	0.139
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Bismuth-212	2		0.636	0.71
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Bismuth-214	0.849		0.0937	0.146
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Cesium-137	-0.00145	U	0.0479	0.0248
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Cobalt-60	-0.00453	U	0.0525	0.0286
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Europium-152	-0.00899	U	0.118	0.0627
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Europium-154	-0.0197	U	0.134	0.0853
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Europium-155	0.00931	U	0.148	0.0798
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Lead-212	1.58		0.075	0.119
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Lead-214	1.24		0.255	0.158
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Potassium-40	7.95		0.503	0.971
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Protactinium-231	0	UJ	0.617	0.625
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Protactinium-234	0.036	U	0.37	0.187
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Protactinium-234m	-1.76	U	6.32	3.57
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Radium-223	0.152	U	0.854	0.487
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Radium-224	2.14		0.804	1.29
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Radium-226	0.849		0.0937	0.146
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Thallium-208	0.455		0.0435	0.075
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Thorium-227	0.00025	U	0.342	0.198
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Thorium-228	1.58		0.075	0.119
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Thorium-232	1.28		0.186	0.24
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Actinium-228	1.57		0.151	0.263
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Americium-241	0.0146	U	0.0652	0.0358
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Bismuth-212	2.34		0.664	0.641
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Bismuth-214	1.13		0.09	0.146
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Cesium-137	0.0159	U	0.0523	0.0266
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Cobalt-60	-0.000197	U	0.0525	0.0274
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Europium-152	-0.0315	U	0.11	0.06
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Europium-154	0.0125	U	0.164	0.0842
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Europium-155	0.0998	U	0.11	0.153
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Lead-212	1.38		0.0698	0.107
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Lead-214	1.26		0.252	0.149
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Potassium-40	6.23		0.432	0.878
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Protactinium-231	0	UJ	0.599	0.607
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Protactinium-234	-0.168	U	0.354	0.205
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Protactinium-234m	1.18	U	7.02	5.41
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Radium-223	0.0245	U	0.799	0.463

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Radium-224	1.9		0.748	1.22
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Radium-226	1.13		0.09	0.146
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Thallium-208	0.456		0.046	0.0634
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Thorium-227	-0.11	U	0.282	0.152
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Thorium-228	1.38		0.0698	0.107
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Thorium-232	1.57		0.151	0.263
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Actinium-228	1.07		0.134	0.224
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Americium-241	0.0341	U	0.0981	0.0513
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Bismuth-212	1.34		0.497	0.54
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Bismuth-214	0.947		0.0683	0.122
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Cesium-137	0.00374	U	0.0383	0.0208
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Cobalt-60	0.00685	U	0.0373	0.0212
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Europium-152	-0.0592	U	0.0785	0.0452
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Europium-154	0.0237	U	0.112	0.0569
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Europium-155	0	UJ	0.0906	0.11
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Lead-212	1.32		0.0524	0.087
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Lead-214	0.947		0.0703	0.116
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Potassium-40	8.46		0.302	0.737
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Protactinium-231	0	UJ	0.444	0.466
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Protactinium-234	-0.0583	U	0.271	0.149
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Protactinium-234m	0.347	U	4.77	2.84
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Radium-223	-0.136	U	0.604	0.361
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Radium-224	1.49		0.561	0.883
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Radium-226	0.947		0.0683	0.122
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Thallium-208	0.388		0.0375	0.0556
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Thorium-227	0.0415	U	0.25	0.134
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Thorium-228	1.32		0.0524	0.087
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Thorium-232	1.07		0.134	0.224
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Actinium-228	1.23		0.142	0.223
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Americium-241	0.116	U	0.188	0.102
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Bismuth-212	1.24		0.571	0.731
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Bismuth-214	0.79		0.0778	0.13
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Cesium-137	-0.00376	U	0.0426	0.0271
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Cobalt-60	-0.00779	U	0.0366	0.0202
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Europium-152	-0.0191	U	0.107	0.0582
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Europium-154	0.0216	U	0.138	0.0699
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Europium-155	0	UJ	0.128	0.13
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Lead-212	1.17		0.0678	0.0924
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Lead-214	0.916		0.215	0.152
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Potassium-40	8.97		0.364	0.982
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Protactinium-231	0.285	U	0.596	0.33
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Protactinium-234	0.0403	U	0.365	0.187
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Protactinium-234m	4.2	U	6.04	4.8
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Radium-223	-0.102	U	0.743	0.452
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Radium-224	1.56		0.727	0.852
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Radium-226	0.79		0.0778	0.13
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Thallium-208	0.352		0.0391	0.0563
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Thorium-227	-0.0645	U	0.28	0.151
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Thorium-228	1.17		0.0678	0.0924

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Thorium-232	1.23		0.142	0.223
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Actinium-228	1.27		0.169	0.26
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Americium-241	0.12	U	0.394	0.196
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Bismuth-212	1.5		0.595	0.741
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Bismuth-214	1.04		0.0895	0.16
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Cesium-137	-0.00822	U	0.044	0.0242
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Cobalt-60	0.0065	U	0.0584	0.0327
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Europium-152	-0.0901	U	0.115	0.0661
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Europium-154	-0.0103	U	0.128	0.0653
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Europium-155	0.00755	U	0.158	0.0838
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Lead-212	1.5		0.0737	0.122
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Lead-214	1.27		0.103	0.143
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Potassium-40	7.27		0.451	0.95
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Protactinium-231	0.275	U	0.697	0.374
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Protactinium-234	-0.0339	U	0.37	0.204
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Protactinium-234m	0.367	U	5.84	3.17
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Radium-223	-0.387	U	0.876	0.536
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Radium-224	2.17		0.789	1.54
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Radium-226	1.04		0.0895	0.16
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Thallium-208	0.38		0.0434	0.0763
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Thorium-227	-0.0814	U	0.337	0.196
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Thorium-228	1.5		0.0737	0.122
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Thorium-232	1.27		0.169	0.26
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Actinium-228	1.47		0.142	0.276
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Americium-241	0.0278	U	0.236	0.128
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Bismuth-212	1.92		0.558	0.866
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Bismuth-214	1.13		0.0883	0.161
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Cesium-137	0.00108	U	0.0464	0.0246
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Cobalt-60	0.00611	U	0.046	0.0219
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Europium-152	0.0174	U	0.121	0.0624
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Europium-154	-0.0351	U	0.102	0.0555
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Europium-155	0.137	U	0.156	0.11
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Lead-212	1.42		0.0701	0.104
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Lead-214	1.37		0.244	0.149
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Potassium-40	7.18		0.458	0.879
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Protactinium-231	0	UJ	0.534	0.679
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Protactinium-234	0.0941	U	0.369	0.184
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Protactinium-234m	2.9	U	5.87	2.92
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Radium-223	-0.0502	U	0.775	0.46
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Radium-224	1.57		0.751	1.01
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Radium-226	1.13		0.0883	0.161
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Thallium-208	0.457		0.0334	0.0831
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Thorium-227	-0.0326	U	0.309	0.164
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Thorium-228	1.42		0.0701	0.104
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Thorium-232	1.47		0.142	0.276
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Actinium-228	1.17		0.132	0.203
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Americium-241	0.0625	U	0.205	0.103
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Bismuth-212	1.38		0.491	0.524
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Bismuth-214	0.81		0.0752	0.117

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Cesium-137	-0.0181	U	0.0284	0.02
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Cobalt-60	-0.0162	U	0.0375	0.0216
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Europium-152	-0.0154	U	0.0895	0.0527
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Europium-154	0.000862	U	0.12	0.0609
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Europium-155	0.0127	U	0.114	0.0601
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Lead-212	1.3		0.0591	0.0959
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Lead-214	0.997		0.211	0.118
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Potassium-40	6.26		0.307	0.729
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Protactinium-231	0	UJ	0.461	0.644
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Protactinium-234	0.0115	U	0.314	0.168
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Protactinium-234m	1.02	U	5.52	2.91
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Radium-223	-0.229	U	0.666	0.378
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Radium-224	1.14		0.633	0.821
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Radium-226	0.81		0.0752	0.117
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Thallium-208	0.409		0.0311	0.0546
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Thorium-227	0.0798	U	0.264	0.143
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Thorium-228	1.3		0.0591	0.0959
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Thorium-232	1.17		0.132	0.203
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Actinium-228	1.05		0.163	0.248
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Americium-241	0.0139	U	0.143	0.0748
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Bismuth-212	0.696		0.645	0.441
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Bismuth-214	0.769		0.0746	0.134
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Cesium-137	-0.00411	U	0.0442	0.0237
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Cobalt-60	0.0146	U	0.0564	0.0268
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Europium-152	-0.024	U	0.0942	0.0549
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Europium-154	0.0273	U	0.142	0.0695
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Europium-155	0.0985	U	0.0991	0.141
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Lead-212	0.866		0.0597	0.0828
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Lead-214	0.809		0.0701	0.102
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Potassium-40	6.07		0.412	0.863
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Protactinium-231	0	UJ	0.39	0.488
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Protactinium-234	0.125	U	0.358	0.172
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Protactinium-234m	-0.0827	U	5.31	2.73
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Radium-223	0.407	U	0.704	0.38
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Radium-224	1.22		0.641	1.14
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Radium-226	0.769		0.0746	0.134
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Thallium-208	0.245		0.0361	0.051
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Thorium-227	0.0139	U	0.26	0.141
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Thorium-228	0.866		0.0597	0.0828
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Thorium-232	1.05		0.163	0.248
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Actinium-228	0.922		0.201	0.24
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Americium-241	0.0419	U	0.325	0.178
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Bismuth-212	1.4		0.479	0.539
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Bismuth-214	0.63		0.0847	0.134
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Cesium-137	0.00329	U	0.0492	0.0252
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Cobalt-60	0	UJ	0.0408	0.0628
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Europium-152	0.0105	U	0.131	0.0789
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Europium-154	0.038	U	0.152	0.081
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Europium-155	0	UJ	0.141	0.159

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Lead-212	0.987		0.0785	0.108
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Lead-214	0.71		0.106	0.14
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Potassium-40	6.38		0.416	0.83
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Protactinium-231	0.434	U	0.657	0.353
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Protactinium-234	0.0113	U	0.398	0.207
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Protactinium-234m	-1.2	U	5.43	3.03
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Radium-223	0.257	U	0.916	0.534
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Radium-224	0	UJ	0.841	1.14
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Radium-226	0.63		0.0847	0.134
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Thallium-208	0.278		0.0425	0.0619
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Thorium-227	-0.0478	U	0.345	0.198
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Thorium-228	0.987		0.0785	0.108
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Thorium-232	0.922		0.201	0.24
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Actinium-228	1.21		0.137	0.226
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Americium-241	-0.0523	U	0.278	0.156
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Bismuth-212	0.999		0.606	0.506
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Bismuth-214	0.688		0.0828	0.156
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Cesium-137	-0.012	U	0.0358	0.0238
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Cobalt-60	0.000537	U	0.0389	0.0193
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Europium-152	-0.0482	U	0.101	0.0573
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Europium-154	0.00505	U	0.109	0.0532
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Europium-155	0.0675	U	0.138	0.153
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Lead-212	1.21		0.0637	0.0974
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Lead-214	0.954		0.214	0.135
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Potassium-40	8.16		0.415	0.867
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Protactinium-231	0	UJ	0.534	0.514
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Protactinium-234	-0.0137	U	0.338	0.18
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Protactinium-234m	3.37	U	5.93	2.7
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Radium-223	-0.391	U	0.715	0.463
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Radium-224	2.1		0.682	1.03
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Radium-226	0.688		0.0828	0.156
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Thallium-208	0.363		0.0379	0.0643
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Thorium-227	0.0797	U	0.304	0.155
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Thorium-228	1.21		0.0637	0.0974
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Thorium-232	1.21		0.137	0.226
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Actinium-228	0.629		0.145	0.195
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Americium-241	0.0655	U	0.218	0.117
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Bismuth-212	1.01		0.473	0.496
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Bismuth-214	0.545		0.0724	0.0956
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Cesium-137	-0.00486	U	0.0431	0.0235
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Cobalt-60	0.0265	U	0.0537	0.0234
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Europium-152	-0.0332	U	0.104	0.0562
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Europium-154	0.0447	U	0.159	0.0753
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Europium-155	0.0557	U	0.119	0.0602
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Lead-212	0.552		0.0653	0.0787
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Lead-214	0.572		0.0775	0.125
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Potassium-40	8.05		0.337	0.92
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Protactinium-231	0.308	U	0.444	0.429
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Protactinium-234	0.146	U	0.374	0.179

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Protactinium-234m	0.254	U	6.62	3.47
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Radium-223	0.166	U	0.732	0.364
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Radium-224	0.328	U	0.699	1.08
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Radium-226	0.545		0.0724	0.0956
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Thallium-208	0.201		0.034	0.0586
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Thorium-227	0.00935	U	0.277	0.155
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Thorium-228	0.552		0.0653	0.0787
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Thorium-232	0.629		0.145	0.195
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Actinium-228	1.55		0.158	0.227
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Americium-241	0.0473	U	0.189	0.108
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Bismuth-212	0.906		0.662	0.632
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Bismuth-214	0.892		0.0919	0.134
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Cesium-137	0.00063	U	0.0445	0.0246
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Cobalt-60	-0.00733	U	0.044	0.0243
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Europium-152	0.00159	U	0.127	0.0682
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Europium-154	-0.0221	U	0.0984	0.0543
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Europium-155	0.117	U	0.126	0.117
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Lead-212	1.34		0.0707	0.103
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Lead-214	0.999		0.224	0.129
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Potassium-40	6.5		0.46	0.86
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Protactinium-231	0.115	U	0.621	0.326
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Protactinium-234	0.0476	U	0.374	0.191
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Protactinium-234m	5.14	U	6.06	4.33
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Radium-223	0.593	U	0.806	0.528
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Radium-224	1.5		0.758	1.04
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Radium-226	0.892		0.0919	0.134
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Thallium-208	0.381		0.0408	0.0628
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Thorium-227	0.0241	U	0.328	0.173
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Thorium-228	1.34		0.0707	0.103
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Thorium-232	1.55		0.158	0.227
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Actinium-228	1.02		0.163	0.237
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Americium-241	0.00368	U	0.0515	0.0284
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Bismuth-212	1.23		0.549	0.744
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Bismuth-214	0.715		0.0744	0.119
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Cesium-137	0.0094	U	0.0491	0.0258
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Cobalt-60	-0.00598	U	0.0485	0.0261
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Europium-152	-0.043	U	0.102	0.0624
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Europium-154	0.00378	U	0.128	0.0649
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Europium-155	0.0292	U	0.0987	0.0515
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Lead-212	0.994		0.0547	0.0842
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Lead-214	0.721		0.0837	0.13
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Potassium-40	6.89		0.453	0.869
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Protactinium-231	0	UJ	0.453	0.491
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Protactinium-234	-0.149	U	0.314	0.194
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Protactinium-234m	3.55	U	6.29	2.91
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Radium-223	-0.0353	U	0.739	0.467
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Radium-224	1.41		0.587	1.02
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Radium-226	0.715		0.0744	0.119
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Thallium-208	0.292		0.0422	0.0526

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Thorium-227	-0.122	U	0.261	0.157
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Thorium-228	0.994		0.0547	0.0842
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Thorium-232	1.02		0.163	0.237
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Actinium-228	0.848		0.157	0.267
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Americium-241	0.00821	U	0.278	0.141
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Bismuth-212	0.886		0.642	0.815
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Bismuth-214	0.659		0.09	0.117
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Cesium-137	0.0255	U	0.0478	0.022
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Cobalt-60	0.00162	U	0.0468	0.023
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Europium-152	-0.00828	U	0.105	0.0562
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Europium-154	-0.00415	U	0.157	0.081
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Europium-155	0.0634	U	0.121	0.0601
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Lead-212	0.886		0.0662	0.0907
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Lead-214	0.809		0.213	0.121
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Potassium-40	7.15		0.464	0.964
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Protactinium-231	0.112	U	0.542	0.276
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Protactinium-234	-0.0162	U	0.352	0.188
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Protactinium-234m	1.39	U	5.81	3.2
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Radium-223	-0.111	U	0.751	0.407
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Radium-224	0.881		0.71	0.841
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Radium-226	0.659		0.09	0.117
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Thallium-208	0.277		0.0443	0.0574
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Thorium-227	0.0447	U	0.266	0.134
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Thorium-228	0.886		0.0662	0.0907
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Thorium-232	0.848		0.157	0.267
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Actinium-228	1.08		0.199	0.246
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Americium-241	0.0604	U	0.191	0.092
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Bismuth-212	0.3	UJ	0.676	0.76
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Bismuth-214	0.771		0.0862	0.141
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Cesium-137	0.00778	U	0.0491	0.0246
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Cobalt-60	0.00128	U	0.0547	0.0268
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Europium-152	0	UJ	0.107	0.0894
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Europium-154	-0.00275	U	0.17	0.0857
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Europium-155	0.0564	U	0.128	0.0637
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Lead-212	1.25		0.0727	0.106
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Lead-214	0.98		0.0966	0.146
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Potassium-40	5.5		0.553	0.818
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Protactinium-231	0	UJ	0.533	0.631
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Protactinium-234	-0.0162	U	0.365	0.219
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Protactinium-234m	5.11	U	6.53	3.62
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Radium-223	0.087	U	0.805	0.478
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Radium-224	0	UJ	0.78	1.31
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Radium-226	0.771		0.0862	0.141
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Thallium-208	0.312		0.0433	0.0827
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Thorium-227	0.037	U	0.305	0.164
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Thorium-228	1.25		0.0727	0.106
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Thorium-232	1.08		0.199	0.246
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Actinium-228	1.11		0.164	0.203
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Americium-241	2.26E-05	U	0.312	0.165

Table 5-17. RBA-2 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Bismuth-212	1.8	J	0.547	0.575
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Bismuth-214	0.836		0.075	0.118
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Cesium-137	0.00428	U	0.0418	0.0223
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Cobalt-60	-0.00522	U	0.0467	0.025
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Europium-152	-0.0603	U	0.106	0.0623
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Europium-154	0.0401	U	0.141	0.074
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Europium-155	0.0781	U	0.149	0.0734
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Lead-212	1.14		0.0664	0.0977
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Lead-214	1.01		0.0897	0.136
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Potassium-40	5.69		0.448	0.847
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Protactinium-231	0	UJ	0.553	0.776
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Protactinium-234	0.077	U	0.342	0.165
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Protactinium-234m	-0.945	U	5.18	2.8
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Radium-223	-0.0138	U	0.804	0.487
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Radium-224	1.25		0.711	0.794
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Radium-226	0.836		0.075	0.118
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Thallium-208	0.366		0.0444	0.0572
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Thorium-227	-0.135	U	0.276	0.157
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Thorium-228	1.14		0.0664	0.0977
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Thorium-232	1.11		0.164	0.203

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

J - Analyte present. Reported value may or may not be accurate or precise

pCi/g - picocure per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-18. RBA-2 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Radium-226	0.739		0.087	0.179
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Americium-241	0.0886	UJ	0.192	0.131
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Plutonium-238	0.0785	UJ	0.289	0.164
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Plutonium-239/240	-0.0499	UJ	0.23	0.0704
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Thorium-228	0.548	J	0.537	0.492
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Thorium-230	0.742	J	0.598	0.561
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Thorium-232	0.913	J	0.418	0.581
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Uranium-233/234	0.49		0.101	0.144
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Uranium-235/236	0.0653	U	0.132	0.0838
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Uranium-238	0.499		0.129	0.151
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Radium-226	0.287		0.0883	0.103
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Americium-241	-0.0464	U	0.228	0.0802
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Plutonium-238	0.0772	UJ	0.258	0.152
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Plutonium-239/240	-0.0213	UJ	0.298	0.125
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Thorium-228	-0.105	UJ	0.396	0.175
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Thorium-230	0.449	J	0.359	0.277
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Thorium-232	0.0464	UJ	0.277	0.154
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Uranium-233/234	0.183		0.16	0.123
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Uranium-235/236	2.48E-09	U	0.114	0.0583
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Uranium-238	0.0602	U	0.161	0.0973
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Radium-226	0.655		0.087	0.149
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Americium-241	0.124	UJ	0.231	0.17
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Plutonium-238	-0.0316	UJ	0.277	0.107
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Plutonium-239/240	0.0274	UJ	0.24	0.123
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Thorium-228	0.416	UJ	0.648	0.454
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Thorium-230	2.01	J	0.515	0.784
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Thorium-232	1.23	J	0.267	0.604
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Uranium-233/234	0.553		0.0943	0.141
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Uranium-235/236	0.0662		0.0644	0.0598
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Uranium-238	0.597		0.0911	0.145
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Radium-226	0.862		0.0841	0.169
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Americium-241	0.028	UJ	0.406	0.197
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Plutonium-238	-0.0491	UJ	0.252	0.0791
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Plutonium-239/240	-0.015	UJ	0.252	0.103
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Thorium-228	0.792	J	0.694	0.561
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Thorium-230	1.26	J	0.577	0.631
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Thorium-232	1.27	J	0.571	0.63
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Uranium-233/234	0.739		0.117	0.17
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Uranium-235/236	0.0673		0.0336	0.0596
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Uranium-238	0.669		0.105	0.161
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Radium-226	0.585		0.0745	0.134
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Americium-241	0.00873	UJ	0.191	0.0913
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Plutonium-238	0.0818	UJ	0.273	0.159
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Plutonium-239/240	-0.0365	UJ	0.264	0.099
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Thorium-228	0.788	J	0.403	0.453
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Thorium-230	1.75	J	0.484	0.651
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Thorium-232	0.971	J	0.315	0.478
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Uranium-233/234	0.525		0.145	0.152
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Uranium-235/236	0.0849		0.0823	0.071
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Uranium-238	0.632		0.102	0.154

Table 5-18. RBA-2 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Radium-226	0.724		0.0963	0.119
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Americium-241	-0.016	UJ	0.185	0.0707
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Plutonium-238	0.0554	UJ	0.263	0.146
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Plutonium-239/240	0.0909	UJ	0.263	0.162
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Thorium-228	0.51	UJ	0.758	0.509
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Thorium-230	0.986	J	0.633	0.573
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Thorium-232	0.506	UJ	0.721	0.49
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Uranium-233/234	0.632	J	0.0889	0.165
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Uranium-235/236	0.0393	J	0.0393	0.0521
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Uranium-238	0.645	J	0.074	0.165
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Radium-226	0.459		0.0849	0.112
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Americium-241	0.0466	UJ	0.273	0.146
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Plutonium-238	0.0338	UJ	0.214	0.115
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Plutonium-239/240	0.0662	UJ	0.214	0.132
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Thorium-228	0.529		0.34	0.26
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Thorium-230	0.418		0.418	0.278
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Thorium-232	0.282		0.264	0.192
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Uranium-233/234	0.342		0.106	0.126
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Uranium-235/236	0.033	U	0.0663	0.0506
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Uranium-238	0.39		0.077	0.128
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Radium-226	0.175	J	0.133	0.0981
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Americium-241	0.13	UJ	0.281	0.192
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Plutonium-238	0.0159	UJ	0.169	0.0883
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Plutonium-239/240	0.0318	UJ	0.201	0.109
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Thorium-228	0.00166	UJ	0.508	0.228
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Thorium-230	0.122	UJ	0.532	0.302
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Thorium-232	-0.0212	UJ	0.368	0.155
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Uranium-233/234	0.196		0.1	0.096
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Uranium-235/236	-0.00808	U	0.0748	0.0314
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Uranium-238	0.159		0.0743	0.0826
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Radium-226	0.111	U	0.131	0.088
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Americium-241	0.00398	UJ	0.402	0.183
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Plutonium-238	-0.0543	UJ	0.279	0.0875
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Plutonium-239/240	0.00151	UJ	0.248	0.112
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Thorium-228	0.117	U	0.37	0.216
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Thorium-230	0.347	U	0.439	0.289
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Thorium-232	0.155	U	0.187	0.151
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Uranium-233/234	0.0267	UJ	0.486	0.259
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Uranium-235/236	0	UJ	0.245	0.126
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Uranium-238	0.0518	UJ	0.287	0.161
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Radium-226	0.436		0.0554	0.0937
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Americium-241	-0.156	U	0.352	0.106
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Plutonium-238	0.011	UJ	0.239	0.115
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Plutonium-239/240	0.0407	UJ	0.258	0.139
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Thorium-228	0.366	UJ	0.803	0.516
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Thorium-230	1.9	J	0.712	0.884
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Thorium-232	0.466	UJ	0.618	0.492
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Uranium-233/234	0.4		0.145	0.144
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Uranium-235/236	-0.0248	U	0.137	0.0595
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Uranium-238	0.371		0.111	0.132

Table 5-18. RBA-2 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Radium-226	0.209		0.054	0.0724
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Americium-241	0.00977	U	0.243	0.115
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Plutonium-238	-0.0245	UJ	0.283	0.109
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Plutonium-239/240	-0.0736	UJ	0.378	0.119
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Thorium-228	0.403	UJ	0.517	0.35
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Thorium-230	1.09	J	0.493	0.448
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Thorium-232	0.322	J	0.253	0.239
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Uranium-233/234	0.217		0.13	0.113
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Uranium-235/236	0.05	U	0.0995	0.0687
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Uranium-238	0.283		0.101	0.118
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Radium-226	0.688		0.0877	0.123
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Americium-241	-0.00319	UJ	0.251	0.114
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Plutonium-238	-0.00591	UJ	0.207	0.0888
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Plutonium-239/240	-0.0272	UJ	0.239	0.0919
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Thorium-228	0.803	J	0.354	0.436
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Thorium-230	0.538	J	0.39	0.372
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Thorium-232	1.02	J	0.259	0.468
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Uranium-233/234	0.795		0.132	0.175
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Uranium-235/236	0.00639	U	0.101	0.0502
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Uranium-238	0.68		0.0879	0.156
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Radium-226	0.872		0.0656	0.167
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Americium-241	-0.0298	UJ	0.261	0.101
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Plutonium-238	0.109	UJ	0.236	0.161
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Plutonium-239/240	-0.00572	UJ	0.3	0.132
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Thorium-228	0.829	J	0.335	0.387
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Thorium-230	1.14	J	0.338	0.44
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Thorium-232	1.13	J	0.304	0.433
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Uranium-233/234	0.728		0.167	0.197
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Uranium-235/236	0.0368	U	0.134	0.0775
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Uranium-238	0.747		0.139	0.193
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Radium-226	0.253	J	0.107	0.108
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Americium-241	0.118	UJ	0.348	0.208
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Plutonium-238	-0.0144	UJ	0.139	0.0587
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Plutonium-239/240	0.00107	UJ	0.108	0.049
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Thorium-228	1.68	J	0.349	0.497
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Thorium-230	0.987	J	0.429	0.412
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Thorium-232	1.98	J	0.251	0.516
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Uranium-233/234	0.986	J	0.127	0.208
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Uranium-235/236	0.0544	UJ	0.106	0.0708
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Uranium-238	0.941	J	0.104	0.201
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Radium-226	0.897	J	0.0771	0.172
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Americium-241	0.202	UJ	0.289	0.231
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Plutonium-238	0.00169	UJ	0.13	0.0602
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Plutonium-239/240	-0.0372	UJ	0.126	0.0359
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Thorium-228	1.68	J	0.218	0.445
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Thorium-230	1.41	J	0.247	0.409
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Thorium-232	1.5	J	0.204	0.416
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Uranium-233/234	0.804		0.0915	0.168
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Uranium-235/236	0.0803		0.0558	0.0627
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Uranium-238	1.08		0.0647	0.19

Table 5-18. RBA-2 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Radium-226	0.619		0.0468	0.12
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Americium-241	-0.0379	UJ	0.221	0.0718
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Plutonium-238	0.0186	UJ	0.122	0.0639
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Plutonium-239/240	-0.0153	UJ	0.129	0.0523
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Thorium-228	0.877	J	0.313	0.411
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Thorium-230	0.723	J	0.361	0.383
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Thorium-232	0.441	J	0.27	0.296
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Uranium-233/234	0.651	J	0.101	0.171
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Uranium-235/236	0.0478	UJ	0.102	0.0678
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Uranium-238	0.61	J	0.0884	0.164
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Radium-226	0.649		0.0659	0.121
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Americium-241	0.0186	UJ	0.246	0.12
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Plutonium-238	0.0291	UJ	0.11	0.0625
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Plutonium-239/240	-0.00493	UJ	0.107	0.046
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Thorium-228	0.93	J	0.288	0.403
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Thorium-230	0.672	J	0.37	0.363
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Thorium-232	1.19	J	0.157	0.435
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Uranium-233/234	0.721		0.0715	0.154
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Uranium-235/236	0.023	U	0.0631	0.0414
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Uranium-238	0.732		0.0896	0.157
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Radium-226	0.558		0.081	0.131
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Americium-241	0.086	UJ	0.215	0.139
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Plutonium-238	0.127	UJ	0.236	0.174
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Plutonium-239/240	-0.00464	UJ	0.366	0.166
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Thorium-228	1.09	J	0.465	0.533
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Thorium-230	0.77	J	0.527	0.473
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Thorium-232	0.862	J	0.315	0.453
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Uranium-233/234	0.583		0.103	0.145
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Uranium-235/236	0.051		0.0306	0.0504
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Uranium-238	0.693		0.0247	0.149
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Radium-226	0.835		0.068	0.143
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Americium-241	0.00119	UJ	0.196	0.088
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Plutonium-238	0.00252	UJ	0.139	0.0664
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Plutonium-239/240	0.0136	UJ	0.102	0.0526
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Thorium-228	1.13	J	0.287	0.374
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Thorium-230	0.774	J	0.357	0.334
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Thorium-232	1.3	J	0.207	0.381
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Uranium-233/234	0.705	J	0.0876	0.173
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Uranium-235/236	-0.00103	UJ	0.0899	0.04
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Uranium-238	0.757	J	0.0552	0.176
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Radium-226	0.874		0.0781	0.162
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Americium-241	-0.0824	UJ	0.279	0.0795
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Plutonium-238	-0.0402	UJ	0.158	0.0578
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Plutonium-239/240	-0.0276	UJ	0.116	0.0347
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Thorium-228	1.08	J	0.238	0.434
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Thorium-230	0.968	J	0.308	0.416
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Thorium-232	1.48	J	0.208	0.494
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Uranium-233/234	0.697		0.0827	0.154
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Uranium-235/236	0.054	U	0.064	0.0545
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Uranium-238	0.84		0.0752	0.167

Table 5-18. RBA-2 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Radium-226	0.648		0.0447	0.111
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Americium-241	0.0276	UJ	0.275	0.138
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Plutonium-238	0.000595	UJ	0.098	0.0441
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Plutonium-239/240	-0.0321	UJ	0.125	0.0366
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Thorium-228	1.15	J	0.293	0.478
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Thorium-230	0.894	J	0.354	0.43
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Thorium-232	0.739	J	0.18	0.376
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Uranium-233/234	0.618		0.0832	0.149
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Uranium-235/236	0.00994	U	0.0755	0.0397
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Uranium-238	0.707		0.0611	0.157
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Radium-226	0.69		0.0721	0.142
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Americium-241	-0.121	UJ	0.463	0.156
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Plutonium-238	-0.0206	UJ	0.113	0.0404
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Plutonium-239/240	-0.00503	UJ	0.109	0.047
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Thorium-228	1.7	J	0.369	0.544
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Thorium-230	1.15	J	0.284	0.439
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Thorium-232	1.65	J	0.25	0.516
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Uranium-233/234	0.494		0.09	0.133
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Uranium-235/236	0	U	0.0313	0.0217
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Uranium-238	0.624		0.0589	0.145
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Radium-226	1.14		0.0848	0.202
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Americium-241	0.215	UJ	0.349	0.252
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Plutonium-238	-0.042	UJ	0.135	0.0378
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Plutonium-239/240	-0.00292	UJ	0.102	0.0438
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Thorium-228	0.951	J	0.243	0.381
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Thorium-230	1.17	J	0.297	0.422
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Thorium-232	0.854	J	0.24	0.358
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Uranium-233/234	0.736	J	0.0831	0.176
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Uranium-235/236	0.0426	UJ	0.0813	0.0591
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Uranium-238	0.921	J	0.0557	0.195
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Radium-226	0.645		0.0508	0.122
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Americium-241	-0.0551	UJ	0.301	0.108
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Plutonium-238	0.0277	UJ	0.131	0.073
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Plutonium-239/240	-0.0078	UJ	0.131	0.0539
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Thorium-228	0.989	J	0.259	0.367
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Thorium-230	1.17	J	0.254	0.39
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Thorium-232	1.07	J	0.221	0.37
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Uranium-233/234	0.958	J	0.0963	0.219
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Uranium-235/236	0.0453	UJ	0.108	0.0715
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Uranium-238	0.858	J	0.0786	0.207
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Radium-226	0.663		0.0583	0.125
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Americium-241	0.232	UJ	0.261	0.212
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Plutonium-238	-0.013	UJ	0.0895	0.0302
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Plutonium-239/240	-0.00977	UJ	0.0829	0.0295
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Thorium-228	1.55	J	0.204	0.423
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Thorium-230	2.3	J	0.243	0.51
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Thorium-232	1.35	J	0.176	0.388
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Uranium-233/234	0.622		0.0761	0.154
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Uranium-235/236	0.0616	U	0.073	0.0622
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Uranium-238	0.704		0.0718	0.163

Table 5-18. RBA-2 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Radium-226	0.932		0.0682	0.152
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Americium-241	-0.0147	UJ	0.248	0.102
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Plutonium-238	-0.00277	UJ	0.097	0.0415
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Plutonium-239/240	0.021	UJ	0.0765	0.0482
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Thorium-228	1.11	J	0.254	0.352
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Thorium-230	1.49	J	0.23	0.395
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Thorium-232	1.47	J	0.199	0.388
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Uranium-233/234	0.508	J	0.0948	0.149
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Uranium-235/236	0.0318	UJ	0.0749	0.0531
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Uranium-238	0.614	J	0.0823	0.161
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Radium-226	0.676		0.062	0.108
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Americium-241	0.0647	UJ	0.251	0.143
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Plutonium-238	0.122	UJ	0.536	0.294
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Plutonium-239/240	0.0229	UJ	0.244	0.127
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Thorium-228	1.21	J	0.393	0.539
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Thorium-230	0.589	J	0.359	0.385
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Thorium-232	0.795	J	0.269	0.426
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Uranium-233/234	0.476		0.0734	0.125
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Uranium-235/236	0.0259	U	0.052	0.0397
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Uranium-238	0.544		0.0722	0.133
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Radium-226	0.641		0.0792	0.138
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Americium-241	-0.0107	UJ	0.289	0.129
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Plutonium-238	-0.0112	UJ	0.117	0.0484
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Plutonium-239/240	-0.00255	UJ	0.0893	0.0382
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Thorium-228	0.97	J	0.253	0.426
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Thorium-230	1.06	J	0.405	0.462
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Thorium-232	0.822	J	0.22	0.387
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Uranium-233/234	0.567		0.0795	0.134
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Uranium-235/236	0.0615	U	0.0713	0.0571
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Uranium-238	0.742		0.0752	0.151
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Radium-226	0.617		0.0954	0.136
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Americium-241	0.00975	U	0.236	0.111
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Plutonium-238	0.0173	UJ	0.0824	0.0475
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Plutonium-239/240	0.00108	UJ	0.109	0.0495
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Thorium-228	1.05	J	0.215	0.355
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Thorium-230	0.825	J	0.244	0.319
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Thorium-232	1.28	J	0.201	0.383
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Uranium-233/234	0.636		0.0871	0.147
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Uranium-235/236	0.00561	U	0.0762	0.0375
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Uranium-238	0.714		0.0243	0.15
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Radium-226	0.843		0.0446	0.13
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Americium-241	-0.0847	U	0.286	0.0939
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Plutonium-238	0.0165	UJ	0.136	0.0693
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Plutonium-239/240	0.0265	UJ	0.103	0.0602
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Thorium-228	1.2	J	0.445	0.448
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Thorium-230	1.33	J	0.385	0.448
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Thorium-232	1.27	J	0.385	0.439
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Uranium-233/234	0.927		0.0829	0.18
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Uranium-235/236	0.0352	U	0.0672	0.0489
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Uranium-238	0.753		0.0461	0.16

Table 5-18. RBA-2 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Radium-226	0.688		0.124	0.141
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Americium-241	0.0151	UJ	0.375	0.178
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Plutonium-238	0.0513	UJ	0.137	0.0822
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Plutonium-239/240	0.00394	UJ	0.086	0.0412
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Thorium-228	1.69	J	0.343	0.582
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Thorium-230	0.879	J	0.405	0.44
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Thorium-232	1.19	J	0.295	0.484
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Uranium-233/234	0.835		0.0728	0.162
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Uranium-235/236	0.0612		0.0609	0.0553
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Uranium-238	0.845		0.0493	0.162
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Radium-226	0.683		0.0853	0.148
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Americium-241	0.0644	UJ	0.208	0.128
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Plutonium-238	-0.0334	UJ	0.138	0.047
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Plutonium-239/240	0.0181	UJ	0.0865	0.0499
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Thorium-228	0.928	J	0.542	0.555
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Thorium-230	0.483	UJ	0.538	0.43
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Thorium-232	1.6	J	0.383	0.669
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Uranium-233/234	0.956		0.0942	0.189
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Uranium-235/236	0.0899		0.0793	0.0722
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Uranium-238	0.814		0.0699	0.172
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Radium-226	0.674		0.0498	0.128
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Americium-241	0.0385	U	0.226	0.121
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Plutonium-238	-0.0223	UJ	0.122	0.0436
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Plutonium-239/240	-0.019	UJ	0.118	0.0432
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Thorium-228	0.37	J	0.205	0.229
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Thorium-230	0.735	J	0.258	0.314
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Thorium-232	0.728	J	0.237	0.309
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Uranium-233/234	0.418		0.0909	0.123
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Uranium-235/236	0.0332	U	0.0633	0.046
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Uranium-238	0.553		0.0623	0.135
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Radium-226	0.83		0.0711	0.164
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Americium-241	0.00962	UJ	0.233	0.11
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Plutonium-238	-0.0213	UJ	0.116	0.0418
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Plutonium-239/240	-0.0146	UJ	0.123	0.0497
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Thorium-228	1.25	J	0.318	0.437
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Thorium-230	0.911	J	0.298	0.373
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Thorium-232	1.01	J	0.216	0.377
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Uranium-233/234	0.638		0.0979	0.149
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Uranium-235/236	0.0194	U	0.0705	0.0421
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Uranium-238	0.584		0.0621	0.138
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Radium-226	0.754		0.0695	0.138
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Americium-241	0.02	UJ	0.213	0.111
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Plutonium-238	0.000525	UJ	0.0865	0.0389
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Plutonium-239/240	-0.0152	UJ	0.11	0.0413
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Thorium-228	0.984	J	0.287	0.403
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Thorium-230	1.07	J	0.27	0.412
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Thorium-232	0.947	J	0.235	0.384
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Uranium-233/234	0.795		0.0776	0.169
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Uranium-235/236	0.0627		0.0589	0.0587
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Uranium-238	0.704		0.0562	0.158

Table 5-18. RBA-2 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Radium-226	0.578	J	0.0674	0.114
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Americium-241	0.0379	UJ	0.379	0.189
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Plutonium-238	0.0237	UJ	0.252	0.132
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Plutonium-239/240	0.0692	UJ	0.252	0.159
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Thorium-228	0.351	J	0.33	0.281
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Thorium-230	0.634	J	0.307	0.346
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Thorium-232	0.556	J	0.309	0.328
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Uranium-233/234	0.271		0.0658	0.0888
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Uranium-235/236	0.0513	U	0.0544	0.0481
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Uranium-238	0.367		0.054	0.0999
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Radium-226	0.696		0.0579	0.124
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Americium-241	-0.0793	UJ	0.327	0.112
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Plutonium-238	0.0145	UJ	0.108	0.0558
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Plutonium-239/240	-0.00589	UJ	0.099	0.0407
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Thorium-228	0.915	J	0.338	0.367
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Thorium-230	1.06	J	0.276	0.374
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Thorium-232	0.847	J	0.205	0.327
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Uranium-233/234	0.572		0.102	0.144
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Uranium-235/236	0.0226	U	0.0838	0.0484
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Uranium-238	0.595		0.0756	0.142
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Radium-226	0.595		0.0844	0.127
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Americium-241	0.0233	UJ	0.147	0.0873
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Plutonium-238	-0.0278	UJ	0.117	0.0349
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Plutonium-239/240	0.00809	UJ	0.107	0.0522
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Thorium-228	1.32	J	0.31	0.524
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Thorium-230	0.678	J	0.403	0.401
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Thorium-232	1.16	J	0.245	0.481
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Uranium-233/234	0.528		0.0793	0.135
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Uranium-235/236	0.00574	U	0.0779	0.0384
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Uranium-238	0.541		0.0519	0.133
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Radium-226	0.783		0.0886	0.142
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Americium-241	0.0627	UJ	0.0941	0.107
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Plutonium-238	-0.0197	UJ	0.101	0.0318
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Plutonium-239/240	0.0274	UJ	0.0411	0.047
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Thorium-228	0.966	J	0.298	0.399
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Thorium-230	0.466	J	0.318	0.296
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Thorium-232	0.778	J	0.148	0.343
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Uranium-233/234	0.406		0.0927	0.121
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Uranium-235/236	0.0266	U	0.0534	0.0407
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Uranium-238	0.507		0.051	0.128
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Radium-226	0.589		0.0377	0.101
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Americium-241	0.00104	U	0.171	0.077
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Plutonium-238	-0.00786	UJ	0.157	0.0678
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Plutonium-239/240	-0.0223	UJ	0.254	0.101
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Thorium-228	1.3	J	0.547	0.67
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Thorium-230	1.75	J	0.469	0.745
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Thorium-232	1.34	J	0.372	0.648
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Uranium-233/234	0.537		0.0971	0.146
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Uranium-235/236	0.0802		0.0344	0.0649
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Uranium-238	0.693		0.0701	0.161

Table 5-18. RBA-2 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Radium-226	0.591		0.0546	0.107
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Americium-241	-0.0202	UJ	0.34	0.14
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Plutonium-238	0.0185	UJ	0.197	0.103
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Plutonium-239/240	0.00285	UJ	0.287	0.131
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Thorium-228	1.58	J	0.392	0.58
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Thorium-230	1.16	J	0.35	0.493
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Thorium-232	1.15	J	0.367	0.494
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Uranium-233/234	0.391		0.124	0.149
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Uranium-235/236	0.0491	U	0.132	0.082
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Uranium-238	0.603		0.157	0.186

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

J - Analyte present. Reported value may or may not be accurate or precise

pCi/g - picocure per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-19. RBA-2 - Gas Flow Proportional Counting Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Strontium-90	-0.0279	U	0.143	0.0782
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Strontium-90	-0.0583	U	0.147	0.0714
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Strontium-90	-0.0809	U	0.142	0.064
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Strontium-90	0.129	U	0.145	0.0895
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Strontium-90	-0.00908	U	0.146	0.0816
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Strontium-90	0.0521	U	0.147	0.085
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Strontium-90	-0.0839	U	0.143	0.0624
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Strontium-90	-0.0446	U	0.144	0.0737
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Strontium-90	0.0666	U	0.145	0.0859
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Strontium-90	-0.077	U	0.148	0.0725
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Strontium-90	-0.0352	U	0.144	0.0748
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Strontium-90	-0.0864	U	0.146	0.0736
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Strontium-90	-0.0277	U	0.144	0.0759
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Strontium-90	-0.0134	U	0.145	0.0746
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Strontium-90	0.0692	U	0.146	0.0862
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Strontium-90	-0.0197	U	0.149	0.0781
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Strontium-90	0.0321	U	0.142	0.0793
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Strontium-90	0.0848	U	0.104	0.065
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Strontium-90	0.0795	U	0.145	0.0868
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Strontium-90	0.0416	U	0.149	0.0842
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Strontium-90	0.13	U	0.147	0.0921
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Strontium-90	0.0443	U	0.143	0.0811
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Strontium-90	0.04	U	0.145	0.0816
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Strontium-90	-0.0364	U	0.145	0.0763
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Strontium-90	-0.0889	U	0.145	0.0632
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Strontium-90	0.0997	U	0.146	0.0899
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Strontium-90	-0.0252	U	0.148	0.0801
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Strontium-90	-0.0375	U	0.145	0.0723
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Strontium-90	0.0501	U	0.134	0.0764
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Strontium-90	0.108	U	0.146	0.0897
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Strontium-90	0.0563	U	0.143	0.0835
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Strontium-90	-0.0686	U	0.148	0.0707
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Strontium-90	0.0314	U	0.146	0.0819
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Strontium-90	0.0736	U	0.147	0.0872
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Strontium-90	0.0856	U	0.143	0.0862
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Strontium-90	-0.082	U	0.147	0.0771
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Strontium-90	-0.0418	U	0.128	0.0563
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Strontium-90	0.0774	U	0.147	0.0875
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Strontium-90	0.0299	U	0.148	0.0812
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Strontium-90	-0.0716	U	0.146	0.0674
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Strontium-90	-0.0945	U	0.144	0.0686

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

pCi/g - picocure per gram

U - Not Detected

Table 5-20. RBA-2 - Radon Emanation Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA2-SB01-0102-0919	09/05/2019 13:04	Radium-226	0.448		0.191	0.17
HPRBA2-SB01-0304-0919	09/05/2019 13:06	Radium-226	0.149		0.119	0.0972
HPRBA2-SB05-0102-0919	09/05/2019 17:52	Radium-226	0.636		0.208	0.217
HPRBA2-SB05-0304-0919	09/05/2019 17:54	Radium-226	0.208		0.146	0.115
HPRBA2-SB05-0506-0919	09/05/2019 17:56	Radium-226	0.681		0.196	0.202
HPRBA2-SB13-0102-0819	08/30/2019 10:10	Radium-226	0.69		0.21	0.212
HPRBA2-SB13-0304-0819	08/30/2019 10:12	Radium-226	0.425		0.222	0.184
HPRBA2-SB21-0102-0919	09/05/2019 10:02	Radium-226	0.171		0.126	0.102
HPRBA2-SB21-0304-0919	09/05/2019 10:04	Radium-226	0.246		0.151	0.131
HPRBA2-SB25-0102-0919	09/05/2019 10:52	Radium-226	0.267		0.137	0.123
HPRBA2-SB25-0304-0919	09/05/2019 10:54	Radium-226	0.293		0.108	0.121
HPRBA2-SS01-000H-0919	09/05/2019 13:00	Radium-226	1.06		0.166	0.258
HPRBA2-SS01P-000H-0919	09/05/2019 13:02	Radium-226	0.612		0.113	0.173
HPRBA2-SS02-000H-0819	08/26/2019 15:20	Radium-226	0.907		0.181	0.233
HPRBA2-SS02P-000H-0819	08/26/2019 15:22	Radium-226	0.567		0.153	0.186
HPRBA2-SS03-000H-0819	08/26/2019 11:55	Radium-226	1.27		0.203	0.279
HPRBA2-SS04-000H-0819	08/26/2019 11:35	Radium-226	0.55		0.156	0.185
HPRBA2-SS05-000H-0919	09/05/2019 17:50	Radium-226	0.46		0.248	0.204
HPRBA2-SS06-000H-0819	08/26/2019 08:25	Radium-226	0.857		0.247	0.265
HPRBA2-SS07-000H-0819	08/26/2019 11:00	Radium-226	0.924		0.0969	0.215
HPRBA2-SS08-000H-0819	08/26/2019 11:20	Radium-226	0.595		0.19	0.191
HPRBA2-SS09-000H-0819	08/26/2019 14:45	Radium-226	0.816		0.142	0.2
HPRBA2-SS10-000H-0819	08/26/2019 15:00	Radium-226	0.605		0.166	0.192
HPRBA2-SS11-000H-0819	08/26/2019 14:05	Radium-226	0.989		0.176	0.247
HPRBA2-SS11P-000H-0819	08/26/2019 14:07	Radium-226	0.775		0.134	0.199
HPRBA2-SS12-000H-0819	08/26/2019 14:20	Radium-226	0.958		0.16	0.241
HPRBA2-SS13-000H-0819	08/30/2019 09:45	Radium-226	0.707		0.233	0.228
HPRBA2-SS14-000H-0819	08/26/2019 10:30	Radium-226	0.525		0.194	0.188
HPRBA2-SS15-000H-0819	08/26/2019 08:40	Radium-226	0.478		0.209	0.188
HPRBA2-SS16-000H-0819	08/26/2019 13:45	Radium-226	0.92		0.213	0.244
HPRBA2-SS17-000H-0819	08/26/2019 13:25	Radium-226	1.13		0.17	0.247
HPRBA2-SS18-000H-0819	08/26/2019 10:15	Radium-226	1.26		0.215	0.306
HPRBA2-SS19-000H-0819	08/26/2019 09:25	Radium-226	0.638		0.196	0.225
HPRBA2-SS19P-000H-0819	08/26/2019 09:27	Radium-226	0.44		0.148	0.163
HPRBA2-SS20-000H-0819	08/26/2019 09:00	Radium-226	0.908		0.229	0.249
HPRBA2-SS21-000H-0919	09/05/2019 10:00	Radium-226	0.28		0.139	0.124
HPRBA2-SS22-000H-0819	08/26/2019 13:05	Radium-226	0.764		0.167	0.2
HPRBA2-SS23-000H-0819	08/26/2019 09:55	Radium-226	0.515		0.186	0.187
HPRBA2-SS24-000H-0819	08/26/2019 09:40	Radium-226	0.731		0.193	0.209
HPRBA2-SS25-000H-0919	09/05/2019 10:50	Radium-226	0.71		0.11	0.182
HPRBA2-SS25P-000H-0919	09/05/2019 10:56	Radium-226	0.406		0.125	0.143

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

pCi/g - picocure per gram

Table 5-21. RBA-2 - Summary of Combined Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	36 / 36	0.155	1.57	0.998	0.401	0.0668	1.06
	Am-241	0/36	-0.101	0.153	0.0175	0.0553	0.00922	0.0111
	Bi-212	30 / 36	-0.0484	2.34	1.09	0.583	0.0971	1.1
	Bi-214	36 / 36	0.111	1.13	0.733	0.268	0.0446	0.776
	Co-60	0/36	-0.0162	0.0265	0.00392	0.00876	0.00146	0.00493
	Cs-137	0/36	-0.0299	0.0272	-0.00125	0.0122	0.00204	-0.0005455
	Eu-152	0/36	-0.0901	0.0518	-0.0157	0.03	0.005	-0.0112
	Eu-154	0/36	-0.0475	0.12	0.00685	0.0335	0.00558	0.00559
	Eu-155	0/36	-0.0298	0.137	0.0349	0.0392	0.00654	0.0288
	K-40	36 / 36	1.92	11.1	7.091	1.702	0.284	7.165
	Pa-231	0/36	-0.25	0.369	0.0576	0.13	0.0216	0
	Pa-234	0/36	-0.295	0.243	-0.0193	0.106	0.0176	-0.015
	Pa-234m	0/36	-2.07	5.14	1.276	1.938	0.323	1.1
	Pb-212	36 / 36	0.102	1.62	1.042	0.432	0.072	1.215
	Pb-214	36 / 36	0.11	1.37	0.874	0.33	0.055	0.951
	Ra-223	0/36	-0.423	0.628	0.00771	0.236	0.0394	-0.00714
	Ra-224	23 / 36	-0.0592	2.17	1.15	0.74	0.123	1.42
	Ra-226	36 / 36	0.111	1.13	0.733	0.268	0.0446	0.776
	Tl-208	36 / 36	0.0319	0.457	0.303	0.125	0.0209	0.334
	Th-227	0/36	-0.122	0.116	-0.00153	0.0639	0.0106	0.00335
	Th-228	36 / 36	0.102	1.62	1.042	0.432	0.072	1.215
	Th-232	36 / 36	0.155	1.57	0.998	0.401	0.0668	1.06
Alpha Spectroscopy	Am-241	0/36	-0.156	0.215	0.0149	0.0731	0.0122	0.0124
	Pu-238	0/36	-0.0543	0.127	0.011	0.0447	0.00745	0.00156
	Pu-239/240	0/36	-0.0736	0.0909	0.0023	0.0328	0.00547	-0.00274
	Ra-226	35 / 36	0.111	1.14	0.628	0.216	0.0359	0.652
	Th-228	29 / 36	-0.105	1.7	0.864	0.443	0.0738	0.941
	Th-230	33 / 36	0.122	2.01	0.943	0.442	0.0737	0.887
	Th-232	31 / 36	-0.0212	1.98	0.931	0.467	0.0778	0.93
	U-233/234	35 / 36	0.0267	0.986	0.574	0.231	0.0384	0.57
	U-235/236	9 / 36	-0.0248	0.0899	0.0361	0.0285	0.00475	0.0373
	U-238	34 / 36	0.0518	0.941	0.603	0.218	0.0364	0.639
Gas Flow Proportional Counting	Sr-90	0/36	-0.0864	0.13	0.00941	0.0669	0.0111	0.0104
Radon Emanation	Ra-226	36 / 36	0.149	1.27	0.66	0.302	0.0504	0.66

Notes:

pCi/g - picocurie per gram

Table 5-22. RBA-2 - Summary of Surface Soil Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	25/25	0.629	1.57	1.189	0.244	0.0489	1.21
	Am-241	0/25	-0.0926	0.153	0.0233	0.0568	0.0114	0.0141
	Bi-212	24/25	0.3	2.34	1.333	0.459	0.0918	1.29
	Bi-214	25/25	0.545	1.13	0.854	0.146	0.0291	0.848
	Co-60	0/25	-0.0162	0.0265	0.00451	0.00984	0.00197	0.00586
	Cs-137	0/25	-0.0299	0.0255	-0.00149	0.0122	0.00245	-0.00125
	Eu-152	0/25	-0.0901	0.0273	-0.0179	0.0295	0.0059	-0.0135
	Eu-154	0/25	-0.0351	0.12	0.0152	0.0319	0.00638	0.0125
	Eu-155	0/25	-0.0298	0.137	0.0433	0.0422	0.00844	0.0406
	K-40	25/25	5.5	8.97	7.069	0.923	0.185	7.07
	Pa-231	0/25	0	0.369	0.0586	0.117	0.0234	0
	Pa-234	0/25	-0.168	0.146	-0.0245	0.0883	0.0177	-0.0162
	Pa-234m	0/25	-1.76	5.14	1.606	1.9	0.38	1.18
	Pb-212	25/25	0.552	1.62	1.247	0.252	0.0503	1.3
	Pb-214	25/25	0.572	1.37	1.02	0.194	0.0388	0.999
	Ra-223	0/25	-0.423	0.593	-0.022	0.234	0.0468	-0.0186
	Ra-224	21/25	0	2.17	1.492	0.549	0.11	1.57
	Ra-226	25/25	0.545	1.13	0.854	0.146	0.0291	0.848
	Tl-208	25/25	0.201	0.457	0.365	0.0679	0.0136	0.38
	Th-227	0/25	-0.122	0.107	-0.0106	0.0666	0.0133	0.00025
	Th-228	25/25	0.552	1.62	1.247	0.252	0.0503	1.3
	Th-232	25/25	0.629	1.57	1.189	0.244	0.0489	1.21
Alpha Spectroscopy	Am-241	0/25	-0.121	0.215	0.0126	0.071	0.0142	0.0151
	Pu-238	0/25	-0.042	0.127	0.00813	0.042	0.0084	0.000525
	Pu-239/240	0/25	-0.0321	0.0692	0.0008168	0.0222	0.00444	-0.00292
	Ra-226	25/25	0.253	1.14	0.694	0.16	0.0319	0.676
	Th-228	25/25	0.351	1.7	1.07	0.326	0.0651	1.05
	Th-230	24/25	0.466	1.75	0.915	0.317	0.0634	0.879
	Th-232	25/25	0.441	1.98	1.095	0.369	0.0738	1.07
	U-233/234	25/25	0.271	0.986	0.655	0.188	0.0376	0.636
	U-235/236	5/25	-0.00103	0.0899	0.0371	0.0249	0.00497	0.0352
	U-238	25/25	0.367	0.941	0.694	0.136	0.0273	0.704
Gas Flow Proportional Counting	Sr-90	0/25	-0.0864	0.13	0.0203	0.0641	0.0128	0.0321
Radon Emanation	Ra-226	25/25	0.28	1.27	0.782	0.255	0.0509	0.764

Notes:

pCi/g - picocurie per gram

Table 5-23. RBA-2-Summary of Subsurface Soil Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	11/11	0.155	1.18	0.562	0.344	0.104	0.53
	Am-241	0/11	-0.101	0.106	0.00426	0.0521	0.0157	-0.00329
	Bi-212	6/11	-0.0484	1.33	0.538	0.446	0.134	0.479
	Bi-214	11/11	0.111	0.975	0.458	0.283	0.0853	0.457
	Co-60	0/11	-0.00698	0.0104	0.0026	0.00579	0.00175	0.00433
	Cs-137	0/11	-0.0205	0.0272	-0.0006812	0.0127	0.00383	0.000159
	Eu-152	0/11	-0.0497	0.0518	-0.0108	0.0319	0.00963	-0.00645
	Eu-154	0/11	-0.0475	0.0408	-0.012	0.0303	0.00914	-0.0198
	Eu-155	0/11	-0.0292	0.0536	0.016	0.0232	0.007	0.0177
	K-40	11/11	1.92	11.1	7.142	2.844	0.858	7.88
	Pa-231	0/11	-0.25	0.333	0.0553	0.161	0.0486	0
	Pa-234	0/11	-0.295	0.243	-0.00742	0.142	0.0429	-0.000301
	Pa-234m	0/11	-2.07	3.14	0.528	1.898	0.572	0.85
	Pb-212	11/11	0.102	1.33	0.575	0.394	0.119	0.56
	Pb-214	11/11	0.11	1.18	0.542	0.341	0.103	0.498
	Ra-223	0/11	-0.201	0.628	0.0753	0.238	0.0719	0.0357
	Ra-224	2/11	-0.0592	1.43	0.372	0.485	0.146	0.226
	Ra-226	11/11	0.111	0.975	0.458	0.283	0.0853	0.457
	Tl-208	11/11	0.0319	0.33	0.16	0.108	0.0326	0.135
	Th-227	0/11	-0.055	0.116	0.0191	0.0545	0.0164	0.0106
	Th-228	11/11	0.102	1.33	0.575	0.394	0.119	0.56
	Th-232	11/11	0.155	1.18	0.562	0.344	0.104	0.53
Alpha Spectroscopy	Am-241	0/11	-0.156	0.13	0.0201	0.081	0.0244	0.00977
	Pu-238	0/11	-0.0543	0.0818	0.0176	0.0519	0.0156	0.0159
	Pu-239/240	0/11	-0.0736	0.0909	0.00566	0.0506	0.0153	0.00151
	Ra-226	10/11	0.111	0.862	0.477	0.256	0.0772	0.459
	Th-228	4/11	-0.105	0.792	0.397	0.292	0.0879	0.416
	Th-230	9/11	0.122	2.01	1.007	0.661	0.199	0.986
	Th-232	6/11	-0.0212	1.27	0.558	0.465	0.14	0.466
	U-233/234	10/11	0.0267	0.739	0.391	0.219	0.0661	0.4
	U-235/236	4/11	-0.0248	0.0849	0.0339	0.0368	0.0111	0.0393
	U-238	9/11	0.0518	0.669	0.396	0.233	0.0703	0.39
Gas Flow Proportional Counting	Sr-90	0/11	-0.0839	0.129	-0.0154	0.0694	0.0209	-0.0352
Radon Emanation	Ra-226	11/11	0.149	0.69	0.383	0.206	0.0621	0.293

Notes:

pCi/g - picocurie per gram

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Actinium-228	0.537		0.129	0.138
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Americium-241	0.0154	U	0.046	0.024
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Bismuth-212	0.399	U	0.616	0.29
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Bismuth-214	0.432		0.0649	0.0923
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Cesium-137	-0.00426	U	0.0339	0.0194
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Cobalt-60	-0.00946	U	0.0318	0.0206
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Europium-152	-0.00316	U	0.0776	0.044
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Europium-154	-0.00525	U	0.134	0.0703
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Europium-155	0.0528	U	0.0735	0.0985
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Lead-212	0.398		0.0474	0.0783
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Lead-214	0.621		0.158	0.0996
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Potassium-40	13.7		0.286	1.03
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Protactinium-231	0.331	U	0.423	0.422
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Protactinium-234	-0.0989	U	0.305	0.166
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Protactinium-234m	1.25	U	4.9	2.34
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Radium-223	0.19	U	0.601	0.32
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Radium-224	0.131	U	0.61	0.456
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Radium-226	0.432		0.0649	0.0923
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Thallium-208	0.121	J	0.0356	0.0406
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Thorium-227	0.0453	U	0.233	0.126
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Thorium-228	0.398		0.0474	0.0783
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Thorium-232	0.537		0.129	0.138
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Actinium-228	0.447		0.121	0.17
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Americium-241	-0.0754	U	0.289	0.151
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Bismuth-212	0.787		0.557	0.688
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Bismuth-214	0.287		0.0729	0.0898
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Cesium-137	-0.0161	U	0.0373	0.0216
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Cobalt-60	-0.00162	U	0.0437	0.0219
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Europium-152	0.0226	U	0.111	0.0541
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Europium-154	0.0195	U	0.163	0.0808
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Europium-155	0.0727	U	0.127	0.0997
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Lead-212	0.475		0.069	0.104
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Lead-214	0.333		0.0797	0.1
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Potassium-40	10.9		0.361	1.03
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Protactinium-231	0.321	U	0.565	0.261
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Protactinium-234	-0.0663	U	0.313	0.177
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Protactinium-234m	-0.206	U	5	2.6
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Radium-223	-0.00165	U	0.672	0.376
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Radium-224	0.326	U	0.801	0.682
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Radium-226	0.287		0.0729	0.0898
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Thallium-208	0.174		0.0357	0.0606
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Thorium-227	-0.0319	U	0.293	0.149
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Thorium-228	0.475		0.069	0.104
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Thorium-232	0.447		0.121	0.17
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Actinium-228	0.377		0.11	0.222
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Americium-241	0.0048	U	0.135	0.068
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Bismuth-212	0	UJ	0.469	0.506
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Bismuth-214	0.352		0.0621	0.105
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Cesium-137	-0.00752	U	0.0291	0.0161
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Cobalt-60	0.00038	U	0.0373	0.0184
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Europium-152	-0.0342	U	0.0768	0.0418
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Europium-154	0.0144	U	0.131	0.0649
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Europium-155	0.0233	U	0.0887	0.0446
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Lead-212	0.412		0.0454	0.0684

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Lead-214	0.415		0.137	0.0961
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Potassium-40	11.2		0.315	0.937
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Protactinium-231	0	UJ	0.394	0.399
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Protactinium-234	-0.0203	U	0.241	0.129
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Protactinium-234m	3.16	U	4.68	3.2
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Radium-223	-0.000378	U	0.564	0.285
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Radium-224	0.978		0.486	0.826
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Radium-226	0.352		0.0621	0.105
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Thallium-208	0.123	J	0.0314	0.0432
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Thorium-227	-0.0495	U	0.213	0.11
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Thorium-228	0.412		0.0454	0.0684
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Thorium-232	0.377		0.11	0.222
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Actinium-228	0.51		0.103	0.134
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Americium-241	-0.0587	U	0.175	0.0913
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Bismuth-212	0	UJ	0.365	0.412
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Bismuth-214	0.254		0.0545	0.075
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Cesium-137	0.00336	U	0.0284	0.0149
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Cobalt-60	0.00931	U	0.0304	0.0145
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Europium-152	0.00639	U	0.0744	0.0388
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Europium-154	-0.0115	U	0.102	0.0552
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Europium-155	0.0264	U	0.0873	0.0476
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Lead-212	0.459		0.0435	0.0589
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Lead-214	0.472		0.0527	0.097
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Potassium-40	13.1		0.221	0.785
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Protactinium-231	0.0302	U	0.367	0.211
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Protactinium-234	0.0747	U	0.244	0.123
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Protactinium-234m	0.888	U	3.67	1.9
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Radium-223	0.0847	U	0.459	0.258
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Radium-224	0.874		0.465	0.549
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Radium-226	0.254		0.0545	0.075
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Thallium-208	0.137	J	0.0243	0.0389
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Thorium-227	0.0334	U	0.195	0.0982
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Thorium-228	0.459		0.0435	0.0589
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Thorium-232	0.51		0.103	0.134
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Actinium-228	0.383		0.102	0.14
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Americium-241	0.00116	U	0.131	0.0729
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Bismuth-212	0.461		0.425	0.399
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Bismuth-214	0.402		0.0606	0.0878
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Cesium-137	-0.00102	U	0.0324	0.0171
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Cobalt-60	-0.00053	U	0.0312	0.0153
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Europium-152	0.00585	U	0.0805	0.0404
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Europium-154	0.0186	U	0.108	0.0551
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Europium-155	-0.00979	U	0.0891	0.048
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Lead-212	0.444		0.0417	0.0588
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Lead-214	0.383		0.128	0.0702
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Potassium-40	12		0.296	0.911
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Protactinium-231	0.28	U	0.417	0.33
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Protactinium-234	0.0781	U	0.257	0.123
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Protactinium-234m	0.73	U	3.99	2.01
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Radium-223	0.0906	U	0.509	0.249
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Radium-224	0.723		0.446	0.651
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Radium-226	0.402		0.0606	0.0878
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Thallium-208	0.123	J	0.0277	0.0352
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Thorium-227	-0.0196	U	0.209	0.118

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Thorium-228	0.444		0.0417	0.0588
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Thorium-232	0.383		0.102	0.14
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Actinium-228	0.433		0.138	0.149
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Americium-241	0.0776	U	0.208	0.113
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Bismuth-212	0.226	U	0.565	0.28
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Bismuth-214	0.301		0.0691	0.103
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Cesium-137	-0.0133	U	0.0334	0.0196
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Cobalt-60	0.00454	U	0.036	0.0189
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Europium-152	-0.00923	U	0.0998	0.0533
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Europium-154	0.1	U	0.151	0.0648
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Europium-155	0.0396	U	0.116	0.0562
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Lead-212	0.375		0.0531	0.0667
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Lead-214	0.294		0.144	0.111
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Potassium-40	12.4		0.425	1.01
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Protactinium-231	0.0264	U	0.491	0.256
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Protactinium-234	-0.0342	U	0.289	0.171
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Protactinium-234m	-0.777	U	4.41	2.34
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Radium-223	-0.0288	U	0.655	0.346
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Radium-224	0.503	U	0.568	0.898
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Radium-226	0.301		0.0691	0.103
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Thallium-208	0.104	J	0.0346	0.0414
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Thorium-227	-0.0432	U	0.246	0.131
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Thorium-228	0.375		0.0531	0.0667
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Thorium-232	0.433		0.138	0.149
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Actinium-228	0.369		0.16	0.208
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Americium-241	0.0867	U	0.269	0.151
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Bismuth-212	0.857		0.62	0.506
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Bismuth-214	0.348		0.0875	0.0876
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Cesium-137	0.00236	U	0.0478	0.0257
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Cobalt-60	-0.0123	U	0.0501	0.0281
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Europium-152	0.000819	U	0.109	0.0631
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Europium-154	-0.0273	U	0.179	0.0994
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Europium-155	0.0403	U	0.114	0.0586
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Lead-212	0.555		0.0663	0.0732
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Lead-214	0.531		0.0804	0.11
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Potassium-40	14.8		0.451	1.18
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Protactinium-231	0.22	U	0.58	0.332
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Protactinium-234	0.114	U	0.442	0.227
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Protactinium-234m	1.53	U	6.31	4.4
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Radium-223	0.21	U	0.743	0.432
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Radium-224	0.267	U	0.71	0.865
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Radium-226	0.348		0.0875	0.0876
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Thallium-208	0.137	J	0.0455	0.0406
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Thorium-227	0.0274	U	0.297	0.154
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Thorium-228	0.555		0.0663	0.0732
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Thorium-232	0.369		0.16	0.208
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Actinium-228	0.434		0.127	0.152
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Americium-241	-0.00471	U	0.124	0.0613
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Bismuth-212	0.503		0.418	0.382
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Bismuth-214	0.362		0.0633	0.0915
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Cesium-137	-0.00056	U	0.0298	0.0156
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Cobalt-60	2.97E-05	U	0.0359	0.0181
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Europium-152	-0.0109	U	0.0776	0.0399
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Europium-154	-0.0126	U	0.107	0.0613

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Europium-155	-0.0114	U	0.0809	0.0459
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Lead-212	0.499		0.0493	0.0692
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Lead-214	0.348		0.0607	0.097
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Potassium-40	12.8		0.361	0.984
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Protactinium-231	0.109	U	0.411	0.217
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Protactinium-234	0.104	U	0.292	0.142
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Protactinium-234m	-0.184	U	4.4	2.23
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Radium-223	0.0876	U	0.543	0.265
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Radium-224	0.405	U	0.665	0.351
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Radium-226	0.362		0.0633	0.0915
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Thallium-208	0.163		0.0305	0.041
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Thorium-227	-0.105	U	0.195	0.117
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Thorium-228	0.499		0.0493	0.0692
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Thorium-232	0.434		0.127	0.152
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Actinium-228	0.58		0.306	0.18
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Americium-241	0.00145	U	0.0491	0.0267
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Bismuth-212	0.375	U	0.694	0.346
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Bismuth-214	0.307		0.0853	0.115
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Cesium-137	0.0134	U	0.0434	0.0213
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Cobalt-60	-0.00688	U	0.044	0.0277
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Europium-152	0.0185	U	0.106	0.0532
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Europium-154	-0.0178	U	0.144	0.078
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Europium-155	0.0382	U	0.0786	0.0407
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Lead-212	0.408		0.0545	0.0665
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Lead-214	0.376		0.074	0.116
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Potassium-40	11.6		0.38	1.03
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Protactinium-231	0.269	U	0.497	0.232
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Protactinium-234	0.00227	U	0.316	0.158
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Protactinium-234m	2.19	U	7.25	3.53
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Radium-223	0.0904	U	0.571	0.309
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Radium-224	0.0309	U	0.585	0.639
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Radium-226	0.307		0.0853	0.115
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Thallium-208	0.142	J	0.0324	0.0461
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Thorium-227	0.021	U	0.215	0.105
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Thorium-228	0.408		0.0545	0.0665
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Thorium-232	0.58		0.306	0.18
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Actinium-228	0.398		0.121	0.189
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Americium-241	0.0499	U	0.254	0.123
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Bismuth-212	0.45	U	0.484	0.445
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Bismuth-214	0.309		0.0838	0.13
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Cesium-137	-0.00897	U	0.0404	0.0232
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Cobalt-60	-0.00879	U	0.0438	0.024
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Europium-152	-0.0132	U	0.0963	0.055
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Europium-154	0.0629	U	0.133	0.0583
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Europium-155	0.0488	U	0.121	0.0585
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Lead-212	0.392		0.056	0.0774
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Lead-214	0.446		0.0665	0.095
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Potassium-40	12.3		0.388	1.02
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Protactinium-231	0.366	U	0.461	0.38
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Protactinium-234	-0.142	U	0.262	0.153
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Protactinium-234m	-0.424	U	5.34	2.82
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Radium-223	-0.0302	U	0.613	0.326
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Radium-224	1.1		0.6	0.71
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Radium-226	0.309		0.0838	0.13

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Thallium-208	0.0796	J	0.036	0.0517
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Thorium-227	0.112	U	0.257	0.139
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Thorium-228	0.392		0.056	0.0774
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Thorium-232	0.398		0.121	0.189
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Actinium-228	0.513		0.147	0.186
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Americium-241	0.0373	U	0.16	0.077
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Bismuth-212	0.485	U	0.549	0.495
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Bismuth-214	0.282		0.0634	0.0877
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Cesium-137	-0.0107	U	0.0346	0.0197
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Cobalt-60	0.0148	U	0.0452	0.0199
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Europium-152	-0.0084	U	0.0828	0.0425
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Europium-154	0.0617	U	0.158	0.0732
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Europium-155	0.0267	U	0.0987	0.0492
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Lead-212	0.402		0.0526	0.0667
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Lead-214	0.37		0.143	0.0817
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Potassium-40	13.4		0.403	1.12
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Protactinium-231	-0.0937	U	0.455	0.237
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Protactinium-234	-0.207	U	0.274	0.168
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Protactinium-234m	-3.37	U	4.44	3.07
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Radium-223	-0.0543	U	0.606	0.311
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Radium-224	0.369	U	0.564	0.7
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Radium-226	0.282		0.0634	0.0877
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Thallium-208	0.137	J	0.0318	0.0468
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Thorium-227	-0.0327	U	0.229	0.13
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Thorium-228	0.402		0.0526	0.0667
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Thorium-232	0.513		0.147	0.186
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Actinium-228	0.215		0.131	0.17
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Americium-241	-0.0453	U	0.131	0.0683
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Bismuth-212	0.489		0.481	0.373
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Bismuth-214	0.32		0.0535	0.0758
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Cesium-137	-0.00818	U	0.0282	0.016
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Cobalt-60	-0.00367	U	0.0366	0.0195
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Europium-152	0.00834	U	0.073	0.04
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Europium-154	-0.00251	U	0.114	0.0602
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Europium-155	0.0721	U	0.0854	0.109
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Lead-212	0.477		0.0462	0.0625
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Lead-214	0.426		0.132	0.0921
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Potassium-40	11.7		0.234	0.889
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Protactinium-231	0.301	U	0.401	0.292
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Protactinium-234	0.0216	U	0.292	0.147
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Protactinium-234m	-0.252	U	4.43	2.26
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Radium-223	-0.155	U	0.505	0.269
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Radium-224	0.845		0.495	0.642
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Radium-226	0.32		0.0535	0.0758
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Thallium-208	0.128	J	0.0297	0.0432
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Thorium-227	-0.0656	U	0.196	0.103
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Thorium-228	0.477		0.0462	0.0625
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Thorium-232	0.215		0.131	0.17
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Actinium-228	0	UJ	0.271	0.138
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Americium-241	0.00533	U	0.0436	0.0232
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Bismuth-212	0.327	U	0.617	0.3
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Bismuth-214	0.309		0.0641	0.0861
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Cesium-137	-0.0131	U	0.0333	0.0192
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Cobalt-60	0.0275	U	0.0437	0.0201

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Europium-152	-0.00859	U	0.069	0.0394
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Europium-154	0.058	U	0.127	0.0613
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Europium-155	0.0153	U	0.0749	0.038
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Lead-212	0.398		0.0431	0.0567
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Lead-214	0.328		0.057	0.0922
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Potassium-40	12		0.313	0.957
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Protactinium-231	0.0835	U	0.418	0.205
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Protactinium-234	-0.044	U	0.312	0.163
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Protactinium-234m	0.128	U	5.15	2.63
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Radium-223	0.0565	U	0.448	0.239
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Radium-224	0	UJ	0.462	0.707
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Radium-226	0.309		0.0641	0.0861
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Thallium-208	0.144		0.0309	0.0542
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Thorium-227	0.0389	U	0.187	0.0979
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Thorium-228	0.398		0.0431	0.0567
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Thorium-232	0	UJ	0.271	0.138
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Actinium-228	0	UJ	0.289	0.192
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Americium-241	-0.0145	U	0.169	0.0921
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Bismuth-212	0.386	U	0.627	0.287
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Bismuth-214	0	UJ	0.144	0.0893
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Cesium-137	0.0159	U	0.0424	0.0203
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Cobalt-60	-0.00723	U	0.038	0.0198
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Europium-152	-0.0168	U	0.0865	0.0485
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Europium-154	-0.0161	U	0.135	0.0698
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Europium-155	0.019	U	0.116	0.0566
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Lead-212	0.441		0.0534	0.0658
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Lead-214	0.361		0.143	0.0929
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Potassium-40	11.4		0.304	0.972
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Protactinium-231	0.354	U	0.539	0.256
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Protactinium-234	-0.0435	U	0.237	0.13
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Protactinium-234m	1.02	U	5.48	2.95
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Radium-223	-0.204	U	0.588	0.322
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Radium-224	0.371	U	0.572	0.666
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Radium-226	0	UJ	0.144	0.0893
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Thallium-208	0.132		0.0361	0.048
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Thorium-227	0.114	U	0.253	0.134
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Thorium-228	0.441		0.0534	0.0658
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Thorium-232	0	UJ	0.289	0.192
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Actinium-228	0.278		0.125	0.142
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Americium-241	-0.00125	U	0.0367	0.019
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Bismuth-212	0.372	U	0.45	0.414
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Bismuth-214	0.364		0.0556	0.081
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Cesium-137	-0.0063	U	0.03	0.0164
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Cobalt-60	-0.000172	U	0.0311	0.0154
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Europium-152	-0.00993	U	0.0705	0.0433
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Europium-154	0.0603	U	0.125	0.0561
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Europium-155	0.012	U	0.0657	0.0321
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Lead-212	0.4		0.0402	0.0556
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Lead-214	0.42		0.0419	0.0889
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Potassium-40	12.4		0.339	0.928
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Protactinium-231	0	UJ	0.326	0.349
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Protactinium-234	-0.0879	U	0.271	0.158
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Protactinium-234m	-0.794	U	3.92	2.26
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Radium-223	0.0821	U	0.457	0.239

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Radium-224	0.687		0.431	0.626
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Radium-226	0.364		0.0556	0.081
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Thallium-208	0.122		0.0285	0.0385
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Thorium-227	0.0228	U	0.179	0.0932
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Thorium-228	0.4		0.0402	0.0556
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Thorium-232	0.278		0.125	0.142
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Actinium-228	0.411		0.13	0.157
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Americium-241	0.0294	U	0.145	0.0686
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Bismuth-212	0.423	U	0.497	0.337
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Bismuth-214	0.357		0.0714	0.0939
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Cesium-137	0.00599	U	0.0372	0.0188
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Cobalt-60	0.0242	U	0.0492	0.021
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Europium-152	-0.022	U	0.0861	0.0476
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Europium-154	0.015	U	0.133	0.066
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Europium-155	0.0269	U	0.0958	0.0471
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Lead-212	0.444		0.051	0.0665
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Lead-214	0.432		0.0681	0.0924
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Potassium-40	11.5		0.363	1.03
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Protactinium-231	0.375	U	0.488	0.232
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Protactinium-234	-0.103	U	0.273	0.151
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Protactinium-234m	-1.54	U	5.97	3.29
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Radium-223	0.0502	U	0.649	0.324
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Radium-224	0	UJ	0.547	0.699
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Radium-226	0.357		0.0714	0.0939
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Thallium-208	0.0992		0.0381	0.0507
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Thorium-227	0.00627	U	0.21	0.114
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Thorium-228	0.444		0.051	0.0665
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Thorium-232	0.411		0.13	0.157
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Actinium-228	0.348		0.133	0.137
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Americium-241	-0.000154	U	0.134	0.0743
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Bismuth-212	0.722		0.453	0.595
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Bismuth-214	0.288		0.0652	0.104
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Cesium-137	-0.0117	U	0.0265	0.0178
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Cobalt-60	0.00336	U	0.042	0.0204
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Europium-152	0.0404	U	0.0834	0.041
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Europium-154	0.00588	U	0.126	0.0628
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Europium-155	0.0121	U	0.0942	0.0492
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Lead-212	0.393		0.0491	0.0741
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Lead-214	0.355		0.134	0.0992
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Potassium-40	11.6		0.354	0.996
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Protactinium-231	-0.00544	U	0.473	0.252
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Protactinium-234	-0.0401	U	0.265	0.147
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Protactinium-234m	3.73	U	5.61	2.42
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Radium-223	0.0331	U	0.617	0.312
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Radium-224	0.298	U	0.526	0.721
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Radium-226	0.288		0.0652	0.104
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Thallium-208	0.122		0.0313	0.0454
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Thorium-227	-0.00417	U	0.205	0.103
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Thorium-228	0.393		0.0491	0.0741
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Thorium-232	0.348		0.133	0.137
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Actinium-228	0.192	U	0.247	0.251
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Americium-241	-0.0608	U	0.279	0.145
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Bismuth-212	0.22	U	0.582	0.287
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Bismuth-214	0.323	J	0.0712	0.107

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Cesium-137	-0.00219	U	0.0378	0.0199
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Cobalt-60	-0.00802	U	0.0393	0.0208
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Europium-152	-0.0136	U	0.09	0.0463
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Europium-154	0.024	U	0.139	0.0657
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Europium-155	0.00935	U	0.126	0.0658
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Lead-212	0.461		0.0667	0.101
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Lead-214	0.362		0.155	0.117
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Potassium-40	11.8		0.262	1.1
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Protactinium-231	-0.0336	U	0.551	0.282
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Protactinium-234	0.0615	U	0.332	0.165
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Protactinium-234m	1.37	U	5.58	2.71
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Radium-223	-0.228	U	0.685	0.365
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Radium-224	0.346	U	0.765	0.664
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Radium-226	0.323	J	0.0712	0.107
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Thallium-208	0.145		0.0347	0.0509
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Thorium-227	-0.0641	U	0.257	0.148
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Thorium-228	0.461		0.0667	0.101
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Thorium-232	0.192	U	0.247	0.251
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Actinium-228	0.298		0.134	0.188
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Americium-241	-0.105	U	0.225	0.117
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Bismuth-212	1.08		0.469	0.577
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Bismuth-214	0.278		0.0705	0.0941
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Cesium-137	0.00866	U	0.0384	0.0191
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Cobalt-60	0.0132	U	0.0463	0.0215
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Europium-152	-0.00642	U	0.0917	0.0465
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Europium-154	0.0451	U	0.136	0.0692
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Europium-155	-0.012	U	0.101	0.0524
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Lead-212	0.424		0.0612	0.0723
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Lead-214	0.36		0.0658	0.102
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Potassium-40	10.8		0.396	1.02
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Protactinium-231	0.109	U	0.492	0.238
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Protactinium-234	-0.0731	U	0.292	0.156
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Protactinium-234m	-0.0221	U	5.03	2.71
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Radium-223	-0.000613	U	0.616	0.308
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Radium-224	0.18	U	0.592	0.639
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Radium-226	0.278		0.0705	0.0941
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Thallium-208	0.0989		0.0358	0.0377
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Thorium-227	0.00805	U	0.25	0.136
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Thorium-228	0.424		0.0612	0.0723
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Thorium-232	0.298		0.134	0.188
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Actinium-228	0.202	U	0.298	0.224
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Americium-241	-0.000138	U	0.145	0.0733
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Bismuth-212	0.694		0.521	0.546
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Bismuth-214	0.313		0.0843	0.097
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Cesium-137	-0.00719	U	0.0444	0.0235
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Cobalt-60	0.00316	U	0.0421	0.0182
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Europium-152	-0.00631	U	0.0986	0.0584
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Europium-154	-0.0197	U	0.142	0.0719
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Europium-155	0.0713	U	0.101	0.0899
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Lead-212	0.446		0.0555	0.111
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Lead-214	0.304		0.082	0.117
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Potassium-40	12.3		0.517	1.27
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Protactinium-231	0.469	U	0.47	0.51
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Protactinium-234	0.0463	U	0.427	0.214

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Protactinium-234m	-0.709	U	6.2	3.18
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Radium-223	0.173	U	0.706	0.385
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Radium-224	0.836	U	0.84	0.386
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Radium-226	0.313		0.0843	0.097
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Thallium-208	0.0742		0.0405	0.0518
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Thorium-227	0.0574	U	0.267	0.135
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Thorium-228	0.446		0.0555	0.111
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Thorium-232	0.202	U	0.298	0.224
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Actinium-228	0.381		0.143	0.171
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Americium-241	0.0283	U	0.192	0.102
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Bismuth-212	0.508	U	0.527	0.417
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Bismuth-214	0.191		0.0787	0.102
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Cesium-137	-0.00782	U	0.0361	0.019
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Cobalt-60	0.00906	U	0.0441	0.0209
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Europium-152	-0.0102	U	0.0845	0.0496
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Europium-154	0.0156	U	0.127	0.0631
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Europium-155	-0.0288	U	0.108	0.0593
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Lead-212	0.332		0.0584	0.0721
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Lead-214	0.344		0.141	0.116
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Potassium-40	11.9		0.41	1.02
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Protactinium-231	-0.202	U	0.456	0.251
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Protactinium-234	0.015	U	0.321	0.162
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Protactinium-234m	0.155	U	5.64	2.94
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Radium-223	-0.31	U	0.583	0.373
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Radium-224	0.622	U	0.626	0.645
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Radium-226	0.191		0.0787	0.102
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Thallium-208	0.105		0.0316	0.0397
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Thorium-227	0.0273	U	0.248	0.123
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Thorium-228	0.332		0.0584	0.0721
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Thorium-232	0.381		0.143	0.171
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Actinium-228	0.36		0.101	0.194
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Americium-241	0.0109	U	0.0949	0.0485
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Bismuth-212	0.417		0.38	0.399
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Bismuth-214	0.261		0.0671	0.0859
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Cesium-137	0.00129	U	0.039	0.0199
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Cobalt-60	0.00506	U	0.0421	0.0207
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Europium-152	-0.0199	U	0.0715	0.0416
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Europium-154	0.0237	U	0.107	0.0494
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Europium-155	0.0382	U	0.0845	0.0405
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Lead-212	0.396		0.0472	0.0601
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Lead-214	0.363		0.0576	0.0744
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Potassium-40	12.2		0.243	0.951
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Protactinium-231	0	UJ	0.376	0.365
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Protactinium-234	-0.0674	U	0.248	0.161
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Protactinium-234m	-0.273	U	4.46	2.5
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Radium-223	0.0497	U	0.511	0.298
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Radium-224	0.245	U	0.505	0.567
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Radium-226	0.261		0.0671	0.0859
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Thallium-208	0.125		0.0295	0.0449
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Thorium-227	0.0137	U	0.215	0.115
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Thorium-228	0.396		0.0472	0.0601
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Thorium-232	0.36		0.101	0.194
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Actinium-228	0.321		0.125	0.163
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Americium-241	-0.00431	U	0.15	0.0761

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Bismuth-212	0.599		0.29	0.414
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Bismuth-214	0.314		0.0588	0.0735
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Cesium-137	0.00529	U	0.0295	0.0144
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Cobalt-60	-0.00552	U	0.0339	0.0204
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Europium-152	0.0118	U	0.0855	0.0425
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Europium-154	-0.0459	U	0.0931	0.0639
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Europium-155	0.00487	U	0.0866	0.0451
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Lead-212	0.365		0.0485	0.057
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Lead-214	0.297		0.0577	0.0845
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Potassium-40	12.4		0.33	1.03
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Protactinium-231	0	UJ	0.363	0.419
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Protactinium-234	0.0619	U	0.261	0.126
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Protactinium-234m	2.56	U	4.51	2.93
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Radium-223	0.206	U	0.588	0.283
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Radium-224	0.0602	U	0.52	0.626
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Radium-226	0.314		0.0588	0.0735
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Thallium-208	0.0822		0.0297	0.0501
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Thorium-227	-0.026	U	0.206	0.117
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Thorium-228	0.365		0.0485	0.057
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Thorium-232	0.321		0.125	0.163
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Actinium-228	0.459		0.109	0.158
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Americium-241	-0.025	U	0.0845	0.0503
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Bismuth-212	0.272	U	0.407	0.404
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Bismuth-214	0.313		0.055	0.0907
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Cesium-137	-0.00255	U	0.0307	0.019
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Cobalt-60	-0.00498	U	0.0348	0.0187
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Europium-152	-0.00981	U	0.0786	0.0418
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Europium-154	0.026	U	0.11	0.0529
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Europium-155	0.0219	U	0.0827	0.0434
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Lead-212	0.426		0.0434	0.057
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Lead-214	0.391		0.057	0.0808
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Potassium-40	12.2		0.238	0.948
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Protactinium-231	0.0392	U	0.403	0.207
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Protactinium-234	0.00819	U	0.283	0.144
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Protactinium-234m	-1.23	U	3.76	2.1
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Radium-223	-0.193	U	0.512	0.319
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Radium-224	0.306	U	0.464	0.527
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Radium-226	0.313		0.055	0.0907
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Thallium-208	0.0918		0.0291	0.0374
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Thorium-227	-0.0267	U	0.194	0.101
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Thorium-228	0.426		0.0434	0.057
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Thorium-232	0.459		0.109	0.158
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Actinium-228	0.478		0.13	0.174
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Americium-241	0.101	U	0.104	0.105
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Bismuth-212	0.302	U	0.536	0.253
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Bismuth-214	0.344		0.0586	0.0748
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Cesium-137	-0.00667	U	0.0376	0.02
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Cobalt-60	0.00588	U	0.0366	0.0174
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Europium-152	-0.0125	U	0.0735	0.0416
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Europium-154	0.0278	U	0.109	0.0509
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Europium-155	0.0146	U	0.0814	0.0401
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Lead-212	0.44		0.0426	0.0602
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Lead-214	0.447		0.135	0.0828
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Potassium-40	13.8		0.189	0.988

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Protactinium-231	0	UJ	0.372	0.441
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Protactinium-234	-0.223	U	0.252	0.168
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Protactinium-234m	-0.748	U	3.99	2.29
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Radium-223	0.493	U	0.56	0.438
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Radium-224	1.21		0.457	0.751
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Radium-226	0.344		0.0586	0.0748
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Thallium-208	0.123		0.0267	0.0408
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Thorium-227	0.0856	U	0.205	0.102
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Thorium-228	0.44		0.0426	0.0602
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Thorium-232	0.478		0.13	0.174
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Actinium-228	0.328		0.113	0.158
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Americium-241	0.0477	U	0.142	0.0725
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Bismuth-212	0.314	U	0.522	0.247
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Bismuth-214	0.279		0.0596	0.0724
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Cesium-137	-0.00678	U	0.0305	0.0171
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Cobalt-60	-0.00409	U	0.0335	0.0178
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Europium-152	0.0248	U	0.0818	0.0435
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Europium-154	0.0184	U	0.106	0.0518
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Europium-155	0.0246	U	0.0915	0.0497
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Lead-212	0.33		0.0528	0.0699
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Lead-214	0.311		0.066	0.0914
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Potassium-40	11.4		0.302	0.903
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Protactinium-231	0.0497	U	0.387	0.213
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Protactinium-234	0.0657	U	0.276	0.132
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Protactinium-234m	0.398	U	4.71	2.35
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Radium-223	0.108	U	0.541	0.295
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Radium-224	0.399	U	0.601	0.474
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Radium-226	0.279		0.0596	0.0724
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Thallium-208	0.116		0.0306	0.0336
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Thorium-227	-0.0882	U	0.19	0.102
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Thorium-228	0.33		0.0528	0.0699
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Thorium-232	0.328		0.113	0.158
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Actinium-228	0.344		0.125	0.121
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Americium-241	-0.00191	U	0.0722	0.039
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Bismuth-212	0.584		0.479	0.393
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Bismuth-214	0.332		0.0584	0.0717
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Cesium-137	-0.0071	U	0.029	0.0166
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Cobalt-60	0.0132	U	0.0374	0.0176
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Europium-152	0.0277	U	0.0847	0.0418
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Europium-154	0.0181	U	0.108	0.0618
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Europium-155	0.02	U	0.0793	0.0401
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Lead-212	0.366		0.0453	0.0662
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Lead-214	0.354		0.0629	0.0885
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Potassium-40	12.1		0.31	0.898
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Protactinium-231	-0.0954	U	0.369	0.197
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Protactinium-234	-0.0516	U	0.251	0.137
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Protactinium-234m	-0.544	U	4.42	2.33
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Radium-223	-0.00751	U	0.524	0.271
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Radium-224	0.0767	U	0.549	0.522
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Radium-226	0.332		0.0584	0.0717
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Thallium-208	0.108		0.0292	0.039
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Thorium-227	-0.0551	U	0.178	0.105
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Thorium-228	0.366		0.0453	0.0662
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Thorium-232	0.344		0.125	0.121

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Actinium-228	0	UJ	0.209	0.128
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Americium-241	0.0348	U	0.183	0.0972
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Bismuth-212	0.414		0.373	0.314
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Bismuth-214	0.286		0.0574	0.0838
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Cesium-137	0.00169	U	0.028	0.0148
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Cobalt-60	0.0156	U	0.0327	0.0149
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Europium-152	-0.0211	U	0.0696	0.0385
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Europium-154	0.000253	U	0.0974	0.0586
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Europium-155	0.0158	U	0.0873	0.0452
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Lead-212	0.425		0.0438	0.0558
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Lead-214	0.298		0.0562	0.0711
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Potassium-40	13		0.251	0.825
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Protactinium-231	0.00928	U	0.366	0.2
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Protactinium-234	0.0251	U	0.243	0.146
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Protactinium-234m	1.36	U	3.74	1.88
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Radium-223	0.121	U	0.518	0.265
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Radium-224	0	UJ	0.574	0.507
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Radium-226	0.286		0.0574	0.0838
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Thallium-208	0.0889		0.0267	0.032
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Thorium-227	0.18	U	0.202	0.145
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Thorium-228	0.425		0.0438	0.0558
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Thorium-232	0	UJ	0.209	0.128
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Actinium-228	0.445		0.166	0.144
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Americium-241	0.00147	U	0.26	0.128
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Bismuth-212	0.418	U	0.704	0.339
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Bismuth-214	0.352		0.0581	0.0868
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Cesium-137	0.01	U	0.0393	0.0194
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Cobalt-60	-0.0191	U	0.0324	0.0203
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Europium-152	0.0537	U	0.104	0.0478
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Europium-154	0.0386	U	0.142	0.0673
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Europium-155	0.0193	U	0.111	0.0561
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Lead-212	0.362		0.0601	0.0659
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Lead-214	0.395		0.0715	0.0967
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Potassium-40	12.6		0.499	1.14
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Protactinium-231	0	UJ	0.47	0.478
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Protactinium-234	-0.106	U	0.254	0.166
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Protactinium-234m	2.12	U	6.39	3.24
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Radium-223	0.081	U	0.678	0.337
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Radium-224	0.00416	U	0.644	0.991
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Radium-226	0.352		0.0581	0.0868
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Thallium-208	0.0921		0.0376	0.0376
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Thorium-227	-0.0317	U	0.258	0.146
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Thorium-228	0.362		0.0601	0.0659
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Thorium-232	0.445		0.166	0.144
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Actinium-228	0.454		0.151	0.205
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Americium-241	0.0505	U	0.272	0.14
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Bismuth-212	0.0944	U	0.587	0.305
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Bismuth-214	0.27		0.0702	0.103
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Cesium-137	0.000236	U	0.0365	0.0191
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Cobalt-60	0.000393	U	0.0404	0.0202
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Europium-152	-0.0853	U	0.0892	0.0607
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Europium-154	-0.0496	U	0.126	0.073
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Europium-155	-0.0257	U	0.0982	0.0524
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Lead-212	0.451		0.0666	0.0849

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Lead-214	0.432		0.0757	0.105
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Potassium-40	13.8		0.404	1.19
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Protactinium-231	0.0741	U	0.512	0.253
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Protactinium-234	-0.0517	U	0.288	0.151
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Protactinium-234m	3.05	U	6.56	3.23
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Radium-223	-0.212	U	0.629	0.336
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Radium-224	0.39	U	0.742	0.72
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Radium-226	0.27		0.0702	0.103
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Thallium-208	0.151		0.0324	0.0504
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Thorium-227	-0.073	U	0.244	0.156
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Thorium-228	0.451		0.0666	0.0849
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Thorium-232	0.454		0.151	0.205
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Actinium-228	0.53		0.151	0.201
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Americium-241	-0.0144	U	0.194	0.102
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Bismuth-212	0.506	U	0.581	0.423
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Bismuth-214	0.539		0.0793	0.114
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Cesium-137	-0.0163	U	0.0412	0.0267
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Cobalt-60	-0.000239	U	0.0525	0.0269
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Europium-152	-0.000124	U	0.106	0.0608
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Europium-154	-9.45E-05	U	0.147	0.075
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Europium-155	0.0623	U	0.122	0.0612
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Lead-212	0.514		0.0634	0.0779
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Lead-214	0.577		0.075	0.155
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Potassium-40	13.2		0.343	1.13
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Protactinium-231	0.441	U	0.468	0.447
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Protactinium-234	-0.0235	U	0.361	0.199
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Protactinium-234m	5.78	U	6.52	3.99
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Radium-223	0.0874	U	0.641	0.352
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Radium-224	0.489	U	0.679	0.939
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Radium-226	0.539		0.0793	0.114
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Thallium-208	0.197		0.0352	0.0464
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Thorium-227	-0.11	U	0.25	0.152
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Thorium-228	0.514		0.0634	0.0779
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Thorium-232	0.53		0.151	0.201
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Actinium-228	0.225		0.11	0.125
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Americium-241	-0.0227	U	0.155	0.0863
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Bismuth-212	0.152	U	0.516	0.274
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Bismuth-214	0.283		0.0627	0.088
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Cesium-137	0.0111	U	0.0333	0.0175
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Cobalt-60	0.00117	U	0.0372	0.0184
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Europium-152	0.0226	U	0.0865	0.0462
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Europium-154	0.0232	U	0.122	0.0656
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Europium-155	0.0452	U	0.0925	0.0452
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Lead-212	0.41		0.0454	0.0587
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Lead-214	0.357		0.13	0.0871
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Potassium-40	13.9		0.331	1
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Protactinium-231	-0.123	U	0.348	0.218
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Protactinium-234	0.00321	U	0.255	0.134
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Protactinium-234m	0.0108	U	4.66	2.55
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Radium-223	-0.0545	U	0.519	0.266
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Radium-224	0	UJ	0.486	0.673
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Radium-226	0.283		0.0627	0.088
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Thallium-208	0.0908		0.0261	0.0401
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Thorium-227	-0.0277	U	0.217	0.123

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Thorium-228	0.41		0.0454	0.0587
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Thorium-232	0.225		0.11	0.125
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Actinium-228	0.476		0.104	0.147
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Americium-241	-0.0253	U	0.103	0.0513
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Bismuth-212	0	UJ	0.363	0.42
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Bismuth-214	0.356		0.0655	0.0947
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Cesium-137	0.026	U	0.0294	0.0273
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Cobalt-60	-0.000545	U	0.0388	0.0198
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Europium-152	-0.0474	U	0.0743	0.046
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Europium-154	-0.00766	U	0.113	0.0584
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Europium-155	0.0407	U	0.0823	0.0389
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Lead-212	0.51		0.0439	0.0649
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Lead-214	0.412		0.129	0.0922
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Potassium-40	14.6		0.308	1.03
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Protactinium-231	0.325	U	0.379	0.392
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Protactinium-234	-0.0431	U	0.254	0.142
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Protactinium-234m	0.381	U	4.64	2.63
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Radium-223	0.11	U	0.538	0.284
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Radium-224	0.069	U	0.471	0.615
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Radium-226	0.356		0.0655	0.0947
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Thallium-208	0.11		0.0274	0.0341
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Thorium-227	-0.035	U	0.211	0.117
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Thorium-228	0.51		0.0439	0.0649
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Thorium-232	0.476		0.104	0.147
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Actinium-228	0.458		0.126	0.181
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Americium-241	0.0243	U	0.13	0.0691
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Bismuth-212	0	UJ	0.368	0.507
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Bismuth-214	0.32		0.0639	0.101
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Cesium-137	0.00116	U	0.034	0.0176
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Cobalt-60	-0.0231	U	0.0279	0.0184
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Europium-152	0.000706	U	0.0863	0.0436
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Europium-154	0.031	U	0.138	0.0668
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Europium-155	0	UJ	0.0856	0.1
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Lead-212	0.333		0.0481	0.0698
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Lead-214	0.377		0.0572	0.0949
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Potassium-40	13.2		0.292	1.01
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Protactinium-231	0.188	U	0.404	0.329
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Protactinium-234	-0.0659	U	0.32	0.183
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Protactinium-234m	-1.41	U	4.26	2.51
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Radium-223	-0.00114	U	0.539	0.301
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Radium-224	1.32		0.515	0.986
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Radium-226	0.32		0.0639	0.101
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Thallium-208	0.117		0.0292	0.0479
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Thorium-227	0.09	U	0.226	0.106
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Thorium-228	0.333		0.0481	0.0698
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Thorium-232	0.458		0.126	0.181
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Actinium-228	0.503		0.223	0.192
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Americium-241	0.00463	U	0.325	0.184
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Bismuth-212	1.23		0.621	0.773
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Bismuth-214	0.629		0.0783	0.12
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Cesium-137	0.0188	U	0.0532	0.0274
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Cobalt-60	0.00519	U	0.0511	0.0252
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Europium-152	-0.0576	U	0.135	0.0795
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Europium-154	0.0283	U	0.192	0.0994

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Europium-155	0.0017	U	0.154	0.0839
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Lead-212	0.624		0.0774	0.102
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Lead-214	0.748		0.0991	0.136
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Potassium-40	17.2		0.476	1.43
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Protactinium-231	0.572	U	0.628	0.638
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Protactinium-234	0.166	U	0.482	0.236
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Protactinium-234m	-0.345	U	5.31	3.77
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Radium-223	0.299	U	0.899	0.467
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Radium-224	0	UJ	0.829	0.934
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Radium-226	0.629		0.0783	0.12
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Thallium-208	0.19		0.0441	0.0698
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Thorium-227	-0.121	U	0.349	0.209
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Thorium-228	0.624		0.0774	0.102
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Thorium-232	0.503		0.223	0.192
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Actinium-228	0.48		0.127	0.148
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Americium-241	0.0459	U	0.125	0.0634
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Bismuth-212	0.151	U	0.451	0.23
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Bismuth-214	0.368		0.054	0.0783
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Cesium-137	0.00534	U	0.0284	0.0146
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Cobalt-60	0.00156	U	0.0327	0.0168
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Europium-152	0.0132	U	0.07	0.0346
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Europium-154	0.00273	U	0.112	0.0594
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Europium-155	0	UJ	0.0703	0.0829
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Lead-212	0.482		0.0405	0.056
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Lead-214	0.415		0.058	0.0927
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Potassium-40	13.5		0.252	0.887
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Protactinium-231	0.362	U	0.37	0.327
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Protactinium-234	0.0401	U	0.269	0.135
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Protactinium-234m	-0.643	U	4.09	2.35
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Radium-223	-0.0795	U	0.435	0.253
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Radium-224	0.195	U	0.434	0.608
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Radium-226	0.368		0.054	0.0783
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Thallium-208	0.112		0.0294	0.0412
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Thorium-227	0.0554	U	0.196	0.104
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Thorium-228	0.482		0.0405	0.056
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Thorium-232	0.48		0.127	0.148
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Actinium-228	0.448		0.0833	0.108
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Americium-241	0.0107	U	0.0821	0.0438
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Bismuth-212	0.487		0.285	0.274
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Bismuth-214	0.348		0.0421	0.0702
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Cesium-137	-0.00218	U	0.0216	0.0115
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Cobalt-60	0.00146	U	0.0311	0.0159
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Europium-152	0.00867	U	0.0583	0.0318
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Europium-154	0.00839	U	0.0856	0.0431
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Europium-155	0.000419	U	0.0591	0.0307
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Lead-212	0.354		0.0318	0.0476
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Lead-214	0.364		0.0464	0.0643
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Potassium-40	13.1		0.236	0.778
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Protactinium-231	0	UJ	0.264	0.39
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Protactinium-234	-0.00446	U	0.203	0.11
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Protactinium-234m	1.26	U	3.56	1.83
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Radium-223	-0.158	U	0.348	0.186
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Radium-224	0.0916	U	0.341	0.541
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Radium-226	0.348		0.0421	0.0702

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Thallium-208	0.0773		0.0249	0.0339
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Thorium-227	0.025	U	0.158	0.0855
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Thorium-228	0.354		0.0318	0.0476
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Thorium-232	0.448		0.0833	0.108
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Actinium-228	0.433		0.0932	0.149
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Americium-241	0.011	U	0.13	0.0701
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Bismuth-212	0.467		0.326	0.329
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Bismuth-214	0.351		0.0446	0.0655
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Cesium-137	0.00428	U	0.0252	0.0129
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Cobalt-60	0.00468	U	0.0296	0.0146
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Europium-152	0.0163	U	0.0624	0.0305
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Europium-154	0.0207	U	0.103	0.0519
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Europium-155	0.0204	U	0.0717	0.0363
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Lead-212	0.481		0.0362	0.0526
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Lead-214	0.453		0.0443	0.0762
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Potassium-40	12.4		0.232	0.767
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Protactinium-231	0	UJ	0.305	0.299
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Protactinium-234	-0.0214	U	0.199	0.125
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Protactinium-234m	0.363	U	3.29	1.81
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Radium-223	0.0994	U	0.417	0.205
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Radium-224	0.659		0.388	0.619
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Radium-226	0.351		0.0446	0.0655
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Thallium-208	0.122		0.0234	0.0343
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Thorium-227	-0.0531	U	0.168	0.0976
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Thorium-228	0.481		0.0362	0.0526
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Thorium-232	0.433		0.0932	0.149
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Actinium-228	0.251		0.12	0.162
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Americium-241	0.00505	U	0.221	0.11
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Bismuth-212	0.522		0.416	0.346
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Bismuth-214	0.293		0.0628	0.0886
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Cesium-137	0.00203	U	0.0295	0.0156
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Cobalt-60	0.00859	U	0.0344	0.0165
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Europium-152	-0.000873	U	0.0762	0.039
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Europium-154	-0.0157	U	0.0968	0.0529
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Europium-155	0.0117	U	0.0859	0.0439
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Lead-212	0.561		0.044	0.0621
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Lead-214	0.39		0.122	0.0826
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Potassium-40	13.5		0.365	0.923
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Protactinium-231	0.229	U	0.404	0.207
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Protactinium-234	-0.13	U	0.245	0.14
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Protactinium-234m	2.55	U	4.94	3.43
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Radium-223	0.221	U	0.505	0.263
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Radium-224	1.05		0.471	0.719
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Radium-226	0.293		0.0628	0.0886
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Thallium-208	0.131		0.0304	0.0401
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Thorium-227	0.0358	U	0.204	0.11
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Thorium-228	0.561		0.044	0.0621
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Thorium-232	0.251		0.12	0.162
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Actinium-228	0.375		0.122	0.144
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Americium-241	-0.0249	U	0.118	0.0601
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Bismuth-212	0	UJ	0.394	0.49
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Bismuth-214	0.324		0.0549	0.086
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Cesium-137	0.0175		0.014	0.0167
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Cobalt-60	-0.0135	U	0.0301	0.0179

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Europium-152	0.0053	U	0.0778	0.0397
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Europium-154	-0.0324	U	0.0995	0.0569
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Europium-155	-0.00709	U	0.0722	0.038
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Lead-212	0.39		0.0395	0.0519
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Lead-214	0.378		0.0586	0.0742
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Potassium-40	12.6		0.278	0.871
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Protactinium-231	0.119	U	0.392	0.193
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Protactinium-234	-0.109	U	0.231	0.131
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Protactinium-234m	-1.61	U	4.2	2.4
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Radium-223	0.183	U	0.494	0.24
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Radium-224	0.743		0.423	0.481
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Radium-226	0.324		0.0549	0.086
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Thallium-208	0.0929		0.0258	0.0387
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Thorium-227	0.062	U	0.203	0.109
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Thorium-228	0.39		0.0395	0.0519
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Thorium-232	0.375		0.122	0.144
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Actinium-228	0.418		0.0783	0.0976
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Americium-241	-0.0266	U	0.134	0.0687
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Bismuth-212	0	UJ	0.284	0.387
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Bismuth-214	0.327		0.0432	0.0676
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Cesium-137	-0.0132	U	0.0197	0.0114
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Cobalt-60	-0.00757	U	0.0236	0.0133
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Europium-152	-0.0117	U	0.0572	0.0312
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Europium-154	-0.0318	U	0.0713	0.0409
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Europium-155	0.0311	U	0.0725	0.0369
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Lead-212	0.435		0.0323	0.0473
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Lead-214	0.434		0.0963	0.0715
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Potassium-40	14		0.229	0.722
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Protactinium-231	0.232	U	0.292	0.279
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Protactinium-234	0.0291	U	0.193	0.103
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Protactinium-234m	0.992	U	2.88	1.49
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Radium-223	0	UJ	0.398	0.39
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Radium-224	0.918		0.346	0.546
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Radium-226	0.327		0.0432	0.0676
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Thallium-208	0.0999		0.021	0.0259
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Thorium-227	0.0215	U	0.157	0.0805
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Thorium-228	0.435		0.0323	0.0473
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Thorium-232	0.418		0.0783	0.0976
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Actinium-228	0.47		0.118	0.152
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Americium-241	-0.00491	U	0.121	0.0579
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Bismuth-212	0.223	U	0.493	0.251
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Bismuth-214	0.352		0.0507	0.086
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Cesium-137	-0.00886	U	0.0283	0.0163
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Cobalt-60	-0.0211	U	0.0302	0.0194
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Europium-152	0.0269	U	0.0694	0.0342
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Europium-154	0.0327	U	0.118	0.0596
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Europium-155	0.0554	U	0.0653	0.0705
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Lead-212	0.454		0.0367	0.0541
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Lead-214	0.335		0.0522	0.0845
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Potassium-40	11.7		0.274	0.856
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Protactinium-231	0	UJ	0.335	0.317
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Protactinium-234	0.0437	U	0.256	0.128
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Protactinium-234m	-0.0923	U	4.36	2.35
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Radium-223	0.0664	U	0.479	0.262

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Radium-224	0.808		0.393	0.569
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Radium-226	0.352		0.0507	0.086
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Thallium-208	0.15		0.024	0.0389
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Thorium-227	-0.0543	U	0.17	0.0975
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Thorium-228	0.454		0.0367	0.0541
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Thorium-232	0.47		0.118	0.152
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Actinium-228	0.679		0.183	0.221
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Americium-241	-0.0129	U	0.216	0.125
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Bismuth-212	0.737		0.596	0.675
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Bismuth-214	0.604		0.088	0.125
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Cesium-137	0.0158	U	0.0527	0.0267
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Cobalt-60	0.0433	U	0.0685	0.0294
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Europium-152	-0.0313	U	0.108	0.0592
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Europium-154	0.0582	U	0.191	0.0923
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Europium-155	0.0217	U	0.133	0.0715
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Lead-212	0.614		0.0865	0.097
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Lead-214	0.662		0.0904	0.115
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Potassium-40	16.8		0.484	1.38
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Protactinium-231	0	UJ	0.53	0.546
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Protactinium-234	0.117	U	0.429	0.218
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Protactinium-234m	-0.604	U	7.11	3.88
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Radium-223	-0.377	U	0.685	0.389
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Radium-224	0	UJ	1.02	0.726
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Radium-226	0.604		0.088	0.125
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Thallium-208	0.177		0.042	0.0591
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Thorium-227	-0.0166	U	0.311	0.18
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Thorium-228	0.614		0.0865	0.097
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Thorium-232	0.679		0.183	0.221
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Actinium-228	0.435		0.0852	0.111
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Americium-241	-0.00938	U	0.0934	0.0503
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Bismuth-212	0.572		0.353	0.314
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Bismuth-214	0.314		0.0455	0.0812
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Cesium-137	-0.00275	U	0.0245	0.0133
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Cobalt-60	-0.00336	U	0.0255	0.0156
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Europium-152	0.00979	U	0.065	0.0324
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Europium-154	0.000988	U	0.0754	0.0386
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Europium-155	0.0142	U	0.0692	0.0349
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Lead-212	0.397		0.037	0.0508
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Lead-214	0.286		0.0482	0.0717
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Potassium-40	12.8		0.232	0.769
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Protactinium-231	0.234	U	0.322	0.29
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Protactinium-234	-0.0287	U	0.188	0.106
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Protactinium-234m	0.857	U	3.45	3.17
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Radium-223	-0.169	U	0.402	0.226
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Radium-224	0.779		0.397	0.656
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Radium-226	0.314		0.0455	0.0812
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Thallium-208	0.129		0.0252	0.0324
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Thorium-227	-0.109	U	0.146	0.0898
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Thorium-228	0.397		0.037	0.0508
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Thorium-232	0.435		0.0852	0.111
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Actinium-228	0.411		0.149	0.167
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Americium-241	-0.0112	U	0.0613	0.0331
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Bismuth-212	0.457	U	0.677	0.32
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Bismuth-214	0.312		0.0767	0.0967

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Cesium-137	0.00562	U	0.0399	0.0226
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Cobalt-60	0.00183	U	0.0399	0.0197
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Europium-152	0.0104	U	0.0907	0.0492
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Europium-154	0.0117	U	0.141	0.0715
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Europium-155	0.0245	U	0.0787	0.0385
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Lead-212	0.412		0.0558	0.0661
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Lead-214	0.327		0.0725	0.0887
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Potassium-40	12.3		0.35	1.03
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Protactinium-231	0	UJ	0.425	0.366
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Protactinium-234	-0.0713	U	0.312	0.178
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Protactinium-234m	-0.391	U	5.43	2.83
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Radium-223	0.0131	U	0.595	0.356
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Radium-224	0.61	U	0.659	0.681
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Radium-226	0.312		0.0767	0.0967
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Thallium-208	0.11		0.0389	0.045
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Thorium-227	0.0106	U	0.233	0.125
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Thorium-228	0.412		0.0558	0.0661
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Thorium-232	0.411		0.149	0.167
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Actinium-228	0.451		0.104	0.142
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Americium-241	0.0332	U	0.108	0.0584
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Bismuth-212	0.589		0.333	0.383
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Bismuth-214	0.255		0.0549	0.0786
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Cesium-137	-0.0103	U	0.0228	0.0131
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Cobalt-60	0.0166	U	0.0345	0.0158
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Europium-152	-0.0337	U	0.0584	0.0364
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Europium-154	0.0236	U	0.0912	0.0467
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Europium-155	0.019	U	0.0784	0.0409
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Lead-212	0.509		0.0354	0.0517
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Lead-214	0.371		0.106	0.0841
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Potassium-40	13.2		0.294	0.823
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Protactinium-231	0	UJ	0.289	0.422
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Protactinium-234	-0.117	U	0.202	0.124
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Protactinium-234m	-0.299	U	3.59	2.03
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Radium-223	-0.129	U	0.4	0.223
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Radium-224	1.01		0.38	0.669
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Radium-226	0.255		0.0549	0.0786
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Thallium-208	0.129		0.027	0.0327
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Thorium-227	-0.0251	U	0.165	0.0941
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Thorium-228	0.509		0.0354	0.0517
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Thorium-232	0.451		0.104	0.142
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Actinium-228	0.459		0.108	0.14
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Americium-241	-0.0199	U	0.127	0.0658
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Bismuth-212	0.228	U	0.4	0.467
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Bismuth-214	0.284		0.0582	0.074
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Cesium-137	0.00066	U	0.0316	0.019
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Cobalt-60	-0.00417	U	0.038	0.0209
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Europium-152	0.000987	U	0.0736	0.0372
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Europium-154	0.0239	U	0.132	0.0686
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Europium-155	0.0127	U	0.0744	0.0366
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Lead-212	0.368		0.051	0.0658
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Lead-214	0.455		0.0545	0.0952
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Potassium-40	12.7		0.31	0.94
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Protactinium-231	0	UJ	0.332	0.352
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Protactinium-234	0.0667	U	0.265	0.128

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Protactinium-234m	-0.347	U	4.48	2.41
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Radium-223	-0.267	U	0.48	0.295
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Radium-224	0.00771	U	0.569	0.677
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Radium-226	0.284		0.0582	0.074
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Thallium-208	0.145		0.0259	0.0446
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Thorium-227	-0.0385	U	0.188	0.106
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Thorium-228	0.368		0.051	0.0658
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Thorium-232	0.459		0.108	0.14
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Actinium-228	0.49		0.106	0.137
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Americium-241	-0.0204	U	0.0936	0.0521
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Bismuth-212	0.812		0.368	0.373
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Bismuth-214	0.402		0.0576	0.0783
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Cesium-137	-0.00948	U	0.0253	0.0142
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Cobalt-60	0.00898	U	0.0348	0.0157
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Europium-152	0.0412	U	0.081	0.0372
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Europium-154	-0.00973	U	0.0918	0.0468
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Europium-155	0.0307	U	0.0702	0.0786
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Lead-212	0.43		0.0471	0.0662
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Lead-214	0.375		0.0536	0.0929
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Potassium-40	12.7		0.249	0.92
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Protactinium-231	0.079	U	0.387	0.206
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Protactinium-234	-0.0845	U	0.237	0.138
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Protactinium-234m	-0.959	U	3.75	2.12
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Radium-223	-0.129	U	0.464	0.242
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Radium-224	0.203	U	0.567	0.531
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Radium-226	0.402		0.0576	0.0783
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Thallium-208	0.123		0.028	0.0341
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Thorium-227	0.0222	U	0.19	0.102
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Thorium-228	0.43		0.0471	0.0662
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Thorium-232	0.49		0.106	0.137
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Actinium-228	0.43		0.172	0.197
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Americium-241	-0.116	U	0.244	0.13
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Bismuth-212	0.43	U	0.511	0.486
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Bismuth-214	0.37		0.0789	0.0941
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Cesium-137	0.00829	U	0.042	0.0213
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Cobalt-60	0.0101	U	0.0399	0.0174
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Europium-152	-0.071	U	0.0923	0.0535
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Europium-154	0.00483	U	0.157	0.0819
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Europium-155	0.0563	U	0.108	0.0513
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Lead-212	0.504		0.0583	0.0742
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Lead-214	0.409		0.166	0.104
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Potassium-40	12.7		0.398	1.17
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Protactinium-231	0.168	U	0.538	0.26
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Protactinium-234	-0.142	U	0.281	0.162
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Protactinium-234m	0.538	U	5.44	2.96
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Radium-223	-0.126	U	0.675	0.353
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Radium-224	0.579	U	0.625	0.785
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Radium-226	0.37		0.0789	0.0941
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Thallium-208	0.133		0.0372	0.04
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Thorium-227	-0.0297	U	0.27	0.167
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Thorium-228	0.504		0.0583	0.0742
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Thorium-232	0.43		0.172	0.197
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Actinium-228	0.48		0.0974	0.139
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Americium-241	0.0705	U	0.157	0.0862

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Bismuth-212	0.652		0.295	0.293
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Bismuth-214	0.352		0.0508	0.0732
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Cesium-137	0.00568	U	0.0263	0.0141
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Cobalt-60	-0.0126	U	0.0264	0.0152
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Europium-152	0.0272	U	0.0743	0.0401
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Europium-154	-0.00993	U	0.0838	0.0477
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Europium-155	0.0745	U	0.0824	0.0688
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Lead-212	0.484		0.0458	0.0532
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Lead-214	0.371		0.1	0.0671
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Potassium-40	13.1		0.263	0.717
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Protactinium-231	0	UJ	0.362	0.326
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Protactinium-234	-0.0358	U	0.206	0.114
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Protactinium-234m	0	UJ	3.61	3.64
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Radium-223	-0.0629	U	0.477	0.304
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Radium-224	0.972		0.49	0.7
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Radium-226	0.352		0.0508	0.0732
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Thallium-208	0.101		0.0253	0.036
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Thorium-227	0.0547	U	0.211	0.113
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Thorium-228	0.484		0.0458	0.0532
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Thorium-232	0.48		0.0974	0.139
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Actinium-228	0.285		0.104	0.142
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Americium-241	0.0088	U	0.106	0.0577
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Bismuth-212	0.489		0.357	0.449
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Bismuth-214	0.303		0.0476	0.0746
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Cesium-137	-0.00417	U	0.0278	0.0153
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Cobalt-60	-0.0094	U	0.0297	0.0165
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Europium-152	0.00343	U	0.0627	0.0316
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Europium-154	0.0203	U	0.103	0.0513
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Europium-155	0.00666	U	0.0701	0.0365
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Lead-212	0.453		0.0391	0.0601
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Lead-214	0.424		0.111	0.0761
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Potassium-40	12.9		0.261	0.807
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Protactinium-231	-0.0266	U	0.346	0.215
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Protactinium-234	0.0693	U	0.251	0.129
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Protactinium-234m	0.318	U	3.57	1.86
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Radium-223	-0.0769	U	0.38	0.221
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Radium-224	0.782		0.419	0.68
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Radium-226	0.303		0.0476	0.0746
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Thallium-208	0.131		0.0239	0.0355
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Thorium-227	-0.0144	U	0.166	0.0844
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Thorium-228	0.453		0.0391	0.0601
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Thorium-232	0.285		0.104	0.142
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Actinium-228	0.691		0.145	0.179
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Americium-241	0.00696	U	0.0456	0.024
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Bismuth-212	0.789		0.511	0.464
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Bismuth-214	0.485		0.0712	0.103
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Cesium-137	-0.00127	U	0.0335	0.0177
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Cobalt-60	0.00988	U	0.0428	0.0201
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Europium-152	-0.0308	U	0.0782	0.0472
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Europium-154	-0.00404	U	0.134	0.0703
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Europium-155	0.0159	U	0.0765	0.0386
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Lead-212	0.556		0.0529	0.0666
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Lead-214	0.588		0.164	0.0911
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Potassium-40	16.1		0.369	1.12

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Protactinium-231	0.0707	U	0.463	0.264
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Protactinium-234	0.0822	U	0.349	0.18
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Protactinium-234m	1.01	U	5.18	2.74
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Radium-223	-0.156	U	0.549	0.323
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Radium-224	0	UJ	0.567	0.901
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Radium-226	0.485		0.0712	0.103
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Thallium-208	0.185		0.0329	0.0434
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Thorium-227	0.151	U	0.232	0.114
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Thorium-228	0.556		0.0529	0.0666
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Thorium-232	0.691		0.145	0.179
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Actinium-228	0.611		0.156	0.179
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Americium-241	-0.0356	U	0.0604	0.0341
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Bismuth-212	0	UJ	0.563	0.54
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Bismuth-214	0.295		0.0751	0.121
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Cesium-137	-0.0028	U	0.0417	0.0223
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Cobalt-60	-0.0015	U	0.0502	0.0262
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Europium-152	-0.0324	U	0.093	0.0493
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Europium-154	0.0522	U	0.156	0.0747
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Europium-155	0.026	U	0.0856	0.0425
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Lead-212	0.487		0.0533	0.0723
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Lead-214	0.358		0.151	0.101
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Potassium-40	12.7		0.436	1.11
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Protactinium-231	-0.0268	U	0.479	0.269
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Protactinium-234	0.0562	U	0.333	0.171
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Protactinium-234m	-1.95	U	4.9	2.73
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Radium-223	-0.144	U	0.584	0.339
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Radium-224	0	UJ	0.572	0.794
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Radium-226	0.295		0.0751	0.121
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Thallium-208	0.171		0.038	0.0549
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Thorium-227	-0.00504	U	0.241	0.132
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Thorium-228	0.487		0.0533	0.0723
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Thorium-232	0.611		0.156	0.179
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Actinium-228	0.332		0.119	0.124
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Americium-241	-0.0318	U	0.195	0.0997
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Bismuth-212	0.532		0.406	0.425
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Bismuth-214	0.283		0.0554	0.0743
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Cesium-137	-0.00183	U	0.0317	0.0173
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Cobalt-60	0.0098	U	0.0401	0.0198
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Europium-152	0.0649	U	0.0857	0.0796
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Europium-154	0.0353	U	0.129	0.0646
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Europium-155	0.0297	U	0.091	0.046
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Lead-212	0.442		0.0484	0.0691
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Lead-214	0.434		0.135	0.0928
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Potassium-40	13.5		0.325	0.978
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Protactinium-231	0.38	U	0.412	0.358
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Protactinium-234	-0.0439	U	0.274	0.147
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Protactinium-234m	-0.0542	U	4.82	2.59
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Radium-223	-0.0355	U	0.545	0.284
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Radium-224	0.245	U	0.58	0.564
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Radium-226	0.283		0.0554	0.0743
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Thallium-208	0.104		0.0321	0.0435
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Thorium-227	-0.00604	U	0.203	0.114
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Thorium-228	0.442		0.0484	0.0691
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Thorium-232	0.332		0.119	0.124

Table 5-24. RBA-3 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Actinium-228	0.523		0.0889	0.136
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Americium-241	0.0371	U	0.154	0.0762
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Bismuth-212	0.533		0.298	0.368
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Bismuth-214	0.296		0.0439	0.0668
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Cesium-137	-0.00728	U	0.0225	0.0124
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Cobalt-60	-0.00939	U	0.0235	0.0158
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Europium-152	0.00956	U	0.0601	0.0313
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Europium-154	-0.00626	U	0.0766	0.0411
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Europium-155	0.0377	U	0.076	0.0878
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Lead-212	0.459		0.0355	0.0489
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Lead-214	0.337		0.0438	0.0707
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Potassium-40	13.2		0.215	0.721
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Protactinium-231	0	UJ	0.273	0.377
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Protactinium-234	-0.0319	U	0.197	0.111
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Protactinium-234m	2.63	U	3.08	1.62
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Radium-223	0.0689	U	0.415	0.24
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Radium-224	0.855		0.379	0.592
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Radium-226	0.296		0.0439	0.0668
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Thallium-208	0.119		0.023	0.0273
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Thorium-227	0.0262	U	0.171	0.0875
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Thorium-228	0.459		0.0355	0.0489
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Thorium-232	0.523		0.0889	0.136
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Actinium-228	0.316		0.202	0.21
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Americium-241	-0.0433	U	0.224	0.135
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Bismuth-212	0.82		0.658	0.387
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Bismuth-214	0.226		0.1	0.152
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Cesium-137	-0.0148	U	0.0463	0.0255
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Cobalt-60	0.00376	U	0.0668	0.0352
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Europium-152	-0.00574	U	0.123	0.0664
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Europium-154	-0.00761	U	0.177	0.0953
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Europium-155	-0.0221	U	0.131	0.0754
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Lead-212	0.362		0.0705	0.0795
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Lead-214	0.396		0.186	0.111
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Potassium-40	12.5		0.556	1.3
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Protactinium-231	0.178	U	0.674	0.348
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Protactinium-234	-0.203	U	0.409	0.244
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Protactinium-234m	-1.77	U	7.2	4.08
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Radium-223	0.0361	U	0.79	0.465
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Radium-224	0.0954	U	0.755	0.911
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Radium-226	0.226		0.1	0.152
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Thallium-208	0.103		0.0412	0.0541
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Thorium-227	-0.111	U	0.358	0.199
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Thorium-228	0.362		0.0705	0.0795
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Thorium-232	0.316		0.202	0.21

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

J - Analyte present. Reported value may or may not be accurate or precise

pCi/g - picocurie per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Radium-226	0.311		0.0445	0.0749
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Americium-241	0.0103	UJ	0.249	0.117
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Plutonium-238	0.0314	UJ	0.0842	0.0556
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Plutonium-239/240	0.0138	UJ	0.0413	0.0387
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Thorium-228	0.293	J	0.194	0.216
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Thorium-230	0.298	J	0.272	0.232
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Thorium-232	0.3	J	0.136	0.209
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Uranium-233/234	0.331		0.0764	0.112
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Uranium-235/236	0.0327		0.0327	0.0435
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Uranium-238	0.282		0.0617	0.102
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Radium-226	0.458		0.0464	0.0883
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Americium-241	0.185	UJ	0.359	0.233
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Plutonium-238	0.0616	UJ	0.101	0.075
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Plutonium-239/240	-0.00305	UJ	0.107	0.0458
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Thorium-228	0.134	UJ	0.331	0.199
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Thorium-230	0.237	UJ	0.271	0.206
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Thorium-232	0.296	J	0.201	0.204
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Uranium-233/234	0.354		0.104	0.126
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Uranium-235/236	0.00781	U	0.0647	0.036
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Uranium-238	0.331		0.0751	0.117
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Radium-226	0.334		0.0484	0.0759
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Americium-241	0.00608	UJ	0.467	0.216
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Plutonium-238	-0.00588	UJ	0.159	0.0706
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Plutonium-239/240	-0.0392	UJ	0.142	0.0409
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Thorium-228	0.387	J	0.215	0.233
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Thorium-230	0.286	J	0.245	0.212
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Thorium-232	0.39	J	0.187	0.227
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Uranium-233/234	0.253		0.0866	0.102
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Uranium-235/236	0.037	U	0.0705	0.0513
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Uranium-238	0.303		0.057	0.106
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Radium-226	0.354		0.0631	0.083
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Americium-241	0.0887	U	0.165	0.121
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Plutonium-238	0.0012	UJ	0.121	0.0552
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Plutonium-239/240	-0.0102	UJ	0.116	0.0462
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Thorium-228	0.199	UJ	0.257	0.185
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Thorium-230	0.428	J	0.241	0.233
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Thorium-232	0.236	J	0.203	0.178
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Uranium-233/234	0.383		0.0804	0.117
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Uranium-235/236	0.051	U	0.0725	0.0557
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Uranium-238	0.326		0.0725	0.108
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Radium-226	0.291		0.0656	0.077
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Americium-241	0.0604	UJ	0.354	0.189
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Plutonium-238	-0.0446	UJ	0.205	0.0628
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Plutonium-239/240	-0.0382	UJ	0.196	0.0615
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Thorium-228	0.276	J	0.164	0.191
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Thorium-230	0.317	J	0.283	0.228
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Thorium-232	0.418	J	0.204	0.232
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Uranium-233/234	0.224		0.0842	0.1
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Uranium-235/236	-0.00441	U	0.065	0.027
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Uranium-238	0.307		0.0693	0.113

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Radium-226	0.327		0.0506	0.075
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Americium-241	-0.0231	UJ	0.389	0.16
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Plutonium-238	-0.0213	UJ	0.132	0.0485
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Plutonium-239/240	0.0427	UJ	0.107	0.0691
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Thorium-228	0.216	UJ	0.232	0.188
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Thorium-230	0.265	J	0.258	0.208
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Thorium-232	0.186	J	0.167	0.163
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Uranium-233/234	0.305		0.0885	0.115
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Uranium-235/236	0.0121	U	0.0363	0.0346
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Uranium-238	0.322		0.0846	0.117
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Radium-226	0.316		0.0495	0.0729
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Americium-241	0.0322	UJ	0.502	0.247
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Plutonium-238	-0.0317	UJ	0.115	0.0331
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Plutonium-239/240	0.00423	UJ	0.102	0.0482
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Thorium-228	0.426	J	0.235	0.25
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Thorium-230	0.554	J	0.279	0.286
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Thorium-232	0.382	J	0.177	0.227
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Uranium-233/234	0.301	J	0.113	0.128
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Uranium-235/236	-0.00116	UJ	0.101	0.045
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Uranium-238	0.306	J	0.111	0.128
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Radium-226	0.43		0.041	0.0803
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Americium-241	0.219	UJ	0.38	0.26
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Plutonium-238	-0.029	UJ	0.122	0.0365
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Plutonium-239/240	0.00423	UJ	0.0923	0.0442
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Thorium-228	0.288	J	0.233	0.217
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Thorium-230	0.418	J	0.25	0.253
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Thorium-232	0.501	J	0.163	0.26
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Uranium-233/234	0.0977	UJ	0.11	0.0842
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Uranium-235/236	0.019	UJ	0.093	0.0536
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Uranium-238	0.339	J	0.098	0.133
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Radium-226	0.528		0.063	0.0972
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Americium-241	0.277	UJ	0.339	0.298
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Plutonium-238	-0.0153	UJ	0.147	0.0622
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Plutonium-239/240	-0.0339	UJ	0.123	0.0354
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Thorium-228	0.0893	UJ	0.404	0.221
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Thorium-230	1.06	J	0.321	0.412
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Thorium-232	0.469	J	0.244	0.278
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Uranium-233/234	0.412	J	0.0978	0.144
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Uranium-235/236	0.00409	UJ	0.0914	0.0443
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Uranium-238	0.515	J	0.0899	0.158
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Radium-226	0.396		0.048	0.0816
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Americium-241	0.0022	UJ	0.363	0.163
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Plutonium-238	-0.0103	UJ	0.0877	0.0312
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Plutonium-239/240	-0.0207	UJ	0.106	0.0333
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Thorium-228	0.186	UJ	0.251	0.187
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Thorium-230	0.563	J	0.249	0.279
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Thorium-232	0.306	J	0.19	0.206
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Uranium-233/234	0.263		0.0685	0.106
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Uranium-235/236	0.0253	U	0.0379	0.0438
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Uranium-238	0.225		0.0306	0.0963

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Radium-226	0.491		0.0685	0.0972
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Americium-241	0.312	UJ	0.541	0.37
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Plutonium-238	-0.0091	UJ	0.0772	0.0275
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Plutonium-239/240	0.0601	UJ	0.0605	0.0612
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Thorium-228	0.379	J	0.281	0.244
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Thorium-230	0.327	J	0.249	0.221
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Thorium-232	0.35	J	0.182	0.213
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Uranium-233/234	0.305	J	0.114	0.125
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Uranium-235/236	0.00377	UJ	0.0843	0.0408
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Uranium-238	0.195	J	0.0762	0.0968
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Radium-226	0.583		0.0667	0.116
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Americium-241	0.0411	UJ	0.307	0.159
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Plutonium-238	0.0195	UJ	0.114	0.0611
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Plutonium-239/240	0.00826	UJ	0.109	0.0534
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Thorium-228	0.269	J	0.16	0.186
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Thorium-230	0.32	J	0.262	0.22
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Thorium-232	0.295	J	0.198	0.198
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Uranium-233/234	0.327	J	0.0737	0.106
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Uranium-235/236	0.0162	U	0.0523	0.0349
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Uranium-238	0.315		0.0726	0.104
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Radium-226	0.35		0.0528	0.0792
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Americium-241	0.0232	UJ	0.0903	0.0526
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Plutonium-238	-0.0501	UJ	0.128	0.0344
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Plutonium-239/240	-0.0113	UJ	0.0992	0.0382
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Thorium-228	0.263	J	0.175	0.194
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Thorium-230	0.392	J	0.24	0.24
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Thorium-232	0.3	J	0.124	0.197
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Uranium-233/234	0.177		0.0854	0.0827
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Uranium-235/236	0.00948	U	0.0284	0.0271
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Uranium-238	0.217		0.048	0.0829
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Radium-226	0.36		0.0578	0.0865
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Americium-241	0.0201	UJ	0.143	0.074
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Plutonium-238	-0.0112	UJ	0.117	0.0482
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Plutonium-239/240	-0.0208	UJ	0.114	0.0408
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Thorium-228	0.765	J	0.276	0.401
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Thorium-230	0.794	J	0.343	0.412
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Thorium-232	0.332	J	0.184	0.266
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Uranium-233/234	0.379	J	0.106	0.136
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Uranium-235/236	0.0124	UJ	0.0945	0.0497
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Uranium-238	0.239	J	0.0946	0.109
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Radium-226	0.532		0.0465	0.11
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Americium-241	0.0123	UJ	0.187	0.0913
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Plutonium-238	0.0277	UJ	0.108	0.0628
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Plutonium-239/240	0.00492	UJ	0.119	0.056
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Thorium-228	0.334	J	0.244	0.217
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Thorium-230	0.33	J	0.224	0.209
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Thorium-232	0.255	J	0.136	0.173
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Uranium-233/234	0.221		0.0574	0.0824
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Uranium-235/236	0.0114	U	0.0555	0.032
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Uranium-238	0.244		0.0502	0.0851

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Radium-226	0.364		0.0723	0.0942
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Americium-241	0.0259	UJ	0.123	0.0684
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Plutonium-238	0.0269	UJ	0.146	0.0781
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Plutonium-239/240	-0.00336	UJ	0.118	0.0504
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Thorium-228	0.16	UJ	0.293	0.193
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Thorium-230	0.293	UJ	0.296	0.231
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Thorium-232	0.245	J	0.208	0.194
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Uranium-233/234	0.395		0.0694	0.0931
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Uranium-235/236	0.0372	U	0.0628	0.0423
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Uranium-238	0.519		0.0688	0.105
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Radium-226	0.407		0.0645	0.0946
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Americium-241	-0.027	UJ	0.147	0.0529
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Plutonium-238	0.027	UJ	0.0781	0.0481
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Plutonium-239/240	0.00127	UJ	0.0973	0.0451
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Thorium-228	0.28	J	0.167	0.194
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Thorium-230	0.43	J	0.231	0.242
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Thorium-232	0.141	J	0.118	0.139
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Uranium-233/234	0.644		0.0696	0.148
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Uranium-235/236	0.063		0.0315	0.0549
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Uranium-238	0.592		0.045	0.141
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Radium-226	0.439		0.0501	0.0982
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Americium-241	0.0168	UJ	0.168	0.0839
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Plutonium-238	-0.0273	UJ	0.106	0.0312
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Plutonium-239/240	-0.0147	UJ	0.106	0.0398
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Thorium-228	0.249	UJ	0.285	0.215
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Thorium-230	0.487	J	0.265	0.266
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Thorium-232	0.327	J	0.123	0.204
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Uranium-233/234	0.297		0.0978	0.111
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Uranium-235/236	0.0291	U	0.0584	0.0445
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Uranium-238	0.279		0.101	0.109
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Radium-226	0.287		0.0305	0.0572
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Americium-241	-0.0189	UJ	0.111	0.0359
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Plutonium-238	-0.0243	UJ	0.121	0.0459
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Plutonium-239/240	-0.028	UJ	0.101	0.0292
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Thorium-228	-0.0251	UJ	0.332	0.139
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Thorium-230	0.394	J	0.287	0.267
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Thorium-232	0.204	J	0.182	0.188
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Uranium-233/234	0.133	J	0.0946	0.0876
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Uranium-235/236	0.00898	UJ	0.0744	0.0413
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Uranium-238	0.151	J	0.071	0.0873
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Radium-226	0.358		0.0486	0.0706
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Americium-241	-0.00727	UJ	0.122	0.0502
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Plutonium-238	0.0237	UJ	0.12	0.0646
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Plutonium-239/240	0.0136	UJ	0.102	0.0526
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Thorium-228	0.224	UJ	0.294	0.213
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Thorium-230	0.512	J	0.297	0.282
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Thorium-232	0.184	UJ	0.209	0.175
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Uranium-233/234	0.22		0.0926	0.095
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Uranium-235/236	0.0133	U	0.065	0.0375
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Uranium-238	0.122		0.0639	0.0692

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Radium-226	0.382		0.0478	0.0739
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Americium-241	0.00434	UJ	0.0947	0.0454
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Plutonium-238	0.0233	UJ	0.126	0.0677
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Plutonium-239/240	0.0233	UJ	0.126	0.0676
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Thorium-228	0.26	J	0.155	0.18
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Thorium-230	0.474	J	0.219	0.242
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Thorium-232	0.184	J	0.111	0.149
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Uranium-233/234	0.214		0.105	0.099
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Uranium-235/236	-0.000873	U	0.0763	0.034
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Uranium-238	0.252		0.0672	0.0974
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Radium-226	0.433		0.05	0.0869
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Americium-241	-0.00373	UJ	0.0746	0.0322
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Plutonium-238	0.021	UJ	0.114	0.0612
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Plutonium-239/240	0.0116	UJ	0.124	0.062
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Thorium-228	0.352	J	0.26	0.239
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Thorium-230	0.475	J	0.274	0.269
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Thorium-232	0.419	J	0.234	0.247
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Uranium-233/234	0.156		0.0947	0.0837
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Uranium-235/236	0.0271	U	0.0544	0.0415
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Uranium-238	0.243		0.052	0.0912
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Radium-226	0.306		0.0492	0.0786
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Americium-241	-0.00657	UJ	0.0758	0.0291
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Plutonium-238	0.0444	UJ	0.119	0.0785
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Plutonium-239/240	-0.0654	UJ	0.189	0.0521
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Thorium-228	0.279	UJ	0.285	0.224
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Thorium-230	0.547	J	0.265	0.279
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Thorium-232	0.267	J	0.123	0.187
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Uranium-233/234	0.273		0.0706	0.0926
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Uranium-235/236	0.00812	U	0.0617	0.0324
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Uranium-238	0.222		0.0679	0.0842
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Radium-226	0.292		0.0763	0.0857
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Americium-241	-0.0103	UJ	0.118	0.0454
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Plutonium-238	-0.00999	UJ	0.14	0.0588
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Plutonium-239/240	-0.00624	UJ	0.135	0.0583
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Thorium-228	0.424	J	0.266	0.251
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Thorium-230	0.191	UJ	0.24	0.182
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Thorium-232	0.221	J	0.147	0.171
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Uranium-233/234	0.331		0.0793	0.105
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Uranium-235/236	-0.00411	U	0.0711	0.0298
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Uranium-238	0.234		0.0529	0.0858
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Radium-226	0.359		0.0651	0.09
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Americium-241	-0.0268	UJ	0.146	0.0526
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Plutonium-238	-0.00505	UJ	0.0849	0.0349
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Plutonium-239/240	-0.0298	UJ	0.114	0.0384
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Thorium-228	0.661	J	0.255	0.305
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Thorium-230	0.405	J	0.269	0.25
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Thorium-232	0.258	J	0.23	0.202
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Uranium-233/234	0.297		0.0748	0.105
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Uranium-235/236	0.00298	U	0.0667	0.0323
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Uranium-238	0.264		0.0457	0.096

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Radium-226	0.524		0.0678	0.107
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Americium-241	0.00975	UJ	0.141	0.0686
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Plutonium-238	0.00311	UJ	0.0678	0.0325
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Plutonium-239/240	0.0111	UJ	0.0333	0.0312
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Thorium-228	0.277	UJ	0.317	0.24
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Thorium-230	0.456	J	0.316	0.282
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Thorium-232	0.232	J	0.225	0.199
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Uranium-233/234	0.352	J	0.118	0.143
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Uranium-235/236	0.0147	UJ	0.112	0.0588
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Uranium-238	0.244	J	0.112	0.121
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Radium-226	0.254		0.0747	0.0779
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Americium-241	0.0308	UJ	0.147	0.0847
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Plutonium-238	0.000585	UJ	0.0964	0.0434
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Plutonium-239/240	0.0263	UJ	0.103	0.0598
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Thorium-228	0.162	UJ	0.241	0.181
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Thorium-230	0.333	J	0.258	0.237
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Thorium-232	0.221	J	0.168	0.185
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Uranium-233/234	0.213	J	0.152	0.13
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Uranium-235/236	0	UJ	0.0531	0.0369
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Uranium-238	0.32	J	0.162	0.153
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Radium-226	0.311		0.0784	0.088
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Americium-241	0.00302	UJ	0.166	0.0794
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Plutonium-238	0.0203	UJ	0.12	0.0635
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Plutonium-239/240	-0.00494	UJ	0.107	0.0461
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Thorium-228	0.242	UJ	0.245	0.2
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Thorium-230	0.489	J	0.243	0.26
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Thorium-232	0.402	J	0.21	0.233
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Uranium-233/234	0.381	J	0.092	0.134
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Uranium-235/236	0.0445	UJ	0.0849	0.0617
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Uranium-238	0.347	J	0.0582	0.124
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Radium-226	0.49		0.0864	0.147
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Americium-241	-0.0483	UJ	0.282	0.0915
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Plutonium-238	0.0229	UJ	0.108	0.0603
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Plutonium-239/240	0.00586	UJ	0.146	0.0699
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Thorium-228	0.136	UJ	0.255	0.178
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Thorium-230	0.287	J	0.27	0.231
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Thorium-232	0.164	UJ	0.178	0.171
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Uranium-233/234	0.33	J	0.119	0.133
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Uranium-235/236	0.0603	UJ	0.0882	0.0698
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Uranium-238	0.284	J	0.0797	0.117
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Radium-226	0.411		0.0565	0.097
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Americium-241	0.00751	UJ	0.187	0.0886
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Plutonium-238	0.0127	UJ	0.127	0.0636
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Plutonium-239/240	-0.0109	UJ	0.189	0.0875
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Thorium-228	0.309	UJ	0.334	0.26
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Thorium-230	0.326	J	0.287	0.249
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Thorium-232	0.206	J	0.183	0.19
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Uranium-233/234	0.338		0.0931	0.124
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Uranium-235/236	0.0212	U	0.0686	0.0458
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Uranium-238	0.362		0.0796	0.126

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Radium-226	0.543		0.0615	0.108
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Americium-241	0.179	UJ	0.371	0.249
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Plutonium-238	0.0504	UJ	0.149	0.0892
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Plutonium-239/240	-0.066	UJ	0.222	0.0828
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Thorium-228	0.235	UJ	0.378	0.267
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Thorium-230	0.785	J	0.348	0.402
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Thorium-232	0.17	UJ	0.324	0.225
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Uranium-233/234	0.568		0.0707	0.133
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Uranium-235/236	0.0623		0.0498	0.0529
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Uranium-238	0.414		0.069	0.114
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Radium-226	0.378		0.0593	0.0925
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Americium-241	-0.0163	UJ	0.138	0.0491
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Plutonium-238	0.00519	UJ	0.126	0.0591
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Plutonium-239/240	-0.0298	UJ	0.165	0.0634
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Thorium-228	0.181	UJ	0.298	0.214
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Thorium-230	0.423	J	0.319	0.291
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Thorium-232	0.496	J	0.197	0.288
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Uranium-233/234	0.212	J	0.152	0.131
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Uranium-235/236	0.0118	UJ	0.0976	0.0542
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Uranium-238	0.285	J	0.142	0.144
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Radium-226	0.391		0.0542	0.104
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Americium-241	0.114	UJ	0.329	0.203
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Plutonium-238	0.0242	UJ	0.066	0.0476
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Plutonium-239/240	0.00716	UJ	0.0762	0.0398
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Thorium-228	0.442		0.188	0.196
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Thorium-230	0.588		0.194	0.22
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Thorium-232	0.552		0.116	0.201
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Uranium-233/234	0.296		0.0611	0.0918
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Uranium-235/236	0.00829	U	0.0249	0.0244
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Uranium-238	0.242		0.0474	0.0819
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Radium-226	0.358		0.0463	0.0919
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Americium-241	0.0368	UJ	0.175	0.101
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Plutonium-238	-0.0125	UJ	0.106	0.0377
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Plutonium-239/240	0.0222	UJ	0.106	0.061
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Thorium-228	0.338		0.141	0.167
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Thorium-230	0.473		0.206	0.205
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Thorium-232	0.263		0.129	0.147
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Uranium-233/234	0.265		0.0828	0.0951
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Uranium-235/236	-0.00458	U	0.0532	0.0218
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Uranium-238	0.315		0.0517	0.0972
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Radium-226	0.615		0.0926	0.114
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Americium-241	0.00816	UJ	0.178	0.0853
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Plutonium-238	-0.0171	UJ	0.151	0.058
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Plutonium-239/240	-0.0134	UJ	0.114	0.0405
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Thorium-228	0.316	UJ	0.598	0.373
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Thorium-230	0.41	UJ	0.508	0.357
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Thorium-232	0.314	UJ	0.519	0.337
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Uranium-233/234	0.278		0.106	0.114
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Uranium-235/236	0.056	U	0.064	0.0592
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Uranium-238	0.196		0.104	0.0986

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Radium-226	0.502		0.0567	0.111
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Americium-241	0.00198	UJ	0.2	0.0909
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Plutonium-238	0.0131	UJ	0.0392	0.0368
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Plutonium-239/240	0.0298	UJ	0.0799	0.0527
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Thorium-228	0.312		0.198	0.182
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Thorium-230	0.343		0.242	0.201
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Thorium-232	0.21		0.158	0.146
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Uranium-233/234	0.337		0.0676	0.0929
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Uranium-235/236	0.0144	U	0.0217	0.0255
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Uranium-238	0.307		0.0619	0.088
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Radium-226	0.331		0.0726	0.0942
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Americium-241	0.0191	UJ	0.0574	0.0538
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Plutonium-238	0.000548	UJ	0.0903	0.0406
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Plutonium-239/240	-0.00329	UJ	0.0657	0.0284
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Thorium-228	0.22		0.117	0.125
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Thorium-230	0.282		0.163	0.149
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Thorium-232	0.304		0.0859	0.138
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Uranium-233/234	0.25		0.0625	0.0834
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Uranium-235/236	-0.00411	U	0.0738	0.0327
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Uranium-238	0.25		0.0505	0.0815
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Radium-226	0.249		0.0698	0.0829
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Americium-241	0.0958	UJ	0.457	0.264
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Plutonium-238	-0.00701	UJ	0.0809	0.031
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Plutonium-239/240	0.0187	UJ	0.0892	0.0514
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Thorium-228	0.19	U	0.237	0.162
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Thorium-230	0.37		0.216	0.189
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Thorium-232	0.291		0.126	0.15
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Uranium-233/234	0.295		0.0715	0.0852
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Uranium-235/236	0.0262	U	0.0464	0.0335
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Uranium-238	0.383		0.016	0.0892
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Radium-226	0.43		0.0752	0.108
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Americium-241	0.179	UJ	0.311	0.258
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Plutonium-238	0.00123	UJ	0.124	0.0566
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Plutonium-239/240	0.0394	UJ	0.114	0.0701
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Thorium-228	0.349		0.119	0.159
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Thorium-230	0.241	U	0.273	0.185
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Thorium-232	0.29		0.119	0.145
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Uranium-233/234	0.315		0.0771	0.0944
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Uranium-235/236	0.0229	U	0.0541	0.0361
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Uranium-238	0.239		0.072	0.083
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Radium-226	0.307		0.0371	0.0881
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Americium-241	-0.019	UJ	0.32	0.131
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Plutonium-238	0.0217	UJ	0.059	0.0426
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Plutonium-239/240	0.028	UJ	0.0751	0.0496
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Thorium-228	0.449		0.181	0.196
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Thorium-230	0.49		0.167	0.199
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Thorium-232	0.414		0.164	0.184
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Uranium-233/234	0.202		0.0801	0.0798
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Uranium-235/236	-0.0117	U	0.0615	0.0215
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Uranium-238	0.343		0.0693	0.0965

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Radium-226	0.385		0.0881	0.107
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Americium-241	0.0633	UJ	0.139	0.101
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Plutonium-238	0.0258	UJ	0.0704	0.0508
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Plutonium-239/240	0.0117	UJ	0.103	0.0526
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Thorium-228	0.268		0.181	0.159
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Thorium-230	0.259		0.168	0.152
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Thorium-232	0.23		0.0976	0.131
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Uranium-233/234	0.267		0.0706	0.0848
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Uranium-235/236	0.0108	U	0.058	0.032
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Uranium-238	0.329		0.059	0.0907
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Radium-226	0.414		0.0879	0.112
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Americium-241	-0.0383	UJ	0.224	0.0726
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Plutonium-238	-0.00289	UJ	0.0577	0.0249
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Plutonium-239/240	0.0125	UJ	0.0793	0.0428
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Thorium-228	0.462	J	0.222	0.224
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Thorium-230	0.264	J	0.194	0.173
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Thorium-232	0.0944	UJ	0.201	0.128
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Uranium-233/234	0.394		0.0823	0.11
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Uranium-235/236	0.017	U	0.0751	0.0422
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Uranium-238	0.323		0.0737	0.0993
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Radium-226	0.764		0.0698	0.132
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Americium-241	0.0195	UJ	0.124	0.0668
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Plutonium-238	-0.0118	UJ	0.124	0.0509
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Plutonium-239/240	0.0241	UJ	0.094	0.0548
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Thorium-228	0.479	UJ	0.487	0.383
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Thorium-230	0.626	J	0.464	0.411
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Thorium-232	0.719	J	0.344	0.407
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Uranium-233/234	0.463		0.0781	0.129
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Uranium-235/236	0.0309	U	0.074	0.0488
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Uranium-238	0.433		0.0652	0.123
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Radium-226	0.392		0.0624	0.0988
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Americium-241	0.00147	UJ	0.242	0.109
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Plutonium-238	0.0248	UJ	0.0904	0.057
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Plutonium-239/240	0.0248	UJ	0.0904	0.057
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Thorium-228	0.254	UJ	0.265	0.225
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Thorium-230	0.418	J	0.312	0.28
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Thorium-232	0.252	J	0.145	0.203
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Uranium-233/234	0.217		0.0836	0.0854
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Uranium-235/236	-0.00855	U	0.0732	0.0297
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Uranium-238	0.318		0.068	0.0965
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Radium-226	0.277		0.0726	0.0922
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Americium-241	0.116	UJ	0.148	0.137
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Plutonium-238	0.014	UJ	0.0421	0.0395
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Plutonium-239/240	0.00393	UJ	0.0858	0.0411
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Thorium-228	0.314	UJ	0.339	0.263
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Thorium-230	0.0581	UJ	0.417	0.217
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Thorium-232	0.255	J	0.247	0.219
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Uranium-233/234	0.356		0.072	0.0912
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Uranium-235/236	0.0159	U	0.0509	0.0307
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Uranium-238	0.341		0.0518	0.0859

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Radium-226	0.285		0.0596	0.0803
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Americium-241	0.0249	UJ	0.158	0.0852
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Plutonium-238	0.00466	UJ	0.113	0.0531
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Plutonium-239/240	0.00116	UJ	0.118	0.0535
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Thorium-228	0.503		0.195	0.215
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Thorium-230	0.213	U	0.224	0.165
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Thorium-232	0.395		0.138	0.181
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Uranium-233/234	0.27		0.0793	0.0952
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Uranium-235/236	0.0091	U	0.0273	0.0268
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Uranium-238	0.317		0.052	0.0977
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Radium-226	0.389		0.065	0.103
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Americium-241	0.0679	UJ	0.141	0.0946
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Plutonium-238	0.0135	UJ	0.0854	0.0461
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Plutonium-239/240	-0.0218	UJ	0.1	0.0307
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Thorium-228	0.392	J	0.122	0.17
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Thorium-230	0.552	J	0.166	0.204
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Thorium-232	0.314	J	0.0746	0.147
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Uranium-233/234	0.279	J	0.0716	0.0905
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Uranium-235/236	0.0161	UJ	0.0572	0.0347
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Uranium-238	0.252	J	0.0694	0.0863
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Radium-226	0.412		0.0867	0.11
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Americium-241	0.03	UJ	0.323	0.161
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Plutonium-238	0.0679	UJ	0.134	0.0894
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Plutonium-239/240	0.00532	UJ	0.129	0.0606
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Thorium-228	0.289		0.16	0.16
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Thorium-230	0.282		0.182	0.163
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Thorium-232	0.251		0.117	0.141
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Uranium-233/234	0.296		0.0856	0.0998
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Uranium-235/236	0.018	U	0.027	0.0318
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Uranium-238	0.24		0.0513	0.0853
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Radium-226	0.302		0.0681	0.0887
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Americium-241	0.0483	UJ	0.131	0.0949
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Plutonium-238	0.00382	UJ	0.0925	0.0435
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Plutonium-239/240	0.00334	UJ	0.0728	0.0349
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Thorium-228	0.345	J	0.137	0.172
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Thorium-230	0.242	J	0.21	0.166
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Thorium-232	0.404	J	0.107	0.178
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Uranium-233/234	0.234		0.108	0.107
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Uranium-235/236	-0.000244	U	0.107	0.0495
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Uranium-238	0.385		0.0863	0.127
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Radium-226	0.371		0.0609	0.0974
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Americium-241	0.083	UJ	0.144	0.12
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Plutonium-238	-0.00787	UJ	0.131	0.0571
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Plutonium-239/240	-0.0157	UJ	0.092	0.0298
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Thorium-228	0.24	J	0.124	0.156
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Thorium-230	0.408	J	0.217	0.212
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Thorium-232	0.179	UJ	0.184	0.149
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Uranium-233/234	0.284		0.0804	0.0915
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Uranium-235/236	0.0193	U	0.0454	0.0322
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Uranium-238	0.338		0.0547	0.0937

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Radium-226	0.317		0.0736	0.0932
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Americium-241	0.0124	UJ	0.132	0.0688
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Plutonium-238	0.0122	UJ	0.0767	0.0456
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Plutonium-239/240	0.016	UJ	0.048	0.045
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Thorium-228	0.468		0.335	0.256
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Thorium-230	0.304		0.276	0.205
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Thorium-232	0.474		0.212	0.217
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Uranium-233/234	0.296		0.0694	0.0933
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Uranium-235/236	0.0289	U	0.0661	0.0431
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Uranium-238	0.292		0.0394	0.0887
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Radium-226	0.426		0.038	0.0774
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Americium-241	0.0142	UJ	0.0899	0.0534
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Plutonium-238	0.0103	UJ	0.09	0.046
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Plutonium-239/240	0.00718	UJ	0.0948	0.0464
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Thorium-228	0.361	UJ	0.368	0.289
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Thorium-230	0.409	J	0.33	0.289
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Thorium-232	0.268	J	0.154	0.216
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Uranium-233/234	0.49		0.106	0.146
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Uranium-235/236	0.00695	U	0.0944	0.0465
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Uranium-238	0.371		0.0301	0.122
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Radium-226	0.381		0.08	0.11
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Americium-241	-0.0497	UJ	0.19	0.064
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Plutonium-238	-0.00211	UJ	0.11	0.0488
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Plutonium-239/240	0.00842	UJ	0.128	0.0624
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Thorium-228	0.327		0.181	0.182
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Thorium-230	0.286		0.201	0.176
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Thorium-232	0.292		0.114	0.16
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Uranium-233/234	0.274		0.0633	0.0831
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Uranium-235/236	0.0457		0.0413	0.0402
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Uranium-238	0.299		0.0453	0.0834
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Radium-226	0.412		0.0763	0.11
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Americium-241	0.00566	UJ	0.141	0.0667
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Plutonium-238	-0.0122	UJ	0.107	0.0413
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Plutonium-239/240	0.0404	UJ	0.0875	0.0598
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Thorium-228	0.386		0.184	0.189
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Thorium-230	0.461		0.196	0.204
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Thorium-232	0.227		0.122	0.139
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Uranium-233/234	0.228		0.0812	0.0922
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Uranium-235/236	0.0298		0.0298	0.0402
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Uranium-238	0.265		0.0567	0.0942
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Radium-226	0.321		0.0747	0.0997
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Americium-241	0.0162	UJ	0.214	0.105
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Plutonium-238	0.0308	UJ	0.0462	0.0528
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Plutonium-239/240	0.00492	UJ	0.119	0.0561
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Thorium-228	0.339	J	0.158	0.17
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Thorium-230	0.282	J	0.209	0.171
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Thorium-232	0.437	J	0.0777	0.176
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Uranium-233/234	0.253		0.0838	0.0981
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Uranium-235/236	0.041	U	0.0725	0.0524
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Uranium-238	0.241		0.0726	0.094

Table 5-25. RBA-3 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Radium-226	0.41		0.0911	0.108
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Americium-241	0.0522	UJ	0.137	0.0847
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Plutonium-238	0.00488	UJ	0.107	0.051
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Plutonium-239/240	-0.0209	UJ	0.122	0.0396
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Thorium-228	0.473	J	0.382	0.339
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Thorium-230	0.493	J	0.381	0.342
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Thorium-232	0.343	J	0.343	0.29
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Uranium-233/234	0.453		0.0769	0.119
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Uranium-235/236	0.0141	U	0.0689	0.0383
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Uranium-238	0.278		0.0634	0.0931

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

J - Analyte present. Reported value may or may not be accurate or precise

pCi/g - picocurie per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-26. RBA-3 - Gas Flow Proportional Counting Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Strontium-90	-0.08	U	0.141	0.0651
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Strontium-90	-0.0119	U	0.141	0.0729
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Strontium-90	0.103	U	0.149	0.0921
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Strontium-90	0.0947	U	0.143	0.0876
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Strontium-90	-0.146	UJ	0.146	0.0672
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Strontium-90	0.0014	UJ	0.105	0.0546
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Strontium-90	0.0854	U	0.148	0.0885
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Strontium-90	-0.0233	U	0.139	0.0709
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Strontium-90	-0.000738	U	0.148	0.077
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Strontium-90	-0.048	U	0.141	0.0677
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Strontium-90	0.0461	U	0.133	0.0761
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Strontium-90	0.0311	U	0.141	0.0768
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Strontium-90	0.0221	U	0.144	0.0802
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Strontium-90	-0.0405	U	0.145	0.0741
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Strontium-90	0.0475	U	0.145	0.0825
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Strontium-90	0.00454	U	0.141	0.0753
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Strontium-90	-0.0216	U	0.144	0.0738
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Strontium-90	-0.0412	U	0.144	0.078
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Strontium-90	0.0586	U	0.144	0.0836
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Strontium-90	-0.0685	U	0.141	0.0673
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Strontium-90	0.0725	U	0.144	0.0855
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Strontium-90	-0.0132	U	0.141	0.0713
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Strontium-90	0.00928	U	0.146	0.0795
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Strontium-90	0.0429	U	0.143	0.0821
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Strontium-90	0.109	U	0.143	0.0875
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Strontium-90	0.00559	U	0.146	0.0825
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Strontium-90	-0.0203	U	0.143	0.0707
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Strontium-90	-0.0103	U	0.141	0.0732
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Strontium-90	-0.00364	U	0.143	0.0741
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Strontium-90	0.0121	U	0.142	0.0782
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Strontium-90	0.00364	U	0.139	0.0729
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Strontium-90	-0.00885	U	0.134	0.0674
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Strontium-90	0.0664	U	0.128	0.0763
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Strontium-90	0.0151	U	0.124	0.0663
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Strontium-90	0.043	U	0.148	0.0835
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Strontium-90	-0.0165	U	0.131	0.0654
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Strontium-90	0.000101	U	0.145	0.0741
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Strontium-90	-0.000742	U	0.136	0.0703
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Strontium-90	0.0808	U	0.138	0.0837
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Strontium-90	0.0684	U	0.14	0.0828
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Strontium-90	0.00434	U	0.12	0.0676
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Strontium-90	0.00367	U	0.143	0.0807
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Strontium-90	-0.0308	U	0.149	0.0789
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Strontium-90	0.0818	U	0.146	0.0874
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Strontium-90	-0.0431	U	0.13	0.0595
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Strontium-90	0.0365	U	0.121	0.0689
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Strontium-90	-0.0292	U	0.122	0.0596
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Strontium-90	0.0659	U	0.127	0.0753
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Strontium-90	-0.00213	U	0.127	0.0668
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Strontium-90	0.033	U	0.116	0.0673

Table 5-26. RBA-3 - Gas Flow Proportional Counting Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Strontium-90	0.087	U	0.123	0.0761
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Strontium-90	-0.0175	U	0.149	0.0751
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Strontium-90	0.0422	U	0.131	0.0747
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Strontium-90	0.0738	U	0.125	0.0756
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Strontium-90	0.0345	U	0.109	0.0616
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Strontium-90	0.0467	U	0.144	0.0828

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

pCi/g - picocurie per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-27. RBA-3 - Radon Emanation Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SB01-0102-0819	08/29/2019 10:00	Radium-226	0.416		0.137	0.162
HPRBA3-SB01-0304-0819	08/29/2019 10:02	Radium-226	0.239		0.106	0.104
HPRBA3-SB01-0506-0819	08/29/2019 10:04	Radium-226	0.266		0.136	0.123
HPRBA3-SB01-0708-0819	08/29/2019 10:06	Radium-226	0.197		0.147	0.114
HPRBA3-SB01-0910-0819	08/29/2019 10:08	Radium-226	0.398		0.163	0.16
HPRBA3-SB01P-0910-0819	08/29/2019 10:10	Radium-226	0.594		0.234	0.214
HPRBA3-SB05-0102-0819	08/29/2019 10:57	Radium-226	0.322		0.152	0.142
HPRBA3-SB05-0304-0819	08/29/2019 10:59	Radium-226	0.313		0.144	0.14
HPRBA3-SB05-0506-0819	08/29/2019 11:01	Radium-226	0.143	U	0.178	0.116
HPRBA3-SB05-0708-0819	08/29/2019 11:03	Radium-226	0.485		0.0864	0.148
HPRBA3-SB05-0910-0819	08/29/2019 11:05	Radium-226	0.284		0.146	0.131
HPRBA3-SB05P-0304-0819	08/29/2019 11:07	Radium-226	0.266		0.165	0.13
HPRBA3-SB13-0102-0819	08/28/2019 15:42	Radium-226	0.255		0.172	0.132
HPRBA3-SB13-0304-0819	08/28/2019 15:44	Radium-226	0.528		0.138	0.163
HPRBA3-SB13-0506-0819	08/28/2019 15:48	Radium-226	0.321		0.135	0.127
HPRBA3-SB13-0708-0819	08/28/2019 15:50	Radium-226	0.248		0.172	0.132
HPRBA3-SB13-0910-0819	08/28/2019 15:52	Radium-226	1.44		0.24	0.317
HPRBA3-SB13P-0304-0819	08/28/2019 15:46	Radium-226	0.463		0.135	0.159
HPRBA3-SB21-0102-0819	08/28/2019 13:32	Radium-226	0.505		0.155	0.171
HPRBA3-SB21-0304-0819	08/28/2019 13:34	Radium-226	0.255		0.0903	0.103
HPRBA3-SB21-0506-0819	08/28/2019 13:36	Radium-226	0.267		0.106	0.115
HPRBA3-SB21-0708-0819	08/28/2019 13:38	Radium-226	0.349		0.209	0.166
HPRBA3-SB21-0910-0819	08/28/2019 13:40	Radium-226	0.417		0.143	0.165
HPRBA3-SB21P-0506-0819	08/28/2019 13:42	Radium-226	0.41		0.153	0.156
HPRBA3-SB25-0102-0819	08/28/2019 17:02	Radium-226	0.386		0.168	0.154
HPRBA3-SB25-0304-0819	08/28/2019 17:06	Radium-226	0.156	U	0.192	0.13
HPRBA3-SB25-0506-0819	08/28/2019 17:08	Radium-226	0.214		0.131	0.114
HPRBA3-SB25-0708-0819	08/28/2019 17:10	Radium-226	0.296		0.159	0.137
HPRBA3-SB25-0910-0819	08/28/2019 17:12	Radium-226	0.323		0.115	0.13
HPRBA3-SB25P-0102-0819	08/28/2019 17:04	Radium-226	0.463		0.143	0.173
HPRBA3-SS01-000H-0819	08/29/2019 09:52	Radium-226	0.543		0.178	0.181
HPRBA3-SS02-000H-0819	08/19/2019 16:10	Radium-226	0.251		0.181	0.139
HPRBA3-SS03-000H-0819	08/19/2019 15:45	Radium-226	0.455		0.144	0.163
HPRBA3-SS04-000H-0819	08/19/2019 15:15	Radium-226	0.305		0.135	0.133
HPRBA3-SS05-000H-0819	08/29/2019 10:55	Radium-226	0.45		0.0801	0.138
HPRBA3-SS06-000H-0819	08/19/2019 11:50	Radium-226	0.225		0.168	0.13
HPRBA3-SS07-000H-0819	08/19/2019 13:30	Radium-226	0.16	U	0.205	0.134
HPRBA3-SS08-000H-0819	08/19/2019 13:55	Radium-226	0.25		0.162	0.134
HPRBA3-SS09-000H-0819	08/19/2019 14:20	Radium-226	0.444		0.181	0.173
HPRBA3-SS10-000H-0819	08/19/2019 14:45	Radium-226	0.313		0.168	0.149
HPRBA3-SS11-000H-0819	08/19/2019 09:40	Radium-226	0.428		0.165	0.166
HPRBA3-SS12-000H-0819	08/19/2019 10:00	Radium-226	0.432		0.145	0.16
HPRBA3-SS13-000H-0819	08/28/2019 15:40	Radium-226	0.821		0.132	0.202
HPRBA3-SS14-000H-0819	08/19/2019 10:35	Radium-226	0.176		0.158	0.114
HPRBA3-SS15-000H-0819	08/19/2019 11:10	Radium-226	0.3		0.151	0.142
HPRBA3-SS16-000H-0819	08/15/2019 14:50	Radium-226	0.348		0.159	0.162
HPRBA3-SS16P-000H-0819	08/15/2019 14:52	Radium-226	0.567		0.136	0.203
HPRBA3-SS17-000H-0819	08/15/2019 15:40	Radium-226	0.446		0.236	0.198
HPRBA3-SS18-000H-0819	08/15/2019 16:25	Radium-226	0.288		0.236	0.181
HPRBA3-SS19-000H-0819	08/19/2019 08:50	Radium-226	0.311		0.16	0.141

Table 5-27. RBA-3 - Radon Emanation Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA3-SS20-000H-0819	08/19/2019 09:10	Radium-226	0.334		0.18	0.148
HPRBA3-SS21-000H-0819	08/28/2019 13:30	Radium-226	0.36		0.0889	0.131
HPRBA3-SS22-000H-0819	08/15/2019 11:20	Radium-226	0.495		0.166	0.184
HPRBA3-SS23-000H-0819	08/15/2019 13:05	Radium-226	0.316		0.253	0.189
HPRBA3-SS24-000H-0819	08/15/2019 14:00	Radium-226	0.262		0.111	0.128
HPRBA3-SS25-000H-0819	08/28/2019 17:00	Radium-226	0.348		0.151	0.141

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

pCi/g - picocurie per gram

U - Not Detected

Table 5-28. RBA-3 - Summary of Combined Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	46 / 50	0	0.691	0.399	0.145	0.0205	0.424
	Am-241	0/50	-0.116	0.101	0.00096576	0.0402	0.00569	0.00131
	Bi-212	25 / 50	0	1.23	0.461	0.277	0.0391	0.464
	Bi-214	49 / 50	0	0.629	0.332	0.095	0.0134	0.317
	Co-60	0/50	-0.0231	0.0433	0.00187	0.0122	0.00173	0.00132
	Cs-137	1 / 50	-0.0163	0.026	-0.0004294	0.00983	0.00139	-0.00155
	Eu-152	0/50	-0.071	0.0649	-0.00107	0.0264	0.00374	-0.0004985
	Eu-154	0/50	-0.0459	0.0629	0.0115	0.0264	0.00374	0.0131
	Eu-155	0/50	-0.0288	0.0745	0.0232	0.0236	0.00333	0.0211
	K-40	50 / 50	10.8	17.2	12.89	1.314	0.186	12.7
	Pa-231	0/50	-0.202	0.572	0.128	0.176	0.0248	0.0749
	Pa-234	0/50	-0.223	0.166	-0.0267	0.0874	0.0124	-0.0339
	Pa-234m	0/50	-3.37	5.78	0.379	1.58	0.223	0.0694
	Pb-212	50 / 50	0.33	0.624	0.441	0.0678	0.00959	0.438
	Pb-214	50 / 50	0.286	0.748	0.405	0.0945	0.0134	0.377
	Ra-223	0/50	-0.377	0.493	0.0217	0.151	0.0213	0.0346
	Ra-224	17 / 50	0	1.32	0.453	0.392	0.0554	0.37
	Ra-226	49 / 50	0	0.629	0.332	0.095	0.0134	0.317
	Tl-208	0/50	0.0742	0.197	0.123	0.0292	0.00413	0.122
	Th-227	50 / 50	-0.121	0.18	0.00371	0.0653	0.00924	0.00716
	Th-228	50 / 50	0.33	0.624	0.441	0.0678	0.00959	0.438
	Th-232	46 / 50	0	0.691	0.399	0.145	0.0205	0.424
Alpha Spectroscopy	Am-241	0/50	-0.0497	0.312	0.0436	0.079	0.0112	0.0177
	Pu-238	0/50	-0.0501	0.0679	0.00681	0.0242	0.00342	0.00424
	Pu-239/240	0/50	-0.066	0.0601	0.000628	0.025	0.00353	0.00458
	Ra-226	50 / 50	0.249	0.764	0.392	0.0973	0.0138	0.38
	Th-228	30 / 50	-0.0251	0.765	0.311	0.137	0.0194	0.291
	Th-230	44 / 50	0.0581	1.06	0.41	0.167	0.0236	0.407
	Th-232	44 / 50	0.0944	0.719	0.312	0.118	0.0167	0.292
	U-233/234	49 / 50	0.0977	0.644	0.302	0.103	0.0146	0.29
	U-235/236	5 / 50	-0.0117	0.063	0.019	0.0191	0.0027	0.0143
	U-238	50 / 50	0.122	0.592	0.303	0.0872	0.0123	0.301
Gas Flow Proportional Counting	Sr-90	0/50	-0.146	0.109	0.0168	0.0514	0.00727	0.00507
Radon Emanation	Ra-226	47 / 50	0.143	1.44	0.362	0.197	0.0279	0.319

Notes:

pCi/g - picocurie per gram

Table 5-29. RBA-3 - Summary of Surface Soil Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	25/25	0.225	0.691	0.448	0.114	0.0229	0.451
	Am-241	0/25	-0.116	0.0705	-0.00565	0.0359	0.00717	-0.00938
	Bi-212	14/25	0	1.23	0.446	0.317	0.0635	0.489
	Bi-214	25/25	0.226	0.629	0.359	0.101	0.0203	0.327
	Co-60	0/25	-0.0231	0.0433	0.00098384	0.0133	0.00265	0.00146
	Cs-137	43490	-0.0163	0.026	0.00106	0.011	0.0022	-0.00127
	Eu-152	0/25	-0.071	0.0649	-0.0025	0.0313	0.00625	0.00343
	Eu-154	0/25	-0.0324	0.0582	0.00916	0.0232	0.00464	0.00483
	Eu-155	0/25	-0.0221	0.0745	0.0239	0.0233	0.00466	0.0217
	K-40	25/25	11.7	17.2	13.5	1.356	0.271	13.2
	Pa-231	0/25	-0.123	0.572	0.136	0.175	0.0351	0.079
	Pa-234	0/25	-0.203	0.166	-0.0219	0.0858	0.0172	-0.0287
	Pa-234m	0/25	-1.95	5.78	0.262	1.629	0.326	0
	Pb-212	25/25	0.333	0.624	0.466	0.0746	0.0149	0.459
	Pb-214	25/25	0.286	0.748	0.423	0.109	0.0218	0.39
	Ra-223	0/25	-0.377	0.299	-0.0206	0.146	0.0292	-0.0355
	Ra-224	11/25	0	1.32	0.499	0.415	0.0829	0.579
	Ra-226	25/25	0.226	0.629	0.359	0.101	0.0203	0.327
	Tl-208	0/25	0.0773	0.197	0.128	0.0327	0.00655	0.122
	Th-227	25/25	-0.121	0.151	-0.00654	0.0659	0.0132	-0.00604
	Th-228	25/25	0.333	0.624	0.466	0.0746	0.0149	0.459
	Th-232	25/25	0.225	0.691	0.448	0.114	0.0229	0.451
Alpha Spectroscopy	Am-241	0/25	-0.0497	0.179	0.0399	0.0594	0.0119	0.0195
	Pu-238	0/25	-0.0171	0.0679	0.00968	0.0201	0.00401	0.00488
	Pu-239/240	0/25	-0.066	0.0404	0.0064	0.0231	0.00462	0.00718
	Ra-226	25/25	0.249	0.764	0.399	0.112	0.0225	0.385
	Th-228	17/25	0.181	0.503	0.342	0.0958	0.0192	0.338
	Th-230	21/25	0.0581	0.785	0.376	0.152	0.0304	0.37
	Th-232	21/25	0.0944	0.719	0.325	0.137	0.0273	0.291
	U-233/234	25/25	0.202	0.568	0.312	0.0938	0.0188	0.284
	U-235/236	3/25	-0.0117	0.0623	0.0184	0.0189	0.00378	0.0159
	U-238	25/25	0.196	0.433	0.31	0.0592	0.0118	0.315
Gas Flow Proportional Counting	Sr-90	0/25	-0.0431	0.087	0.0267	0.0382	0.00764	0.033
Radon Emanation	Ra-226	24/25	0.16	0.821	0.362	0.137	0.0274	0.334

Notes:

pCi/g - picocurie per gram

Table 5-30. RBA-3 - Summary of Subsurface Soil Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	21/25	0	0.58	0.35	0.157	0.0314	0.377
	Am-241	0/25	-0.105	0.101	0.00758	0.0438	0.00877	0.00147
	Bi-212	11/25	0	1.08	0.475	0.235	0.047	0.423
	Bi-214	24/25	0	0.432	0.304	0.0809	0.0162	0.309
	Co-60	0/25	-0.0191	0.0275	0.00276	0.0113	0.00225	0.00038
	Cs-137	0/25	-0.0161	0.0159	-0.00191	0.0085	0.0017	-0.00426
	Eu-152	0/25	-0.0342	0.0537	0.00035796	0.021	0.00421	-0.00642
	Eu-154	0/25	-0.0459	0.0629	0.0139	0.0296	0.00592	0.0156
	Eu-155	0/25	-0.0288	0.0727	0.0224	0.0242	0.00485	0.02
	K-40	25/25	10.8	14.8	12.29	0.962	0.192	12.2
	Pa-231	0/25	-0.202	0.469	0.119	0.179	0.0358	0.0497
	Pa-234	0/25	-0.223	0.114	-0.0315	0.0905	0.0181	-0.0435
	Pa-234m	0/25	-3.37	3.73	0.496	1.554	0.311	0.155
	Pb-212	25/25	0.33	0.555	0.416	0.0502	0.01	0.408
	Pb-214	25/25	0.297	0.621	0.387	0.0755	0.0151	0.363
	Ra-223	0/25	-0.31	0.493	0.0639	0.147	0.0293	0.081
	Ra-224	6/25	0	1.21	0.408	0.371	0.0742	0.326
	Ra-226	24/25	0	0.432	0.304	0.0809	0.0162	0.309
	Tl-208	0/25	0.0742	0.174	0.119	0.025	0.005	0.122
	Th-227	25/25	-0.105	0.18	0.014	0.0644	0.0129	0.0137
	Th-228	25/25	0.33	0.555	0.416	0.0502	0.01	0.408
	Th-232	21/25	0	0.58	0.35	0.157	0.0314	0.377
Alpha Spectroscopy	Am-241	0/25	-0.0483	0.312	0.0473	0.0957	0.0191	0.0103
	Pu-238	0/25	-0.0501	0.0616	0.00394	0.0279	0.00557	0.0012
	Pu-239/240	0/25	-0.0654	0.0601	-0.00514	0.0259	0.00519	-0.00305
	Ra-226	25/25	0.254	0.532	0.385	0.0813	0.0163	0.36
	Th-228	13/25	-0.0251	0.765	0.281	0.165	0.033	0.276
	Th-230	23/25	0.237	1.06	0.444	0.176	0.0353	0.418
	Th-232	23/25	0.141	0.501	0.298	0.0976	0.0195	0.296
	U-233/234	24/25	0.0977	0.644	0.292	0.113	0.0227	0.297
	U-235/236	2/25	-0.00441	0.063	0.0195	0.0196	0.00393	0.0124
	U-238	25/25	0.122	0.592	0.296	0.109	0.0218	0.282
Gas Flow Proportional Counting	Sr-90	0/25	-0.146	0.109	0.00681	0.0611	0.0122	-0.000738
Radon Emanation	Ra-226	23/25	0.143	1.44	0.361	0.247	0.0493	0.313

Notes:

pCi/g - picocurie per gram

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-FILL13-0919	09/04/2019 09:20	Actinium-228	1.14		0.22	0.284
HPRBA4-FILL13-0919	09/04/2019 09:20	Americium-241	-0.0148	U	0.0647	0.0349
HPRBA4-FILL13-0919	09/04/2019 09:20	Bismuth-212	1.68		0.766	0.733
HPRBA4-FILL13-0919	09/04/2019 09:20	Bismuth-214	0.815		0.107	0.153
HPRBA4-FILL13-0919	09/04/2019 09:20	Cesium-137	-0.021	U	0.0504	0.0296
HPRBA4-FILL13-0919	09/04/2019 09:20	Cobalt-60	-0.00892	U	0.0609	0.0382
HPRBA4-FILL13-0919	09/04/2019 09:20	Europium-152	-0.0394	U	0.112	0.0616
HPRBA4-FILL13-0919	09/04/2019 09:20	Europium-154	0.0308	U	0.203	0.105
HPRBA4-FILL13-0919	09/04/2019 09:20	Europium-155	0.0516	U	0.117	0.0614
HPRBA4-FILL13-0919	09/04/2019 09:20	Lead-212	1.27		0.068	0.0989
HPRBA4-FILL13-0919	09/04/2019 09:20	Lead-214	0.845		0.225	0.157
HPRBA4-FILL13-0919	09/04/2019 09:20	Potassium-40	23.5		0.473	1.54
HPRBA4-FILL13-0919	09/04/2019 09:20	Protactinium-231	0.369	U	0.58	0.488
HPRBA4-FILL13-0919	09/04/2019 09:20	Protactinium-234	0.0376	U	0.493	0.273
HPRBA4-FILL13-0919	09/04/2019 09:20	Protactinium-234m	-0.66	U	7.69	4.29
HPRBA4-FILL13-0919	09/04/2019 09:20	Radium-223	0.0171	U	0.828	0.523
HPRBA4-FILL13-0919	09/04/2019 09:20	Radium-224	1.75		0.73	1.05
HPRBA4-FILL13-0919	09/04/2019 09:20	Radium-226	0.815		0.107	0.153
HPRBA4-FILL13-0919	09/04/2019 09:20	Thallium-208	0.365		0.0523	0.0713
HPRBA4-FILL13-0919	09/04/2019 09:20	Thorium-227	-0.0977	U	0.334	0.199
HPRBA4-FILL13-0919	09/04/2019 09:20	Thorium-228	1.27		0.068	0.0989
HPRBA4-FILL13-0919	09/04/2019 09:20	Thorium-232	1.14		0.22	0.284
HPRBA4-FILL18-0819	08/21/2019 09:25	Actinium-228	1.09		0.22	0.265
HPRBA4-FILL18-0819	08/21/2019 09:25	Americium-241	0.0163	U	0.298	0.169
HPRBA4-FILL18-0819	08/21/2019 09:25	Bismuth-212	1.79		0.694	0.703
HPRBA4-FILL18-0819	08/21/2019 09:25	Bismuth-214	0.9		0.0869	0.148
HPRBA4-FILL18-0819	08/21/2019 09:25	Cesium-137	0.00741	U	0.0525	0.0281
HPRBA4-FILL18-0819	08/21/2019 09:25	Cobalt-60	0.0678	U	0.0732	0.062
HPRBA4-FILL18-0819	08/21/2019 09:25	Europium-152	0.0225	U	0.128	0.066
HPRBA4-FILL18-0819	08/21/2019 09:25	Europium-154	0.0864	U	0.219	0.109
HPRBA4-FILL18-0819	08/21/2019 09:25	Europium-155	0.117	U	0.135	0.162
HPRBA4-FILL18-0819	08/21/2019 09:25	Lead-212	1.24		0.0786	0.108
HPRBA4-FILL18-0819	08/21/2019 09:25	Lead-214	0.902		0.0931	0.174
HPRBA4-FILL18-0819	08/21/2019 09:25	Potassium-40	25		0.467	1.64
HPRBA4-FILL18-0819	08/21/2019 09:25	Protactinium-231	0	UJ	0.631	0.578
HPRBA4-FILL18-0819	08/21/2019 09:25	Protactinium-234	-0.135	U	0.413	0.233
HPRBA4-FILL18-0819	08/21/2019 09:25	Protactinium-234m	0.168	U	6.96	3.65
HPRBA4-FILL18-0819	08/21/2019 09:25	Radium-223	0.0931	U	0.825	0.476
HPRBA4-FILL18-0819	08/21/2019 09:25	Radium-224	1.45		0.843	1.22
HPRBA4-FILL18-0819	08/21/2019 09:25	Radium-226	0.9		0.0869	0.148
HPRBA4-FILL18-0819	08/21/2019 09:25	Thallium-208	0.416		0.05	0.0665
HPRBA4-FILL18-0819	08/21/2019 09:25	Thorium-227	-0.155	U	0.337	0.187
HPRBA4-FILL18-0819	08/21/2019 09:25	Thorium-228	1.24		0.0786	0.108
HPRBA4-FILL18-0819	08/21/2019 09:25	Thorium-232	1.09		0.22	0.265
HPRBA4-FILL19-0819	08/21/2019 10:45	Actinium-228	1.06		0.14	0.197
HPRBA4-FILL19-0819	08/21/2019 10:45	Americium-241	-0.156	U	0.232	0.13
HPRBA4-FILL19-0819	08/21/2019 10:45	Bismuth-212	0	UJ	0.46	0.775
HPRBA4-FILL19-0819	08/21/2019 10:45	Bismuth-214	0.782		0.0698	0.116
HPRBA4-FILL19-0819	08/21/2019 10:45	Cesium-137	0.012	U	0.0436	0.0227
HPRBA4-FILL19-0819	08/21/2019 10:45	Cobalt-60	-0.0043	U	0.0377	0.0204
HPRBA4-FILL19-0819	08/21/2019 10:45	Europium-152	-0.00587	U	0.096	0.0527
HPRBA4-FILL19-0819	08/21/2019 10:45	Europium-154	-0.0199	U	0.125	0.0686
HPRBA4-FILL19-0819	08/21/2019 10:45	Europium-155	0.0309	U	0.128	0.0692
HPRBA4-FILL19-0819	08/21/2019 10:45	Lead-212	1.09		0.0606	0.0858
HPRBA4-FILL19-0819	08/21/2019 10:45	Lead-214	0.936		0.073	0.115

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-FILL19-0819	08/21/2019 10:45	Potassium-40	23.9		0.381	1.21
HPRBA4-FILL19-0819	08/21/2019 10:45	Protactinium-231	0	UJ	0.467	0.352
HPRBA4-FILL19-0819	08/21/2019 10:45	Protactinium-234	-0.26	U	0.278	0.179
HPRBA4-FILL19-0819	08/21/2019 10:45	Protactinium-234m	1.54	U	5.2	2.76
HPRBA4-FILL19-0819	08/21/2019 10:45	Radium-223	-0.216	U	0.629	0.399
HPRBA4-FILL19-0819	08/21/2019 10:45	Radium-224	0	UJ	0.649	1.02
HPRBA4-FILL19-0819	08/21/2019 10:45	Radium-226	0.782		0.0698	0.116
HPRBA4-FILL19-0819	08/21/2019 10:45	Thallium-208	0.353		0.0356	0.0531
HPRBA4-FILL19-0819	08/21/2019 10:45	Thorium-227	-0.00342	U	0.272	0.146
HPRBA4-FILL19-0819	08/21/2019 10:45	Thorium-228	1.09		0.0606	0.0858
HPRBA4-FILL19-0819	08/21/2019 10:45	Thorium-232	1.06		0.14	0.197
HPRBA4-FILL20-0819	08/21/2019 11:35	Actinium-228	1.15		0.162	0.25
HPRBA4-FILL20-0819	08/21/2019 11:35	Americium-241	-0.00493	U	0.0385	0.0226
HPRBA4-FILL20-0819	08/21/2019 11:35	Bismuth-212	1.05		0.622	0.58
HPRBA4-FILL20-0819	08/21/2019 11:35	Bismuth-214	0.828		0.0726	0.12
HPRBA4-FILL20-0819	08/21/2019 11:35	Cesium-137	-0.0093	U	0.0458	0.0265
HPRBA4-FILL20-0819	08/21/2019 11:35	Cobalt-60	0.01	U	0.0522	0.0262
HPRBA4-FILL20-0819	08/21/2019 11:35	Europium-152	0.0216	U	0.0854	0.0466
HPRBA4-FILL20-0819	08/21/2019 11:35	Europium-154	0.0295	U	0.164	0.0841
HPRBA4-FILL20-0819	08/21/2019 11:35	Europium-155	0	UJ	0.056	0.0761
HPRBA4-FILL20-0819	08/21/2019 11:35	Lead-212	1.15		0.0463	0.0673
HPRBA4-FILL20-0819	08/21/2019 11:35	Lead-214	0.933		0.186	0.113
HPRBA4-FILL20-0819	08/21/2019 11:35	Potassium-40	22.7		0.368	1.35
HPRBA4-FILL20-0819	08/21/2019 11:35	Protactinium-231	0	UJ	0.403	0.407
HPRBA4-FILL20-0819	08/21/2019 11:35	Protactinium-234	0.0451	U	0.372	0.202
HPRBA4-FILL20-0819	08/21/2019 11:35	Protactinium-234m	0.0957	U	5.46	3.05
HPRBA4-FILL20-0819	08/21/2019 11:35	Radium-223	0.00425	U	0.555	0.313
HPRBA4-FILL20-0819	08/21/2019 11:35	Radium-224	1.43		0.497	0.881
HPRBA4-FILL20-0819	08/21/2019 11:35	Radium-226	0.828		0.0726	0.12
HPRBA4-FILL20-0819	08/21/2019 11:35	Thallium-208	0.338		0.0374	0.0529
HPRBA4-FILL20-0819	08/21/2019 11:35	Thorium-227	-0.0405	U	0.2	0.113
HPRBA4-FILL20-0819	08/21/2019 11:35	Thorium-228	1.15		0.0463	0.0673
HPRBA4-FILL20-0819	08/21/2019 11:35	Thorium-232	1.15		0.162	0.25
HPRBA4-FILL21-0919	09/04/2019 11:10	Actinium-228	1.14		0.161	0.274
HPRBA4-FILL21-0919	09/04/2019 11:10	Americium-241	-0.0381	U	0.246	0.13
HPRBA4-FILL21-0919	09/04/2019 11:10	Bismuth-212	0.873		0.567	0.851
HPRBA4-FILL21-0919	09/04/2019 11:10	Bismuth-214	0.733		0.0849	0.118
HPRBA4-FILL21-0919	09/04/2019 11:10	Cesium-137	0.0038	U	0.0454	0.0239
HPRBA4-FILL21-0919	09/04/2019 11:10	Cobalt-60	-0.0182	U	0.0422	0.0243
HPRBA4-FILL21-0919	09/04/2019 11:10	Europium-152	0.0106	U	0.119	0.0609
HPRBA4-FILL21-0919	09/04/2019 11:10	Europium-154	0.00838	U	0.167	0.0859
HPRBA4-FILL21-0919	09/04/2019 11:10	Europium-155	0.0813	U	0.136	0.0684
HPRBA4-FILL21-0919	09/04/2019 11:10	Lead-212	1.11		0.0641	0.0985
HPRBA4-FILL21-0919	09/04/2019 11:10	Lead-214	0.917		0.0835	0.122
HPRBA4-FILL21-0919	09/04/2019 11:10	Potassium-40	20.3		0.43	1.4
HPRBA4-FILL21-0919	09/04/2019 11:10	Protactinium-231	0	UJ	0.549	0.604
HPRBA4-FILL21-0919	09/04/2019 11:10	Protactinium-234	-0.143	U	0.318	0.194
HPRBA4-FILL21-0919	09/04/2019 11:10	Protactinium-234m	1.05	U	7.59	6.82
HPRBA4-FILL21-0919	09/04/2019 11:10	Radium-223	-0.609	U	0.635	0.428
HPRBA4-FILL21-0919	09/04/2019 11:10	Radium-224	1.58		0.686	0.957
HPRBA4-FILL21-0919	09/04/2019 11:10	Radium-226	0.733		0.0849	0.118
HPRBA4-FILL21-0919	09/04/2019 11:10	Thallium-208	0.36		0.0397	0.0622
HPRBA4-FILL21-0919	09/04/2019 11:10	Thorium-227	0.0735	U	0.323	0.177
HPRBA4-FILL21-0919	09/04/2019 11:10	Thorium-228	1.11		0.0641	0.0985
HPRBA4-FILL21-0919	09/04/2019 11:10	Thorium-232	1.14		0.161	0.274

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-FILL24-0819	08/21/2019 13:25	Actinium-228	0.8		0.248	0.245
HPRBA4-FILL24-0819	08/21/2019 13:25	Americium-241	-0.0417	U	0.233	0.122
HPRBA4-FILL24-0819	08/21/2019 13:25	Bismuth-212	1.12		0.719	0.856
HPRBA4-FILL24-0819	08/21/2019 13:25	Bismuth-214	0.76		0.0965	0.134
HPRBA4-FILL24-0819	08/21/2019 13:25	Cesium-137	-0.0148	U	0.0491	0.0289
HPRBA4-FILL24-0819	08/21/2019 13:25	Cobalt-60	0.0199	U	0.0788	0.0401
HPRBA4-FILL24-0819	08/21/2019 13:25	Europium-152	-0.0577	U	0.124	0.0738
HPRBA4-FILL24-0819	08/21/2019 13:25	Europium-154	0.0215	U	0.216	0.114
HPRBA4-FILL24-0819	08/21/2019 13:25	Europium-155	0.0434	U	0.128	0.0656
HPRBA4-FILL24-0819	08/21/2019 13:25	Lead-212	1.13		0.0697	0.102
HPRBA4-FILL24-0819	08/21/2019 13:25	Lead-214	0.731		0.104	0.126
HPRBA4-FILL24-0819	08/21/2019 13:25	Potassium-40	23.5		0.567	1.64
HPRBA4-FILL24-0819	08/21/2019 13:25	Protactinium-231	0.308	U	0.692	0.374
HPRBA4-FILL24-0819	08/21/2019 13:25	Protactinium-234	-0.146	U	0.473	0.268
HPRBA4-FILL24-0819	08/21/2019 13:25	Protactinium-234m	-4.02	U	8	4.72
HPRBA4-FILL24-0819	08/21/2019 13:25	Radium-223	0.229	U	0.993	0.563
HPRBA4-FILL24-0819	08/21/2019 13:25	Radium-224	2.05		0.748	1.21
HPRBA4-FILL24-0819	08/21/2019 13:25	Radium-226	0.76		0.0965	0.134
HPRBA4-FILL24-0819	08/21/2019 13:25	Thallium-208	0.265		0.0534	0.08
HPRBA4-FILL24-0819	08/21/2019 13:25	Thorium-227	0.000476	U	0.314	0.179
HPRBA4-FILL24-0819	08/21/2019 13:25	Thorium-228	1.13		0.0697	0.102
HPRBA4-FILL24-0819	08/21/2019 13:25	Thorium-232	0.8		0.248	0.245
HPRBA4-FILL25-0919	09/04/2019 10:20	Actinium-228	0.803		0.165	0.241
HPRBA4-FILL25-0919	09/04/2019 10:20	Americium-241	-0.00373	U	0.0514	0.0281
HPRBA4-FILL25-0919	09/04/2019 10:20	Bismuth-212	1.04		0.56	0.531
HPRBA4-FILL25-0919	09/04/2019 10:20	Bismuth-214	0.559		0.0744	0.122
HPRBA4-FILL25-0919	09/04/2019 10:20	Cesium-137	2.11E-06	U	0.0383	0.0203
HPRBA4-FILL25-0919	09/04/2019 10:20	Cobalt-60	0.00253	U	0.047	0.0271
HPRBA4-FILL25-0919	09/04/2019 10:20	Europium-152	0.0392	U	0.104	0.0598
HPRBA4-FILL25-0919	09/04/2019 10:20	Europium-154	-0.0423	U	0.129	0.0726
HPRBA4-FILL25-0919	09/04/2019 10:20	Europium-155	-0.0092	U	0.0862	0.0466
HPRBA4-FILL25-0919	09/04/2019 10:20	Lead-212	0.949		0.0502	0.08
HPRBA4-FILL25-0919	09/04/2019 10:20	Lead-214	0.829		0.19	0.128
HPRBA4-FILL25-0919	09/04/2019 10:20	Potassium-40	19.1		0.392	1.26
HPRBA4-FILL25-0919	09/04/2019 10:20	Protactinium-231	0	UJ	0.4	0.759
HPRBA4-FILL25-0919	09/04/2019 10:20	Protactinium-234	-0.0165	U	0.353	0.206
HPRBA4-FILL25-0919	09/04/2019 10:20	Protactinium-234m	3	U	5.66	4.2
HPRBA4-FILL25-0919	09/04/2019 10:20	Radium-223	0.0206	U	0.664	0.403
HPRBA4-FILL25-0919	09/04/2019 10:20	Radium-224	1.97		0.538	1.19
HPRBA4-FILL25-0919	09/04/2019 10:20	Radium-226	0.559		0.0744	0.122
HPRBA4-FILL25-0919	09/04/2019 10:20	Thallium-208	0.317		0.0346	0.0616
HPRBA4-FILL25-0919	09/04/2019 10:20	Thorium-227	0.104	U	0.251	0.131
HPRBA4-FILL25-0919	09/04/2019 10:20	Thorium-228	0.949		0.0502	0.08
HPRBA4-FILL25-0919	09/04/2019 10:20	Thorium-232	0.803		0.165	0.241
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Actinium-228	0.523		0.0875	0.163
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Americium-241	-0.00104	U	0.119	0.0654
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Bismuth-212	0	UJ	0.378	0.644
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Bismuth-214	0.436		0.0519	0.0753
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Cesium-137	-0.0114	U	0.0247	0.0162
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Cobalt-60	-0.00339	U	0.0196	0.00969
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Europium-152	-0.00772	U	0.0768	0.0393
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Europium-154	0.0264	U	0.107	0.0535
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Europium-155	0.0254	U	0.0885	0.0464
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Lead-212	0.45		0.0434	0.0599
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Lead-214	0.434		0.0596	0.102

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Potassium-40	5.65		0.32	0.651
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Protactinium-231	0.265	U	0.367	0.395
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Protactinium-234	-0.00379	U	0.213	0.111
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Protactinium-234m	-0.67	U	4.08	2.25
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Radium-223	0.0981	U	0.529	0.26
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Radium-224	0.862		0.464	0.779
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Radium-226	0.436		0.0519	0.0753
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Thallium-208	0.125		0.0303	0.04
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Thorium-227	0.00396	U	0.201	0.111
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Thorium-228	0.45		0.0434	0.0599
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Thorium-232	0.523		0.0875	0.163
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Actinium-228	0.543		0.118	0.144
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Americium-241	0.0305	U	0.233	0.131
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Bismuth-212	0.595		0.529	0.549
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Bismuth-214	0.444		0.068	0.0976
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Cesium-137	-0.0119	U	0.0365	0.02
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Cobalt-60	-0.0155	U	0.036	0.0219
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Europium-152	-0.0543	U	0.0934	0.0579
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Europium-154	-0.0474	U	0.116	0.0698
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Europium-155	0.0359	U	0.109	0.0566
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Lead-212	0.44		0.0577	0.0762
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Lead-214	0.421		0.0735	0.124
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Potassium-40	5.94		0.431	0.799
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Protactinium-231	0	UJ	0.433	0.66
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Protactinium-234	-0.0952	U	0.274	0.156
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Protactinium-234m	-0.238	U	5.42	2.86
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Radium-223	-0.231	U	0.679	0.38
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Radium-224	0.143	U	0.619	0.923
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Radium-226	0.444		0.068	0.0976
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Thallium-208	0.133		0.0335	0.0475
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Thorium-227	0.0285	U	0.267	0.137
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Thorium-228	0.44		0.0577	0.0762
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Thorium-232	0.543		0.118	0.144
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Actinium-228	0.49		0.127	0.174
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Americium-241	-0.0557	U	0.123	0.0735
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Bismuth-212	0.157	U	0.496	0.529
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Bismuth-214	0.325		0.0699	0.102
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Cesium-137	-0.0196	U	0.0288	0.0179
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Cobalt-60	0.00239	U	0.0443	0.022
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Europium-152	-0.0197	U	0.0883	0.0468
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Europium-154	-0.0311	U	0.084	0.047
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Europium-155	0.0454	U	0.0905	0.0443
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Lead-212	0.434		0.0513	0.0712
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Lead-214	0.559		0.157	0.115
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Potassium-40	5.7		0.303	0.728
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Protactinium-231	0.291	U	0.375	0.419
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Protactinium-234	-0.105	U	0.21	0.131
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Protactinium-234m	-2.19	U	3.98	2.25
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Radium-223	0.345	U	0.628	0.548
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Radium-224	0	UJ	0.78	0.683
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Radium-226	0.325		0.0699	0.102
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Thallium-208	0.134		0.0316	0.0499
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Thorium-227	-0.132	U	0.196	0.109
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Thorium-228	0.434		0.0513	0.0712
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Thorium-232	0.49		0.127	0.174

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Actinium-228	-0.000588	U	0.149	0.0767
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Americium-241	0.0553	U	0.109	0.056
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Bismuth-212	-0.0943	U	0.428	0.228
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Bismuth-214	-0.000382	U	0.0743	0.0434
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Cesium-137	-0.00538	U	0.0336	0.019
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Cobalt-60	-0.0059	U	0.0301	0.0162
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Europium-152	0.00643	U	0.0923	0.0481
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Europium-154	0.013	U	0.0801	0.0339
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Europium-155	0.00183	U	0.086	0.0488
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Lead-212	0	UJ	0.0563	0.0719
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Lead-214	0.0448	U	0.08	0.0409
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Potassium-40	-0.11	U	0.427	0.227
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Protactinium-231	-0.142	U	0.394	0.249
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Protactinium-234	0.0157	U	0.287	0.143
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Protactinium-234m	0.248	U	3.33	1.57
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Radium-223	-0.387	U	0.512	0.308
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Radium-224	0	UJ	0.481	0.764
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Radium-226	-0.000382	U	0.0743	0.0434
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Thallium-208	-0.00816	U	0.0375	0.0213
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Thorium-227	0.0715	U	0.239	0.119
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Thorium-228	0	UJ	0.0563	0.0719
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Thorium-232	-0.000588	U	0.149	0.0767
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Actinium-228	0.412		0.12	0.145
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Americium-241	-0.0445	U	0.142	0.0745
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Bismuth-212	0.164	U	0.651	0.337
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Bismuth-214	0.362		0.0705	0.0966
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Cesium-137	-0.00593	U	0.0327	0.018
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Cobalt-60	0.00299	U	0.0431	0.0209
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Europium-152	-0.0253	U	0.091	0.0488
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Europium-154	0.0336	U	0.131	0.0591
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Europium-155	0	UJ	0.0813	0.0771
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Lead-212	0.447		0.0553	0.0828
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Lead-214	0.443		0.065	0.109
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Potassium-40	3.75		0.432	0.727
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Protactinium-231	0.0959	U	0.492	0.243
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Protactinium-234	-0.0824	U	0.295	0.16
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Protactinium-234m	4.73	U	5.91	3.5
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Radium-223	0.0871	U	0.647	0.356
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Radium-224	0.231	U	0.645	0.814
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Radium-226	0.362		0.0705	0.0966
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Thallium-208	0.136		0.0348	0.046
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Thorium-227	-0.023	U	0.248	0.141
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Thorium-228	0.447		0.0553	0.0828
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Thorium-232	0.412		0.12	0.145
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Actinium-228	1.09		0.2	0.264
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Americium-241	0.0491	U	0.167	0.0887
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Bismuth-212	1.03		0.593	0.914
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Bismuth-214	1.09		0.0822	0.135
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Cesium-137	0.00903	U	0.0471	0.0274
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Cobalt-60	-0.0149	U	0.0538	0.0301
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Europium-152	0.0432	U	0.11	0.0597
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Europium-154	-0.0525	U	0.147	0.0829
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Europium-155	0	UJ	0.1	0.134
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Lead-212	1.25		0.059	0.0862
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Lead-214	1.4		0.226	0.145

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Potassium-40	26.7		0.459	1.48
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Protactinium-231	0	UJ	0.436	0.598
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Protactinium-234	-0.0702	U	0.439	0.253
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Protactinium-234m	4.42	U	7.06	3.7
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Radium-223	0.0758	U	0.734	0.449
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Radium-224	1.91		0.634	0.969
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Radium-226	1.09		0.0822	0.135
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Thallium-208	0.322		0.0469	0.0677
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Thorium-227	-0.0253	U	0.266	0.151
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Thorium-228	1.25		0.059	0.0862
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Thorium-232	1.09		0.2	0.264
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Actinium-228	0.442		0.124	0.182
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Americium-241	-0.00945	U	0.142	0.0779
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Bismuth-212	0.709		0.417	0.468
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Bismuth-214	0.42		0.0607	0.0822
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Cesium-137	0.00371	U	0.0356	0.0187
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Cobalt-60	0.0128	U	0.0399	0.0184
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Europium-152	-0.0131	U	0.084	0.0466
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Europium-154	0.0446	U	0.125	0.059
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Europium-155	0.031	U	0.0937	0.0493
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Lead-212	0.558		0.0483	0.0636
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Lead-214	0.372		0.0681	0.106
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Potassium-40	6.84		0.269	0.718
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Protactinium-231	0	UJ	0.394	0.566
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Protactinium-234	-0.0119	U	0.275	0.142
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Protactinium-234m	-0.771	U	4.5	2.32
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Radium-223	0.457	U	0.604	0.498
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Radium-224	1.17		0.517	0.801
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Radium-226	0.42		0.0607	0.0822
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Thallium-208	0.153		0.0321	0.0424
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Thorium-227	-0.0178	U	0.222	0.114
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Thorium-228	0.558		0.0483	0.0636
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Thorium-232	0.442		0.124	0.182
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Actinium-228	0.355		0.105	0.146
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Americium-241	0.0513	U	0.185	0.0975
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Bismuth-212	1		0.328	0.432
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Bismuth-214	0.355		0.0538	0.0774
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Cesium-137	-0.000647	U	0.0301	0.0158
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Cobalt-60	-0.00444	U	0.03	0.0161
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Europium-152	0.0663	U	0.0691	0.0369
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Europium-154	-0.0296	U	0.0737	0.0419
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Europium-155	0.0247	U	0.0937	0.0485
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Lead-212	0.48		0.0473	0.0736
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Lead-214	0.395		0.0546	0.0756
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Potassium-40	6.56		0.318	0.644
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Protactinium-231	0	UJ	0.328	0.311
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Protactinium-234	0.0207	U	0.215	0.112
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Protactinium-234m	1.78	U	3.7	1.79
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Radium-223	0.0256	U	0.505	0.265
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Radium-224	0.602	U	0.626	0.501
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Radium-226	0.355		0.0538	0.0774
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Thallium-208	0.13		0.0274	0.0379
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Thorium-227	0.107	U	0.213	0.104
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Thorium-228	0.48		0.0473	0.0736
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Thorium-232	0.355		0.105	0.146

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Actinium-228	0.431		0.115	0.136
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Americium-241	-0.003	U	0.0768	0.0427
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Bismuth-212	0.552		0.406	0.376
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Bismuth-214	0.348		0.0577	0.0732
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Cesium-137	-0.0027	U	0.0327	0.018
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Cobalt-60	-0.00906	U	0.0318	0.0179
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Europium-152	0.00499	U	0.0759	0.0386
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Europium-154	-0.0138	U	0.0878	0.0471
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Europium-155	0.0102	U	0.0794	0.0416
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Lead-212	0.48		0.0497	0.0664
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Lead-214	0.43		0.129	0.0913
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Potassium-40	5.71		0.235	0.603
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Protactinium-231	0.123	U	0.386	0.196
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Protactinium-234	0.0147	U	0.227	0.112
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Protactinium-234m	2.4	U	4.62	3.05
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Radium-223	0.214	U	0.538	0.285
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Radium-224	0.514	U	0.529	0.531
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Radium-226	0.348		0.0577	0.0732
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Thallium-208	0.149		0.0276	0.042
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Thorium-227	0.0126	U	0.191	0.0954
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Thorium-228	0.48		0.0497	0.0664
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Thorium-232	0.431		0.115	0.136
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Actinium-228	0.327	U	0.332	0.165
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Americium-241	-0.0228	U	0.2	0.115
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Bismuth-212	0.866		0.507	0.681
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Bismuth-214	0.499		0.0766	0.118
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Cesium-137	0.477		0.0475	0.0642
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Cobalt-60	0.00895	U	0.0439	0.0194
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Europium-152	-0.0181	U	0.113	0.0647
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Europium-154	-0.0192	U	0.144	0.0752
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Europium-155	0.00362	U	0.141	0.0732
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Lead-212	0.58		0.0672	0.0795
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Lead-214	0	UJ	0.185	0.111
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Potassium-40	12.1		0.423	1.15
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Protactinium-231	0.324	U	0.625	0.342
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Protactinium-234	0.072	U	0.353	0.173
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Protactinium-234m	1.9	U	7.23	3.75
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Radium-223	-0.0997	U	0.725	0.411
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Radium-224	0.561	U	0.72	0.951
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Radium-226	0.499		0.0766	0.118
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Thallium-208	0.156		0.0463	0.0595
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Thorium-227	0.0464	U	0.299	0.156
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Thorium-228	0.58		0.0672	0.0795
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Thorium-232	0.327	U	0.332	0.165
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Actinium-228	0.479		0.132	0.205
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Americium-241	0.0499	U	0.286	0.14
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Bismuth-212	0.441	U	0.544	0.476
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Bismuth-214	0.402		0.0776	0.108
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Cesium-137	0.0159	U	0.0343	0.0269
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Cobalt-60	-0.0218	U	0.0406	0.0248
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Europium-152	-0.0166	U	0.0998	0.0525
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Europium-154	-0.0234	U	0.122	0.0765
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Europium-155	0.0541	U	0.116	0.0565
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Lead-212	0.559		0.0631	0.0791
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Lead-214	0.507		0.18	0.114

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Potassium-40	8.45		0.47	0.893
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Protactinium-231	0.209	U	0.54	0.259
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Protactinium-234	0.00248	U	0.321	0.16
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Protactinium-234m	-1.93	U	5.52	3.33
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Radium-223	0.136	U	0.695	0.342
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Radium-224	0.354	U	0.676	0.731
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Radium-226	0.402		0.0776	0.108
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Thallium-208	0.156		0.0381	0.0529
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Thorium-227	0.0421	U	0.262	0.141
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Thorium-228	0.559		0.0631	0.0791
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Thorium-232	0.479		0.132	0.205
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Actinium-228	0.476		0.168	0.204
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Americium-241	-0.0894	U	0.238	0.144
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Bismuth-212	0	UJ	0.585	0.637
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Bismuth-214	0.475		0.0784	0.146
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Cesium-137	-0.00533	U	0.0448	0.0237
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Cobalt-60	0.0016	U	0.0498	0.0298
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Europium-152	-0.0181	U	0.102	0.0586
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Europium-154	0.0992	U	0.19	0.0904
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Europium-155	-0.0372	U	0.112	0.0643
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Lead-212	0.629		0.0586	0.0887
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Lead-214	0.671		0.184	0.133
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Potassium-40	17.1		0.452	1.32
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Protactinium-231	-0.0665	U	0.585	0.332
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Protactinium-234	0.141	U	0.438	0.219
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Protactinium-234m	-1.51	U	5.96	3.22
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Radium-223	-0.135	U	0.74	0.405
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Radium-224	1.11		0.628	0.918
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Radium-226	0.475		0.0784	0.146
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Thallium-208	0.158		0.0427	0.0722
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Thorium-227	-0.0675	U	0.296	0.16
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Thorium-228	0.629		0.0586	0.0887
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Thorium-232	0.476		0.168	0.204
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Actinium-228	0.568		0.148	0.201
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Americium-241	-0.0833	U	0.221	0.117
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Bismuth-212	1.09		0.516	0.503
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Bismuth-214	0.515		0.0706	0.115
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Cesium-137	0.0145	U	0.0472	0.0241
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Cobalt-60	-0.0143	U	0.0383	0.0223
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Europium-152	0.0242	U	0.102	0.0501
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Europium-154	0.0236	U	0.153	0.0774
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Europium-155	0	UJ	0.112	0.125
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Lead-212	0.798		0.0608	0.0848
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Lead-214	0.865		0.196	0.137
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Potassium-40	15		0.454	1.19
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Protactinium-231	0	UJ	0.483	0.532
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Protactinium-234	0.105	U	0.387	0.21
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Protactinium-234m	2.09	U	5.99	2.86
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Radium-223	0.257	U	0.705	0.376
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Radium-224	0.477	U	0.651	0.951
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Radium-226	0.515		0.0706	0.115
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Thallium-208	0.248		0.0425	0.0591
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Thorium-227	-0.00407	U	0.264	0.134
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Thorium-228	0.798		0.0608	0.0848
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Thorium-232	0.568		0.148	0.201

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Actinium-228	0.542		0.15	0.21
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Americium-241	0.0297	U	0.121	0.0601
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Bismuth-212	0.871		0.569	0.597
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Bismuth-214	0.528		0.0752	0.117
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Cesium-137	0.0125	U	0.0484	0.0261
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Cobalt-60	-0.0157	U	0.0399	0.0229
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Europium-152	0.00767	U	0.0953	0.0576
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Europium-154	-0.00557	U	0.133	0.0688
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Europium-155	-0.000928	U	0.09	0.0477
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Lead-212	0.666		0.0559	0.0755
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Lead-214	0.555		0.0796	0.0873
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Potassium-40	11.7		0.436	1.09
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Protactinium-231	0	UJ	0.424	0.672
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Protactinium-234	0.101	U	0.339	0.166
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Protactinium-234m	-0.571	U	5.43	2.89
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Radium-223	-0.00454	U	0.647	0.368
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Radium-224	0.428	U	0.599	0.87
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Radium-226	0.528		0.0752	0.117
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Thallium-208	0.209		0.0391	0.0544
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Thorium-227	-0.137	U	0.243	0.149
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Thorium-228	0.666		0.0559	0.0755
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Thorium-232	0.542		0.15	0.21
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Actinium-228	0.863		0.179	0.225
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Americium-241	0.00577	U	0.211	0.113
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Bismuth-212	1.15		0.546	0.529
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Bismuth-214	0.745		0.0642	0.103
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Cesium-137	-0.00252	U	0.0403	0.0219
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Cobalt-60	0.00277	U	0.048	0.0241
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Europium-152	-0.00162	U	0.101	0.0524
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Europium-154	-0.0363	U	0.141	0.0777
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Europium-155	0.0326	U	0.122	0.0645
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Lead-212	0.866		0.0627	0.0841
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Lead-214	1.01		0.215	0.114
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Potassium-40	21.7		0.332	1.39
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Protactinium-231	0	UJ	0.476	0.548
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Protactinium-234	-0.0615	U	0.34	0.194
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Protactinium-234m	3.84	U	6.31	3.01
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Radium-223	-0.0993	U	0.699	0.414
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Radium-224	0	UJ	0.671	1.07
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Radium-226	0.745		0.0642	0.103
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Thallium-208	0.233		0.0394	0.053
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Thorium-227	0.0228	U	0.271	0.153
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Thorium-228	0.866		0.0627	0.0841
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Thorium-232	0.863		0.179	0.225
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Actinium-228	0.703		0.15	0.232
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Americium-241	-0.0321	U	0.123	0.0772
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Bismuth-212	1.17		0.621	0.689
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Bismuth-214	0.676		0.0798	0.133
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Cesium-137	-0.00354	U	0.0462	0.0273
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Cobalt-60	0.0119	U	0.0513	0.0253
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Europium-152	0.0276	U	0.109	0.0627
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Europium-154	0.0809	U	0.185	0.0907
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Europium-155	0.0392	U	0.125	0.07
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Lead-212	0.885		0.0631	0.0836
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Lead-214	0.859		0.209	0.125

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Potassium-40	23.3		0.379	1.44
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Protactinium-231	0.499	U	0.573	0.49
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Protactinium-234	-0.125	U	0.345	0.244
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Protactinium-234m	-0.639	U	5.92	3.21
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Radium-223	-0.313	U	0.719	0.467
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Radium-224	1.59		0.676	0.989
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Radium-226	0.676		0.0798	0.133
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Thallium-208	0.285		0.0365	0.0572
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Thorium-227	0.0498	U	0.291	0.153
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Thorium-228	0.885		0.0631	0.0836
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Thorium-232	0.703		0.15	0.232
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Actinium-228	1.09		0.189	0.242
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Americium-241	0.0247	U	0.122	0.0664
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Bismuth-212	0.989		0.535	0.597
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Bismuth-214	0.798		0.081	0.121
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Cesium-137	-0.016	U	0.0433	0.026
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Cobalt-60	0.0297	U	0.0528	0.0231
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Europium-152	-0.0404	U	0.113	0.0642
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Europium-154	0.00249	U	0.151	0.0805
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Europium-155	0	UJ	0.112	0.0844
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Lead-212	1.04		0.0672	0.0909
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Lead-214	0.952		0.0892	0.133
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Potassium-40	16.6		0.378	1.23
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Protactinium-231	0	UJ	0.527	0.51
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Protactinium-234	-0.262	U	0.303	0.192
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Protactinium-234m	0.863	U	6.29	3.43
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Radium-223	-0.277	U	0.653	0.421
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Radium-224	1.26		0.72	0.915
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Radium-226	0.798		0.081	0.121
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Thallium-208	0.329		0.0406	0.0702
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Thorium-227	0.00551	U	0.299	0.177
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Thorium-228	1.04		0.0672	0.0909
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Thorium-232	1.09		0.189	0.242
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Actinium-228	0.92		0.181	0.204
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Americium-241	0.0235	U	0.108	0.0596
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Bismuth-212	0.564		0.563	0.493
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Bismuth-214	0.717		0.0798	0.13
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Cesium-137	0.0183	U	0.0453	0.0261
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Cobalt-60	0.0129	U	0.0561	0.0334
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Europium-152	-0.0245	U	0.1	0.0551
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Europium-154	-0.0268	U	0.149	0.0854
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Europium-155	0.069	U	0.109	0.0555
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Lead-212	0.871		0.0602	0.0822
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Lead-214	0.903		0.0771	0.116
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Potassium-40	22.2		0.443	1.32
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Protactinium-231	0.27	U	0.495	0.482
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Protactinium-234	-0.0486	U	0.338	0.213
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Protactinium-234m	2.33	U	6.17	3.7
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Radium-223	0.223	U	0.718	0.503
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Radium-224	0	UJ	0.645	0.924
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Radium-226	0.717		0.0798	0.13
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Thallium-208	0.228		0.0424	0.061
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Thorium-227	0.0609	U	0.28	0.143
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Thorium-228	0.871		0.0602	0.0822
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Thorium-232	0.92		0.181	0.204

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Actinium-228	0.979		0.116	0.198
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Americium-241	0.0249	U	0.134	0.073
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Bismuth-212	1.82		0.453	0.768
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Bismuth-214	0.555		0.0721	0.122
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Cesium-137	0.00511	U	0.0382	0.0197
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Cobalt-60	-0.00258	U	0.0412	0.0212
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Europium-152	0.0494	U	0.088	0.0488
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Europium-154	-0.0328	U	0.112	0.0708
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Europium-155	0.0238	U	0.0969	0.0502
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Lead-212	0.953		0.0542	0.0827
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Lead-214	0.807		0.0686	0.122
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Potassium-40	16.3		0.259	1.12
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Protactinium-231	0	UJ	0.42	0.679
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Protactinium-234	-0.0673	U	0.301	0.171
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Protactinium-234m	-0.198	U	4.11	2.22
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Radium-223	-0.126	U	0.565	0.297
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Radium-224	1.06		0.581	0.936
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Radium-226	0.555		0.0721	0.122
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Thallium-208	0.277		0.033	0.0524
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Thorium-227	0.104	U	0.253	0.134
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Thorium-228	0.953		0.0542	0.0827
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Thorium-232	0.979		0.116	0.198
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Actinium-228	0.84		0.116	0.162
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Americium-241	0.0376	U	0.207	0.112
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Bismuth-212	0.645		0.421	0.534
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Bismuth-214	0.665		0.0621	0.103
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Cesium-137	0.000767	U	0.0321	0.0168
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Cobalt-60	0.00246	U	0.0324	0.0189
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Europium-152	0.00171	U	0.0868	0.0464
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Europium-154	-0.0185	U	0.0897	0.0489
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Europium-155	0.0168	U	0.106	0.0562
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Lead-212	0.886		0.052	0.0746
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Lead-214	0.824		0.065	0.0995
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Potassium-40	15.2		0.306	0.943
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Protactinium-231	0	UJ	0.386	0.353
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Protactinium-234	-0.0769	U	0.27	0.155
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Protactinium-234m	0.106	U	4.01	2.18
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Radium-223	0.112	U	0.588	0.34
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Radium-224	0	UJ	0.557	0.706
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Radium-226	0.665		0.0621	0.103
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Thallium-208	0.244		0.0288	0.0418
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Thorium-227	-0.111	U	0.215	0.119
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Thorium-228	0.886		0.052	0.0746
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Thorium-232	0.84		0.116	0.162
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Actinium-228	1.04		0.153	0.211
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Americium-241	0.0481	U	0.174	0.095
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Bismuth-212	0	UJ	0.582	0.78
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Bismuth-214	0.887		0.073	0.133
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Cesium-137	0.00944	U	0.0432	0.022
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Cobalt-60	-0.00265	U	0.0394	0.02
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Europium-152	-0.0377	U	0.096	0.0555
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Europium-154	0.0181	U	0.158	0.0799
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Europium-155	0.0866	U	0.116	0.0932
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Lead-212	1.03		0.0682	0.0997
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Lead-214	1.05		0.222	0.141

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Potassium-40	19		0.431	1.38
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Protactinium-231	0	UJ	0.529	0.624
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Protactinium-234	-0.0956	U	0.324	0.217
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Protactinium-234m	-0.113	U	5.89	3.44
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Radium-223	-0.217	U	0.72	0.389
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Radium-224	1.09		0.731	0.956
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Radium-226	0.887		0.073	0.133
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Thallium-208	0.279		0.04	0.0671
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Thorium-227	-0.0898	U	0.276	0.147
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Thorium-228	1.03		0.0682	0.0997
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Thorium-232	1.04		0.153	0.211
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Actinium-228	1.39		0.195	0.262
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Americium-241	0.000809	U	0.327	0.164
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Bismuth-212	1.53		0.717	0.745
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Bismuth-214	1.03		0.0949	0.168
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Cesium-137	0.00163	U	0.051	0.0266
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Cobalt-60	-0.0189	U	0.0526	0.0299
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Europium-152	-0.0328	U	0.119	0.0732
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Europium-154	-0.0527	U	0.185	0.104
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Europium-155	0	UJ	0.127	0.167
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Lead-212	1.57		0.069	0.11
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Lead-214	1.41		0.256	0.158
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Potassium-40	21.1		0.427	1.42
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Protactinium-231	0.466	U	0.69	0.369
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Protactinium-234	0.422	U	0.491	0.339
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Protactinium-234m	-2.67	U	6.49	4.04
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Radium-223	0.0661	U	0.87	0.507
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Radium-224	1.37		0.74	1.08
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Radium-226	1.03		0.0949	0.168
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Thallium-208	0.426		0.0432	0.0802
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Thorium-227	-0.0951	U	0.299	0.16
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Thorium-228	1.57		0.069	0.11
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Thorium-232	1.39		0.195	0.262
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Actinium-228	0.811		0.181	0.29
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Americium-241	-0.0992	U	0.311	0.17
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Bismuth-212	0	UJ	0.639	0.731
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Bismuth-214	0.751		0.0873	0.126
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Cesium-137	0.029	U	0.053	0.0265
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Cobalt-60	-0.000389	U	0.0463	0.0239
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Europium-152	-0.0295	U	0.11	0.0696
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Europium-154	-0.0302	U	0.144	0.0797
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Europium-155	0.114	U	0.142	0.106
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Lead-212	0.963		0.0628	0.096
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Lead-214	0.924		0.0903	0.133
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Potassium-40	16.5		0.387	1.2
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Protactinium-231	0.389	U	0.656	0.363
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Protactinium-234	-0.148	U	0.365	0.207
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Protactinium-234m	0.601	U	6.57	3.8
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Radium-223	0.182	U	0.784	0.57
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Radium-224	1.36		0.673	1.13
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Radium-226	0.751		0.0873	0.126
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Thallium-208	0.255		0.0408	0.0638
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Thorium-227	-0.0188	U	0.286	0.154
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Thorium-228	0.963		0.0628	0.096
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Thorium-232	0.811		0.181	0.29

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Actinium-228	1.52		0.145	0.196
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Americium-241	-0.0957	U	0.176	0.105
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Bismuth-212	1.5		0.508	0.669
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Bismuth-214	1.15		0.073	0.128
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Cesium-137	0.0115	U	0.0442	0.0252
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Cobalt-60	0.00451	U	0.0423	0.021
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Europium-152	-0.0304	U	0.109	0.0609
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Europium-154	-0.00636	U	0.138	0.0773
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Europium-155	0	UJ	0.122	0.124
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Lead-212	1.65		0.0585	0.103
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Lead-214	1.45		0.23	0.139
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Potassium-40	20.2		0.402	1.19
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Protactinium-231	0	UJ	0.507	0.579
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Protactinium-234	-0.0417	U	0.308	0.194
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Protactinium-234m	0.873	U	5.73	3.12
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Radium-223	0.156	U	0.72	0.401
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Radium-224	2.29		0.626	1.03
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Radium-226	1.15		0.073	0.128
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Thallium-208	0.456		0.0393	0.0612
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Thorium-227	0.0596	U	0.286	0.158
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Thorium-228	1.65		0.0585	0.103
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Thorium-232	1.52		0.145	0.196
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Actinium-228	1.3		0.16	0.23
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Americium-241	0.0351	U	0.269	0.156
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Bismuth-212	1.88		0.572	0.616
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Bismuth-214	1.11		0.0793	0.131
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Cesium-137	0.0181	U	0.0433	0.0259
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Cobalt-60	-0.00673	U	0.0401	0.0219
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Europium-152	-0.0553	U	0.115	0.0683
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Europium-154	0.0171	U	0.146	0.0934
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Europium-155	0.0235	U	0.143	0.0727
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Lead-212	1.57		0.0708	0.104
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Lead-214	1.35		0.0846	0.164
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Potassium-40	22.5		0.397	1.15
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Protactinium-231	0	UJ	0.56	0.622
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Protactinium-234	-0.118	U	0.333	0.222
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Protactinium-234m	2.62	U	6.03	3.12
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Radium-223	-0.00576	U	0.77	0.489
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Radium-224	2.25		0.757	1.3
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Radium-226	1.11		0.0793	0.131
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Thallium-208	0.387		0.0407	0.0712
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Thorium-227	-0.0917	U	0.327	0.185
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Thorium-228	1.57		0.0708	0.104
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Thorium-232	1.3		0.16	0.23
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Actinium-228	0.951		0.165	0.255
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Americium-241	0.0072	U	0.281	0.143
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Bismuth-212	1.23		0.624	0.735
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Bismuth-214	0.97		0.091	0.139
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Cesium-137	-0.00474	U	0.0433	0.0271
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Cobalt-60	0.0248	U	0.0545	0.024
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Europium-152	-0.0277	U	0.116	0.0659
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Europium-154	0.0376	U	0.172	0.0863
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Europium-155	0.0479	U	0.132	0.067
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Lead-212	1.14		0.0697	0.101
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Lead-214	1.07		0.0917	0.144

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Potassium-40	13.5		0.527	1.29
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Protactinium-231	0	UJ	0.55	0.645
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Protactinium-234	-0.144	U	0.365	0.206
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Protactinium-234m	-0.0352	U	5.75	2.96
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Radium-223	-0.0522	U	0.747	0.436
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Radium-224	0.981		0.747	0.96
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Radium-226	0.97		0.091	0.139
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Thallium-208	0.266		0.0462	0.0724
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Thorium-227	0.108	U	0.325	0.16
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Thorium-228	1.14		0.0697	0.101
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Thorium-232	0.951		0.165	0.255
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Actinium-228	0.887		0.109	0.158
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Americium-241	-0.00135	U	0.203	0.111
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Bismuth-212	0.847		0.416	0.599
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Bismuth-214	0.893		0.0604	0.107
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Cesium-137	-0.00404	U	0.0317	0.017
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Cobalt-60	-0.000528	U	0.032	0.0168
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Europium-152	0.00473	U	0.0887	0.047
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Europium-154	-0.0131	U	0.101	0.0548
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Europium-155	0.0311	U	0.108	0.0557
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Lead-212	0.996		0.052	0.0782
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Lead-214	1.01		0.172	0.12
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Potassium-40	14.2		0.292	0.844
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Protactinium-231	0	UJ	0.391	0.409
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Protactinium-234	-0.0221	U	0.249	0.137
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Protactinium-234m	1.85	U	4.4	2.25
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Radium-223	-0.175	U	0.526	0.325
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Radium-224	1.17		0.556	0.754
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Radium-226	0.893		0.0604	0.107
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Thallium-208	0.294		0.029	0.0529
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Thorium-227	0.0311	U	0.232	0.119
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Thorium-228	0.996		0.052	0.0782
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Thorium-232	0.887		0.109	0.158
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Actinium-228	0.728		0.201	0.223
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Americium-241	-0.0377	U	0.19	0.103
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Bismuth-212	0.572	U	0.586	0.835
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Bismuth-214	0.783		0.0828	0.122
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Cesium-137	-0.00479	U	0.0462	0.0257
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Cobalt-60	0	UJ	0.0683	0.0678
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Europium-152	0.0368	U	0.128	0.0666
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Europium-154	-0.0192	U	0.163	0.0895
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Europium-155	-0.00436	U	0.114	0.0595
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Lead-212	0.998		0.0617	0.0916
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Lead-214	0.883		0.0825	0.126
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Potassium-40	13.3		0.534	1.21
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Protactinium-231	0	UJ	0.534	0.708
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Protactinium-234	0.082	U	0.387	0.223
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Protactinium-234m	-0.702	U	7	3.78
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Radium-223	0.178	U	0.809	0.446
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Radium-224	0	UJ	0.662	1.05
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Radium-226	0.783		0.0828	0.122
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Thallium-208	0.265		0.0468	0.0562
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Thorium-227	-0.103	U	0.274	0.162
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Thorium-228	0.998		0.0617	0.0916
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Thorium-232	0.728		0.201	0.223

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Actinium-228	0.94		0.174	0.24
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Americium-241	-0.106	UJ	0.0567	0.0427
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Bismuth-212	1.51		0.544	0.533
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Bismuth-214	0.89		0.0817	0.146
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Cesium-137	-0.0119	U	0.0455	0.026
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Cobalt-60	0.0131	U	0.0473	0.023
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Europium-152	-0.00528	U	0.0985	0.0517
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Europium-154	0.0532	U	0.164	0.0919
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Europium-155	0.0426	U	0.0928	0.0479
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Lead-212	0.971		0.058	0.0791
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Lead-214	0.846		0.0785	0.111
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Potassium-40	13.7		0.449	1.06
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Protactinium-231	0	UJ	0.45	0.342
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Protactinium-234	-0.105	U	0.374	0.221
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Protactinium-234m	3.43	U	6.21	2.98
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Radium-223	0.261	U	0.641	0.374
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Radium-224	2.42		0.622	0.901
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Radium-226	0.89		0.0817	0.146
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Thallium-208	0.288		0.0446	0.0648
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Thorium-227	0.0854	U	0.27	0.148
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Thorium-228	0.971		0.058	0.0791
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Thorium-232	0.94		0.174	0.24
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Actinium-228	0.857		0.122	0.176
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Americium-241	0.00196	U	0.227	0.132
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Bismuth-212	1		0.503	0.531
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Bismuth-214	0.694		0.0677	0.116
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Cesium-137	-0.0116	U	0.0344	0.02
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Cobalt-60	0.0113	U	0.0442	0.0225
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Europium-152	-0.0564	U	0.0954	0.0607
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Europium-154	-0.0198	U	0.119	0.0681
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Europium-155	0.0703	U	0.126	0.0611
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Lead-212	0.996		0.061	0.0838
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Lead-214	0.855		0.0754	0.107
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Potassium-40	15		0.351	0.953
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Protactinium-231	0	UJ	0.486	0.458
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Protactinium-234	0.0805	U	0.287	0.146
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Protactinium-234m	0.4	U	4.87	3.68
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Radium-223	-0.149	U	0.671	0.559
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Radium-224	0	UJ	0.652	1.15
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Radium-226	0.694		0.0677	0.116
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Thallium-208	0.233		0.0333	0.05
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Thorium-227	-0.0181	U	0.272	0.15
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Thorium-228	0.996		0.061	0.0838
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Thorium-232	0.857		0.122	0.176
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Actinium-228	0.882		0.178	0.194
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Americium-241	0.00707	U	0.177	0.0939
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Bismuth-212	0.341	U	0.586	0.671
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Bismuth-214	0.676		0.0839	0.14
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Cesium-137	-0.0131	U	0.0416	0.0239
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Cobalt-60	0.0152	U	0.0503	0.0231
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Europium-152	0.0182	U	0.108	0.0602
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Europium-154	-0.00387	U	0.153	0.0793
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Europium-155	0.0691	U	0.127	0.0657
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Lead-212	0.917		0.0656	0.0972
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Lead-214	0.738		0.203	0.131

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Potassium-40	15.1		0.371	1.19
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Protactinium-231	0.094	U	0.529	0.534
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Protactinium-234	-0.107	U	0.321	0.191
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Protactinium-234m	-1.03	U	5.37	2.91
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Radium-223	-0.0532	U	0.722	0.38
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Radium-224	1.43		0.703	1.09
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Radium-226	0.676		0.0839	0.14
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Thallium-208	0.242		0.0411	0.0556
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Thorium-227	0.00205	U	0.3	0.155
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Thorium-228	0.917		0.0656	0.0972
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Thorium-232	0.882		0.178	0.194
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Actinium-228	0.558		0.154	0.211
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Americium-241	0.0122	U	0.303	0.152
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Bismuth-212	1.05		0.513	0.525
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Bismuth-214	0.522		0.0891	0.113
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Cesium-137	-0.0146	U	0.0401	0.0234
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Cobalt-60	-0.0113	U	0.0413	0.0231
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Europium-152	0.025	U	0.113	0.058
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Europium-154	-0.00747	U	0.144	0.0758
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Europium-155	0.0404	U	0.125	0.0629
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Lead-212	0.745		0.06	0.0823
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Lead-214	0.755		0.213	0.13
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Potassium-40	12.2		0.474	1.11
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Protactinium-231	0.529	U	0.564	0.744
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Protactinium-234	-0.118	U	0.346	0.192
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Protactinium-234m	-0.58	U	6.69	3.48
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Radium-223	0.164	U	0.781	0.389
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Radium-224	0	UJ	0.643	1.01
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Radium-226	0.522		0.0891	0.113
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Thallium-208	0.157		0.039	0.0542
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Thorium-227	0.0466	U	0.292	0.159
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Thorium-228	0.745		0.06	0.0823
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Thorium-232	0.558		0.154	0.211
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Actinium-228	0.956		0.166	0.221
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Americium-241	-0.0211	U	0.0583	0.0344
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Bismuth-212	1.39		0.581	0.633
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Bismuth-214	0.81		0.0808	0.129
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Cesium-137	0.0184	U	0.0477	0.0243
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Cobalt-60	-0.00482	U	0.0438	0.0238
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Europium-152	-0.0589	U	0.0986	0.0598
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Europium-154	0.0891	U	0.184	0.089
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Europium-155	0.0752	U	0.0895	0.1
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Lead-212	1.04		0.0607	0.0835
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Lead-214	1.2		0.225	0.125
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Potassium-40	16.6		0.341	1.23
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Protactinium-231	0.421	U	0.525	0.461
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Protactinium-234	0.0125	U	0.398	0.209
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Protactinium-234m	3.29	U	7.44	3.76
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Radium-223	0.128	U	0.621	0.348
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Radium-224	1.63		0.651	0.968
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Radium-226	0.81		0.0808	0.129
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Thallium-208	0.301		0.0378	0.0718
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Thorium-227	0.0396	U	0.286	0.147
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Thorium-228	1.04		0.0607	0.0835
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Thorium-232	0.956		0.166	0.221

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Actinium-228	1.03		0.121	0.215
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Americium-241	-0.0221	U	0.184	0.103
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Bismuth-212	1.01		0.459	0.461
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Bismuth-214	0.672		0.0675	0.13
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Cesium-137	-0.00337	U	0.0392	0.0219
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Cobalt-60	-0.0066	U	0.0373	0.0205
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Europium-152	-0.0271	U	0.0967	0.0524
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Europium-154	-0.0714	U	0.121	0.0737
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Europium-155	0.0412	U	0.111	0.0569
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Lead-212	0.967		0.055	0.0817
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Lead-214	0.877		0.191	0.129
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Potassium-40	14.2		0.359	1.07
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Protactinium-231	0.441	U	0.444	0.429
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Protactinium-234	0.0247	U	0.303	0.153
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Protactinium-234m	-1.47	U	4.91	2.82
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Radium-223	0.108	U	0.657	0.369
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Radium-224	1.03		0.589	0.887
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Radium-226	0.672		0.0675	0.13
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Thallium-208	0.284		0.0355	0.054
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Thorium-227	-0.00439	U	0.262	0.141
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Thorium-228	0.967		0.055	0.0817
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Thorium-232	1.03		0.121	0.215
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Actinium-228	1.07		0.153	0.254
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Americium-241	-0.0604	U	0.165	0.101
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Bismuth-212	1.33		0.584	0.489
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Bismuth-214	0.76		0.0853	0.123
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Cesium-137	0.014	U	0.0509	0.0271
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Cobalt-60	0.0155	U	0.0516	0.0251
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Europium-152	0.0342	U	0.12	0.0644
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Europium-154	-0.00491	U	0.161	0.0876
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Europium-155	0.0361	U	0.129	0.0699
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Lead-212	1.12		0.0664	0.0962
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Lead-214	1		0.22	0.144
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Potassium-40	14.2		0.437	1.13
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Protactinium-231	0.325	U	0.631	0.35
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Protactinium-234	-0.026	U	0.365	0.195
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Protactinium-234m	0	UJ	6.15	5.24
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Radium-223	-0.629	U	0.694	0.474
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Radium-224	1.63		0.711	0.993
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Radium-226	0.76		0.0853	0.123
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Thallium-208	0.321		0.039	0.0659
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Thorium-227	-0.0755	U	0.29	0.158
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Thorium-228	1.12		0.0664	0.0962
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Thorium-232	1.07		0.153	0.254
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Actinium-228	0.548		0.143	0.197
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Americium-241	-0.00799	U	0.0488	0.0273
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Bismuth-212	0.535		0.486	0.446
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Bismuth-214	0.551		0.0656	0.125
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Cesium-137	0.00286	U	0.0363	0.021
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Cobalt-60	0.0023	U	0.0369	0.018
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Europium-152	0.0127	U	0.0958	0.0534
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Europium-154	-0.0708	U	0.12	0.0725
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Europium-155	-0.0037	U	0.0776	0.0444
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Lead-212	0.671		0.0482	0.0707
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Lead-214	0.56		0.0691	0.101

Table 5-31. RBA-4 - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Potassium-40	12		0.308	1.01
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Protactinium-231	0.116	U	0.488	0.267
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Protactinium-234	0.0856	U	0.319	0.15
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Protactinium-234m	1.79	U	5.59	2.65
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Radium-223	0.195	U	0.565	0.271
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Radium-224	1.01		0.517	0.885
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Radium-226	0.551		0.0656	0.125
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Thallium-208	0.181		0.0346	0.0533
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Thorium-227	-0.0113	U	0.197	0.11
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Thorium-228	0.671		0.0482	0.0707
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Thorium-232	0.548		0.143	0.197
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Actinium-228	0.653		0.129	0.159
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Americium-241	-0.0143	U	0.168	0.0872
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Bismuth-212	0.366	U	0.442	0.409
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Bismuth-214	0.527		0.0598	0.0854
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Cesium-137	0.00228	U	0.034	0.0186
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Cobalt-60	0.016	U	0.0422	0.0183
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Europium-152	0.0724	U	0.0948	0.0656
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Europium-154	-0.0196	U	0.105	0.0555
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Europium-155	0.0608	U	0.102	0.0503
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Lead-212	0.621		0.0489	0.0697
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Lead-214	0.623		0.0642	0.0982
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Potassium-40	8.07		0.341	0.838
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Protactinium-231	-0.117	U	0.437	0.24
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Protactinium-234	-0.0714	U	0.264	0.153
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Protactinium-234m	-1.69	U	4.01	2.42
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Radium-223	-0.141	U	0.545	0.289
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Radium-224	1.18		0.523	0.924
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Radium-226	0.527		0.0598	0.0854
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Thallium-208	0.161		0.0359	0.0499
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Thorium-227	0.0571	U	0.238	0.128
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Thorium-228	0.621		0.0489	0.0697
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Thorium-232	0.653		0.129	0.159

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

pCi/g - picocurie per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-32. RBA-4 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-FILL13-0919	09/04/2019 09:20	Radium-226	0.647	J	0.0624	0.132
HPRBA4-FILL13-0919	09/04/2019 09:20	Americium-241	0.00104	U	0.171	0.0768
HPRBA4-FILL13-0919	09/04/2019 09:20	Plutonium-238	-0.00438	UJ	0.514	0.251
HPRBA4-FILL13-0919	09/04/2019 09:20	Plutonium-239/240	0.0584	UJ	0.317	0.17
HPRBA4-FILL13-0919	09/04/2019 09:20	Thorium-228	0.891	J	0.245	0.361
HPRBA4-FILL13-0919	09/04/2019 09:20	Thorium-230	0.976	J	0.311	0.383
HPRBA4-FILL13-0919	09/04/2019 09:20	Thorium-232	0.756	J	0.193	0.325
HPRBA4-FILL13-0919	09/04/2019 09:20	Uranium-233/234	0.631		0.0874	0.144
HPRBA4-FILL13-0919	09/04/2019 09:20	Uranium-235/236	0.109		0.0793	0.0733
HPRBA4-FILL13-0919	09/04/2019 09:20	Uranium-238	0.502		0.078	0.128
HPRBA4-FILL18-0819	08/21/2019 09:25	Radium-226	1		0.0935	0.185
HPRBA4-FILL18-0819	08/21/2019 09:25	Americium-241	0.0156	UJ	0.34	0.163
HPRBA4-FILL18-0819	08/21/2019 09:25	Plutonium-238	0.0429	UJ	0.107	0.0694
HPRBA4-FILL18-0819	08/21/2019 09:25	Plutonium-239/240	0.0429	UJ	0.107	0.0694
HPRBA4-FILL18-0819	08/21/2019 09:25	Thorium-228	0.838	J	0.214	0.347
HPRBA4-FILL18-0819	08/21/2019 09:25	Thorium-230	0.942	J	0.273	0.371
HPRBA4-FILL18-0819	08/21/2019 09:25	Thorium-232	0.605	J	0.136	0.289
HPRBA4-FILL18-0819	08/21/2019 09:25	Uranium-233/234	0.675		0.0749	0.146
HPRBA4-FILL18-0819	08/21/2019 09:25	Uranium-235/236	0.0919		0.0506	0.0627
HPRBA4-FILL18-0819	08/21/2019 09:25	Uranium-238	0.586		0.0539	0.134
HPRBA4-FILL19-0819	08/21/2019 10:45	Radium-226	0.787		0.0909	0.176
HPRBA4-FILL19-0819	08/21/2019 10:45	Americium-241	0.075	UJ	0.14	0.102
HPRBA4-FILL19-0819	08/21/2019 10:45	Plutonium-238	0.0358	UJ	0.106	0.0633
HPRBA4-FILL19-0819	08/21/2019 10:45	Plutonium-239/240	-0.0297	UJ	0.122	0.0417
HPRBA4-FILL19-0819	08/21/2019 10:45	Thorium-228	0.895	J	0.26	0.398
HPRBA4-FILL19-0819	08/21/2019 10:45	Thorium-230	0.748	J	0.37	0.384
HPRBA4-FILL19-0819	08/21/2019 10:45	Thorium-232	0.852	J	0.207	0.38
HPRBA4-FILL19-0819	08/21/2019 10:45	Uranium-233/234	0.877	J	0.103	0.205
HPRBA4-FILL19-0819	08/21/2019 10:45	Uranium-235/236	0.0186	UJ	0.0911	0.0526
HPRBA4-FILL19-0819	08/21/2019 10:45	Uranium-238	0.702	J	0.0896	0.183
HPRBA4-FILL20-0819	08/21/2019 11:35	Radium-226	0.748		0.0795	0.16
HPRBA4-FILL20-0819	08/21/2019 11:35	Americium-241	-0.0178	UJ	0.122	0.0413
HPRBA4-FILL20-0819	08/21/2019 11:35	Plutonium-238	0.0486	UJ	0.105	0.072
HPRBA4-FILL20-0819	08/21/2019 11:35	Plutonium-239/240	-0.0109	UJ	0.124	0.0491
HPRBA4-FILL20-0819	08/21/2019 11:35	Thorium-228	0.811	J	0.288	0.338
HPRBA4-FILL20-0819	08/21/2019 11:35	Thorium-230	0.843	J	0.251	0.334
HPRBA4-FILL20-0819	08/21/2019 11:35	Thorium-232	0.955	J	0.175	0.343
HPRBA4-FILL20-0819	08/21/2019 11:35	Uranium-233/234	0.831	J	0.114	0.202
HPRBA4-FILL20-0819	08/21/2019 11:35	Uranium-235/236	0.023	UJ	0.112	0.0622
HPRBA4-FILL20-0819	08/21/2019 11:35	Uranium-238	0.698	J	0.0906	0.183
HPRBA4-FILL21-0919	09/04/2019 11:10	Radium-226	0.939		0.0776	0.163
HPRBA4-FILL21-0919	09/04/2019 11:10	Americium-241	0.0815	U	0.177	0.121
HPRBA4-FILL21-0919	09/04/2019 11:10	Plutonium-238	-0.0173	UJ	0.2	0.0766
HPRBA4-FILL21-0919	09/04/2019 11:10	Plutonium-239/240	-0.0245	UJ	0.279	0.111
HPRBA4-FILL21-0919	09/04/2019 11:10	Thorium-228	0.656	J	0.363	0.341
HPRBA4-FILL21-0919	09/04/2019 11:10	Thorium-230	0.526	J	0.387	0.32
HPRBA4-FILL21-0919	09/04/2019 11:10	Thorium-232	0.551	J	0.306	0.302
HPRBA4-FILL21-0919	09/04/2019 11:10	Uranium-233/234	0.863		0.0853	0.182
HPRBA4-FILL21-0919	09/04/2019 11:10	Uranium-235/236	0.0576	U	0.0818	0.0629
HPRBA4-FILL21-0919	09/04/2019 11:10	Uranium-238	0.783		0.0502	0.17
HPRBA4-FILL24-0819	08/21/2019 13:25	Radium-226	0.744		0.0286	0.167
HPRBA4-FILL24-0819	08/21/2019 13:25	Americium-241	-0.00485	UJ	0.17	0.0728
HPRBA4-FILL24-0819	08/21/2019 13:25	Plutonium-238	0.0476	UJ	0.103	0.0705
HPRBA4-FILL24-0819	08/21/2019 13:25	Plutonium-239/240	0.0907	UJ	0.11	0.0886

Table 5-32. RBA-4 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-FILL24-0819	08/21/2019 13:25	Thorium-228	1.26	J	0.19	0.413
HPRBA4-FILL24-0819	08/21/2019 13:25	Thorium-230	0.694	J	0.256	0.318
HPRBA4-FILL24-0819	08/21/2019 13:25	Thorium-232	1.07	J	0.189	0.377
HPRBA4-FILL24-0819	08/21/2019 13:25	Uranium-233/234	0.437		0.109	0.14
HPRBA4-FILL24-0819	08/21/2019 13:25	Uranium-235/236	0.0577	U	0.0659	0.0609
HPRBA4-FILL24-0819	08/21/2019 13:25	Uranium-238	0.508		0.0764	0.144
HPRBA4-FILL25-0919	09/04/2019 10:20	Radium-226	0.515	J	0.0962	0.131
HPRBA4-FILL25-0919	09/04/2019 10:20	Americium-241	0.0391	UJ	0.23	0.123
HPRBA4-FILL25-0919	09/04/2019 10:20	Plutonium-238	0.0293	UJ	0.256	0.131
HPRBA4-FILL25-0919	09/04/2019 10:20	Plutonium-239/240	0.00585	UJ	0.372	0.175
HPRBA4-FILL25-0919	09/04/2019 10:20	Thorium-228	0.615	J	0.402	0.409
HPRBA4-FILL25-0919	09/04/2019 10:20	Thorium-230	0.606	J	0.365	0.395
HPRBA4-FILL25-0919	09/04/2019 10:20	Thorium-232	0.761	J	0.276	0.423
HPRBA4-FILL25-0919	09/04/2019 10:20	Uranium-233/234	0.691		0.0944	0.161
HPRBA4-FILL25-0919	09/04/2019 10:20	Uranium-235/236	0.0331	U	0.0782	0.0521
HPRBA4-FILL25-0919	09/04/2019 10:20	Uranium-238	0.555		0.0996	0.146
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Radium-226	0.533	J	0.0683	0.117
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Americium-241	0.0683	UJ	0.228	0.135
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Plutonium-238	-0.00569	UJ	0.298	0.132
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Plutonium-239/240	-0.0597	UJ	0.276	0.0842
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Thorium-228	0.271	UJ	0.4	0.302
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Thorium-230	0.325	UJ	0.365	0.31
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Thorium-232	0.315	J	0.274	0.289
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Uranium-233/234	0.168		0.136	0.113
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Uranium-235/236	0.0385	U	0.106	0.0694
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Uranium-238	0.267		0.104	0.127
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Radium-226	0.416	J	0.0982	0.115
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Americium-241	-0.121	UJ	0.387	0.109
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Plutonium-238	0.0319	UJ	0.0957	0.0897
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Plutonium-239/240	0.0166	UJ	0.177	0.0921
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Thorium-228	0.304	UJ	0.441	0.318
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Thorium-230	0.247	UJ	0.417	0.29
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Thorium-232	0.458	J	0.341	0.336
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Uranium-233/234	0.302		0.127	0.143
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Uranium-235/236	0.0533	U	0.127	0.084
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Uranium-238	0.115	U	0.146	0.105
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Radium-226	0.449	J	0.0817	0.108
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Americium-241	0.00453	UJ	0.457	0.208
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Plutonium-238	0.0702	UJ	0.105	0.12
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Plutonium-239/240	0.0701	UJ	0.105	0.12
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Thorium-228	0.686	J	0.488	0.449
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Thorium-230	0.449	UJ	0.456	0.374
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Thorium-232	0.225	UJ	0.377	0.277
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Uranium-233/234	0.376		0.0986	0.114
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Uranium-235/236	0.0101	U	0.0927	0.0485
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Uranium-238	0.175		0.075	0.0788
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Radium-226	0.0764	U	0.116	0.0787
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Americium-241	0.0565	UJ	0.357	0.188
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Plutonium-238	-0.0175	UJ	0.201	0.0772
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Plutonium-239/240	0.0189	UJ	0.201	0.105
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Thorium-228	0.0696	UJ	0.228	0.139
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Thorium-230	0.0619	UJ	0.313	0.173
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Thorium-232	-7.16E-05	UJ	0.281	0.136
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Uranium-233/234	0.0364	U	0.117	0.0707

Table 5-32. RBA-4 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Uranium-235/236	0.0194	U	0.0583	0.0556
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Uranium-238	0.0145	U	0.11	0.0578
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Radium-226	0.417	J	0.049	0.101
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Americium-241	0.0455	UJ	0.217	0.125
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Plutonium-238	0.00135	UJ	0.222	0.0999
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Plutonium-239/240	0.00135	UJ	0.222	0.0999
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Thorium-228	0.293	UJ	0.556	0.368
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Thorium-230	0.406	UJ	0.453	0.372
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Thorium-232	0.433	J	0.234	0.346
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Uranium-233/234	0.361	J	0.193	0.202
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Uranium-235/236	0.119	J	0.089	0.132
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Uranium-238	0.175	J	0.15	0.144
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Radium-226	1.31		0.0932	0.198
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Americium-241	-0.0139	UJ	0.233	0.0957
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Plutonium-238	0.0566	UJ	0.332	0.177
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Plutonium-239/240	-0.0702	UJ	0.383	0.138
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Thorium-228	1.44	J	0.615	0.618
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Thorium-230	1.27	J	0.525	0.562
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Thorium-232	0.519	UJ	0.591	0.427
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Uranium-233/234	0.953	J	0.115	0.227
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Uranium-235/236	0.0869	UJ	0.103	0.0877
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Uranium-238	0.944	J	0.0931	0.224
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Radium-226	0.419	J	0.101	0.11
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Americium-241	0.123	UJ	0.194	0.156
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Plutonium-238	-0.0254	UJ	0.215	0.0766
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Plutonium-239/240	-0.00845	UJ	0.169	0.0729
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Thorium-228	0.643	J	0.422	0.473
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Thorium-230	0.841	J	0.553	0.548
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Thorium-232	0.147	UJ	0.491	0.299
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Uranium-233/234	0.414		0.0984	0.124
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Uranium-235/236	0.0332	U	0.0674	0.0487
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Uranium-238	0.276		0.0979	0.105
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Radium-226	0.505	J	0.112	0.126
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Americium-241	-0.00663	UJ	0.232	0.0995
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Plutonium-238	0.0894	UJ	0.196	0.142
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Plutonium-239/240	0.00993	UJ	0.217	0.104
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Thorium-228	0.315	UJ	0.422	0.284
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Thorium-230	0.432	J	0.36	0.283
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Thorium-232	0.327	J	0.2	0.215
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Uranium-233/234	0.305	J	0.207	0.176
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Uranium-235/236	0.0813	UJ	0.118	0.1
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Uranium-238	0.45	J	0.126	0.186
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Radium-226	0.286	J	0.0525	0.0876
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Americium-241	-0.0389	UJ	0.227	0.0737
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Plutonium-238	0.0757	UJ	0.114	0.13
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Plutonium-239/240	-0.00908	UJ	0.181	0.0783
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Thorium-228	0.323	UJ	0.563	0.384
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Thorium-230	1.25	J	0.519	0.606
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Thorium-232	0.568	J	0.322	0.407
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Uranium-233/234	0.416		0.142	0.177
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Uranium-235/236	0.0342	U	0.111	0.0738
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Uranium-238	0.241		0.106	0.134
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Radium-226	0.617	J	0.017	0.117
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Americium-241	0.137	UJ	0.334	0.203

Table 5-32. RBA-4 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Plutonium-238	0.0354	UJ	0.31	0.159
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Plutonium-239/240	-0.0743	UJ	0.343	0.105
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Thorium-228	0.26	UJ	0.408	0.277
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Thorium-230	0.402	J	0.36	0.298
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Thorium-232	0.548	J	0.338	0.328
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Uranium-233/234	0.434		0.145	0.163
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Uranium-235/236	-0.00129	U	0.113	0.0503
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Uranium-238	0.403		0.113	0.151
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Radium-226	0.407		0.0604	0.104
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Americium-241	-0.0158	UJ	0.182	0.0699
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Plutonium-238	0.0337	UJ	0.109	0.067
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Plutonium-239/240	0.0554	UJ	0.148	0.0896
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Thorium-228	0.482	J	0.376	0.349
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Thorium-230	0.149	UJ	0.389	0.242
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Thorium-232	0.0851	UJ	0.349	0.201
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Uranium-233/234	0.313		0.0898	0.113
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Uranium-235/236	0.0225	U	0.0337	0.0389
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Uranium-238	0.277		0.0826	0.105
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Radium-226	0.387		0.0283	0.12
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Americium-241	-0.0562	UJ	0.402	0.159
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Plutonium-238	0.0282	UJ	0.147	0.0867
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Plutonium-239/240	0.0405	UJ	0.205	0.115
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Thorium-228	0.34	UJ	0.523	0.35
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Thorium-230	0.572	J	0.457	0.383
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Thorium-232	0.334	J	0.288	0.276
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Uranium-233/234	0.389	J	0.124	0.148
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Uranium-235/236	0.0239	UJ	0.116	0.0647
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Uranium-238	0.489	J	0.113	0.161
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Radium-226	0.479		0.0876	0.123
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Americium-241	-0.0281	UJ	0.203	0.0762
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Plutonium-238	0.174	UJ	0.367	0.23
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Plutonium-239/240	-0.054	UJ	0.41	0.187
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Thorium-228	0.529	J	0.35	0.363
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Thorium-230	0.977	J	0.422	0.48
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Thorium-232	0.707	J	0.257	0.394
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Uranium-233/234	0.463	J	0.0896	0.12
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Uranium-235/236	0.0428	U	0.0655	0.0503
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Uranium-238	0.554		0.0852	0.129
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Radium-226	0.499	J	0.079	0.119
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Americium-241	0	UJ	0.11	0.0741
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Plutonium-238	-0.0384	UJ	0.263	0.0889
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Plutonium-239/240	-0.00799	UJ	0.28	0.12
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Thorium-228	0.709	J	0.248	0.338
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Thorium-230	0.446	J	0.36	0.3
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Thorium-232	0.279	J	0.184	0.215
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Uranium-233/234	0.31		0.131	0.137
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Uranium-235/236	0.031	U	0.0464	0.0537
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Uranium-238	0.629		0.102	0.18
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Radium-226	0.769		0.0288	0.17
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Americium-241	-0.0108	UJ	0.182	0.0748
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Plutonium-238	0.0236	UJ	0.0919	0.0535
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Plutonium-239/240	0.0513	UJ	0.136	0.0813
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Thorium-228	0.749	J	0.236	0.303
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Thorium-230	0.95	J	0.222	0.331

Table 5-32. RBA-4 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Thorium-232	0.551	J	0.215	0.259
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Uranium-233/234	0.8	J	0.12	0.197
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Uranium-235/236	0.051	UJ	0.109	0.0724
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Uranium-238	0.647	J	0.1	0.176
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Radium-226	0.919		0.1	0.178
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Americium-241	-0.0128	UJ	0.179	0.0751
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Plutonium-238	0.025	UJ	0.0681	0.0492
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Plutonium-239/240	0.0574	UJ	0.0936	0.0698
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Thorium-228	0.754	J	0.305	0.352
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Thorium-230	0.787	J	0.315	0.358
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Thorium-232	0.635	J	0.238	0.313
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Uranium-233/234	0.612		0.0713	0.142
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Uranium-235/236	0.0121	U	0.0819	0.0431
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Uranium-238	0.373		0.0568	0.111
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Radium-226	0.749		0.105	0.157
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Americium-241	0.0107	UJ	0.266	0.126
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Plutonium-238	0.00789	UJ	0.084	0.0438
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Plutonium-239/240	0.023	UJ	0.084	0.0529
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Thorium-228	0.716	J	0.297	0.375
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Thorium-230	0.622	J	0.389	0.369
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Thorium-232	0.631	J	0.248	0.344
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Uranium-233/234	0.727	J	0.122	0.184
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Uranium-235/236	0.0174	UJ	0.0849	0.049
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Uranium-238	0.703	J	0.033	0.174
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Radium-226	0.77		0.0996	0.159
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Americium-241	0.106	UJ	0.402	0.225
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Plutonium-238	-0.0129	UJ	0.113	0.0436
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Plutonium-239/240	-0.00617	UJ	0.104	0.0426
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Thorium-228	0.759	J	0.341	0.382
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Thorium-230	0.436	J	0.345	0.305
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Thorium-232	0.715	J	0.234	0.352
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Uranium-233/234	0.666	J	0.118	0.186
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Uranium-235/236	-0.00674	UJ	0.116	0.0488
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Uranium-238	0.527	J	0.0942	0.164
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Radium-226	0.76		0.0785	0.152
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Americium-241	0.0804	UJ	0.313	0.182
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Plutonium-238	0.0242	UJ	0.0661	0.0477
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Plutonium-239/240	0.0176	UJ	0.0841	0.0485
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Thorium-228	0.687	J	0.238	0.309
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Thorium-230	0.538	J	0.306	0.291
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Thorium-232	0.464	J	0.127	0.244
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Uranium-233/234	0.556		0.106	0.152
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Uranium-235/236	0.0316	U	0.0635	0.0485
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Uranium-238	0.509		0.0737	0.142
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Radium-226	0.629		0.0698	0.13
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Americium-241	-0.0605	UJ	0.33	0.119
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Plutonium-238	0.00406	UJ	0.0886	0.0425
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Plutonium-239/240	0.0186	UJ	0.0886	0.0511
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Thorium-228	0.863	J	0.367	0.415
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Thorium-230	0.668	J	0.403	0.379
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Thorium-232	0.901	J	0.265	0.401
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Uranium-233/234	0.636		0.0796	0.15
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Uranium-235/236	0.0207	U	0.0753	0.0449
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Uranium-238	0.589		0.0462	0.142

Table 5-32. RBA-4 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Radium-226	0.64		0.0899	0.142
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Americium-241	0.108	UJ	0.188	0.156
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Plutonium-238	-0.0151	UJ	0.109	0.0409
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Plutonium-239/240	-0.053	UJ	0.135	0.0363
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Thorium-228	0.697	J	0.502	0.402
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Thorium-230	0.964	J	0.415	0.42
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Thorium-232	0.874	J	0.326	0.383
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Uranium-233/234	0.537		0.0971	0.139
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Uranium-235/236	0.0403	U	0.0719	0.0515
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Uranium-238	0.673		0.0719	0.15
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Radium-226	1.04		0.0834	0.174
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Americium-241	0.00929	UJ	0.203	0.0971
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Plutonium-238	-0.0124	UJ	0.109	0.0419
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Plutonium-239/240	0.0247	UJ	0.113	0.0622
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Thorium-228	1.4	J	0.252	0.482
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Thorium-230	1.24	J	0.36	0.467
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Thorium-232	1.1	J	0.2	0.422
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Uranium-233/234	1.03		0.0958	0.194
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Uranium-235/236	0.129		0.0848	0.0836
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Uranium-238	1.04		0.0779	0.193
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Radium-226	0.804		0.077	0.131
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Americium-241	-0.0264	UJ	0.232	0.0894
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Plutonium-238	0.0194	UJ	0.207	0.108
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Plutonium-239/240	0.0298	UJ	0.261	0.134
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Thorium-228	0.494	J	0.433	0.35
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Thorium-230	0.728	J	0.378	0.385
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Thorium-232	0.836	J	0.358	0.402
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Uranium-233/234	0.696		0.0983	0.17
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Uranium-235/236	0.0308	U	0.0724	0.0514
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Uranium-238	0.729		0.0704	0.17
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Radium-226	1.09		0.068	0.157
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Americium-241	0.0584	UJ	0.213	0.134
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Plutonium-238	-0.0181	UJ	0.093	0.0292
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Plutonium-239/240	0.00402	UJ	0.0974	0.0458
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Thorium-228	1.35	J	0.242	0.424
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Thorium-230	1.44	J	0.268	0.437
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Thorium-232	1.44	J	0.182	0.426
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Uranium-233/234	1.16	J	0.107	0.224
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Uranium-235/236	0.0863	UJ	0.1	0.0801
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Uranium-238	1.05	J	0.0968	0.212
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Radium-226	1.41		0.0671	0.199
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Americium-241	0.00979	UJ	0.214	0.102
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Plutonium-238	-0.00366	UJ	0.0732	0.0316
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Plutonium-239/240	-0.00732	UJ	0.0845	0.0324
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Thorium-228	0.771	J	0.189	0.313
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Thorium-230	0.378	J	0.246	0.236
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Thorium-232	0.832	J	0.122	0.315
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Uranium-233/234	1.03		0.0924	0.193
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Uranium-235/236	0.0548	U	0.0778	0.0599
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Uranium-238	1.11		0.0778	0.199
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Radium-226	0.751		0.0557	0.144
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Americium-241	-0.00511	UJ	0.102	0.0441
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Plutonium-238	0.0982	UJ	0.13	0.0977
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Plutonium-239/240	0.00517	UJ	0.125	0.0589

Table 5-32. RBA-4 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Thorium-228	0.852	J	0.247	0.334
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Thorium-230	0.988	J	0.263	0.357
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Thorium-232	0.933	J	0.171	0.335
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Uranium-233/234	0.828	J	0.17	0.254
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Uranium-235/236	-0.0163	UJ	0.142	0.0524
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Uranium-238	0.524	J	0.139	0.202
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Radium-226	0.883		0.0752	0.168
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Americium-241	0.0277	UJ	0.101	0.0636
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Plutonium-238	0.064	UJ	0.115	0.0794
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Plutonium-239/240	0.019	UJ	0.0905	0.0522
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Thorium-228	0.815	J	0.213	0.314
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Thorium-230	1.12	J	0.279	0.371
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Thorium-232	0.919	J	0.115	0.32
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Uranium-233/234	0.727		0.0647	0.112
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Uranium-235/236	0.0354	U	0.0387	0.0328
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Uranium-238	0.658		0.0503	0.105
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Radium-226	0.611		0.0773	0.149
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Americium-241	-0.0124	UJ	0.143	0.055
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Plutonium-238	0.0547	UJ	0.213	0.124
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Plutonium-239/240	0.085	UJ	0.213	0.138
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Thorium-228	0.688	J	0.266	0.313
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Thorium-230	0.626	J	0.304	0.307
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Thorium-232	0.684	J	0.194	0.298
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Uranium-233/234	0.602	J	0.112	0.176
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Uranium-235/236	0.0139	UJ	0.106	0.0556
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Uranium-238	0.468	J	0.0997	0.155
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Radium-226	0.933		0.105	0.181
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Americium-241	-0.0263	UJ	0.362	0.16
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Plutonium-238	0.0814	UJ	0.238	0.14
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Plutonium-239/240	0.0431	UJ	0.168	0.0978
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Thorium-228	0.729	J	0.191	0.281
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Thorium-230	0.653	J	0.222	0.27
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Thorium-232	0.684	J	0.145	0.265
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Uranium-233/234	0.693		0.0896	0.168
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Uranium-235/236	0.0619		0.0371	0.06
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Uranium-238	0.593		0.0626	0.154
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Radium-226	0.552		0.107	0.144
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Americium-241	-0.0237	U	0.103	0.0377
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Plutonium-238	-0.0399	UJ	0.351	0.135
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Plutonium-239/240	0.132	UJ	0.286	0.196
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Thorium-228	0.733	J	0.28	0.424
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Thorium-230	0.461	J	0.435	0.371
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Thorium-232	0.885	J	0.399	0.472
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Uranium-233/234	0.528	J	0.0985	0.123
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Uranium-235/236	0.0611		0.0584	0.0518
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Uranium-238	0.488		0.076	0.114
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Radium-226	0.729		0.1	0.179
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Americium-241	-0.0417	UJ	0.302	0.113
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Plutonium-238	0.0569	UJ	0.187	0.109
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Plutonium-239/240	0.136	UJ	0.173	0.125
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Thorium-228	0.703	J	0.606	0.459
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Thorium-230	0.408	UJ	0.495	0.353
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Thorium-232	0.428	J	0.393	0.325
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Uranium-233/234	0.537		0.0852	0.142

Table 5-32. RBA-4 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Uranium-235/236	0.0586	U	0.0694	0.0591
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Uranium-238	0.579		0.0816	0.146
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Radium-226	0.534		0.0928	0.138
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Americium-241	-0.065	UJ	0.252	0.074
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Plutonium-238	0.0559	UJ	0.328	0.175
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Plutonium-239/240	0.0457	UJ	0.342	0.176
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Thorium-228	0.756	J	0.523	0.481
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Thorium-230	0.793	J	0.431	0.465
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Thorium-232	0.57	J	0.291	0.384
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Uranium-233/234	0.419	J	0.114	0.129
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Uranium-235/236	0.0206	U	0.0786	0.0493
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Uranium-238	0.399		0.0796	0.12
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Radium-226	0.553	J	0.0974	0.129
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Americium-241	-0.0146	UJ	0.168	0.0645
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Plutonium-238	-0.00944	UJ	0.189	0.0814
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Plutonium-239/240	0.011	UJ	0.24	0.115
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Thorium-228	0.592	J	0.297	0.357
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Thorium-230	0.625	J	0.357	0.373
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Thorium-232	1.02	J	0.235	0.443
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Uranium-233/234	0.68	J	0.115	0.181
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Uranium-235/236	0.0567	J	0.0425	0.0629
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Uranium-238	0.667	J	0.0934	0.177
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Radium-226	0.719		0.0862	0.164
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Americium-241	0.0177	UJ	0.441	0.209
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Plutonium-238	0.163	UJ	0.165	0.166
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Plutonium-239/240	0.0686	UJ	0.103	0.118
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Thorium-228	0.565	J	0.268	0.319
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Thorium-230	0.427	J	0.366	0.305
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Thorium-232	0.913	J	0.246	0.388
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Uranium-233/234	0.616		0.0977	0.148
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Uranium-235/236	0.0509	U	0.0724	0.0557
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Uranium-238	0.61		0.0724	0.144
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Radium-226	0.539		0.0703	0.125
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Americium-241	-0.0223	UJ	0.195	0.0753
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Plutonium-238	-0.00719	UJ	0.144	0.062
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Plutonium-239/240	0.0239	UJ	0.21	0.107
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Thorium-228	0.358	UJ	0.364	0.291
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Thorium-230	0.874	J	0.357	0.405
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Thorium-232	1.04	J	0.233	0.417
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Uranium-233/234	0.567		0.108	0.134
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Uranium-235/236	0.00846	U	0.0811	0.0439
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Uranium-238	0.657		0.0986	0.141
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Radium-226	0.549		0.0834	0.138
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Americium-241	-0.0621	UJ	0.386	0.151
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Plutonium-238	0.0364	UJ	0.142	0.0826
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Plutonium-239/240	0.0267	UJ	0.157	0.0837
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Thorium-228	0.859	J	0.186	0.333
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Thorium-230	0.241	UJ	0.247	0.204
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Thorium-232	0.47	J	0.185	0.25
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Uranium-233/234	0.527	J	0.113	0.131
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Uranium-235/236	0.0168	U	0.103	0.0569
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Uranium-238	0.528		0.0908	0.126
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Radium-226	0.504	J	0.139	0.136
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Americium-241	-0.0196	UJ	0.423	0.201

Table 5-32. RBA-4 - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Plutonium-238	-0.0322	UJ	0.221	0.0745
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Plutonium-239/240	0.0442	UJ	0.26	0.139
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Thorium-228	0.453	UJ	0.46	0.368
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Thorium-230	0.355	UJ	0.478	0.344
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Thorium-232	0.592	J	0.385	0.383
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Uranium-233/234	0.554		0.137	0.195
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Uranium-235/236	-0.00159	U	0.138	0.0616
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Uranium-238	0.371		0.152	0.167

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

J - Analyte present. Reported value may or may not be accurate or precise

pCi/g - picocurie per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-33. RBA-4 - Gas Flow Proportional Counting Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-FILL13-0919	09/04/2019 09:20	Strontium-90	-0.0988	U	0.148	0.0763
HPRBA4-FILL18-0819	08/21/2019 09:25	Strontium-90	-0.0832	U	0.141	0.0564
HPRBA4-FILL19-0819	08/21/2019 10:45	Strontium-90	-0.0164	U	0.133	0.0644
HPRBA4-FILL20-0819	08/21/2019 11:35	Strontium-90	0.00164	U	0.134	0.0694
HPRBA4-FILL21-0919	09/04/2019 11:10	Strontium-90	-0.0194	U	0.127	0.061
HPRBA4-FILL24-0819	08/21/2019 13:25	Strontium-90	0.0834	U	0.141	0.0857
HPRBA4-FILL25-0919	09/04/2019 10:20	Strontium-90	-0.0417	U	0.147	0.0699
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Strontium-90	-0.0468	U	0.149	0.0755
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Strontium-90	0.0126	U	0.144	0.0771
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Strontium-90	0.0564	U	0.146	0.0858
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Strontium-90	-0.0229	U	0.142	0.0749
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Strontium-90	-0.0339	U	0.146	0.0812
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Strontium-90	0.0642	U	0.145	0.0852
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Strontium-90	-0.112	U	0.148	0.0761
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Strontium-90	-0.0751	U	0.144	0.0694
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Strontium-90	-0.0951	U	0.148	0.0751
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Strontium-90	-0.076	U	0.147	0.0787
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Strontium-90	-0.0193	U	0.139	0.0698
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Strontium-90	0.036	U	0.134	0.0745
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Strontium-90	0.0242	U	0.142	0.0783
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Strontium-90	0.00477	U	0.147	0.083
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Strontium-90	-0.0458	U	0.14	0.0672
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Strontium-90	-0.0472	U	0.142	0.0653
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Strontium-90	0.0313	U	0.146	0.0819
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Strontium-90	0.108	U	0.143	0.0893
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Strontium-90	0.0622	U	0.147	0.0855
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Strontium-90	-0.033	U	0.148	0.0739
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Strontium-90	-0.0431	U	0.147	0.0651
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Strontium-90	0.0312	U	0.141	0.0779
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Strontium-90	-0.0105	U	0.147	0.0819
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Strontium-90	-0.0249	U	0.143	0.0703
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Strontium-90	0.0501	U	0.144	0.0829
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Strontium-90	0.0276	U	0.14	0.0767
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Strontium-90	0.00895	U	0.148	0.0789
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Strontium-90	0.0691	U	0.148	0.0872
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Strontium-90	0.0235	U	0.146	0.0793
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Strontium-90	0.0151	U	0.138	0.0744
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Strontium-90	0.0576	U	0.14	0.0814
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Strontium-90	-0.022	U	0.146	0.0795
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Strontium-90	0.0158	U	0.138	0.0744
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Strontium-90	0.0887	U	0.148	0.0896
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Strontium-90	0.0359	U	0.125	0.0706
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Strontium-90	-0.0709	U	0.14	0.0601
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Strontium-90	0.0376	U	0.143	0.0805

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

pCi/g - picocurie per gram

U - Not Detected

Table 5-34. RBA-4 -Radon Emanation Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBA4-FILL13-0919	09/04/2019 09:20	Radium-226	0.754		0.113	0.179
HPRBA4-FILL18-0819	08/21/2019 09:25	Radium-226	1.2		0.21	0.265
HPRBA4-FILL19-0819	08/21/2019 10:45	Radium-226	0.507		0.19	0.177
HPRBA4-FILL20-0819	08/21/2019 11:35	Radium-226	1.09		0.122	0.237
HPRBA4-FILL21-0919	09/04/2019 11:10	Radium-226	0.716		0.133	0.176
HPRBA4-FILL24-0819	08/21/2019 13:25	Radium-226	0.608		0.0913	0.17
HPRBA4-FILL25-0919	09/04/2019 10:20	Radium-226	0.393		0.0813	0.13
HPRBA4-SB01-0102-0919	09/04/2019 14:17	Radium-226	0.29		0.123	0.119
HPRBA4-SB01-0304-0919	09/04/2019 14:19	Radium-226	0.303		0.156	0.137
HPRBA4-SB01P-0304-0919	09/04/2019 14:21	Radium-226	0.51		0.15	0.159
HPRBA4-SB05-0102-0919	09/04/2019 12:37	Radium-226	0.0724	U	0.0791	0.0608
HPRBA4-SB05-0304-0919	09/04/2019 12:39	Radium-226	0.443		0.133	0.148
HPRBA4-SB13-0304-0919	09/04/2019 09:24	Radium-226	1.62		0.158	0.306
HPRBA4-SB25-0102-0919	09/04/2019 10:24	Radium-226	0.333		0.182	0.151
HPRBA4-SB25-0304-0919	09/04/2019 10:26	Radium-226	0.295		0.121	0.119
HPRBA4-SB25P-0304-0919	09/04/2019 10:28	Radium-226	0.37		0.138	0.137
HPRBA4-SS01-000H-0919	09/04/2019 14:15	Radium-226	0.567		0.177	0.18
HPRBA4-SS02-000H-0819	08/20/2019 16:45	Radium-226	0.488		0.117	0.15
HPRBA4-SS03-000H-0819	08/21/2019 14:40	Radium-226	0.467		0.153	0.159
HPRBA4-SS04-000H-0819	08/21/2019 14:20	Radium-226	0.667		0.184	0.222
HPRBA4-SS05-000H-0919	09/04/2019 12:35	Radium-226	0.372		0.198	0.168
HPRBA4-SS06-000H-0819	08/20/2019 10:15	Radium-226	0.952		0.148	0.22
HPRBA4-SS07-000H-0819	08/20/2019 12:00	Radium-226	0.757		0.142	0.216
HPRBA4-SS08-000H-0819	08/20/2019 13:45	Radium-226	1.17		0.144	0.25
HPRBA4-SS09-000H-0819	08/20/2019 14:05	Radium-226	0.707		0.153	0.19
HPRBA4-SS10-000H-0819	08/20/2019 14:30	Radium-226	0.911		0.142	0.211
HPRBA4-SS10P-000H-0819	08/20/2019 14:32	Radium-226	0.888		0.243	0.26
HPRBA4-SS11-000H-0819	08/20/2019 16:15	Radium-226	1.12		0.155	0.243
HPRBA4-SS12-000H-0819	08/20/2019 15:50	Radium-226	1.14		0.0875	0.226
HPRBA4-SS13-000H-0919	09/04/2019 09:22	Radium-226	0.927		0.117	0.2
HPRBA4-SS14-000H-0819	08/20/2019 15:20	Radium-226	1.4		0.18	0.273
HPRBA4-SS15-000H-0819	08/20/2019 14:55	Radium-226	1.01		0.111	0.217
HPRBA4-SS16-000H-0819	08/21/2019 08:25	Radium-226	0.77		0.155	0.214
HPRBA4-SS16P-000H-0819	08/21/2019 08:27	Radium-226	0.637		0.208	0.212
HPRBA4-SS17-000H-0819	08/21/2019 08:50	Radium-226	0.753		0.187	0.219
HPRBA4-SS18-000H-0819	08/21/2019 10:10	Radium-226	0.0139	U	0.133	0.0608
HPRBA4-SS19-000H-0819	08/21/2019 11:10	Radium-226	0.744		0.123	0.198
HPRBA4-SS19P-000H-0819	08/21/2019 11:12	Radium-226	1.46		0.238	0.316
HPRBA4-SS20-000H-0819	08/21/2019 11:55	Radium-226	0.482		0.168	0.164
HPRBA4-SS21-000H-0919	09/04/2019 11:20	Radium-226	0.904		0.173	0.215
HPRBA4-SS22-000H-0819	08/20/2019 11:00	Radium-226	0.626		0.17	0.187
HPRBA4-SS23-000H-0819	08/20/2019 11:30	Radium-226	0.799		0.128	0.209
HPRBA4-SS24-000H-0819	08/21/2019 13:50	Radium-226	1.4		0.214	0.287
HPRBA4-SS25-000H-0919	09/04/2019 10:22	Radium-226	0.68		0.127	0.174

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

pCi/g - picocurie per gram

U - Not Detected

Table 5-35. RBA-4 - Summary of Combined Analytical Results

Former Hunters Point Naval Shipyard Background Study Report, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	37 / 39	-0.000588	1.52	0.817	0.327	0.0523	0.857
	Am-241	0/39	-0.156	0.0553	-0.0138	0.0496	0.00795	-0.00493
	Bi-212	29 / 39	-0.0943	1.88	0.893	0.557	0.0891	1
	Bi-214	38 / 39	-0.000382	1.15	0.68	0.24	0.0384	0.717
	Co-60	0 / 39	-0.0218	0.0678	0.00231	0.0164	0.00263	0
	Cs-137	1 / 39	-0.021	0.477	0.0135	0.077	0.0123	0.00163
	Eu-152	0/39	-0.0589	0.0724	-0.00472	0.0355	0.00568	-0.00772
	Eu-154	0/39	-0.0714	0.0992	0.00198	0.0431	0.0069	-0.00557
	Eu-155	0/39	-0.0372	0.117	0.032	0.0347	0.00556	0.031
	K-40	38 / 39	-0.11	26.7	15.64	6.613	1.059	16.3
	Pa-231	0/39	-0.142	0.529	0.121	0.191	0.0306	0
	Pa-234	0/39	-0.262	0.422	-0.0294	0.121	0.0194	-0.0417
	Pa-234m	0/39	-4.02	4.73	0.579	1.953	0.313	0.168
	Pb-212	38 / 39	0	1.65	0.909	0.343	0.0549	0.963
	Pb-214	37 / 39	0	1.45	0.81	0.332	0.0532	0.859
	Ra-223	0/39	-0.629	0.457	-0.0136	0.23	0.0369	0.0206
	Ra-224	25 / 39	0	2.42	1.032	0.737	0.118	1.09
	Ra-226	38 / 39	-0.000382	1.15	0.68	0.24	0.0384	0.717
	Tl-208	38 / 39	-0.00816	0.456	0.2549703	0.099355	0.0159095	0.265
	Th-227	0/39	-0.155	0.108	0.0009684	0.0702	0.011241	0.000476
	Th-228	38 / 39	0	1.65	0.9093077	0.34273	0.0548808	0.963
	Th-232	37 / 39	-0.000588	1.52	0.8165747	0.326632	0.052303	0.857
Alpha Spectroscopy	Am-241	0/39	-0.121	0.137	0.0122	0.0553	0.00886	-0.00485
	Pu-238	0/39	-0.0399	0.174	0.0253	0.0482	0.00772	0.0242
	Pu-239/240	0/39	-0.0743	0.132	0.0161	0.0445	0.00713	0.0176
	Ra-226	38 / 39	0.0764	1.41	0.683	0.262	0.0419	0.64
	Th-228	30 / 39	0.0696	1.44	0.682	0.31	0.0496	0.697
	Th-230	32 / 39	0.0619	1.44	0.656	0.312	0.05	0.625
	Th-232	35 / 39	-0.0000716	1.44	0.656	0.301	0.0482	0.635
	U-233/234	38 / 39	0.0364	1.16	0.597	0.244	0.0391	0.602
	U-235/236	7 / 39	-0.0163	0.129	0.0426	0.0343	0.00549	0.0332
	U-238	37 / 39	0.0145	1.11	0.554	0.239	0.0382	0.528
Gas Flow Proportional Counting	Sr-90	0/39	-0.112	0.108	-0.00223	0.0537	0.00861	0.00164
Radon Emanation	Ra-226	37 / 39	0.0139	1.62	0.73	0.366	0.0586	0.716

Notes:

pCi/g - picocurie per gram

Table 5-36. RBA-4 - Summary of Fill Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	7/7	0.8	1.15	1.026	0.157	0.0592	1.09
	Am-241	0/7	-0.156	0.0163	-0.0347	0.0572	0.0216	-0.0148
	Bi-212	6/7	0	1.79	1.079	0.588	0.222	1.05
	Bi-214	7/7	0.559	0.9	0.768	0.107	0.0404	0.782
	Co-60	0/7	-0.0182	0.0678	0.00983	0.0284	0.0107	0.00253
	Cs-137	0/7	-0.021	0.012	-0.00313	0.0122	0.00461	0.00000211
	Eu-152	0/7	-0.0577	0.0392	-0.0013	0.0354	0.0134	0.0106
	Eu-154	0/7	-0.0423	0.0864	0.0163	0.0411	0.0155	0.0215
	Eu-155	0/7	-0.0092	0.117	0.045	0.0442	0.0167	0.0434
	K-40	7/7	19.1	25	22.57	2.106	0.796	23.5
	Pa-231	0/7	0	0.369	0.0967	0.166	0.0628	0
	Pa-234	0/7	-0.26	0.0451	-0.0883	0.113	0.0428	-0.135
	Pa-234m	0/7	-4.02	3	0.168	2.195	0.83	0.168
	Pb-212	7/7	0.949	1.27	1.134	0.105	0.0399	1.13
	Pb-214	7/7	0.731	0.936	0.87	0.0744	0.0281	0.902
	Ra-223	0/7	-0.609	0.229	-0.0659	0.274	0.103	0.0171
	Ra-224	6/7	0	2.05	1.461	0.688	0.26	1.58
	Ra-226	7/7	0.559	0.9	0.768	0.107	0.0404	0.782
	Tl-208	7/7	0.265	0.416	0.345	0.0465	0.0176	0.353
	Th-227	0/7	-0.155	0.104	-0.0169	0.0908	0.0343	-0.00342
	Th-228	7/7	0.949	1.27	1.134	0.105	0.0399	1.13
	Th-232	7/7	0.8	1.15	1.026	0.157	0.0592	1.09
Alpha Spectroscopy	Am-241	0/7	-0.0178	0.0815	0.0271	0.0393	0.0148	0.0156
	Pu-238	0/7	-0.0173	0.0486	0.0261	0.0264	0.00996	0.0358
	Pu-239	0/7	-0.0297	0.0907	0.019	0.0458	0.0173	0.00585
	Ra-226	7/7	0.515	1	0.769	0.165	0.0623	0.748
	Th-228	7/7	0.615	1.26	0.852	0.211	0.0796	0.838
	Th-230	7/7	0.526	0.976	0.762	0.168	0.0635	0.748
	Th-232	7/7	0.551	1.07	0.793	0.184	0.0695	0.761
	U-233	7/7	0.437	0.877	0.715	0.157	0.0594	0.691
	U-235	2/7	0.0186	0.109	0.0558	0.0344	0.013	0.0576
	U-238	7/7	0.502	0.783	0.619	0.109	0.0412	0.586
Gas Flow Proportional Counting	Sr-90	0/7	-0.0988	0.0834	-0.0249	0.0601	0.0227	-0.0194
Radon Emanation	Ra-226	7/7	0.393	1.2	0.753	0.296	0.112	0.716

Notes:

pCi/g - picocurie per gram

Table 5-37. RBA-4 - Summary of Surface Soil Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	24/25	0.327	1.52	0.852	0.299	0.0598	0.863
	Am-241	0/25	-0.106	0.0499	-0.0171	0.0477	0.00954	-0.00799
	Bi-212	19/25	0	1.88	0.955	0.536	0.107	1.01
	Bi-214	25/25	0.402	1.15	0.721	0.204	0.0408	0.717
	Co-60	0/25	-0.0218	0.0297	0.00198	0.0132	0.00263	0.0016
	Cs-137	1/25	-0.016	0.477	0.0229	0.0954	0.0191	0.00286
	Eu-152	0/25	-0.0589	0.0724	-0.00762	0.0351	0.00703	-0.0181
	Eu-154	0/25	-0.0714	0.0992	-0.00101	0.0451	0.00902	-0.00747
	Eu-155	0/25	-0.0372	0.114	0.0326	0.0352	0.00705	0.0361
	K-40	25/25	8.07	23.3	15.86	4.244	0.849	15
	Pa-231	0/25	-0.117	0.529	0.152	0.209	0.0418	0
	Pa-234	0/25	-0.262	0.422	-0.0121	0.135	0.0269	-0.0417
	Pa-234m	0/25	-2.67	3.84	0.477	1.79	0.358	0
	Pb-212	25/25	0.559	1.65	0.956	0.295	0.0591	0.963
	Pb-214	24/25	0	1.45	0.879	0.309	0.0617	0.877
	Ra-223	0/25	-0.629	0.261	-0.00778	0.214	0.0429	-0.00454
	Ra-224	16/25	0	2.42	1.003	0.736	0.147	1.06
	Ra-226	25/25	0.402	1.15	0.721	0.204	0.0408	0.717
	Tl-208	25/25	0.156	0.456	0.262	0.0814	0.0163	0.265
	Th-227	0/25	-0.137	0.108	0.000462	0.0698	0.014	0.00551
	Th-228	25/25	0.559	1.65	0.956	0.295	0.0591	0.963
	Th-232	24/25	0.327	1.52	0.852	0.299	0.0598	0.863
Alpha Spectroscopy	Am-241	0/25	-0.065	0.137	0.00544	0.0529	0.0106	-0.0124
	Pu-238	0/25	-0.0399	0.174	0.0269	0.0552	0.011	0.0236
	Pu-239/240	0/25	-0.0743	0.132	0.0235	0.0444	0.00888	0.0247
	Ra-226	25/25	0.387	1.41	0.703	0.237	0.0475	0.64
	Th-228	21/25	0.26	1.4	0.691	0.261	0.0521	0.709
	Th-230	22/25	0.149	1.44	0.667	0.31	0.062	0.625
	Th-232	24/25	0.0851	1.44	0.713	0.289	0.0578	0.684
	U-233/234	25/25	0.31	1.16	0.629	0.215	0.043	0.602
	U-235/236	4/25	-0.0163	0.129	0.0335	0.0317	0.00634	0.0308
	U-238	25/25	0.277	1.11	0.601	0.21	0.042	0.554
Gas Flow Proportional Counting	Sr-90	0/25	-0.076	0.108	0.0121	0.0474	0.00948	0.0235
Radon Emanation	Ra-226	24/25	0.0139	1.4	0.793	0.318	0.0636	0.757

Notes:

pCi/g - picocurie per gram

Table 5-38. RBA-4 - Summary of Subsurface Soil Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	6/7	-0.000588	1.09	0.481	0.324	0.123	0.442
	Ac-241	0/7	-0.0445	0.0553	0.0187	0.038	0.0143	0.0305
	Bi-212	4/7	-0.0943	1.03	0.486	0.465	0.176	0.595
	Bi-214	6/7	-0.000382	1.09	0.444	0.324	0.122	0.42
	Co-60	0/7	-0.0155	0.0128	-0.00405	0.00989	0.00374	-0.00444
	Cs-137	0/7	-0.0119	0.00903	-0.00322	0.00773	0.00292	-0.00538
	Eu-152	0/7	-0.0543	0.0663	0.00222	0.041	0.0155	-0.00772
	Eu-154	0/7	-0.0525	0.0446	-0.0017	0.0405	0.0153	0.013
	Eu-155	0/7	0	0.0359	0.017	0.0158	0.00596	0.0247
	K-40	6/7	-0.11	26.7	7.904	8.628	3.261	5.94
	Pa-231	0/7	-0.142	0.265	0.0313	0.124	0.047	0
	Pa-234	0/7	-0.0952	0.0207	-0.0324	0.0487	0.0184	-0.0119
	Pa-234m	0/7	-0.771	4.73	1.357	2.358	0.891	0.248
	Pb-212	6/7	0	1.25	0.518	0.37	0.14	0.45
	Pb-214	6/7	0.0448	1.4	0.501	0.42	0.159	0.421
	Ra-223	0/7	-0.387	0.457	0.0179	0.269	0.102	0.0758
	Ra-224	3/7	0	1.91	0.703	0.676	0.255	0.602
	Ra-226	6/7	-0.000382	1.09	0.444	0.324	0.122	0.42
	Tl-208	6/7	-0.00816	0.322	0.142	0.0963	0.0364	0.133
	Th-227	0/7	-0.0253	0.107	0.0207	0.0514	0.0194	0.00396
	Th-228	6/7	0	1.25	0.518	0.37	0.14	0.45
	Th-232	6/7	-0.000588	1.09	0.481	0.324	0.123	0.442
Alpha Spectroscopy	Am-241	0/7	-0.121	0.123	0.0217	0.0781	0.0295	0.0455
	Pu-238	0/7	-0.0254	0.0894	0.0187	0.0423	0.016	0.00135
	Pu-239/240	0/7	-0.0702	0.0189	-0.0131	0.0367	0.0139	0.00135
	Ra-226	6/7	0.0764	1.31	0.525	0.377	0.142	0.419
	Th-228	2/7	0.0696	1.44	0.477	0.457	0.173	0.304
	Th-230	3/7	0.0619	1.27	0.512	0.41	0.155	0.406
	Th-232	4/7	-0.0000716	0.519	0.314	0.184	0.0696	0.327
	U-233/234	6/7	0.0364	0.953	0.363	0.289	0.109	0.305
	U-235/236	1/7	0.0194	0.119	0.0617	0.0354	0.0134	0.0533
	U-238	5/7	0.0145	0.944	0.32	0.308	0.116	0.267
Gas Flow Proportional Counting	Sr-90	0/7	-0.112	0.0642	-0.0306	0.0574	0.0217	-0.0339
Radon Emanation	Ra-226	6/7	0.0724	1.62	0.479	0.515	0.195	0.303

Notes:

pCi/g - picocurie per gram

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Actinium-228	1.08		0.133	0.228
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Americium-241	-0.0201	U	0.17	0.0986
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Bismuth-212	1.56		0.494	0.694
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Bismuth-214	0.588		0.0749	0.122
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Cesium-137	-0.00766	U	0.0404	0.0225
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Cobalt-60	-0.00379	U	0.0468	0.0244
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Europium-152	-0.0376	U	0.0958	0.0596
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Europium-154	0.0232	U	0.154	0.0758
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Europium-155	0.0404	U	0.112	0.0583
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Lead-212	0.815		0.0604	0.0905
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Lead-214	0.657		0.0819	0.126
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Potassium-40	11.6		0.328	1.03
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Protactinium-231	0.109	U	0.591	0.33
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Protactinium-234	0.0212	U	0.383	0.207
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Protactinium-234m	-3.5	U	4.31	2.6
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Radium-223	-0.2	U	0.67	0.413
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Radium-224	1.34		0.648	1.05
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Radium-226	0.588		0.0749	0.122
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Thallium-208	0.235		0.0414	0.0652
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Thorium-227	0.0546	U	0.3	0.152
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Thorium-228	0.815		0.0604	0.0905
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Thorium-232	1.08		0.133	0.228
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Actinium-228	0.943		0.148	0.23
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Americium-241	-0.0107	U	0.231	0.134
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Bismuth-212	0.49	U	0.695	0.333
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Bismuth-214	0.687		0.0704	0.118
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Cesium-137	0	UJ	0.0403	0.0502
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Cobalt-60	-0.0058	U	0.0391	0.0218
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Europium-152	-0.0374	U	0.0975	0.0552
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Europium-154	0.059	U	0.144	0.0702
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Europium-155	0.077	U	0.116	0.0599
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Lead-212	0.931		0.0593	0.0902
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Lead-214	0.753		0.186	0.112
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Potassium-40	12.6		0.367	0.978
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Protactinium-231	0	UJ	0.444	0.466
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Protactinium-234	0.00233	U	0.339	0.205
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Protactinium-234m	0.407	U	5.42	3.92
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Radium-223	-0.203	U	0.644	0.405
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Radium-224	1.15		0.635	0.949
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Radium-226	0.687		0.0704	0.118
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Thallium-208	0.235		0.0378	0.0538
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Thorium-227	0.0228	U	0.272	0.142
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Thorium-228	0.931		0.0593	0.0902
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Thorium-232	0.943		0.148	0.23
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Actinium-228	0.833		0.172	0.233
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Americium-241	0.0271	U	0.316	0.159
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Bismuth-212	0.705		0.597	0.631
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Bismuth-214	0.566		0.0777	0.126
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Cesium-137	0.0162	U	0.0454	0.023
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Cobalt-60	-0.00223	U	0.0441	0.0229
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Europium-152	0.0112	U	0.119	0.0633
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Europium-154	0.0025	U	0.14	0.0723
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Europium-155	0.0458	U	0.139	0.172

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Lead-212	0.836		0.066	0.0862
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Lead-214	0.766		0.0791	0.141
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Potassium-40	12.2		0.57	1.17
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Protactinium-231	0.32	U	0.584	0.346
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Protactinium-234	-0.00787	U	0.325	0.167
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Protactinium-234m	2.12	U	6.38	3.13
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Radium-223	0.193	U	0.783	0.408
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Radium-224	0	UJ	0.707	1.16
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Radium-226	0.566		0.0777	0.126
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Thallium-208	0.245		0.0422	0.0598
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Thorium-227	-0.00264	U	0.291	0.156
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Thorium-228	0.836		0.066	0.0862
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Thorium-232	0.833		0.172	0.233
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Actinium-228	0.813		0.15	0.224
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Americium-241	0.129	U	0.306	0.162
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Bismuth-212	0.982		0.569	0.611
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Bismuth-214	0.635		0.081	0.127
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Cesium-137	0.0176	U	0.0485	0.0248
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Cobalt-60	-0.0175	U	0.0457	0.0265
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Europium-152	0.0185	U	0.116	0.0641
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Europium-154	0.0544	U	0.157	0.0748
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Europium-155	0.0295	U	0.134	0.0672
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Lead-212	0.86		0.063	0.0924
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Lead-214	0.742		0.0854	0.126
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Potassium-40	13.4		0.452	1.09
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Protactinium-231	0.345	U	0.518	0.536
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Protactinium-234	0.00287	U	0.303	0.153
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Protactinium-234m	2.42	U	6.64	3.26
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Radium-223	0.0196	U	0.737	0.394
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Radium-224	1.26		0.675	1.19
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Radium-226	0.635		0.081	0.127
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Thallium-208	0.25		0.0373	0.0629
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Thorium-227	-0.111	U	0.275	0.154
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Thorium-228	0.86		0.063	0.0924
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Thorium-232	0.813		0.15	0.224
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Actinium-228	0.77		0.128	0.192
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Americium-241	0.00683	U	0.128	0.0678
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Bismuth-212	0.782		0.468	0.549
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Bismuth-214	0.606		0.0586	0.0935
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Cesium-137	0.073		0.0324	0.0416
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Cobalt-60	-0.00648	U	0.0411	0.0219
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Europium-152	0.0276	U	0.0982	0.0742
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Europium-154	0.0553	U	0.14	0.065
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Europium-155	0.0187	U	0.0952	0.0481
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Lead-212	0.855		0.0494	0.0794
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Lead-214	0.757		0.176	0.107
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Potassium-40	11.8		0.348	0.995
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Protactinium-231	0	UJ	0.449	0.482
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Protactinium-234	-0.0226	U	0.268	0.165
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Protactinium-234m	-0.367	U	5.03	2.68
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Radium-223	-0.119	U	0.589	0.34
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Radium-224	0.95		0.529	0.894
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Radium-226	0.606		0.0586	0.0935

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Thallium-208	0.25		0.034	0.0498
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Thorium-227	-0.0301	U	0.234	0.131
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Thorium-228	0.855		0.0494	0.0794
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Thorium-232	0.77		0.128	0.192
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Actinium-228	0.769		0.138	0.185
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Americium-241	-0.0272	U	0.304	0.155
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Bismuth-212	0.68	U	0.798	0.37
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Bismuth-214	0.653		0.0836	0.14
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Cesium-137	-0.0179	U	0.0394	0.0234
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Cobalt-60	0.0113	U	0.0503	0.0238
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Europium-152	0.00863	U	0.115	0.0582
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Europium-154	0.00191	U	0.155	0.0923
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Europium-155	0.05	U	0.13	0.145
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Lead-212	0.924		0.0669	0.0958
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Lead-214	0.763		0.0858	0.138
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Potassium-40	11.3		0.482	1.09
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Protactinium-231	0	UJ	0.5	0.55
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Protactinium-234	-0.0824	U	0.307	0.166
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Protactinium-234m	-2.49	U	5.65	3.29
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Radium-223	0.277	U	0.805	0.431
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Radium-224	0	UJ	0.717	1.21
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Radium-226	0.653		0.0836	0.14
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Thallium-208	0.216		0.043	0.0541
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Thorium-227	-0.0402	U	0.32	0.184
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Thorium-228	0.924		0.0669	0.0958
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Thorium-232	0.769		0.138	0.185
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Actinium-228	0.652		0.163	0.195
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Americium-241	-0.0923	U	0.17	0.0873
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Bismuth-212	0.545	U	0.729	0.342
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Bismuth-214	0.613		0.075	0.112
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Cesium-137	0.0596		0.0389	0.0371
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Cobalt-60	-0.000397	U	0.0419	0.0215
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Europium-152	-0.0408	U	0.0906	0.0558
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Europium-154	-0.00585	U	0.145	0.0772
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Europium-155	0	UJ	0.0926	0.101
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Lead-212	0.905		0.0552	0.0888
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Lead-214	0.771		0.077	0.123
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Potassium-40	10.8		0.463	1.08
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Protactinium-231	0	UJ	0.39	0.389
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Protactinium-234	-0.126	U	0.335	0.189
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Protactinium-234m	-0.858	U	5.37	2.93
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Radium-223	0.133	U	0.701	0.381
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Radium-224	0.484	U	0.592	0.756
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Radium-226	0.613		0.075	0.112
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Thallium-208	0.229		0.0401	0.0508
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Thorium-227	0.0955	U	0.273	0.142
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Thorium-228	0.905		0.0552	0.0888
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Thorium-232	0.652		0.163	0.195
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Actinium-228	0.851		0.121	0.194
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Americium-241	0.0211	U	0.108	0.0624
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Bismuth-212	1.25		0.403	0.621
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Bismuth-214	0.711		0.0626	0.115
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Cesium-137	0.0409		0.0346	0.0324

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Cobalt-60	-0.00318	U	0.0367	0.0194
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Europium-152	0.0503	U	0.102	0.0544
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Europium-154	0.01	U	0.109	0.0542
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Europium-155	0.0462	U	0.105	0.0557
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Lead-212	0.852		0.0588	0.0803
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Lead-214	0.66		0.0696	0.112
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Potassium-40	11.9		0.298	0.965
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Protactinium-231	-0.0615	U	0.507	0.388
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Protactinium-234	0.0276	U	0.313	0.159
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Protactinium-234m	0.0821	U	4.72	2.43
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Radium-223	0.0465	U	0.636	0.372
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Radium-224	1.05		0.63	0.933
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Radium-226	0.711		0.0626	0.115
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Thallium-208	0.239		0.0313	0.0477
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Thorium-227	-0.11	U	0.233	0.13
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Thorium-228	0.852		0.0588	0.0803
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Thorium-232	0.851		0.121	0.194
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Actinium-228	0.898		0.127	0.182
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Americium-241	0.0266	U	0.15	0.0836
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Bismuth-212	1.19		0.465	0.688
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Bismuth-214	0.68		0.0645	0.114
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Cesium-137	-0.00233	U	0.0386	0.0208
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Cobalt-60	0.0113	U	0.0455	0.0217
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Europium-152	0.014	U	0.102	0.0521
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Europium-154	-0.0614	U	0.108	0.0688
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Europium-155	0.00252	U	0.107	0.0598
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Lead-212	0.794		0.0541	0.0785
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Lead-214	0.84		0.07	0.116
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Potassium-40	11		0.376	0.978
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Protactinium-231	0	UJ	0.479	0.469
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Protactinium-234	-0.0165	U	0.288	0.156
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Protactinium-234m	-0.443	U	4.55	2.48
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Radium-223	-0.0219	U	0.667	0.363
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Radium-224	0	UJ	0.58	0.803
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Radium-226	0.68		0.0645	0.114
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Thallium-208	0.231		0.0351	0.0522
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Thorium-227	-0.0939	U	0.234	0.14
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Thorium-228	0.794		0.0541	0.0785
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Thorium-232	0.898		0.127	0.182
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Actinium-228	0.683		0.166	0.208
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Americium-241	0.0596	U	0.204	0.11
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Bismuth-212	0.689	U	0.706	0.592
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Bismuth-214	0.608		0.0753	0.113
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Cesium-137	0.00853	U	0.0492	0.0254
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Cobalt-60	0.0117	U	0.0544	0.0259
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Europium-152	-0.0631	U	0.107	0.0703
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Europium-154	0.0408	U	0.145	0.0664
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Europium-155	0.0848	U	0.149	0.0728
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Lead-212	0.793		0.065	0.084
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Lead-214	0.675		0.0818	0.121
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Potassium-40	12.6		0.375	1.09
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Protactinium-231	0	UJ	0.549	0.558
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Protactinium-234	-0.0277	U	0.374	0.205

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Protactinium-234m	0.322	U	6.53	3.55
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Radium-223	0.0378	U	0.709	0.423
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Radium-224	1.22		0.696	0.992
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Radium-226	0.608		0.0753	0.113
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Thallium-208	0.255		0.0491	0.0667
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Thorium-227	-0.155	U	0.273	0.155
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Thorium-228	0.793		0.065	0.084
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Thorium-232	0.683		0.166	0.208
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Actinium-228	0.812		0.135	0.204
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Americium-241	-0.0337	U	0.161	0.0863
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Bismuth-212	1.14		0.472	0.555
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Bismuth-214	0.541		0.0798	0.106
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Cesium-137	0.0173	U	0.0468	0.0233
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Cobalt-60	0.00713	U	0.0486	0.0236
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Europium-152	-0.00888	U	0.0965	0.0528
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Europium-154	-0.0143	U	0.129	0.0679
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Europium-155	0	UJ	0.11	0.171
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Lead-212	0.789		0.0591	0.0943
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Lead-214	0.66		0.073	0.113
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Potassium-40	12		0.333	1.04
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Protactinium-231	0	UJ	0.494	0.502
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Protactinium-234	0.0145	U	0.291	0.152
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Protactinium-234m	-1.96	U	5	3.08
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Radium-223	-0.0373	U	0.676	0.397
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Radium-224	0	UJ	0.633	1.02
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Radium-226	0.541		0.0798	0.106
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Thallium-208	0.251		0.04	0.0609
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Thorium-227	-0.171	U	0.228	0.129
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Thorium-228	0.789		0.0591	0.0943
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Thorium-232	0.812		0.135	0.204
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Actinium-228	0.704		0.13	0.196
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Americium-241	-0.0593	U	0.114	0.0713
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Bismuth-212	0.599		0.444	0.458
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Bismuth-214	0.588		0.0679	0.108
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Cesium-137	0.00571	U	0.0408	0.0219
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Cobalt-60	0.00856	U	0.0395	0.0188
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Europium-152	-0.00689	U	0.0924	0.052
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Europium-154	-0.0342	U	0.104	0.0589
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Europium-155	-0.0235	U	0.0972	0.061
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Lead-212	0.867		0.0533	0.0766
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Lead-214	0.748		0.176	0.114
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Potassium-40	12		0.313	1
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Protactinium-231	0	UJ	0.453	0.398
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Protactinium-234	-0.00591	U	0.269	0.157
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Protactinium-234m	-1.11	U	4.63	2.53
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Radium-223	0.14	U	0.629	0.358
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Radium-224	1.27		0.571	0.854
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Radium-226	0.588		0.0679	0.108
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Thallium-208	0.229		0.0353	0.0562
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Thorium-227	0.182	U	0.246	0.209
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Thorium-228	0.867		0.0533	0.0766
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Thorium-232	0.704		0.13	0.196
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Actinium-228	0.891		0.144	0.204

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Americium-241	0.00673	U	0.0492	0.0243
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Bismuth-212	1.12		0.504	0.523
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Bismuth-214	0.673		0.0732	0.104
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Cesium-137	0.017	U	0.0426	0.021
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Cobalt-60	0.00115	U	0.0433	0.0221
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Europium-152	0.0264	U	0.0999	0.054
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Europium-154	0.0161	U	0.131	0.0651
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Europium-155	0.0468	U	0.0803	0.0942
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Lead-212	0.848		0.0518	0.0739
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Lead-214	0.91		0.063	0.116
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Potassium-40	11.9		0.344	1.05
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Protactinium-231	0	UJ	0.354	0.358
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Protactinium-234	-0.057	U	0.314	0.179
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Protactinium-234m	0.427	U	5.11	2.85
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Radium-223	-0.178	U	0.53	0.34
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Radium-224	1.1		0.555	1.06
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Radium-226	0.673		0.0732	0.104
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Thallium-208	0.255		0.0367	0.0533
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Thorium-227	0	UJ	0.235	0.542
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Thorium-228	0.848		0.0518	0.0739
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Thorium-232	0.891		0.144	0.204
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Actinium-228	0.681		0.145	0.205
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Americium-241	0.0836	U	0.171	0.0884
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Bismuth-212	0.984		0.467	0.518
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Bismuth-214	0.674		0.0714	0.106
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Cesium-137	0.0691		0.0365	0.038
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Cobalt-60	0.024	U	0.052	0.0261
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Europium-152	0.0658	U	0.0913	0.0706
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Europium-154	-0.0222	U	0.141	0.0767
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Europium-155	0	UJ	0.101	0.134
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Lead-212	0.785		0.0601	0.0844
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Lead-214	0.81		0.195	0.117
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Potassium-40	11.9		0.345	1.05
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Protactinium-231	0.451	U	0.504	0.544
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Protactinium-234	-0.138	U	0.314	0.2
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Protactinium-234m	-0.757	U	5.26	2.83
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Radium-223	0.0361	U	0.66	0.352
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Radium-224	0	UJ	0.644	1.07
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Radium-226	0.674		0.0714	0.106
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Thallium-208	0.275		0.033	0.0564
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Thorium-227	0.0817	U	0.253	0.265
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Thorium-228	0.785		0.0601	0.0844
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Thorium-232	0.681		0.145	0.205
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Actinium-228	0.767		0.151	0.205
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Americium-241	-0.00906	U	0.26	0.151
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Bismuth-212	1.08		0.613	0.637
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Bismuth-214	0.482		0.0958	0.145
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Cesium-137	-0.00578	U	0.0419	0.0253
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Cobalt-60	-0.00531	U	0.0548	0.0303
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Europium-152	-0.0339	U	0.112	0.0629
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Europium-154	0.0226	U	0.153	0.0779
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Europium-155	0.0444	U	0.13	0.0693
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Lead-212	0.79		0.0741	0.127

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Lead-214	0.729		0.0779	0.13
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Potassium-40	12.5		0.411	1.14
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Protactinium-231	0.359	U	0.649	0.365
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Protactinium-234	-0.23	U	0.257	0.17
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Protactinium-234m	0.276	U	6.07	3.17
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Radium-223	0.0198	U	0.671	0.393
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Radium-224	1.01	U	1.06	0.756
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Radium-226	0.482		0.0958	0.145
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Thallium-208	0.256		0.0427	0.0563
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Thorium-227	0.0279	U	0.291	0.151
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Thorium-228	0.79		0.0741	0.127
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Thorium-232	0.767		0.151	0.205
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Actinium-228	0.792		0.191	0.253
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Americium-241	0.0358	U	0.303	0.164
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Bismuth-212	1.07		0.577	0.7
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Bismuth-214	0.763		0.0767	0.11
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Cesium-137	0.0265	U	0.0528	0.0307
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Cobalt-60	0.0103	U	0.0577	0.0291
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Europium-152	0.0522	U	0.125	0.0657
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Europium-154	0.0423	U	0.179	0.0903
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Europium-155	0.0398	U	0.147	0.0735
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Lead-212	0.829		0.0782	0.1
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Lead-214	0.728		0.207	0.132
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Potassium-40	12.6		0.46	1.18
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Protactinium-231	-0.227	U	0.604	0.355
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Protactinium-234	-0.0459	U	0.38	0.236
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Protactinium-234m	0.854	U	6.61	3.53
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Radium-223	-0.19	U	0.81	0.511
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Radium-224	1.37		0.838	1.13
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Radium-226	0.763		0.0767	0.11
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Thallium-208	0.215		0.0357	0.0718
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Thorium-227	-0.147	U	0.313	0.178
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Thorium-228	0.829		0.0782	0.1
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Thorium-232	0.792		0.191	0.253
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Actinium-228	0.718		0.159	0.205
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Americium-241	-0.0129	U	0.218	0.113
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Bismuth-212	1.02		0.549	0.566
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Bismuth-214	0.748		0.0799	0.117
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Cesium-137	0.0452		0.0395	0.0277
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Cobalt-60	-0.00967	U	0.0427	0.0231
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Europium-152	-0.011	U	0.104	0.054
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Europium-154	0.0443	U	0.154	0.073
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Europium-155	0.0796	U	0.127	0.0625
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Lead-212	0.865		0.0628	0.0917
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Lead-214	0.845		0.0902	0.136
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Potassium-40	12		0.392	1.05
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Protactinium-231	0	UJ	0.512	0.564
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Protactinium-234	-0.0213	U	0.311	0.169
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Protactinium-234m	1.98	U	6.83	3.4
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Radium-223	-0.0133	U	0.764	0.395
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Radium-224	1.17		0.672	0.825
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Radium-226	0.748		0.0799	0.117
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Thallium-208	0.203		0.0391	0.0576

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Thorium-227	0.117	U	0.308	0.164
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Thorium-228	0.865		0.0628	0.0917
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Thorium-232	0.718		0.159	0.205
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Actinium-228	0.815		0.151	0.163
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Americium-241	-0.0102	U	0.0512	0.033
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Bismuth-212	0	UJ	0.512	0.557
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Bismuth-214	0.56		0.0822	0.128
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Cesium-137	0.00582	U	0.0373	0.0211
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Cobalt-60	-0.0191	U	0.0336	0.0206
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Europium-152	0.0234	U	0.0911	0.0466
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Europium-154	0.0418	U	0.141	0.0747
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Europium-155	0.0453	U	0.0884	0.0443
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Lead-212	0.783		0.0509	0.0747
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Lead-214	0.76		0.187	0.114
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Potassium-40	11.6		0.405	1.02
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Protactinium-231	0	UJ	0.445	0.492
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Protactinium-234	-0.0444	U	0.324	0.17
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Protactinium-234m	0.508	U	5.38	2.71
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Radium-223	0.161	U	0.673	0.37
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Radium-224	1.21		0.546	0.832
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Radium-226	0.56		0.0822	0.128
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Thallium-208	0.26		0.0356	0.0471
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Thorium-227	-0.0248	U	0.219	0.125
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Thorium-228	0.783		0.0509	0.0747
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Thorium-232	0.815		0.151	0.163
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Actinium-228	0.77		0.136	0.178
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Americium-241	0.0521	U	0.271	0.16
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Bismuth-212	0.748		0.544	0.501
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Bismuth-214	0.614		0.0736	0.119
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Cesium-137	-0.00106	U	0.0435	0.0232
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Cobalt-60	0.00678	U	0.0433	0.0225
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Europium-152	-0.00701	U	0.102	0.0562
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Europium-154	-0.0203	U	0.116	0.0756
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Europium-155	-0.0033	U	0.114	0.0616
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Lead-212	0.892		0.0592	0.0881
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Lead-214	0.759		0.0753	0.111
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Potassium-40	11.5		0.389	0.958
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Protactinium-231	0	UJ	0.523	0.518
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Protactinium-234	-0.138	U	0.3	0.175
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Protactinium-234m	-0.0195	U	5.02	2.88
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Radium-223	-0.0738	U	0.664	0.413
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Radium-224	1.23		0.635	0.969
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Radium-226	0.614		0.0736	0.119
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Thallium-208	0.187		0.0348	0.0558
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Thorium-227	0.117	U	0.291	0.151
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Thorium-228	0.892		0.0592	0.0881
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Thorium-232	0.77		0.136	0.178
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Actinium-228	0.64		0.162	0.231
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Americium-241	0.147	U	0.264	0.139
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Bismuth-212	1.27	J	0.51	0.661
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Bismuth-214	0.529		0.0864	0.137
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Cesium-137	0	UJ	0.0374	0.0583
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Cobalt-60	0.00927	U	0.0538	0.0274

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Europium-152	0.085	U	0.109	0.092
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Europium-154	0.0599	U	0.172	0.0853
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Europium-155	0.0828	U	0.129	0.126
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Lead-212	0.955		0.0673	0.0985
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Lead-214	0.747		0.0807	0.128
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Potassium-40	12.1		0.406	1.08
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Protactinium-231	0.0472	U	0.586	0.321
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Protactinium-234	-0.127	U	0.261	0.18
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Protactinium-234m	1.24	U	6.43	5.03
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Radium-223	-0.217	U	0.743	0.462
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Radium-224	0.682	U	0.721	1.05
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Radium-226	0.529		0.0864	0.137
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Thallium-208	0.228		0.0393	0.0683
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Thorium-227	-0.0803	U	0.283	0.153
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Thorium-228	0.955		0.0673	0.0985
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Thorium-232	0.64		0.162	0.231
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Actinium-228	0.729		0.135	0.209
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Americium-241	0.0178	U	0.118	0.0568
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Bismuth-212	1.28		0.391	0.495
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Bismuth-214	0.605		0.063	0.112
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Cesium-137	0.00851	U	0.0424	0.0226
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Cobalt-60	0.00165	U	0.0314	0.015
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Europium-152	-0.0402	U	0.0843	0.0509
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Europium-154	-0.0306	U	0.113	0.0715
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Europium-155	-0.00339	U	0.0881	0.0451
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Lead-212	0.821		0.0489	0.0749
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Lead-214	0.706		0.0672	0.116
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Potassium-40	12.4		0.303	0.955
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Protactinium-231	0.345	U	0.428	0.381
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Protactinium-234	0.176	U	0.336	0.159
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Protactinium-234m	-1.09	U	4.85	2.68
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Radium-223	-0.224	U	0.568	0.368
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Radium-224	0.804		0.524	0.777
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Radium-226	0.605		0.063	0.112
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Thallium-208	0.245		0.0335	0.0463
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Thorium-227	0.121	U	0.242	0.122
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Thorium-228	0.821		0.0489	0.0749
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Thorium-232	0.729		0.135	0.209
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Actinium-228	0.965		0.154	0.189
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Americium-241	0.00739	U	0.19	0.102
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Bismuth-212	0	UJ	0.48	0.57
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Bismuth-214	0.721		0.0722	0.121
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Cesium-137	0.00234	U	0.043	0.0227
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Cobalt-60	0.00479	U	0.0531	0.027
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Europium-152	0.00245	U	0.0967	0.0489
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Europium-154	-0.0481	U	0.114	0.0669
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Europium-155	0.0574	U	0.118	0.0583
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Lead-212	0.82		0.0614	0.0884
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Lead-214	0.886		0.2	0.106
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Potassium-40	11.7		0.481	1.16
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Protactinium-231	0.442	U	0.502	0.487
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Protactinium-234	-0.0629	U	0.345	0.184
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Protactinium-234m	0.188	U	6.05	3.12

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Radium-223	0.0618	U	0.702	0.391
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Radium-224	0.594	U	0.658	1.1
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Radium-226	0.721		0.0722	0.121
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Thallium-208	0.247		0.0402	0.0542
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Thorium-227	0.019	U	0.265	0.146
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Thorium-228	0.82		0.0614	0.0884
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Thorium-232	0.965		0.154	0.189
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Actinium-228	0.918		0.135	0.185
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Americium-241	0.0117	U	0.165	0.0953
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Bismuth-212	0.856		0.53	0.457
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Bismuth-214	0.575		0.0828	0.123
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Cesium-137	0.00485	U	0.0485	0.0266
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Cobalt-60	-0.0136	U	0.0466	0.0311
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Europium-152	0.00835	U	0.107	0.0562
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Europium-154	0.0111	U	0.128	0.0652
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Europium-155	0.0631	U	0.13	0.0698
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Lead-212	0.831		0.0656	0.0826
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Lead-214	0.771		0.0869	0.126
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Potassium-40	11.1		0.411	0.976
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Protactinium-231	0.201	U	0.585	0.33
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Protactinium-234	-0.0164	U	0.349	0.184
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Protactinium-234m	3.36	U	6.02	6.71
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Radium-223	-0.133	U	0.717	0.439
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Radium-224	0.967		0.703	0.864
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Radium-226	0.575		0.0828	0.123
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Thallium-208	0.252		0.0371	0.0564
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Thorium-227	-0.0577	U	0.306	0.165
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Thorium-228	0.831		0.0656	0.0826
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Thorium-232	0.918		0.135	0.185
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Actinium-228	0.76		0.172	0.197
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Americium-241	-0.023	U	0.188	0.0985
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Bismuth-212	1.24		0.488	0.455
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Bismuth-214	0.672		0.0657	0.117
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Cesium-137	0.0451	U	0.0505	0.024
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Cobalt-60	0.0216	U	0.0522	0.024
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Europium-152	0.0321	U	0.102	0.0551
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Europium-154	-0.0287	U	0.114	0.0623
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Europium-155	0.0146	U	0.106	0.0558
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Lead-212	0.812		0.0535	0.0781
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Lead-214	0.786		0.184	0.114
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Potassium-40	12.3		0.244	0.978
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Protactinium-231	0	UJ	0.442	0.588
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Protactinium-234	-0.0534	U	0.286	0.162
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Protactinium-234m	-0.282	U	4.7	2.58
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Radium-223	-0.0694	U	0.63	0.367
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Radium-224	0	UJ	0.573	0.779
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Radium-226	0.672		0.0657	0.117
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Thallium-208	0.22		0.0355	0.0589
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Thorium-227	0.0376	U	0.24	0.131
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Thorium-228	0.812		0.0535	0.0781
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Thorium-232	0.76		0.172	0.197
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Actinium-228	0.826		0.134	0.169
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Americium-241	0.0295	U	0.114	0.0647

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Bismuth-212	1.15		0.444	0.407
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Bismuth-214	0.559		0.0702	0.101
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Cesium-137	0.0147	U	0.0354	0.0174
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Cobalt-60	-0.00974	U	0.0295	0.0167
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Europium-152	-0.0245	U	0.0864	0.0499
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Europium-154	0.00443	U	0.112	0.0652
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Europium-155	0.0749	U	0.103	0.0564
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Lead-212	0.829		0.0537	0.0777
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Lead-214	0.77		0.0699	0.125
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Potassium-40	12.1		0.256	0.936
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Protactinium-231	0	UJ	0.422	0.457
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Protactinium-234	-0.0562	U	0.292	0.157
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Protactinium-234m	-0.732	U	4.34	2.32
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Radium-223	0.0204	U	0.557	0.324
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Radium-224	0.928		0.575	0.899
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Radium-226	0.559		0.0702	0.101
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Thallium-208	0.245		0.0329	0.0527
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Thorium-227	-0.0261	U	0.235	0.124
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Thorium-228	0.829		0.0537	0.0777
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Thorium-232	0.826		0.134	0.169
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Actinium-228	0.993		0.139	0.221
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Americium-241	0.0185	U	0.137	0.0728
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Bismuth-212	0.938		0.497	0.52
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Bismuth-214	0.664		0.0643	0.109
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Cesium-137	0.02	U	0.0418	0.0206
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Cobalt-60	0.000561	U	0.0368	0.0184
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Europium-152	-0.0523	U	0.0803	0.0501
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Europium-154	0.0817	U	0.157	0.0734
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Europium-155	0.0288	U	0.0936	0.0478
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Lead-212	0.859		0.0495	0.0729
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Lead-214	0.792		0.0737	0.109
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Potassium-40	11.8		0.424	1.03
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Protactinium-231	0	UJ	0.403	0.412
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Protactinium-234	-0.123	U	0.253	0.154
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Protactinium-234m	0.774	U	5.04	2.87
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Radium-223	-0.104	U	0.563	0.356
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Radium-224	0.836		0.531	0.749
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Radium-226	0.664		0.0643	0.109
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Thallium-208	0.232		0.0334	0.0512
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Thorium-227	0.0573	U	0.236	0.128
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Thorium-228	0.859		0.0495	0.0729
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Thorium-232	0.993		0.139	0.221
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Actinium-228	0.787		0.102	0.228
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Americium-241	-0.0178	U	0.144	0.0822
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Bismuth-212	1.11		0.435	0.508
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Bismuth-214	0.546		0.0645	0.105
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Cesium-137	0.114		0.0308	0.0461
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Cobalt-60	-0.000917	U	0.0379	0.0192
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Europium-152	0.0348	U	0.0977	0.0479
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Europium-154	-0.056	U	0.101	0.0639
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Europium-155	0.0178	U	0.105	0.0567
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Lead-212	0.809		0.0514	0.0771
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Lead-214	0.826		0.0656	0.122

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Potassium-40	12.1		0.286	0.913
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Protactinium-231	0	UJ	0.42	0.412
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Protactinium-234	-0.0563	U	0.281	0.158
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Protactinium-234m	0.0176	U	4.24	2.4
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Radium-223	-0.126	U	0.588	0.309
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Radium-224	1.09		0.55	0.566
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Radium-226	0.546		0.0645	0.105
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Thallium-208	0.228		0.0299	0.0498
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Thorium-227	-0.0529	U	0.239	0.139
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Thorium-228	0.809		0.0514	0.0771
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Thorium-232	0.787		0.102	0.228
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Actinium-228	0.742		0.153	0.231
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Americium-241	-0.0263	U	0.165	0.0957
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Bismuth-212	0.761		0.535	0.588
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Bismuth-214	0.739		0.0717	0.125
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Cesium-137	-0.0172	U	0.0416	0.0243
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Cobalt-60	-0.0045	U	0.0445	0.0232
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Europium-152	-0.0358	U	0.0988	0.0541
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Europium-154	-0.0133	U	0.141	0.0743
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Europium-155	-0.0387	U	0.106	0.0599
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Lead-212	0.865		0.058	0.0916
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Lead-214	0.788		0.2	0.138
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Potassium-40	12		0.218	1.05
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Protactinium-231	0	UJ	0.48	0.759
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Protactinium-234	-0.0099	U	0.34	0.186
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Protactinium-234m	-1.98	U	5.21	2.85
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Radium-223	-0.287	U	0.687	0.388
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Radium-224	0.591	U	0.621	0.886
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Radium-226	0.739		0.0717	0.125
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Thallium-208	0.247		0.0334	0.0518
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Thorium-227	0.0482	U	0.284	0.149
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Thorium-228	0.865		0.058	0.0916
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Thorium-232	0.742		0.153	0.231
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Actinium-228	0.858		0.13	0.218
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Americium-241	-0.0164	U	0.0981	0.0571
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Bismuth-212	1.18		0.48	0.547
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Bismuth-214	0.736		0.0676	0.096
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Cesium-137	0.0209	U	0.0339	0.0234
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Cobalt-60	0.0132	U	0.0429	0.0205
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Europium-152	-0.0408	U	0.0813	0.046
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Europium-154	0.019	U	0.126	0.0639
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Europium-155	0.0591	U	0.0985	0.0502
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Lead-212	0.882		0.0575	0.0778
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Lead-214	0.764		0.0656	0.112
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Potassium-40	11.8		0.357	0.929
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Protactinium-231	0	UJ	0.402	0.38
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Protactinium-234	-0.0102	U	0.305	0.159
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Protactinium-234m	-1.04	U	4.73	2.66
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Radium-223	-0.154	U	0.571	0.349
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Radium-224	0.456	U	0.615	0.558
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Radium-226	0.736		0.0676	0.096
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Thallium-208	0.218		0.0328	0.0505
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Thorium-227	0.0413	U	0.251	0.141

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Thorium-228	0.882		0.0575	0.0778
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Thorium-232	0.858		0.13	0.218
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Actinium-228	0.675		0.167	0.188
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Americium-241	0.0468	U	0.0512	0.0571
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Bismuth-212	1.03		0.503	0.583
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Bismuth-214	0.604		0.0754	0.121
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Cesium-137	0	UJ	0.0424	0.0419
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Cobalt-60	-0.00456	U	0.0492	0.0264
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Europium-152	-0.00546	U	0.0943	0.049
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Europium-154	0.0562	U	0.164	0.0797
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Europium-155	0.0262	U	0.0858	0.044
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Lead-212	0.823		0.0527	0.0788
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Lead-214	0.803		0.189	0.117
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Potassium-40	12.1		0.428	1.13
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Protactinium-231	0	UJ	0.461	0.403
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Protactinium-234	-0.0299	U	0.273	0.14
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Protactinium-234m	2.41	U	5.7	2.67
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Radium-223	0.242	U	0.634	0.337
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Radium-224	0.431	U	0.708	0.824
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Radium-226	0.604		0.0754	0.121
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Thallium-208	0.278		0.0348	0.0541
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Thorium-227	-0.0432	U	0.219	0.127
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Thorium-228	0.823		0.0527	0.0788
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Thorium-232	0.675		0.167	0.188
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Actinium-228	0.819		0.164	0.227
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Americium-241	-0.0212	U	0.0479	0.0268
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Bismuth-212	0.484	U	0.503	0.457
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Bismuth-214	0.701		0.0642	0.111
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Cesium-137	0.0212	U	0.0426	0.0206
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Cobalt-60	-0.00815	U	0.0356	0.0224
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Europium-152	0.0308	U	0.0958	0.051
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Europium-154	-0.0282	U	0.109	0.06
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Europium-155	0.00163	U	0.0777	0.0409
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Lead-212	0.878		0.0481	0.0773
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Lead-214	0.851		0.185	0.129
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Potassium-40	12.8		0.308	1.05
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Protactinium-231	0.24	U	0.46	0.253
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Protactinium-234	-0.028	U	0.303	0.168
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Protactinium-234m	-0.00597	U	5.19	2.96
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Radium-223	0.0937	U	0.589	0.318
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Radium-224	0	UJ	0.516	0.79
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Radium-226	0.701		0.0642	0.111
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Thallium-208	0.233		0.0329	0.0544
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Thorium-227	-0.000862	U	0.231	0.127
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Thorium-228	0.878		0.0481	0.0773
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Thorium-232	0.819		0.164	0.227
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Actinium-228	0.853		0.201	0.254
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Americium-241	-0.00719	U	0.0748	0.0407
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Bismuth-212	1.11		0.618	0.826
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Bismuth-214	0.59		0.118	0.148
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Cesium-137	0.0582		0.0354	0.0377
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Cobalt-60	-0.00825	U	0.0621	0.0327
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Europium-152	0.0195	U	0.129	0.0694

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Europium-154	-0.0582	U	0.156	0.0879
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Europium-155	0.0272	U	0.123	0.0617
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Lead-212	0.792		0.0677	0.0965
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Lead-214	0.795		0.233	0.142
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Potassium-40	10.7		0.547	1.28
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Protactinium-231	0	UJ	0.599	0.599
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Protactinium-234	0.0632	U	0.561	0.297
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Protactinium-234m	-2.45	U	6.33	3.82
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Radium-223	0.0811	U	0.827	0.447
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Radium-224	1.7		0.726	1.31
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Radium-226	0.59		0.118	0.148
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Thallium-208	0.301		0.0457	0.0695
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Thorium-227	-0.00782	U	0.319	0.174
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Thorium-228	0.792		0.0677	0.0965
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Thorium-232	0.853		0.201	0.254
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Actinium-228	0.746		0.118	0.181
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Americium-241	-0.0419	U	0.121	0.0697
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Bismuth-212	0.998		0.446	0.613
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Bismuth-214	0.699		0.0559	0.0865
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Cesium-137	0.0331	U	0.0458	0.0216
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Cobalt-60	0.0284	U	0.043	0.0333
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Europium-152	-0.000289	U	0.0882	0.0451
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Europium-154	0.0429	U	0.118	0.0539
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Europium-155	0.0224	U	0.0908	0.0466
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Lead-212	0.82		0.049	0.0729
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Lead-214	0.685		0.0686	0.103
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Potassium-40	12.2		0.265	0.948
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Protactinium-231	0.326	U	0.407	0.314
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Protactinium-234	0.14	U	0.258	0.181
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Protactinium-234m	-0.424	U	4.31	2.42
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Radium-223	-0.0856	U	0.537	0.311
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Radium-224	0	UJ	0.525	0.839
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Radium-226	0.699		0.0559	0.0865
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Thallium-208	0.255		0.0312	0.0455
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Thorium-227	-0.0182	U	0.218	0.123
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Thorium-228	0.82		0.049	0.0729
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Thorium-232	0.746		0.118	0.181
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Actinium-228	0.757		0.146	0.23
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Americium-241	0.0016	U	0.118	0.0581
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Bismuth-212	1.5		0.388	0.436
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Bismuth-214	0.624		0.06	0.092
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Cesium-137	0.00582	U	0.0441	0.024
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Cobalt-60	0.0128	U	0.044	0.0271
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Europium-152	0.016	U	0.0934	0.0506
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Europium-154	-0.0115	U	0.124	0.0746
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Europium-155	0.018	U	0.0949	0.0478
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Lead-212	0.786		0.0525	0.077
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Lead-214	0.781		0.18	0.108
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Potassium-40	11.9		0.33	1
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Protactinium-231	-0.0788	U	0.444	0.276
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Protactinium-234	-0.0957	U	0.252	0.149
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Protactinium-234m	-1.02	U	4.75	2.61
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Radium-223	0.271	U	0.629	0.349

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Radium-224	1.07		0.563	0.902
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Radium-226	0.624		0.06	0.092
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Thallium-208	0.246		0.0359	0.0551
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Thorium-227	-0.0404	U	0.214	0.12
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Thorium-228	0.786		0.0525	0.077
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Thorium-232	0.757		0.146	0.23
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Actinium-228	0.65		0.161	0.19
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Americium-241	-0.00599	U	0.217	0.119
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Bismuth-212	0.811		0.541	0.484
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Bismuth-214	0.574		0.0732	0.113
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Cesium-137	-0.00469	U	0.0428	0.0261
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Cobalt-60	0.00101	U	0.0439	0.0219
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Europium-152	-0.0208	U	0.0936	0.0492
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Europium-154	-0.032	U	0.131	0.0713
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Europium-155	-0.0186	U	0.11	0.0591
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Lead-212	0.836		0.0615	0.0886
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Lead-214	0.774		0.0751	0.135
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Potassium-40	11.6		0.297	0.985
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Protactinium-231	0	UJ	0.492	0.565
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Protactinium-234	-0.0999	U	0.311	0.182
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Protactinium-234m	0.566	U	5.99	3.08
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Radium-223	0.26	U	0.736	0.391
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Radium-224	0	UJ	0.658	0.909
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Radium-226	0.574		0.0732	0.113
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Thallium-208	0.243		0.0372	0.0595
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Thorium-227	-0.0696	U	0.277	0.161
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Thorium-228	0.836		0.0615	0.0886
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Thorium-232	0.65		0.161	0.19
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Actinium-228	0.896		0.139	0.183
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Americium-241	0.0513	U	0.193	0.104
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Bismuth-212	0.79		0.543	0.401
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Bismuth-214	0.583		0.0682	0.105
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Cesium-137	0.015	U	0.0433	0.0225
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Cobalt-60	-0.0056	U	0.0324	0.0169
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Europium-152	0.0443	U	0.101	0.0484
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Europium-154	-0.000872	U	0.129	0.066
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Europium-155	0.0332	U	0.108	0.0554
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Lead-212	0.804		0.0578	0.0773
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Lead-214	0.727		0.0631	0.107
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Potassium-40	12.7		0.413	1.04
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Protactinium-231	0	UJ	0.43	0.479
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Protactinium-234	-0.118	U	0.262	0.159
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Protactinium-234m	2.54	U	5.33	4.72
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Radium-223	0.0352	U	0.6	0.305
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Radium-224	1.15		0.619	0.905
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Radium-226	0.583		0.0682	0.105
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Thallium-208	0.223		0.0355	0.0523
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Thorium-227	-0.0175	U	0.224	0.127
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Thorium-228	0.804		0.0578	0.0773
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Thorium-232	0.896		0.139	0.183
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Actinium-228	0.877		0.154	0.214
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Americium-241	0.0329	U	0.154	0.0868
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Bismuth-212	0.473	U	0.618	0.654

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Bismuth-214	0.573		0.0771	0.122
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Cesium-137	0.0317	U	0.0425	0.0339
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Cobalt-60	0.00844	U	0.0443	0.0217
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Europium-152	-0.00777	U	0.108	0.0581
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Europium-154	0.00656	U	0.134	0.0696
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Europium-155	-0.0221	U	0.113	0.0651
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Lead-212	0.867		0.0626	0.0848
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Lead-214	0.854		0.0802	0.14
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Potassium-40	13.5		0.365	1.05
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Protactinium-231	0	UJ	0.44	0.455
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Protactinium-234	-0.0894	U	0.269	0.15
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Protactinium-234m	2.05	U	5.61	3.03
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Radium-223	-0.12	U	0.697	0.425
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Radium-224	0	UJ	0.67	1.02
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Radium-226	0.573		0.0771	0.122
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Thallium-208	0.226		0.0406	0.0572
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Thorium-227	0.0541	U	0.296	0.153
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Thorium-228	0.867		0.0626	0.0848
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Thorium-232	0.877		0.154	0.214
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Actinium-228	0.737		0.119	0.169
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Americium-241	-0.0207	U	0.0951	0.0553
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Bismuth-212	1.26		0.462	0.613
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Bismuth-214	0.623		0.0682	0.106
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Cesium-137	0.0121	U	0.0386	0.0198
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Cobalt-60	-0.0104	U	0.0323	0.0184
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Europium-152	0.0182	U	0.0854	0.0449
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Europium-154	-0.0282	U	0.121	0.0781
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Europium-155	0.0117	U	0.0923	0.0493
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Lead-212	0.804		0.0534	0.0774
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Lead-214	0.671		0.0732	0.123
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Potassium-40	11.4		0.336	0.989
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Protactinium-231	0.135	U	0.492	0.25
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Protactinium-234	-0.0512	U	0.278	0.149
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Protactinium-234m	0.841	U	5.06	2.64
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Radium-223	0.171	U	0.617	0.343
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Radium-224	1.32		0.572	1.06
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Radium-226	0.623		0.0682	0.106
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Thallium-208	0.22		0.0328	0.0409
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Thorium-227	0.00388	U	0.228	0.117
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Thorium-228	0.804		0.0534	0.0774
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Thorium-232	0.737		0.119	0.169
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Actinium-228	0.814		0.17	0.234
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Americium-241	0.204		0.198	0.187
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Bismuth-212	0	UJ	0.863	0.403
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Bismuth-214	0.598		0.0855	0.154
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Cesium-137	0.0118	U	0.0455	0.0226
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Cobalt-60	0.00721	U	0.0528	0.0256
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Europium-152	0.0382	U	0.118	0.0621
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Europium-154	-0.0282	U	0.119	0.0629
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Europium-155	0.1	U	0.151	0.0729
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Lead-212	0.782		0.0615	0.0847
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Lead-214	0.751		0.0779	0.124
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Potassium-40	10.3		0.42	1.1

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Protactinium-231	0	UJ	0.501	0.604
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Protactinium-234	-0.0326	U	0.334	0.183
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Protactinium-234m	1.78	U	6.37	3.24
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Radium-223	-0.236	U	0.683	0.395
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Radium-224	0	UJ	0.659	1.09
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Radium-226	0.598		0.0855	0.154
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Thallium-208	0.262		0.0416	0.0611
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Thorium-227	0.216	U	0.301	0.28
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Thorium-228	0.782		0.0615	0.0847
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Thorium-232	0.814		0.17	0.234
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Actinium-228	0.613		0.156	0.301
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Americium-241	0.00851	U	0.252	0.124
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Bismuth-212	0.794		0.522	0.629
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Bismuth-214	0.643		0.0805	0.123
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Cesium-137	0.0376	U	0.0541	0.0251
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Cobalt-60	-0.00572	U	0.0426	0.0224
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Europium-152	-0.0277	U	0.106	0.0611
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Europium-154	-0.00776	U	0.162	0.085
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Europium-155	0.0385	U	0.114	0.0568
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Lead-212	0.863		0.0565	0.0854
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Lead-214	0.809		0.202	0.131
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Potassium-40	12.7		0.473	1.11
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Protactinium-231	0.275	U	0.507	0.664
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Protactinium-234	-0.0101	U	0.379	0.203
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Protactinium-234m	1.72	U	6.09	3.03
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Radium-223	0.134	U	0.666	0.37
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Radium-224	0.944		0.606	0.9
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Radium-226	0.643		0.0805	0.123
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Thallium-208	0.222		0.0383	0.0531
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Thorium-227	-0.0184	U	0.25	0.129
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Thorium-228	0.863		0.0565	0.0854
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Thorium-232	0.613		0.156	0.301
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Actinium-228	0.8		0.139	0.211
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Americium-241	0.00471	U	0.0471	0.0246
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Bismuth-212	0.976		0.469	0.643
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Bismuth-214	0.553		0.0691	0.103
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Cesium-137	-0.00231	U	0.034	0.0181
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Cobalt-60	-0.00315	U	0.0361	0.0187
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Europium-152	-0.0196	U	0.0772	0.0449
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Europium-154	-0.0181	U	0.121	0.0647
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Europium-155	-0.00203	U	0.08	0.042
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Lead-212	0.827		0.0487	0.0744
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Lead-214	0.766		0.0655	0.115
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Potassium-40	13.2		0.35	1.03
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Protactinium-231	0	UJ	0.431	0.498
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Protactinium-234	-0.00382	U	0.277	0.149
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Protactinium-234m	-0.538	U	4.49	2.61
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Radium-223	-0.241	U	0.512	0.307
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Radium-224	1.67		0.522	1.11
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Radium-226	0.553		0.0691	0.103
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Thallium-208	0.319		0.0276	0.0496
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Thorium-227	0.0152	U	0.205	0.11
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Thorium-228	0.827		0.0487	0.0744

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Thorium-232	0.8		0.139	0.211
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Actinium-228	0.633		0.157	0.216
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Americium-241	-0.00435	U	0.348	0.196
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Bismuth-212	1.09		0.577	0.597
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Bismuth-214	0.691		0.0761	0.107
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Cesium-137	-0.00514	U	0.0471	0.0257
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Cobalt-60	-0.0186	U	0.0502	0.0285
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Europium-152	0.0586	U	0.139	0.0705
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Europium-154	0.0551	U	0.186	0.0881
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Europium-155	0.0656	U	0.15	0.0769
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Lead-212	0.932		0.0722	0.102
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Lead-214	0.932		0.232	0.142
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Potassium-40	12		0.407	1.17
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Protactinium-231	0.0378	U	0.615	0.348
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Protactinium-234	-0.179	U	0.344	0.215
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Protactinium-234m	3.17	U	6.77	4.45
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Radium-223	-0.187	U	0.823	0.492
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Radium-224	1.55		0.774	1.11
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Radium-226	0.691		0.0761	0.107
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Thallium-208	0.218		0.0458	0.0639
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Thorium-227	0.0525	U	0.344	0.173
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Thorium-228	0.932		0.0722	0.102
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Thorium-232	0.633		0.157	0.216
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Actinium-228	0.854		0.142	0.248
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Americium-241	0.0773	U	0.224	0.109
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Bismuth-212	0.815		0.541	0.47
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Bismuth-214	0.751		0.0859	0.13
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Cesium-137	0.00457	U	0.0471	0.0246
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Cobalt-60	0.00657	U	0.0496	0.0239
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Europium-152	0.0157	U	0.11	0.0592
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Europium-154	-0.00105	U	0.149	0.0757
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Europium-155	0.0358	U	0.145	0.0723
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Lead-212	0.82		0.0571	0.0841
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Lead-214	0.684		0.0823	0.139
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Potassium-40	11.2		0.305	1.05
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Protactinium-231	0	UJ	0.46	0.657
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Protactinium-234	-0.0632	U	0.314	0.176
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Protactinium-234m	2.85	U	6.98	3.51
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Radium-223	-0.155	U	0.667	0.417
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Radium-224	1.32		0.612	0.959
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Radium-226	0.751		0.0859	0.13
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Thallium-208	0.27		0.0431	0.0785
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Thorium-227	-0.0252	U	0.283	0.15
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Thorium-228	0.82		0.0571	0.0841
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Thorium-232	0.854		0.142	0.248
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Actinium-228	0.792		0.143	0.202
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Americium-241	0.0795	U	0.255	0.121
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Bismuth-212	1.24		0.559	0.604
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Bismuth-214	0.771		0.0813	0.0996
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Cesium-137	0.0774		0.0447	0.0415
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Cobalt-60	-0.00253	U	0.044	0.0225
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Europium-152	0.0136	U	0.105	0.0536
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Europium-154	-0.00242	U	0.163	0.0981

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Europium-155	0	UJ	0.103	0.113
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Lead-212	0.877		0.058	0.0854
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Lead-214	0.834		0.201	0.13
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Potassium-40	12.9		0.384	1.05
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Protactinium-231	0	UJ	0.493	0.436
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Protactinium-234	0.018	U	0.365	0.191
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Protactinium-234m	0.00655	U	5.63	2.98
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Radium-223	-0.0357	U	0.629	0.367
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Radium-224	1.18		0.622	0.909
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Radium-226	0.771		0.0813	0.0996
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Thallium-208	0.246		0.034	0.0471
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Thorium-227	0.161	U	0.297	0.143
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Thorium-228	0.877		0.058	0.0854
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Thorium-232	0.792		0.143	0.202
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Actinium-228	0.835		0.106	0.218
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Americium-241	0.0423	U	0.216	0.115
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Bismuth-212	0.823		0.58	0.49
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Bismuth-214	0.715		0.0675	0.104
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Cesium-137	0.0228	U	0.0448	0.0213
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Cobalt-60	0.00356	U	0.046	0.0228
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Europium-152	-0.0262	U	0.0961	0.0509
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Europium-154	-0.0387	U	0.119	0.0659
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Europium-155	0.0559	U	0.107	0.112
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Lead-212	0.831		0.0651	0.0909
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Lead-214	0.719		0.0829	0.129
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Potassium-40	12.2		0.377	1.01
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Protactinium-231	0	UJ	0.486	0.624
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Protactinium-234	0.0754	U	0.356	0.182
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Protactinium-234m	4.3	U	6.62	5.85
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Radium-223	-0.122	U	0.69	0.402
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Radium-224	1.72		0.698	1.07
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Radium-226	0.715		0.0675	0.104
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Thallium-208	0.209		0.0372	0.0442
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Thorium-227	0.0868	U	0.268	0.141
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Thorium-228	0.831		0.0651	0.0909
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Thorium-232	0.835		0.106	0.218
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Actinium-228	0.778		0.118	0.167
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Americium-241	0.0566	U	0.213	0.115
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Bismuth-212	0.558		0.431	0.44
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Bismuth-214	0.62		0.065	0.094
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Cesium-137	0.00567	U	0.0346	0.0179
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Cobalt-60	-0.0043	U	0.0387	0.021
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Europium-152	0.0444	U	0.0908	0.0457
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Europium-154	0.0478	U	0.119	0.0587
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Europium-155	0.0341	U	0.108	0.0566
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Lead-212	0.936		0.0478	0.0759
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Lead-214	0.777		0.17	0.111
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Potassium-40	12.3		0.366	0.904
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Protactinium-231	0.416	U	0.488	0.258
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Protactinium-234	0.024	U	0.25	0.132
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Protactinium-234m	3.07	U	4.78	2.35
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Radium-223	-0.396	U	0.536	0.356
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Radium-224	1.39		0.511	0.962

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Radium-226	0.62		0.065	0.094
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Thallium-208	0.252		0.0314	0.0444
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Thorium-227	-0.016	U	0.23	0.122
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Thorium-228	0.936		0.0478	0.0759
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Thorium-232	0.778		0.118	0.167
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Actinium-228	0.764		0.15	0.243
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Americium-241	-0.00919	U	0.262	0.157
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Bismuth-212	1.09		0.521	0.486
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Bismuth-214	0.71		0.0625	0.12
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Cesium-137	0.0225	U	0.049	0.0342
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Cobalt-60	-0.0062	U	0.0376	0.0199
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Europium-152	-0.00301	U	0.104	0.0551
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Europium-154	-0.0287	U	0.137	0.0765
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Europium-155	0.0215	U	0.138	0.0693
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Lead-212	0.827		0.0629	0.087
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Lead-214	0.852		0.204	0.109
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Potassium-40	12.5		0.343	1.04
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Protactinium-231	0.368	U	0.609	0.66
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Protactinium-234	-0.083	U	0.317	0.172
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Protactinium-234m	0.275	U	5.54	2.99
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Radium-223	-0.13	U	0.75	0.409
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Radium-224	0	UJ	0.673	0.929
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Radium-226	0.71		0.0625	0.12
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Thallium-208	0.207		0.0454	0.0491
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Thorium-227	-0.0323	U	0.3	0.161
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Thorium-228	0.827		0.0629	0.087
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Thorium-232	0.764		0.15	0.243
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Actinium-228	0.699		0.159	0.191
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Americium-241	-0.0437	U	0.167	0.0901
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Bismuth-212	0	UJ	0.538	0.732
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Bismuth-214	0.581		0.0805	0.129
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Cesium-137	-0.00566	U	0.0386	0.0212
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Cobalt-60	-0.0115	U	0.0391	0.0216
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Europium-152	-0.0335	U	0.0984	0.0536
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Europium-154	-0.0625	U	0.128	0.0743
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Europium-155	0.0309	U	0.112	0.0584
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Lead-212	0.771		0.065	0.09
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Lead-214	0.715		0.0753	0.118
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Potassium-40	12.7		0.385	1.06
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Protactinium-231	0.259	U	0.52	0.536
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Protactinium-234	0.0296	U	0.362	0.193
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Protactinium-234m	-0.796	U	5.11	2.65
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Radium-223	0.248	U	0.77	0.393
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Radium-224	0	UJ	0.697	1.29
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Radium-226	0.581		0.0805	0.129
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Thallium-208	0.221		0.0395	0.0593
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Thorium-227	0.00689	U	0.272	0.139
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Thorium-228	0.771		0.065	0.09
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Thorium-232	0.699		0.159	0.191
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Actinium-228	0.706		0.132	0.186
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Americium-241	0.0533	U	0.117	0.0656
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Bismuth-212	1.33		0.515	0.489
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Bismuth-214	0.595		0.0781	0.09

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Cesium-137	0.0149	U	0.0387	0.0195
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Cobalt-60	0.0332	U	0.0379	0.018
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Europium-152	0.015	U	0.0931	0.0504
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Europium-154	0.0396	U	0.135	0.0736
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Europium-155	0.0807	U	0.109	0.0562
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Lead-212	0.772		0.0539	0.0755
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Lead-214	0.679		0.0771	0.109
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Potassium-40	11.7		0.32	0.91
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Protactinium-231	0	UJ	0.423	0.461
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Protactinium-234	0.00813	U	0.289	0.147
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Protactinium-234m	0.689	U	4.89	2.46
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Radium-223	-0.0743	U	0.597	0.322
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Radium-224	0.748		0.577	0.699
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Radium-226	0.595		0.0781	0.09
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Thallium-208	0.263		0.0329	0.0422
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Thorium-227	0.123	U	0.258	0.127
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Thorium-228	0.772		0.0539	0.0755
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Thorium-232	0.706		0.132	0.186
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Actinium-228	0.688		0.169	0.216
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Americium-241	0.0305	U	0.254	0.142
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Bismuth-212	1.56		0.502	0.526
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Bismuth-214	0.56		0.0753	0.137
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Cesium-137	0.0342	U	0.0448	0.0398
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Cobalt-60	0	U	0.0508	0.0271
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Europium-152	0.043	U	0.112	0.0614
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Europium-154	-0.0509	U	0.147	0.0868
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Europium-155	0.031	U	0.128	0.0681
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Lead-212	0.8		0.0673	0.0947
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Lead-214	0.762		0.083	0.134
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Potassium-40	11.9		0.426	1.08
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Protactinium-231	0.369	U	0.469	0.509
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Protactinium-234	0.0682	U	0.385	0.195
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Protactinium-234m	2.77	U	6.74	3.3
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Radium-223	0.151	U	0.708	1.04
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Radium-224	0.508	U	0.721	1.03
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Radium-226	0.56		0.0753	0.137
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Thallium-208	0.248		0.0409	0.0597
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Thorium-227	-0.168	U	0.265	0.15
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Thorium-228	0.8		0.0673	0.0947
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Thorium-232	0.688		0.169	0.216
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Actinium-228	0.972		0.167	0.249
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Americium-241	-0.0346	U	0.28	0.177
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Bismuth-212	0.624	U	0.649	0.673
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Bismuth-214	0.751		0.0765	0.133
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Cesium-137	0.0141	U	0.0493	0.0255
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Cobalt-60	-0.00932	U	0.045	0.0258
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Europium-152	0.0251	U	0.124	0.0681
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Europium-154	-0.00928	U	0.146	0.0812
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Europium-155	0.0216	U	0.138	0.0726
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Lead-212	1.19		0.0666	0.0964
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Lead-214	0.822		0.0865	0.124
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Potassium-40	11.6		0.406	0.961
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Protactinium-231	0	UJ	0.597	0.511

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Protactinium-234	0.0992	U	0.351	0.189
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Protactinium-234m	0.987	U	6.22	3.51
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Radium-223	-0.188	U	0.713	0.462
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Radium-224	1.79		0.714	0.964
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Radium-226	0.751		0.0765	0.133
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Thallium-208	0.32		0.0396	0.0629
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Thorium-227	0.13	U	0.309	0.163
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Thorium-228	1.19		0.0666	0.0964
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Thorium-232	0.972		0.167	0.249
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Actinium-228	1.15		0.132	0.18
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Americium-241	0.0033	U	0.243	0.13
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Bismuth-212	0.999		0.481	0.512
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Bismuth-214	0.692		0.0688	0.115
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Cesium-137	0.0175	U	0.0407	0.0228
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Cobalt-60	0.00964	U	0.0415	0.0208
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Europium-152	0.0127	U	0.0948	0.0508
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Europium-154	-0.000113	U	0.122	0.0647
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Europium-155	0.0846	U	0.116	0.115
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Lead-212	1.14		0.0571	0.0841
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Lead-214	0.664		0.0699	0.119
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Potassium-40	13.1		0.309	0.942
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Protactinium-231	0	UJ	0.476	0.392
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Protactinium-234	-0.0281	U	0.298	0.191
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Protactinium-234m	3.17	U	5.08	2.49
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Radium-223	-0.102	U	0.607	0.378
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Radium-224	1.09		0.611	0.933
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Radium-226	0.692		0.0688	0.115
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Thallium-208	0.272		0.0342	0.0511
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Thorium-227	0.0977	U	0.271	0.14
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Thorium-228	1.14		0.0571	0.0841
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Thorium-232	1.15		0.132	0.18
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Actinium-228	0.8		0.173	0.177
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Americium-241	0.0101	U	0.0617	0.0341
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Bismuth-212	0.936		0.694	0.667
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Bismuth-214	0.669		0.0853	0.137
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Cesium-137	0.0495		0.0421	0.034
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Cobalt-60	0.0183	U	0.056	0.0357
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Europium-152	0.0146	U	0.113	0.0574
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Europium-154	-0.0588	U	0.152	0.0896
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Europium-155	0.0772	U	0.0969	0.0706
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Lead-212	0.887		0.0591	0.0873
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Lead-214	0.817		0.0803	0.125
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Potassium-40	12.4		0.417	1.14
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Protactinium-231	0.0359	U	0.571	0.295
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Protactinium-234	0.13	U	0.431	0.212
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Protactinium-234m	-0.745	U	6.72	3.61
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Radium-223	-0.000986	U	0.739	0.404
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Radium-224	1.01		0.634	0.949
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Radium-226	0.669		0.0853	0.137
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Thallium-208	0.283		0.0436	0.0624
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Thorium-227	0.0707	U	0.297	0.148
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Thorium-228	0.887		0.0591	0.0873
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Thorium-232	0.8		0.173	0.177

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Actinium-228	0.792		0.116	0.206
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Americium-241	0.00652	U	0.138	0.0771
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Bismuth-212	0.972		0.481	0.456
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Bismuth-214	0.619		0.0697	0.108
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Cesium-137	0.0483		0.0319	0.0406
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Cobalt-60	-0.0167	U	0.0293	0.0172
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Europium-152	-0.0578	U	0.0857	0.0483
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Europium-154	-0.0508	U	0.102	0.0734
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Europium-155	0.0204	U	0.109	0.0592
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Lead-212	0.819		0.0517	0.0751
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Lead-214	0.826		0.182	0.106
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Potassium-40	12.2		0.357	0.925
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Protactinium-231	0.42	U	0.421	0.425
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Protactinium-234	0.0994	U	0.31	0.154
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Protactinium-234m	2.6	U	5.53	2.72
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Radium-223	-0.0247	U	0.599	0.343
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Radium-224	1.15		0.554	0.715
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Radium-226	0.619		0.0697	0.108
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Thallium-208	0.265		0.0349	0.0483
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Thorium-227	-0.0169	U	0.227	0.129
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Thorium-228	0.819		0.0517	0.0751
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Thorium-232	0.792		0.116	0.206
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Actinium-228	0.963		0.128	0.217
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Americium-241	0.00651	U	0.0523	0.0285
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Bismuth-212	1.04		0.514	0.62
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Bismuth-214	0.641		0.0718	0.117
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Cesium-137	0.00655	U	0.0353	0.0177
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Cobalt-60	0.000275	U	0.0363	0.018
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Europium-152	-0.0174	U	0.0964	0.051
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Europium-154	-0.0272	U	0.139	0.0761
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Europium-155	0	UJ	0.0767	0.0881
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Lead-212	0.727		0.0555	0.09
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Lead-214	0.673		0.0763	0.0974
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Potassium-40	10.8		0.366	1.04
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Protactinium-231	0	UJ	0.351	0.39
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Protactinium-234	0.0154	U	0.329	0.165
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Protactinium-234m	3.62	U	6.43	3
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Radium-223	0.0837	U	0.628	0.316
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Radium-224	0.341	U	0.677	0.736
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Radium-226	0.641		0.0718	0.117
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Thallium-208	0.255		0.0353	0.0526
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Thorium-227	0.082	U	0.247	0.131
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Thorium-228	0.727		0.0555	0.09
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Thorium-232	0.963		0.128	0.217
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Actinium-228	0.797		0.133	0.182
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Americium-241	0.0212	U	0.262	0.154
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Bismuth-212	1.19		0.567	0.532
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Bismuth-214	0.603		0.0736	0.0961
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Cesium-137	0.106		0.0436	0.0545
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Cobalt-60	0.00873	U	0.0461	0.0222
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Europium-152	-0.0051	U	0.108	0.0603
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Europium-154	-0.0457	U	0.127	0.1
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Europium-155	-0.00922	U	0.116	0.0588

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Lead-212	0.812		0.064	0.0862
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Lead-214	0.822		0.194	0.137
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Potassium-40	11.7		0.381	1.01
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Protactinium-231	0.223	U	0.613	0.313
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Protactinium-234	-0.00659	U	0.329	0.191
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Protactinium-234m	1.43	U	5.94	3.09
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Radium-223	0.0908	U	0.702	0.405
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Radium-224	0.627	U	0.685	1.05
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Radium-226	0.603		0.0736	0.0961
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Thallium-208	0.281		0.0359	0.0615
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Thorium-227	0.0438	U	0.278	0.143
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Thorium-228	0.812		0.064	0.0862
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Thorium-232	0.797		0.133	0.182
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Actinium-228	0.775		0.186	0.213
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Americium-241	-0.0155	U	0.182	0.0928
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Bismuth-212	0.358	U	0.577	0.649
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Bismuth-214	0.59		0.0829	0.106
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Cesium-137	0	UJ	0.0374	0.0346
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Cobalt-60	0.00857	U	0.0473	0.0225
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Europium-152	0.0644	U	0.116	0.0595
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Europium-154	0.08	U	0.168	0.0763
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Europium-155	0.0552	U	0.121	0.0605
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Lead-212	0.864		0.0591	0.0908
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Lead-214	0.799		0.213	0.15
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Potassium-40	11.7		0.519	1.21
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Protactinium-231	0.422	U	0.591	0.275
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Protactinium-234	-0.0767	U	0.304	0.164
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Protactinium-234m	4.42	U	6.47	3.66
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Radium-223	0.09	U	0.682	0.377
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Radium-224	0.858		0.634	0.746
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Radium-226	0.59		0.0829	0.106
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Thallium-208	0.268		0.0368	0.0469
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Thorium-227	0.0988	U	0.273	0.143
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Thorium-228	0.864		0.0591	0.0908
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Thorium-232	0.775		0.186	0.213
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Actinium-228	0.887		0.352	0.199
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Americium-241	0.0451	U	0.209	0.113
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Bismuth-212	0.853		0.52	0.606
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Bismuth-214	0.614		0.0969	0.134
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Cesium-137	0.0722		0.0412	0.0419
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Cobalt-60	0.00376	U	0.0491	0.024
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Europium-152	0.048	U	0.116	0.0632
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Europium-154	0.00844	U	0.158	0.0791
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Europium-155	0.128	U	0.129	0.118
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Lead-212	0.727		0.0618	0.0836
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Lead-214	0.742		0.195	0.116
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Potassium-40	11.9		0.351	1.05
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Protactinium-231	0	UJ	0.541	0.504
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Protactinium-234	-0.0233	U	0.327	0.177
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Protactinium-234m	-1.92	U	5.14	3.07
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Radium-223	0.0101	U	0.722	0.394
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Radium-224	1.02		0.662	0.743
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Radium-226	0.614		0.0969	0.134

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Thallium-208	0.231		0.0452	0.0596
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Thorium-227	-0.0349	U	0.286	0.153
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Thorium-228	0.727		0.0618	0.0836
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Thorium-232	0.887		0.352	0.199
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Actinium-228	0.775		0.158	0.184
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Americium-241	-0.0169	U	0.307	0.173
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Bismuth-212	0.862		0.577	0.506
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Bismuth-214	0.653		0.0861	0.126
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Cesium-137	0.0344	U	0.0516	0.0271
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Cobalt-60	-0.0118	U	0.041	0.023
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Europium-152	-0.00151	U	0.117	0.0633
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Europium-154	-0.0287	U	0.142	0.0785
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Europium-155	0.0455	U	0.138	0.0689
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Lead-212	0.844		0.0665	0.0904
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Lead-214	0.672		0.0913	0.119
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Potassium-40	12.3		0.334	1.08
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Protactinium-231	-0.0163	U	0.551	0.297
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Protactinium-234	0.0532	U	0.398	0.202
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Protactinium-234m	1.92	U	6.34	3.83
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Radium-223	-0.0525	U	0.735	0.419
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Radium-224	0.343	U	0.713	0.996
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Radium-226	0.653		0.0861	0.126
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Thallium-208	0.291		0.0438	0.0574
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Thorium-227	0.146	U	0.279	0.43
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Thorium-228	0.844		0.0665	0.0904
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Thorium-232	0.775		0.158	0.184
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Actinium-228	0.775		0.136	0.201
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Americium-241	0.0178	U	0.0463	0.0233
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Bismuth-212	0.747		0.46	0.424
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Bismuth-214	0.665		0.065	0.105
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Cesium-137	0.0242	U	0.0439	0.0212
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Cobalt-60	0.00631	U	0.0341	0.0157
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Europium-152	-0.0505	U	0.0688	0.0438
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Europium-154	-0.00542	U	0.0974	0.0495
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Europium-155	0.0266	U	0.0793	0.04
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Lead-212	0.875		0.0471	0.0725
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Lead-214	0.763		0.0585	0.0913
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Potassium-40	11.9		0.364	1.02
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Protactinium-231	0	UJ	0.392	0.401
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Protactinium-234	0.0669	U	0.306	0.173
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Protactinium-234m	-0.976	U	4.39	2.62
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Radium-223	-0.247	U	0.528	0.316
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Radium-224	1.28		0.505	0.777
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Radium-226	0.665		0.065	0.105
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Thallium-208	0.255		0.03	0.0548
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Thorium-227	0.0853	U	0.226	0.116
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Thorium-228	0.875		0.0471	0.0725
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Thorium-232	0.775		0.136	0.201
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Actinium-228	0.8		0.135	0.21
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Americium-241	0.0206	U	0.153	0.0822
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Bismuth-212	0.971		0.47	0.552
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Bismuth-214	0.576		0.0719	0.126
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Cesium-137	0.0275	U	0.0474	0.0231

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Cobalt-60	0.000138	U	0.0396	0.0229
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Europium-152	-0.0117	U	0.0981	0.0514
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Europium-154	0.0245	U	0.124	0.0599
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Europium-155	0.0248	U	0.107	0.0549
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Lead-212	0.806		0.0575	0.0851
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Lead-214	0.805		0.189	0.12
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Potassium-40	11.9		0.293	1.02
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Protactinium-231	0	UJ	0.441	0.495
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Protactinium-234	-0.00654	U	0.276	0.173
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Protactinium-234m	1.92	U	4.77	2.49
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Radium-223	-0.141	U	0.593	0.351
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Radium-224	1.07		0.616	0.809
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Radium-226	0.576		0.0719	0.126
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Thallium-208	0.185		0.0394	0.0498
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Thorium-227	0.0176	U	0.253	0.14
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Thorium-228	0.806		0.0575	0.0851
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Thorium-232	0.8		0.135	0.21
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Actinium-228	1.03		0.151	0.205
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Americium-241	0.0375	U	0.197	0.107
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Bismuth-212	0.935		0.471	0.486
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Bismuth-214	0.622		0.0656	0.096
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Cesium-137	0.0578		0.0343	0.0438
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Cobalt-60	0.00262	U	0.0419	0.0207
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Europium-152	0.0133	U	0.0988	0.0499
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Europium-154	-0.0259	U	0.116	0.0627
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Europium-155	0.0302	U	0.106	0.0545
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Lead-212	0.869		0.0484	0.0768
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Lead-214	0.785		0.181	0.105
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Potassium-40	12.3		0.381	1.09
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Protactinium-231	0	UJ	0.489	0.49
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Protactinium-234	0.0541	U	0.332	0.173
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Protactinium-234m	-1.68	U	5.12	3.39
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Radium-223	0.0582	U	0.656	0.369
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Radium-224	1.54		0.518	0.711
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Radium-226	0.622		0.0656	0.096
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Thallium-208	0.201		0.0309	0.0514
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Thorium-227	-0.0394	U	0.225	0.13
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Thorium-228	0.869		0.0484	0.0768
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Thorium-232	1.03		0.151	0.205
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Actinium-228	0.864		0.223	0.25
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Americium-241	-0.0303	U	0.0696	0.0394
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Bismuth-212	1.08		0.717	0.771
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Bismuth-214	0.565		0.12	0.143
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Cesium-137	-0.0126	U	0.0544	0.0301
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Cobalt-60	-0.000563	U	0.0645	0.0325
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Europium-152	-0.00684	U	0.134	0.0683
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Europium-154	0.00178	U	0.194	0.0984
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Europium-155	0.0598	U	0.125	0.0609
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Lead-212	0.853		0.0709	0.105
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Lead-214	0.811		0.246	0.149
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Potassium-40	11.3		0.441	1.21
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Protactinium-231	-0.238	U	0.592	0.353
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Protactinium-234	-0.109	U	0.477	0.274

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Protactinium-234m	-3.72	U	8.01	4.5
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Radium-223	-0.188	U	0.862	0.501
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Radium-224	0	UJ	0.761	1.3
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Radium-226	0.565		0.12	0.143
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Thallium-208	0.235		0.0512	0.0651
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Thorium-227	-0.021	U	0.33	0.199
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Thorium-228	0.853		0.0709	0.105
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Thorium-232	0.864		0.223	0.25
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Actinium-228	0.931		0.138	0.195
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Americium-241	-0.0055	U	0.111	0.0671
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Bismuth-212	0.853		0.503	0.503
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Bismuth-214	0.629		0.0717	0.0917
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Cesium-137	0	UJ	0.0343	0.0435
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Cobalt-60	-0.00326	U	0.044	0.027
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Europium-152	0.00388	U	0.0902	0.0524
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Europium-154	0.0616	U	0.128	0.0738
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Europium-155	-0.0109	U	0.101	0.0575
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Lead-212	0.88		0.0569	0.0789
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Lead-214	0.714		0.0651	0.125
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Potassium-40	13.1		0.261	1.02
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Protactinium-231	0.221	U	0.534	0.299
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Protactinium-234	0.0853	U	0.355	0.176
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Protactinium-234m	0.964	U	5.84	2.98
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Radium-223	-0.163	U	0.582	0.364
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Radium-224	0	UJ	0.609	0.721
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Radium-226	0.629		0.0717	0.0917
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Thallium-208	0.188		0.039	0.0548
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Thorium-227	-0.0696	U	0.245	0.135
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Thorium-228	0.88		0.0569	0.0789
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Thorium-232	0.931		0.138	0.195
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Actinium-228	0.726		0.172	0.21
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Americium-241	-0.000302	U	0.303	0.153
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Bismuth-212	0	UJ	0.57	0.686
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Bismuth-214	0.641		0.077	0.122
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Cesium-137	0.0465		0.0452	0.0361
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Cobalt-60	-0.00752	U	0.0453	0.0245
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Europium-152	0.0156	U	0.115	0.0579
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Europium-154	-0.0155	U	0.155	0.0835
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Europium-155	-0.022	U	0.118	0.0635
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Lead-212	0.829		0.067	0.0924
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Lead-214	0.736		0.0837	0.136
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Potassium-40	12.4		0.399	1.14
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Protactinium-231	0.229	U	0.6	0.292
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Protactinium-234	-0.181	U	0.336	0.214
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Protactinium-234m	1.56	U	6.02	2.99
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Radium-223	0.0742	U	0.777	0.437
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Radium-224	1.01		0.718	0.949
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Radium-226	0.641		0.077	0.122
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Thallium-208	0.235		0.0396	0.0481
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Thorium-227	-0.0602	U	0.283	0.164
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Thorium-228	0.829		0.067	0.0924
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Thorium-232	0.726		0.172	0.21
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Actinium-228	0.866		0.125	0.17

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Americium-241	-0.000501	U	0.158	0.0844
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Bismuth-212	0.638		0.53	0.607
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Bismuth-214	0.614		0.0764	0.11
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Cesium-137	0.0103	U	0.0425	0.0217
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Cobalt-60	-0.0118	U	0.0416	0.0227
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Europium-152	-0.00243	U	0.101	0.055
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Europium-154	0.016	U	0.136	0.0725
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Europium-155	0.0216	U	0.117	0.0645
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Lead-212	0.987		0.0556	0.0852
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Lead-214	0.713		0.184	0.12
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Potassium-40	11.4		0.279	1
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Protactinium-231	0.164	U	0.539	0.299
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Protactinium-234	-0.0749	U	0.258	0.149
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Protactinium-234m	1.63	U	5.87	3.02
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Radium-223	0.258	U	0.688	0.373
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Radium-224	1.44		0.595	1.18
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Radium-226	0.614		0.0764	0.11
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Thallium-208	0.327		0.0364	0.0541
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Thorium-227	-0.0243	U	0.259	0.15
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Thorium-228	0.987		0.0556	0.0852
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Thorium-232	0.866		0.125	0.17
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Actinium-228	0.619		0.157	0.259
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Americium-241	0	UJ	0.048	0.0661
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Bismuth-212	1.31		0.489	0.561
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Bismuth-214	0.664		0.0761	0.122
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Cesium-137	0.031	U	0.0422	0.0333
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Cobalt-60	0.0149	U	0.0511	0.0244
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Europium-152	0.0164	U	0.0954	0.0478
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Europium-154	0.000668	U	0.133	0.0688
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Europium-155	0.0422	U	0.0906	0.0459
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Lead-212	0.8		0.0536	0.0766
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Lead-214	0.746		0.076	0.11
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Potassium-40	11.7		0.432	1.02
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Protactinium-231	0	UJ	0.397	0.505
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Protactinium-234	-0.0638	U	0.313	0.191
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Protactinium-234m	4.24	U	6.11	4.43
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Radium-223	-0.194	U	0.601	0.363
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Radium-224	0.959		0.575	0.854
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Radium-226	0.664		0.0761	0.122
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Thallium-208	0.282		0.0346	0.0589
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Thorium-227	-0.0739	U	0.242	0.143
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Thorium-228	0.8		0.0536	0.0766
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Thorium-232	0.619		0.157	0.259
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Actinium-228	0.689		0.198	0.255
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Americium-241	-0.00141	U	0.332	0.182
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Bismuth-212	0.966		0.602	0.67
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Bismuth-214	0.772		0.0822	0.126
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Cesium-137	0.033	U	0.0485	0.0397
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Cobalt-60	-0.0135	U	0.0422	0.0245
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Europium-152	0.0321	U	0.132	0.0688
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Europium-154	0.0274	U	0.183	0.0951
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Europium-155	0.00619	U	0.141	0.0798
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Lead-212	0.869		0.0742	0.102

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Lead-214	0.748		0.094	0.146
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Potassium-40	11.8		0.468	1.12
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Protactinium-231	0	UJ	0.618	0.704
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Protactinium-234	-0.112	U	0.415	0.233
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Protactinium-234m	3.55	U	7.38	3.68
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Radium-223	0.303	U	0.893	0.511
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Radium-224	0	UJ	0.795	1.37
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Radium-226	0.772		0.0822	0.126
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Thallium-208	0.242		0.0427	0.0679
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Thorium-227	0.0208	U	0.355	0.189
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Thorium-228	0.869		0.0742	0.102
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Thorium-232	0.689		0.198	0.255
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Actinium-228	0.975		0.141	0.231
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Americium-241	0.0273	U	0.053	0.0306
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Bismuth-212	1.55		0.527	0.823
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Bismuth-214	0.639		0.0829	0.111
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Cesium-137	0.0215	U	0.0495	0.0247
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Cobalt-60	0.0103	U	0.0495	0.0243
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Europium-152	-0.0435	U	0.0969	0.0591
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Europium-154	-0.0343	U	0.127	0.0705
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Europium-155	0	UJ	0.0813	0.105
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Lead-212	0.868		0.0737	0.0985
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Lead-214	0.755		0.0738	0.111
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Potassium-40	11.1		0.266	1
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Protactinium-231	0	UJ	0.503	0.438
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Protactinium-234	0.0141	U	0.384	0.21
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Protactinium-234m	1.03	U	6.19	3.28
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Radium-223	-0.301	U	0.634	0.424
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Radium-224	0.167	U	0.779	0.717
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Radium-226	0.639		0.0829	0.111
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Thallium-208	0.27		0.0398	0.0727
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Thorium-227	0.076	U	0.27	0.145
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Thorium-228	0.868		0.0737	0.0985
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Thorium-232	0.975		0.141	0.231
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Actinium-228	0.725		0.159	0.189
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Americium-241	-0.0435	U	0.157	0.09
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Bismuth-212	0.789	U	0.794	0.362
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Bismuth-214	0.624		0.0738	0.115
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Cesium-137	0.0179	U	0.0425	0.0206
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Cobalt-60	0.0046	U	0.0399	0.019
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Europium-152	-0.014	U	0.0909	0.0498
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Europium-154	0.0351	U	0.133	0.0668
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Europium-155	0.0129	U	0.105	0.0551
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Lead-212	0.768		0.0507	0.085
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Lead-214	0.703		0.18	0.11
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Potassium-40	11.5		0.245	1.01
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Protactinium-231	0	UJ	0.463	0.596
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Protactinium-234	-0.015	U	0.222	0.117
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Protactinium-234m	-0.178	U	5.21	2.64
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Radium-223	-0.164	U	0.655	0.393
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Radium-224	0.387	U	0.543	1.13
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Radium-226	0.624		0.0738	0.115
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Thallium-208	0.187		0.0375	0.057

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Thorium-227	-0.0711	U	0.224	0.117
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Thorium-228	0.768		0.0507	0.085
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Thorium-232	0.725		0.159	0.189
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Actinium-228	0.607		0.139	0.206
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Americium-241	-0.0859	U	0.168	0.0964
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Bismuth-212	1.03		0.47	0.556
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Bismuth-214	0.612		0.0734	0.115
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Cesium-137	0.0343	U	0.043	0.0419
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Cobalt-60	-0.012	U	0.043	0.0242
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Europium-152	-0.0182	U	0.101	0.0591
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Europium-154	0.0141	U	0.149	0.0783
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Europium-155	0.0395	U	0.109	0.108
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Lead-212	0.792		0.0544	0.0845
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Lead-214	0.782		0.192	0.13
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Potassium-40	11.7		0.417	1.06
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Protactinium-231	0.432	U	0.478	0.5
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Protactinium-234	0.115	U	0.353	0.163
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Protactinium-234m	0.765	U	5.15	2.52
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Radium-223	0.0414	U	0.663	0.37
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Radium-224	0.928		0.583	0.786
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Radium-226	0.612		0.0734	0.115
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Thallium-208	0.253		0.0329	0.0517
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Thorium-227	-0.00284	U	0.264	0.147
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Thorium-228	0.792		0.0544	0.0845
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Thorium-232	0.607		0.139	0.206
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Actinium-228	0.702		0.124	0.181
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Americium-241	0.0554	U	0.176	0.0876
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Bismuth-212	0.646		0.512	0.466
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Bismuth-214	0.648		0.0689	0.0998
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Cesium-137	0.0129	U	0.0412	0.021
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Cobalt-60	-0.00365	U	0.04	0.0214
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Europium-152	0.000724	U	0.104	0.0548
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Europium-154	-0.0223	U	0.126	0.0698
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Europium-155	0.0567	U	0.0939	0.0996
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Lead-212	0.597		0.0641	0.0859
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Lead-214	0.691		0.0669	0.101
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Potassium-40	11.7		0.376	1.02
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Protactinium-231	0	UJ	0.437	0.494
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Protactinium-234	-0.22	U	0.276	0.17
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Protactinium-234m	4.47	U	5.13	2.78
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Radium-223	-0.109	U	0.629	0.375
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Radium-224	0.162	U	0.819	0.693
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Radium-226	0.648		0.0689	0.0998
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Thallium-208	0.184		0.0345	0.0534
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Thorium-227	-0.066	U	0.238	0.127
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Thorium-228	0.597		0.0641	0.0859
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Thorium-232	0.702		0.124	0.181
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Actinium-228	0.766		0.123	0.151
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Americium-241	0.0417	U	0.0954	0.0508
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Bismuth-212	0.868		0.462	0.56
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Bismuth-214	0.552		0.0667	0.098
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Cesium-137	0.0134	U	0.0396	0.0203
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Cobalt-60	0.0232	U	0.0404	0.0177

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Europium-152	-0.0277	U	0.077	0.0422
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Europium-154	0.0445	U	0.119	0.0564
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Europium-155	0.0593	U	0.0861	0.109
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Lead-212	0.773		0.0456	0.0707
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Lead-214	0.748		0.0637	0.111
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Potassium-40	11		0.309	0.873
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Protactinium-231	0	UJ	0.388	0.481
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Protactinium-234	-0.0255	U	0.285	0.15
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Protactinium-234m	4.22	U	5	3.68
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Radium-223	-0.0282	U	0.537	0.313
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Radium-224	1.61		0.488	0.778
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Radium-226	0.552		0.0667	0.098
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Thallium-208	0.214		0.0339	0.0592
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Thorium-227	0.0275	U	0.241	0.122
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Thorium-228	0.773		0.0456	0.0707
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Thorium-232	0.766		0.123	0.151
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Actinium-228	0.808		0.135	0.188
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Americium-241	0.0529	U	0.131	0.0689
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Bismuth-212	1.14		0.469	0.609
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Bismuth-214	0.624		0.0638	0.102
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Cesium-137	0.0179	U	0.0428	0.0212
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Cobalt-60	0.0193	U	0.043	0.0191
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Europium-152	0.0346	U	0.089	0.0466
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Europium-154	0.000342	U	0.0961	0.054
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Europium-155	0.0255	U	0.09	0.0459
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Lead-212	0.824		0.0504	0.0747
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Lead-214	0.784		0.0626	0.111
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Potassium-40	11.6		0.303	0.881
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Protactinium-231	0.3	U	0.377	0.349
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Protactinium-234	-0.0548	U	0.287	0.162
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Protactinium-234m	-1.56	U	3.88	2.34
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Radium-223	0.0198	U	0.558	0.282
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Radium-224	1.22		0.54	0.886
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Radium-226	0.624		0.0638	0.102
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Thallium-208	0.227		0.0268	0.0492
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Thorium-227	0.0003	U	0.232	0.13
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Thorium-228	0.824		0.0504	0.0747
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Thorium-232	0.808		0.135	0.188
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Actinium-228	0.718		0.327	0.159
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Americium-241	0.0323	U	0.16	0.0875
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Bismuth-212	1.11		0.485	0.557
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Bismuth-214	0.615		0.0658	0.114
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Cesium-137	0.0135	U	0.0371	0.0244
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Cobalt-60	0.0101	U	0.0484	0.023
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Europium-152	-0.0337	U	0.101	0.0575
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Europium-154	0.0416	U	0.146	0.0688
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Europium-155	0.0682	U	0.106	0.132
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Lead-212	0.799		0.0591	0.0915
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Lead-214	0.672		0.0715	0.0984
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Potassium-40	12.1		0.287	1.02
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Protactinium-231	0.0333	U	0.445	0.511
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Protactinium-234	0.0111	U	0.319	0.17
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Protactinium-234m	-0.125	U	5.44	2.76

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Radium-223	-0.151	U	0.656	0.375
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Radium-224	0.948		0.634	0.865
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Radium-226	0.615		0.0658	0.114
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Thallium-208	0.233		0.0327	0.0554
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Thorium-227	0.0198	U	0.262	0.132
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Thorium-228	0.799		0.0591	0.0915
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Thorium-232	0.718		0.327	0.159
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Actinium-228	0.705		0.138	0.16
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Americium-241	-0.00371	U	0.111	0.0545
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Bismuth-212	1.21		0.424	0.481
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Bismuth-214	0.562		0.0736	0.0949
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Cesium-137	0.00221	U	0.0389	0.0213
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Cobalt-60	-0.00768	U	0.0381	0.0237
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Europium-152	0.0132	U	0.0907	0.0491
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Europium-154	0.0315	U	0.123	0.0586
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Europium-155	0.0862	U	0.0906	0.0954
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Lead-212	0.822		0.0498	0.075
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Lead-214	0.718		0.174	0.0899
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Potassium-40	12.1		0.284	0.909
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Protactinium-231	0	UJ	0.404	0.567
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Protactinium-234	-0.146	U	0.262	0.162
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Protactinium-234m	-1.17	U	4.5	2.49
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Radium-223	-0.355	U	0.569	0.348
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Radium-224	1.95		0.534	0.789
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Radium-226	0.562		0.0736	0.0949
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Thallium-208	0.196		0.0338	0.0493
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Thorium-227	0.0153	U	0.234	0.126
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Thorium-228	0.822		0.0498	0.075
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Thorium-232	0.705		0.138	0.16
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Actinium-228	0.852		0.12	0.174
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Americium-241	0.0424	U	0.11	0.0615
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Bismuth-212	1.05		0.429	0.486
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Bismuth-214	0.635		0.0739	0.0987
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Cesium-137	0.0252	U	0.0436	0.0215
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Cobalt-60	-0.00269	U	0.0369	0.0195
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Europium-152	-0.0215	U	0.0868	0.0499
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Europium-154	-0.0182	U	0.117	0.0636
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Europium-155	0.0621	U	0.0942	0.112
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Lead-212	0.861		0.0538	0.0775
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Lead-214	0.779		0.177	0.103
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Potassium-40	12		0.317	0.97
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Protactinium-231	0.411	U	0.435	0.501
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Protactinium-234	0.0397	U	0.322	0.163
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Protactinium-234m	-0.398	U	5.14	2.73
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Radium-223	0.0679	U	0.646	0.376
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Radium-224	1.16		0.576	0.774
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Radium-226	0.635		0.0739	0.0987
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Thallium-208	0.277		0.0334	0.0492
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Thorium-227	0.048	U	0.254	0.13
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Thorium-228	0.861		0.0538	0.0775
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Thorium-232	0.852		0.12	0.174
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Actinium-228	0.787		0.135	0.194
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Americium-241	0.00288	U	0.155	0.0899

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Bismuth-212	1.13		0.522	0.649
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Bismuth-214	0.703		0.0776	0.12
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Cesium-137	0.051		0.0422	0.0376
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Cobalt-60	-0.00354	U	0.0364	0.0193
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Europium-152	0.00157	U	0.111	0.0589
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Europium-154	0.0525	U	0.143	0.0755
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Europium-155	-0.0313	U	0.116	0.0672
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Lead-212	0.838		0.0622	0.0866
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Lead-214	0.786		0.0829	0.142
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Potassium-40	11.4		0.419	1
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Protactinium-231	0	UJ	0.471	0.64
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Protactinium-234	0.0701	U	0.342	0.169
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Protactinium-234m	3.09	U	5.57	2.56
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Radium-223	0.526	U	0.745	0.603
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Radium-224	1.47		0.667	1.08
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Radium-226	0.703		0.0776	0.12
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Thallium-208	0.243		0.0304	0.0515
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Thorium-227	-0.0845	U	0.297	0.162
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Thorium-228	0.838		0.0622	0.0866
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Thorium-232	0.787		0.135	0.194
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Actinium-228	0.811		0.16	0.241
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Americium-241	-0.0237	U	0.187	0.0921
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Bismuth-212	0.532	U	0.788	0.383
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Bismuth-214	0.53		0.0929	0.114
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Cesium-137	0.0412		0.0386	0.034
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Cobalt-60	0.00149	U	0.0447	0.0227
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Europium-152	-0.0763	U	0.0842	0.0498
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Europium-154	0.0302	U	0.161	0.0872
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Europium-155	0.0522	U	0.114	0.0554
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Lead-212	0.808		0.0582	0.0849
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Lead-214	0.785		0.199	0.129
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Potassium-40	11.6		0.42	1.11
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Protactinium-231	0.417	U	0.499	0.375
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Protactinium-234	-0.0831	U	0.312	0.171
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Protactinium-234m	-1.54	U	5.94	3.34
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Radium-223	-0.455	U	0.598	0.388
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Radium-224	0	UJ	0.624	0.964
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Radium-226	0.53		0.0929	0.114
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Thallium-208	0.212		0.0436	0.0515
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Thorium-227	-0.0496	U	0.252	0.157
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Thorium-228	0.808		0.0582	0.0849
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Thorium-232	0.811		0.16	0.241
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Actinium-228	0.736		0.199	0.274
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Americium-241	0.00888	U	0.0639	0.0359
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Bismuth-212	1.1		0.608	0.551
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Bismuth-214	0.727		0.0944	0.151
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Cesium-137	0.0078	U	0.0534	0.0283
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Cobalt-60	0.015	U	0.0567	0.0296
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Europium-152	0.0389	U	0.123	0.0638
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Europium-154	-0.0871	U	0.157	0.0969
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Europium-155	0.0408	U	0.108	0.0565
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Lead-212	0.873		0.0623	0.0871
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Lead-214	0.731		0.208	0.122

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Potassium-40	11.9		0.535	1.2
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Protactinium-231	0.411	U	0.642	0.308
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Protactinium-234	0.076	U	0.478	0.241
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Protactinium-234m	-3.78	U	6.04	3.65
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Radium-223	0.0491	U	0.77	0.4
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Radium-224	1.11		0.668	0.767
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Radium-226	0.727		0.0944	0.151
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Thallium-208	0.31		0.0408	0.0572
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Thorium-227	0.0523	U	0.281	0.141
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Thorium-228	0.873		0.0623	0.0871
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Thorium-232	0.736		0.199	0.274
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Actinium-228	0.721		0.152	0.197
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Americium-241	-0.0115	U	0.147	0.079
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Bismuth-212	0.535	U	0.603	0.687
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Bismuth-214	0.624		0.0732	0.116
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Cesium-137	0.028	U	0.0428	0.0315
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Cobalt-60	0.00534	U	0.0467	0.0223
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Europium-152	0.0179	U	0.105	0.0569
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Europium-154	-0.0202	U	0.12	0.0628
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Europium-155	0.0243	U	0.101	0.0511
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Lead-212	0.806		0.0528	0.0811
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Lead-214	0.797		0.195	0.109
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Potassium-40	11.7		0.341	1.13
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Protactinium-231	0.346	U	0.476	0.386
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Protactinium-234	0.0294	U	0.394	0.209
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Protactinium-234m	0.238	U	6.24	3.5
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Radium-223	-0.0264	U	0.645	0.362
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Radium-224	0.995		0.567	0.895
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Radium-226	0.624		0.0732	0.116
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Thallium-208	0.202		0.0399	0.0615
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Thorium-227	0.0682	U	0.269	0.143
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Thorium-228	0.806		0.0528	0.0811
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Thorium-232	0.721		0.152	0.197
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Actinium-228	0.89		0.141	0.201
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Americium-241	0.0997	U	0.212	0.103
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Bismuth-212	0.728		0.559	0.484
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Bismuth-214	0.65		0.0711	0.116
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Cesium-137	0.0215	U	0.051	0.0252
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Cobalt-60	0.00202	U	0.0534	0.0274
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Europium-152	0.0245	U	0.112	0.0561
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Europium-154	0.0611	U	0.162	0.0529
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Europium-155	0.0528	U	0.119	0.0597
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Lead-212	0.72		0.0753	0.111
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Lead-214	0.703		0.0755	0.129
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Potassium-40	12.3		0.393	1.23
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Protactinium-231	0.194	U	0.549	0.293
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Protactinium-234	0.0332	U	0.431	0.22
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Protactinium-234m	1.78	U	6.37	3.09
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Radium-223	-0.358	U	0.695	0.436
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Radium-224	0.0927	U	0.916	0.777
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Radium-226	0.65		0.0711	0.116
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Thallium-208	0.206		0.0403	0.0596
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Thorium-227	0.0319	U	0.27	0.149

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Thorium-228	0.72		0.0753	0.111
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Thorium-232	0.89		0.141	0.201
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Actinium-228	0.959		0.153	0.197
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Americium-241	-0.0111	U	0.0468	0.0258
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Bismuth-212	1.1		0.467	0.508
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Bismuth-214	0.668		0.0746	0.122
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Cesium-137	0.141		0.0367	0.0468
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Cobalt-60	0.0113	U	0.0467	0.0224
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Europium-152	-0.0417	U	0.0839	0.0516
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Europium-154	-0.00723	U	0.129	0.0677
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Europium-155	-0.0255	U	0.0796	0.0438
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Lead-212	0.758		0.0475	0.0741
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Lead-214	0.808		0.18	0.115
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Potassium-40	13.4		0.303	1.08
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Protactinium-231	0.285	U	0.416	0.397
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Protactinium-234	-0.078	U	0.33	0.202
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Protactinium-234m	1.06	U	5.02	2.7
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Radium-223	0.044	U	0.612	0.365
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Radium-224	2.42		0.509	0.802
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Radium-226	0.668		0.0746	0.122
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Thallium-208	0.259		0.0366	0.0568
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Thorium-227	0.0473	U	0.23	0.132
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Thorium-228	0.758		0.0475	0.0741
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Thorium-232	0.959		0.153	0.197
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Actinium-228	0.454		0.174	0.249
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Americium-241	0.0486	U	0.256	0.141
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Bismuth-212	0.82		0.567	0.546
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Bismuth-214	0.538		0.0781	0.117
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Cesium-137	0.0855		0.0401	0.0407
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Cobalt-60	-0.0183	U	0.0433	0.0262
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Europium-152	-0.0202	U	0.105	0.057
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Europium-154	0.00735	U	0.147	0.0773
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Europium-155	0.0638	U	0.125	0.064
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Lead-212	0.836		0.0592	0.09
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Lead-214	0.754		0.189	0.134
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Potassium-40	12.2		0.303	1.02
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Protactinium-231	0.272	U	0.534	0.637
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Protactinium-234	-0.0931	U	0.371	0.207
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Protactinium-234m	0.743	U	6.16	3.19
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Radium-223	-0.171	U	0.685	0.375
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Radium-224	1.51		0.634	0.895
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Radium-226	0.538		0.0781	0.117
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Thallium-208	0.228		0.0357	0.0479
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Thorium-227	0.107	U	0.288	0.157
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Thorium-228	0.836		0.0592	0.09
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Thorium-232	0.454		0.174	0.249
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Actinium-228	0.439		0.195	0.267
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Americium-241	-0.12	U	0.336	0.185
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Bismuth-212	0.824		0.585	0.73
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Bismuth-214	0.568		0.0858	0.137
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Cesium-137	0.0807		0.0537	0.0433
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Cobalt-60	-0.0159	U	0.0508	0.0283
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Europium-152	-0.00217	U	0.122	0.0631

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Europium-154	0.00894	U	0.163	0.081
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Europium-155	-0.0171	U	0.141	0.0779
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Lead-212	0.769		0.0867	0.101
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Lead-214	0.649		0.0942	0.144
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Potassium-40	13.5		0.363	1.25
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Protactinium-231	0.182	U	0.66	0.362
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Protactinium-234	0.0695	U	0.413	0.212
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Protactinium-234m	-0.87	U	6	3.2
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Radium-223	-0.26	U	0.809	0.44
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Radium-224	0.0961	U	1.08	0.837
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Radium-226	0.568		0.0858	0.137
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Thallium-208	0.215		0.0481	0.0661
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Thorium-227	-0.00959	U	0.357	0.185
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Thorium-228	0.769		0.0867	0.101
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Thorium-232	0.439		0.195	0.267
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Actinium-228	0.637		0.153	0.219
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Americium-241	-0.0373	U	0.156	0.0943
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Bismuth-212	0.452	U	0.611	0.508
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Bismuth-214	0.6		0.0832	0.148
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Cesium-137	0.0558		0.0389	0.0491
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Cobalt-60	-0.00979	U	0.0418	0.0235
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Europium-152	0.0215	U	0.11	0.0636
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Europium-154	-0.0347	U	0.141	0.0831
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Europium-155	-0.0376	U	0.12	0.0705
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Lead-212	0.758		0.0646	0.083
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Lead-214	0.778		0.0787	0.101
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Potassium-40	12.4		0.427	1.04
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Protactinium-231	0.444	U	0.531	0.501
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Protactinium-234	0	UJ	0.363	0.379
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Protactinium-234m	0.361	U	5.43	2.81
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Radium-223	-0.0249	U	0.787	0.424
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Radium-224	1.5		0.692	1.17
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Radium-226	0.6	J	0.0832	0.148
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Thallium-208	0.226		0.0379	0.0607
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Thorium-227	0.0514	U	0.308	0.16
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Thorium-228	0.758		0.0646	0.083
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Thorium-232	0.637		0.153	0.219
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Actinium-228	0.777		0.164	0.225
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Americium-241	-0.0603	U	0.178	0.101
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Bismuth-212	0.713		0.521	0.65
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Bismuth-214	0.596		0.0788	0.109
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Cesium-137	0.0964		0.0445	0.052
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Cobalt-60	-0.00179	U	0.0384	0.0194
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Europium-152	-0.0187	U	0.102	0.0539
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Europium-154	0.0285	U	0.154	0.0758
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Europium-155	0.00249	U	0.118	0.0618
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Lead-212	0.88		0.0551	0.0863
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Lead-214	0.867		0.207	0.131
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Potassium-40	12.3		0.443	1.18
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Protactinium-231	0.139	U	0.549	0.272
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Protactinium-234	-0.033	U	0.327	0.17
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Protactinium-234m	5.98	U	6.22	2.9
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Radium-223	0.0699	U	0.693	0.387

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Radium-224	1.61		0.59	1
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Radium-226	0.596		0.0788	0.109
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Thallium-208	0.227		0.042	0.0658
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Thorium-227	-0.0108	U	0.276	0.156
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Thorium-228	0.88		0.0551	0.0863
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Thorium-232	0.777		0.164	0.225
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Actinium-228	0.699		0.152	0.191
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Americium-241	0.0399	U	0.178	0.0969
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Bismuth-212	0.983		0.491	0.697
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Bismuth-214	0.591		0.0708	0.119
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Cesium-137	0.102		0.0399	0.0422
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Cobalt-60	0.0177	U	0.0531	0.0258
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Europium-152	0.0251	U	0.108	0.0551
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Europium-154	-0.0871	U	0.125	0.0785
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Europium-155	0.0115	U	0.114	0.125
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Lead-212	0.798		0.058	0.0787
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Lead-214	0.687		0.0706	0.123
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Potassium-40	11.5		0.445	1.01
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Protactinium-231	0.482	U	0.489	0.478
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Protactinium-234	0.09	U	0.328	0.158
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Protactinium-234m	2.32	U	4.35	3.63
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Radium-223	0.353	U	0.663	0.348
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Radium-224	1.43		0.621	0.957
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Radium-226	0.591		0.0708	0.119
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Thallium-208	0.252		0.0339	0.0531
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Thorium-227	-0.0858	U	0.254	0.137
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Thorium-228	0.798		0.058	0.0787
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Thorium-232	0.699		0.152	0.191
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Actinium-228	0.733		0.162	0.22
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Americium-241	-0.0583	U	0.211	0.124
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Bismuth-212	1.05		0.629	0.631
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Bismuth-214	0.678		0.0873	0.137
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Cesium-137	0.0874		0.0515	0.0618
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Cobalt-60	0.00368	U	0.0476	0.0228
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Europium-152	0.0632	U	0.126	0.0645
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Europium-154	0.0121	U	0.15	0.0737
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Europium-155	0.0805	U	0.155	0.0771
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Lead-212	0.766		0.0653	0.0835
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Lead-214	0.717		0.209	0.141
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Potassium-40	11.8		0.339	1.14
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Protactinium-231	0	UJ	0.569	0.775
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Protactinium-234	0.0159	U	0.42	0.226
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Protactinium-234m	0.31	U	6.24	3.36
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Radium-223	0.19	U	0.765	0.444
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Radium-224	0.983		0.7	0.93
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Radium-226	0.678		0.0873	0.137
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Thallium-208	0.329		0.0418	0.0612
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Thorium-227	0.0223	U	0.3	0.158
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Thorium-228	0.766		0.0653	0.0835
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Thorium-232	0.733		0.162	0.22
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Actinium-228	0.831		0.119	0.179
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Americium-241	0.0144	U	0.236	0.124
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Bismuth-212	0.644		0.436	0.483

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Bismuth-214	0.669		0.0623	0.104
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Cesium-137	0.0957		0.0292	0.0337
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Cobalt-60	-0.00785	U	0.0316	0.0174
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Europium-152	-0.0287	U	0.0805	0.0441
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Europium-154	-0.0333	U	0.106	0.0596
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Europium-155	0.025	U	0.105	0.0565
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Lead-212	0.892		0.0478	0.0699
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Lead-214	0.739		0.0596	0.109
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Potassium-40	11.5		0.363	0.897
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Protactinium-231	0	UJ	0.41	0.392
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Protactinium-234	-0.121	U	0.263	0.16
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Protactinium-234m	-0.657	U	4.28	2.51
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Radium-223	-0.148	U	0.569	0.344
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Radium-224	1.27		0.512	0.813
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Radium-226	0.669		0.0623	0.104
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Thallium-208	0.206		0.0344	0.0521
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Thorium-227	-0.057	U	0.221	0.118
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Thorium-228	0.892		0.0478	0.0699
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Thorium-232	0.831		0.119	0.179
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Actinium-228	1.05		0.155	0.228
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Americium-241	0.0313	U	0.319	0.159
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Bismuth-212	0	UJ	0.887	0.403
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Bismuth-214	0.792		0.0733	0.133
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Cesium-137	-0.0249	U	0.0369	0.0233
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Cobalt-60	0.00166	U	0.0425	0.0214
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Europium-152	-0.0609	U	0.11	0.0636
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Europium-154	-0.0664	U	0.111	0.0677
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Europium-155	-0.0243	U	0.137	0.0713
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Lead-212	1.17		0.0669	0.0987
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Lead-214	1.03		0.21	0.125
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Potassium-40	5.25		0.403	0.718
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Protactinium-231	0.164	U	0.565	0.322
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Protactinium-234	0.0605	U	0.333	0.182
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Protactinium-234m	3.53	U	6.19	3.06
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Radium-223	-0.156	U	0.71	0.441
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Radium-224	1.67		0.717	0.948
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Radium-226	0.792		0.0733	0.133
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Thallium-208	0.32		0.039	0.0586
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Thorium-227	0.195	U	0.32	0.158
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Thorium-228	1.17		0.0669	0.0987
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Thorium-232	1.05		0.155	0.228
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Actinium-228	0.865		0.14	0.197
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Americium-241	-0.00107	U	0.181	0.0926
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Bismuth-212	0.527	U	0.662	0.618
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Bismuth-214	0.752		0.083	0.121
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Cesium-137	0.0604		0.0483	0.0466
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Cobalt-60	-0.00802	U	0.0476	0.0264
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Europium-152	-0.0173	U	0.0834	0.0456
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Europium-154	0.0723	U	0.18	0.0873
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Europium-155	0.059	U	0.11	0.0521
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Lead-212	0.794		0.0552	0.0833
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Lead-214	0.775		0.195	0.106
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Potassium-40	11		0.399	1.06

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Protactinium-231	0	UJ	0.517	0.534
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Protactinium-234	0.139	U	0.388	0.184
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Protactinium-234m	-2.77	U	4.47	2.72
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Radium-223	0.215	U	0.697	0.337
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Radium-224	1.34		0.592	0.945
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Radium-226	0.752		0.083	0.121
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Thallium-208	0.16		0.0416	0.0611
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Thorium-227	-0.0322	U	0.27	0.152
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Thorium-228	0.794		0.0552	0.0833
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Thorium-232	0.865		0.14	0.197
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Actinium-228	0.83		0.156	0.204
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Americium-241	0.0567	U	0.298	0.156
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Bismuth-212	1.26		0.543	0.543
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Bismuth-214	0.557		0.0815	0.115
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Cesium-137	0.114		0.0405	0.0449
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Cobalt-60	-0.00611	U	0.0431	0.023
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Europium-152	0.012	U	0.113	0.0572
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Europium-154	-0.0135	U	0.144	0.0769
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Europium-155	0.031	U	0.126	0.0639
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Lead-212	0.973		0.0656	0.0972
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Lead-214	0.759		0.0821	0.128
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Potassium-40	11.5		0.506	1.11
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Protactinium-231	0	UJ	0.511	0.564
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Protactinium-234	0.229	U	0.402	0.178
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Protactinium-234m	0.429	U	6.42	3.36
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Radium-223	-0.149	U	0.733	0.433
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Radium-224	0	UJ	0.703	0.954
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Radium-226	0.557		0.0815	0.115
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Thallium-208	0.209		0.0379	0.0667
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Thorium-227	0.0463	U	0.287	0.156
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Thorium-228	0.973		0.0656	0.0972
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Thorium-232	0.83		0.156	0.204
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Actinium-228	0.681		0.128	0.184
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Americium-241	0.00924	U	0.158	0.0863
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Bismuth-212	0.93		0.436	0.641
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Bismuth-214	0.622		0.0708	0.118
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Cesium-137	0.126		0.0389	0.0478
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Cobalt-60	0.00895	U	0.0472	0.0232
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Europium-152	-0.00336	U	0.0952	0.0492
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Europium-154	-0.00612	U	0.13	0.0781
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Europium-155	0	UJ	0.095	0.106
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Lead-212	0.781		0.0617	0.082
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Lead-214	0.843		0.193	0.129
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Potassium-40	12		0.3	1
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Protactinium-231	0.273	U	0.528	0.276
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Protactinium-234	-0.097	U	0.282	0.176
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Protactinium-234m	0.733	U	5.16	2.61
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Radium-223	0.00533	U	0.664	0.378
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Radium-224	0.981		0.661	0.828
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Radium-226	0.622		0.0708	0.118
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Thallium-208	0.262		0.0322	0.0559
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Thorium-227	-0.0879	U	0.257	0.152
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Thorium-228	0.781		0.0617	0.082

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Thorium-232	0.681		0.128	0.184
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Actinium-228	0.72		0.176	0.195
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Americium-241	0.0547	U	0.301	0.155
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Bismuth-212	1.18		0.529	0.724
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Bismuth-214	0.702		0.0732	0.105
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Cesium-137	0.0781		0.0403	0.0477
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Cobalt-60	0.0133	U	0.0509	0.0245
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Europium-152	0.006	U	0.112	0.0593
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Europium-154	-0.0572	U	0.123	0.0721
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Europium-155	0.0943	U	0.144	0.0691
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Lead-212	0.715		0.0662	0.0881
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Lead-214	0.764		0.192	0.116
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Potassium-40	12.9		0.437	1.1
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Protactinium-231	0.298	U	0.561	0.306
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Protactinium-234	-0.0708	U	0.328	0.177
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Protactinium-234m	-0.0135	U	5.71	2.98
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Radium-223	0.0653	U	0.645	0.375
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Radium-224	1.36		0.709	1.16
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Radium-226	0.702		0.0732	0.105
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Thallium-208	0.221		0.0336	0.0567
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Thorium-227	0.0191	U	0.294	0.155
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Thorium-228	0.715		0.0662	0.0881
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Thorium-232	0.72		0.176	0.195
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Actinium-228	0.735		0.165	0.234
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Americium-241	-0.116	U	0.276	0.159
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Bismuth-212	0.876		0.545	0.659
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Bismuth-214	0.613		0.0742	0.132
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Cesium-137	0.118		0.0383	0.0642
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Cobalt-60	-0.00197	U	0.0487	0.0254
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Europium-152	-0.0286	U	0.119	0.0639
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Europium-154	0.0344	U	0.156	0.0757
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Europium-155	0.0314	U	0.131	0.0671
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Lead-212	0.755		0.0647	0.0881
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Lead-214	0.683		0.086	0.128
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Potassium-40	11.7		0.534	1.19
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Protactinium-231	0	UJ	0.505	0.521
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Protactinium-234	-0.112	U	0.34	0.188
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Protactinium-234m	2.43	U	6.38	3.09
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Radium-223	-0.212	U	0.741	0.418
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Radium-224	1.22		0.693	0.913
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Radium-226	0.613		0.0742	0.132
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Thallium-208	0.219		0.0369	0.0485
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Thorium-227	-0.0273	U	0.289	0.179
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Thorium-228	0.755		0.0647	0.0881
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Thorium-232	0.735		0.165	0.234
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Actinium-228	0.753		0.159	0.201
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Americium-241	-0.0669	U	0.173	0.0925
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Bismuth-212	0.663		0.454	0.615
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Bismuth-214	0.639		0.0748	0.112
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Cesium-137	0.104		0.0371	0.0352
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Cobalt-60	-0.00485	U	0.0396	0.0214
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Europium-152	-0.0155	U	0.0961	0.0513
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Europium-154	-0.0511	U	0.119	0.0702

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Europium-155	0.0197	U	0.109	0.0586
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Lead-212	0.757		0.0544	0.0764
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Lead-214	0.765		0.179	0.114
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Potassium-40	12.2		0.381	1.02
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Protactinium-231	0	UJ	0.42	0.475
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Protactinium-234	-0.0271	U	0.285	0.149
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Protactinium-234m	2.55	U	4.47	2.76
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Radium-223	0.0486	U	0.623	0.355
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Radium-224	0	UJ	0.583	0.905
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Radium-226	0.639		0.0748	0.112
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Thallium-208	0.211		0.0364	0.0534
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Thorium-227	0.0287	U	0.265	0.134
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Thorium-228	0.757		0.0544	0.0764
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Thorium-232	0.753		0.159	0.201
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Actinium-228	0.854		0.165	0.29
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Americium-241	0.0418	U	0.0627	0.0648
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Bismuth-212	1.19		0.622	0.623
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Bismuth-214	0.756		0.0781	0.127
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Cesium-137	0.115		0.0481	0.064
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Cobalt-60	0.00154	U	0.0554	0.0287
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Europium-152	-0.0627	U	0.0999	0.0579
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Europium-154	0.0457	U	0.16	0.0837
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Europium-155	0	UJ	0.0916	0.134
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Lead-212	0.806		0.06	0.0842
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Lead-214	0.871		0.222	0.139
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Potassium-40	11.6		0.586	1.18
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Protactinium-231	0.302	U	0.538	0.493
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Protactinium-234	0.0392	U	0.429	0.217
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Protactinium-234m	2.66	U	7.95	4.9
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Radium-223	-0.0291	U	0.677	0.395
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Radium-224	0	UJ	0.643	1.02
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Radium-226	0.756		0.0781	0.127
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Thallium-208	0.245		0.0383	0.0591
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Thorium-227	-0.0825	U	0.282	0.151
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Thorium-228	0.806		0.06	0.0842
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Thorium-232	0.854		0.165	0.29
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Actinium-228	0.823		0.141	0.194
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Americium-241	0.000775	U	0.104	0.0601
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Bismuth-212	0.804		0.466	0.529
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Bismuth-214	0.696		0.0691	0.121
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Cesium-137	0.132		0.0345	0.0447
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Cobalt-60	-0.0124	U	0.0384	0.022
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Europium-152	0.0177	U	0.0987	0.0532
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Europium-154	0.0418	U	0.131	0.0634
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Europium-155	-0.00319	U	0.0975	0.0538
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Lead-212	0.863		0.0582	0.0794
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Lead-214	0.799		0.188	0.121
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Potassium-40	12.1		0.284	0.962
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Protactinium-231	0.0539	U	0.517	0.282
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Protactinium-234	0.0114	U	0.291	0.149
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Protactinium-234m	1.1	U	4.89	3.15
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Radium-223	-0.231	U	0.572	0.359
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Radium-224	1.69		0.623	0.765

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Radium-226	0.696		0.0691	0.121
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Thallium-208	0.249		0.0334	0.0524
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Thorium-227	0.127	U	0.271	0.134
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Thorium-228	0.863		0.0582	0.0794
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Thorium-232	0.823		0.141	0.194
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Actinium-228	0.69		0.148	0.203
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Americium-241	-0.0122	U	0.183	0.0959
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Bismuth-212	1.07		0.569	0.65
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Bismuth-214	0.715		0.0759	0.123
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Cesium-137	0.0679		0.0455	0.0545
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Cobalt-60	-0.00433	U	0.0387	0.0205
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Europium-152	0.063	U	0.117	0.0553
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Europium-154	-0.0289	U	0.129	0.0723
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Europium-155	0.0507	U	0.11	0.0531
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Lead-212	0.804		0.0553	0.0829
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Lead-214	0.753		0.0844	0.121
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Potassium-40	10.3		0.352	1.09
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Protactinium-231	0	UJ	0.504	0.426
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Protactinium-234	0.00479	U	0.334	0.17
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Protactinium-234m	5.5	U	6.88	4.57
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Radium-223	0.44	U	0.7	0.396
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Radium-224	0	UJ	0.593	1.01
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Radium-226	0.715		0.0759	0.123
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Thallium-208	0.245		0.0429	0.0545
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Thorium-227	-0.0355	U	0.272	0.154
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Thorium-228	0.804		0.0553	0.0829
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Thorium-232	0.69		0.148	0.203
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Actinium-228	0.932		0.137	0.198
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Americium-241	0.0711	U	0.272	0.151
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Bismuth-212	1.23		0.599	0.582
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Bismuth-214	0.659		0.0824	0.112
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Cesium-137	0.0832		0.047	0.0377
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Cobalt-60	-0.0184	U	0.0398	0.0245
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Europium-152	0.00221	U	0.121	0.0723
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Europium-154	0.0111	U	0.173	0.0922
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Europium-155	-8.95E-05	U	0.128	0.0705
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Lead-212	0.803		0.0746	0.134
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Lead-214	0.657		0.0835	0.135
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Potassium-40	12.7		0.346	1.07
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Protactinium-231	0.0363	U	0.617	0.343
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Protactinium-234	0.155	U	0.359	0.164
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Protactinium-234m	1.06	U	6.95	3.62
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Radium-223	-0.132	U	0.785	0.482
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Radium-224	0.941	U	1.04	0.634
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Radium-226	0.659		0.0824	0.112
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Thallium-208	0.231		0.0412	0.065
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Thorium-227	-0.162	U	0.258	0.148
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Thorium-228	0.803		0.0746	0.134
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Thorium-232	0.932		0.137	0.198
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Actinium-228	0.594		0.132	0.207
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Americium-241	0.0364	U	0.136	0.0665
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Bismuth-212	1.53		0.451	0.657
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Bismuth-214	0.696		0.061	0.1

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Cesium-137	0.0754		0.0369	0.0324
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Cobalt-60	0.00419	U	0.0474	0.0241
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Europium-152	-0.00821	U	0.0883	0.0507
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Europium-154	0.0449	U	0.139	0.0743
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Europium-155	0.00928	U	0.0845	0.0437
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Lead-212	0.886		0.0463	0.0741
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Lead-214	0.682		0.0679	0.108
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Potassium-40	11.7		0.338	0.988
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Protactinium-231	0	UJ	0.378	0.399
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Protactinium-234	0.0591	U	0.317	0.165
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Protactinium-234m	-0.967	U	4.64	2.86
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Radium-223	0.205	U	0.602	0.324
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Radium-224	1.22		0.496	0.714
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Radium-226	0.696		0.061	0.1
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Thallium-208	0.212		0.0329	0.0453
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Thorium-227	0.00401	U	0.227	0.126
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Thorium-228	0.886		0.0463	0.0741
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Thorium-232	0.594		0.132	0.207
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Actinium-228	0.781		0.145	0.224
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Americium-241	-0.0831	U	0.299	0.193
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Bismuth-212	0.829		0.65	0.66
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Bismuth-214	0.629		0.0764	0.141
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Cesium-137	0.0607		0.0463	0.0392
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Cobalt-60	0.00949	U	0.0518	0.025
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Europium-152	-0.0286	U	0.106	0.0571
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Europium-154	0.0298	U	0.158	0.083
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Europium-155	0.00254	U	0.127	0.0668
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Lead-212	0.849		0.0594	0.0904
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Lead-214	0.883		0.0785	0.139
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Potassium-40	12.1		0.442	1.08
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Protactinium-231	0	UJ	0.522	0.639
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Protactinium-234	-0.124	U	0.29	0.164
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Protactinium-234m	3.29	U	6.39	3.11
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Radium-223	0.18	U	0.744	0.403
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Radium-224	0	UJ	0.636	1.15
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Radium-226	0.629		0.0764	0.141
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Thallium-208	0.225		0.0412	0.0545
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Thorium-227	0.152	U	0.31	0.16
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Thorium-228	0.849		0.0594	0.0904
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Thorium-232	0.781		0.145	0.224
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Actinium-228	0.664		0.146	0.17
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Americium-241	0.055	U	0.167	0.0935
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Bismuth-212	0.947		0.561	0.567
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Bismuth-214	0.614		0.0777	0.103
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Cesium-137	0.12		0.0394	0.042
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Cobalt-60	-0.0065	U	0.0421	0.0231
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Europium-152	-0.0188	U	0.117	0.0641
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Europium-154	-0.00395	U	0.13	0.0789
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Europium-155	0.0357	U	0.112	0.146
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Lead-212	0.808		0.0689	0.0881
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Lead-214	0.733		0.088	0.128
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Potassium-40	12.4		0.438	1.05
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Protactinium-231	0.295	U	0.617	0.311

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Protactinium-234	-0.134	U	0.259	0.152
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Protactinium-234m	0.881	U	5.46	2.77
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Radium-223	-0.154	U	0.767	0.472
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Radium-224	1.19		0.738	0.967
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Radium-226	0.614		0.0777	0.103
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Thallium-208	0.197		0.0386	0.0512
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Thorium-227	0.0139	U	0.282	0.147
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Thorium-228	0.808		0.0689	0.0881
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Thorium-232	0.664		0.146	0.17
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Actinium-228	0.627		0.142	0.161
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Americium-241	-0.0598	U	0.181	0.106
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Bismuth-212	0.878		0.445	0.445
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Bismuth-214	0.68		0.0668	0.0987
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Cesium-137	0.0578		0.0382	0.0382
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Cobalt-60	0.0063	U	0.0425	0.0203
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Europium-152	0.0344	U	0.105	0.052
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Europium-154	-0.0287	U	0.126	0.0685
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Europium-155	0.0255	U	0.105	0.0543
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Lead-212	0.815		0.0529	0.0808
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Lead-214	0.818		0.188	0.123
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Potassium-40	12.4		0.344	1.02
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Protactinium-231	0	UJ	0.484	0.469
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Protactinium-234	-0.18	U	0.291	0.213
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Protactinium-234m	-0.897	U	5.2	2.97
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Radium-223	0.398	U	0.665	0.479
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Radium-224	1.58		0.567	0.957
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Radium-226	0.68		0.0668	0.0987
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Thallium-208	0.199		0.0338	0.0539
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Thorium-227	0	UJ	0.263	0.269
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Thorium-228	0.815		0.0529	0.0808
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Thorium-232	0.627		0.142	0.161
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Actinium-228	0.793		0.169	0.175
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Americium-241	-0.0182	U	0.268	0.148
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Bismuth-212	1.14		0.542	0.541
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Bismuth-214	0.534		0.0859	0.115
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Cesium-137	0.0918		0.0438	0.041
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Cobalt-60	0.00669	U	0.0383	0.0177
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Europium-152	0.00764	U	0.111	0.0586
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Europium-154	0.0579	U	0.138	0.0733
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Europium-155	0.037	U	0.128	0.0629
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Lead-212	0.771		0.0637	0.0812
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Lead-214	0.747		0.0816	0.131
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Potassium-40	12		0.365	1.01
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Protactinium-231	0	UJ	0.486	0.658
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Protactinium-234	-0.0135	U	0.319	0.164
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Protactinium-234m	2.64	U	6	2.99
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Radium-223	0.298	U	0.749	0.375
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Radium-224	0	UJ	0.682	1.09
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Radium-226	0.534		0.0859	0.115
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Thallium-208	0.277		0.0319	0.0584
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Thorium-227	-0.00741	U	0.252	0.132
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Thorium-228	0.771		0.0637	0.0812
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Thorium-232	0.793		0.169	0.175

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Actinium-228	0.595		0.159	0.23
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Americium-241	-0.0512	U	0.193	0.0969
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Bismuth-212	1.06		0.594	0.544
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Bismuth-214	0.61		0.0715	0.112
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Cesium-137	0.0873		0.0409	0.0434
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Cobalt-60	-0.00536	U	0.0449	0.0281
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Europium-152	-0.0131	U	0.105	0.0611
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Europium-154	0.0171	U	0.151	0.0767
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Europium-155	0.0187	U	0.116	0.0581
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Lead-212	0.797		0.0624	0.0848
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Lead-214	0.734		0.0766	0.118
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Potassium-40	12.1		0.367	1.05
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Protactinium-231	0	UJ	0.511	0.542
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Protactinium-234	-0.089	U	0.374	0.236
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Protactinium-234m	2.53	U	6.29	4.06
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Radium-223	-0.105	U	0.619	0.359
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Radium-224	1.24		0.669	0.894
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Radium-226	0.61		0.0715	0.112
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Thallium-208	0.225		0.0414	0.0629
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Thorium-227	-0.00337	U	0.264	0.146
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Thorium-228	0.797		0.0624	0.0848
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Thorium-232	0.595		0.159	0.23
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Actinium-228	0.665		0.125	0.22
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Americium-241	-0.0453	U	0.207	0.107
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Bismuth-212	1.09		0.419	0.585
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Bismuth-214	0.827		0.066	0.123
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Cesium-137	0.0328	U	0.0456	0.0208
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Cobalt-60	-0.00785	U	0.037	0.0198
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Europium-152	-0.0466	U	0.0903	0.0494
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Europium-154	0.0661	U	0.127	0.0533
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Europium-155	0.0229	U	0.113	0.0577
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Lead-212	0.734		0.0736	0.0971
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Lead-214	0.752		0.19	0.113
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Potassium-40	12.1		0.348	1
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Protactinium-231	0.0621	U	0.525	0.262
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Protactinium-234	0.168	U	0.307	0.144
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Protactinium-234m	-0.779	U	4.84	2.57
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Radium-223	-0.281	U	0.624	0.353
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Radium-224	0.566	U	0.695	0.73
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Radium-226	0.827		0.066	0.123
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Thallium-208	0.2		0.0401	0.0453
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Thorium-227	-0.0126	U	0.246	0.137
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Thorium-228	0.734		0.0736	0.0971
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Thorium-232	0.665		0.125	0.22
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Actinium-228	0.574		0.176	0.236
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Americium-241	-0.0993	U	0.169	0.091
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Bismuth-212	0	UJ	0.514	0.771
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Bismuth-214	0.753		0.0732	0.13
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Cesium-137	0.0842		0.0398	0.0413
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Cobalt-60	0.0207	U	0.0561	0.0258
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Europium-152	0.0227	U	0.118	0.0595
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Europium-154	-0.0509	U	0.146	0.0838
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Europium-155	0.023	U	0.114	0.0586

Table 5-39. RBA-SanBruno - Gamma Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Lead-212	0.869		0.0601	0.087
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Lead-214	0.768		0.0779	0.138
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Potassium-40	12.2		0.0661	1.06
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Protactinium-231	0	UJ	0.52	0.501
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Protactinium-234	0.0679	U	0.382	0.187
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Protactinium-234m	5.53	U	5.87	4.36
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Radium-223	-0.145	U	0.694	0.367
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Radium-224	0.61	U	0.644	0.89
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Radium-226	0.753		0.0732	0.13
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Thallium-208	0.261		0.0375	0.0635
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Thorium-227	-0.0186	U	0.257	0.145
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Thorium-228	0.869		0.0601	0.087
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Thorium-232	0.574		0.176	0.236
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Actinium-228	0.766		0.11	0.187
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Americium-241	0.0386	U	0.221	0.121
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Bismuth-212	0.418	U	0.529	0.464
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Bismuth-214	0.568		0.0645	0.102
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Cesium-137	0.0334	U	0.0422	0.0227
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Cobalt-60	0.000763	U	0.0358	0.0186
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Europium-152	-0.0138	U	0.0924	0.0508
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Europium-154	0.0677	U	0.131	0.111
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Europium-155	-0.0321	U	0.108	0.0567
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Lead-212	0.814		0.0529	0.0707
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Lead-214	0.799		0.162	0.103
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Potassium-40	11.6		0.309	0.824
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Protactinium-231	0	UJ	0.422	0.6
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Protactinium-234	-0.126	U	0.225	0.13
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Protactinium-234m	2.47	U	5.3	2.83
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Radium-223	-0.0058	U	0.597	0.359
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Radium-224	1.15		0.566	0.922
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Radium-226	0.568		0.0645	0.102
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Thallium-208	0.221		0.034	0.043
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Thorium-227	-0.0797	U	0.235	0.13
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Thorium-228	0.814		0.0529	0.0707
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Thorium-232	0.766		0.11	0.187

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

J - Analyte present. Reported value may or may not be accurate or precise

pCi/g - picocure per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Radium-226	0.62		0.0655	0.111
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Americium-241	-0.0438	UJ	0.272	0.0996
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Plutonium-238	-0.0184	UJ	0.191	0.0789
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Plutonium-239/240	0.16	UJ	0.263	0.185
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Thorium-228	0.837	J	0.406	0.419
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Thorium-230	0.739	J	0.384	0.391
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Thorium-232	0.514	J	0.288	0.318
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Uranium-233/234	0.546		0.07	0.133
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Uranium-235/236	0.0521	U	0.0618	0.0526
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Uranium-238	0.493		0.0877	0.13
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Radium-226	0.67		0.0437	0.103
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Americium-241	-0.0211	UJ	0.241	0.0955
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Plutonium-238	-0.0347	UJ	0.485	0.204
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Plutonium-239/240	-0.13	UJ	0.47	0.136
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Thorium-228	0.716	J	0.621	0.52
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Thorium-230	0.989	J	0.489	0.553
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Thorium-232	0.726	J	0.335	0.462
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Uranium-233/234	0.553		0.0774	0.136
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Uranium-235/236	0.0689	U	0.0696	0.0602
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Uranium-238	0.636		0.0563	0.143
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Radium-226	0.746		0.0515	0.111
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Americium-241	0.0103	UJ	0.249	0.117
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Plutonium-238	-0.0819	UJ	0.402	0.142
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Plutonium-239/240	-0.0714	UJ	0.39	0.14
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Thorium-228	0.491	J	0.382	0.355
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Thorium-230	0.725	J	0.442	0.425
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Thorium-232	0.589	J	0.251	0.357
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Uranium-233/234	0.702		0.0813	0.156
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Uranium-235/236	0.0374	U	0.0799	0.0531
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Uranium-238	0.622		0.0692	0.146
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Radium-226	0.748		0.0474	0.127
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Americium-241	0.0412	UJ	0.197	0.113
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Plutonium-238	-0.0555	UJ	0.256	0.0782
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Plutonium-239/240	0.0119	UJ	0.295	0.14
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Thorium-228	0.676	J	0.395	0.404
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Thorium-230	0.917	J	0.353	0.446
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Thorium-232	0.478	J	0.246	0.322
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Uranium-233/234	0.471		0.0995	0.141
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Uranium-235/236	0.0242	U	0.0363	0.0419
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Uranium-238	0.582		0.0889	0.153
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Radium-226	0.527		0.051	0.102
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Americium-241	0.15	UJ	0.259	0.178
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Plutonium-238	-0.102	UJ	0.421	0.144
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Plutonium-239/240	-0.0294	UJ	0.335	0.133
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Thorium-228	0.691	J	0.368	0.379
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Thorium-230	0.813	J	0.329	0.393
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Thorium-232	0.75	J	0.213	0.364
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Uranium-233/234	0.654	J	0.0905	0.165
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Uranium-235/236	0.0206	UJ	0.0666	0.0445
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Uranium-238	0.72	J	0.0878	0.172
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Radium-226	0.733		0.0493	0.128
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Americium-241	0.0832	UJ	0.145	0.12
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Plutonium-238	-0.013	UJ	0.282	0.121
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Plutonium-239/240	-0.0052	UJ	0.272	0.12

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Thorium-228	0.592	J	0.269	0.376
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Thorium-230	1.04	J	0.399	0.496
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Thorium-232	0.626	J	0.266	0.38
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Uranium-233/234	0.809		0.0951	0.17
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Uranium-235/236	0.0848		0.0748	0.0681
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Uranium-238	0.753		0.0606	0.161
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Radium-226	0.619		0.0812	0.13
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Americium-241	0.127	UJ	0.236	0.173
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Plutonium-238	0.079	UJ	0.343	0.19
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Plutonium-239/240	-0.0521	UJ	0.323	0.118
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Thorium-228	0.722	J	0.37	0.407
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Thorium-230	0.886	J	0.426	0.45
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Thorium-232	1.13	J	0.274	0.475
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Uranium-233/234	0.746		0.07	0.155
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Uranium-235/236	-0.00158	U	0.0853	0.0383
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Uranium-238	0.618		0.0821	0.143
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Radium-226	0.445		0.0486	0.1
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Americium-241	-0.0323	UJ	0.368	0.146
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Plutonium-238	0.0556	UJ	0.265	0.153
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Plutonium-239/240	-0.0591	UJ	0.422	0.167
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Thorium-228	0.559	J	0.2	0.31
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Thorium-230	0.686	J	0.347	0.359
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Thorium-232	0.857	J	0.199	0.372
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Uranium-233/234	0.696		0.0958	0.155
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Uranium-235/236	0.0258	U	0.0767	0.047
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Uranium-238	0.972		0.0776	0.178
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Radium-226	0.56		0.066	0.115
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Americium-241	0.0306	UJ	0.193	0.115
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Plutonium-238	-0.0306	UJ	0.269	0.103
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Plutonium-239/240	-0.0625	UJ	0.306	0.108
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Thorium-228	1.21	J	0.382	0.546
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Thorium-230	0.809	J	0.415	0.457
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Thorium-232	1.23	J	0.213	0.527
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Uranium-233/234	0.54		0.0742	0.134
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Uranium-235/236	0.0191	U	0.0696	0.0415
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Uranium-238	0.646		0.0766	0.146
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Radium-226	0.539		0.0644	0.11
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Americium-241	0.0185	UJ	0.461	0.219
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Plutonium-238	-0.0249	UJ	0.211	0.0753
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Plutonium-239/240	0.0886	UJ	0.256	0.158
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Thorium-228	0.583	J	0.35	0.39
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Thorium-230	0.552	J	0.51	0.415
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Thorium-232	0.91	J	0.313	0.462
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Uranium-233/234	0.667		0.0929	0.162
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Uranium-235/236	0.0267	U	0.0732	0.048
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Uranium-238	0.564		0.072	0.147
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Radium-226	0.515		0.0686	0.133
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Americium-241	0.0382	UJ	0.335	0.171
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Plutonium-238	-0.112	UJ	0.403	0.116
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Plutonium-239/240	-0.0446	UJ	0.306	0.103
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Thorium-228	0.653	J	0.241	0.32
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Thorium-230	0.441	J	0.374	0.301
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Thorium-232	0.509	J	0.202	0.278
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Uranium-233/234	0.652		0.0813	0.159

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Uranium-235/236	0.047		0.0353	0.0522
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Uranium-238	0.621		0.0595	0.153
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Radium-226	0.785		0.0666	0.131
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Americium-241	0.0511	UJ	0.324	0.175
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Plutonium-238	0.224	UJ	0.285	0.264
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Plutonium-239/240	0.0452	UJ	0.285	0.17
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Thorium-228	0.828	J	0.227	0.373
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Thorium-230	0.68	J	0.295	0.347
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Thorium-232	0.548	J	0.264	0.311
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Uranium-233/234	0.476		0.0707	0.125
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Uranium-235/236	0.019	U	0.0693	0.0413
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Uranium-238	0.528		0.0795	0.133
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Radium-226	0.77		0.0831	0.162
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Americium-241	0.13	UJ	0.212	0.158
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Plutonium-238	0.0259	UJ	0.275	0.144
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Plutonium-239/240	-0.0954	UJ	0.401	0.12
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Thorium-228	0.822	J	0.182	0.33
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Thorium-230	0.747	J	0.292	0.329
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Thorium-232	0.828	J	0.18	0.326
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Uranium-233/234	0.424	J	0.133	0.17
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Uranium-235/236	0.0191	UJ	0.0572	0.0536
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Uranium-238	0.44	J	0.0854	0.166
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Radium-226	0.637		0.0728	0.152
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Americium-241	-0.0496	UJ	0.229	0.0699
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Plutonium-238	0.0221	UJ	0.236	0.123
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Plutonium-239/240	0.0238	UJ	0.314	0.154
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Thorium-228	0.725	J	0.355	0.355
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Thorium-230	0.863	J	0.318	0.369
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Thorium-232	0.683	J	0.293	0.329
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Uranium-233/234	0.517		0.0506	0.102
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Uranium-235/236	0.0425	U	0.0611	0.0427
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Uranium-238	0.621		0.0595	0.112
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Radium-226	0.737		0.082	0.151
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Americium-241	-0.0743	UJ	0.269	0.0776
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Plutonium-238	0.0405	UJ	0.355	0.181
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Plutonium-239/240	-0.0465	UJ	0.408	0.157
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Thorium-228	0.573	J	0.309	0.321
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Thorium-230	0.927	J	0.337	0.395
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Thorium-232	0.497	J	0.212	0.283
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Uranium-233/234	0.571		0.0627	0.118
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Uranium-235/236	0.0551	U	0.0587	0.0479
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Uranium-238	0.596		0.0662	0.121
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Radium-226	0.461		0.0938	0.111
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Americium-241	0.0558	UJ	0.302	0.162
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Plutonium-238	0.171	UJ	0.456	0.277
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Plutonium-239/240	0.106	UJ	0.411	0.234
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Thorium-228	0.487	J	0.367	0.326
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Thorium-230	0.702	J	0.319	0.362
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Thorium-232	0.611	J	0.161	0.322
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Uranium-233/234	0.524		0.0699	0.127
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Uranium-235/236	0.0363	U	0.0648	0.0464
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Uranium-238	0.586		0.0713	0.134
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Radium-226	0.684		0.0665	0.127
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Americium-241	0.0369	UJ	0.176	0.102

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Plutonium-238	0.0389	UJ	0.247	0.133
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Plutonium-239/240	0.0957	UJ	0.277	0.17
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Thorium-228	0.495	J	0.364	0.335
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Thorium-230	0.546	J	0.422	0.36
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Thorium-232	0.499	J	0.248	0.31
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Uranium-233/234	0.604		0.0652	0.135
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Uranium-235/236	0.0444	U	0.0793	0.0537
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Uranium-238	0.701		0.0764	0.146
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Radium-226	0.727		0.0554	0.131
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Americium-241	0.0489	UJ	0.234	0.135
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Plutonium-238	-0.0305	UJ	0.426	0.179
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Plutonium-239/240	0.164	UJ	0.515	0.297
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Thorium-228	0.833	J	0.408	0.408
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Thorium-230	0.488	J	0.353	0.317
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Thorium-232	0.428	J	0.336	0.297
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Uranium-233/234	0.503		0.0897	0.139
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Uranium-235/236	0.0337		0.0337	0.0447
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Uranium-238	0.627		0.0273	0.149
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Radium-226	0.35		0.067	0.0909
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Americium-241	-0.005	UJ	0.175	0.0751
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Plutonium-238	0.0955	UJ	0.28	0.164
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Plutonium-239/240	0.0674	UJ	0.279	0.155
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Thorium-228	0.965	J	0.426	0.524
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Thorium-230	0.707	J	0.476	0.464
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Thorium-232	0.559	J	0.234	0.388
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Uranium-233/234	0.462		0.0719	0.134
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Uranium-235/236	0.0904		0.0628	0.0706
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Uranium-238	0.616		0.0599	0.153
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Radium-226	0.568		0.0687	0.113
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Americium-241	0.116	U	0.194	0.152
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Plutonium-238	0.0427	UJ	0.251	0.134
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Plutonium-239/240	-0.00647	UJ	0.227	0.0971
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Thorium-228	0.875	J	0.405	0.505
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Thorium-230	0.908	J	0.584	0.544
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Thorium-232	0.543	J	0.362	0.401
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Uranium-233/234	0.573	J	0.104	0.159
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Uranium-235/236	0.0512	J	0.0384	0.0569
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Uranium-238	0.513	J	0.0942	0.149
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Radium-226	0.544		0.0793	0.112
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Americium-241	0.0812	UJ	0.24	0.144
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Plutonium-238	0.0578	UJ	0.224	0.128
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Plutonium-239/240	-0.0522	UJ	0.256	0.0903
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Thorium-228	0.637	J	0.626	0.534
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Thorium-230	0.718	J	0.69	0.569
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Thorium-232	0.532	J	0.461	0.46
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Uranium-233/234	0.601		0.0954	0.149
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Uranium-235/236	0.0313	U	0.075	0.0494
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Uranium-238	0.616		0.0606	0.146
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Radium-226	0.699		0.0668	0.142
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Americium-241	0.11	UJ	0.238	0.163
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Plutonium-238	-0.0285	UJ	0.325	0.129
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Plutonium-239/240	0.352	UJ	0.417	0.306
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Thorium-228	2.2	J	0.447	0.849
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Thorium-230	0.93	J	0.518	0.577

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Thorium-232	2.65	J	0.518	0.92
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Uranium-233/234	0.659	J	0.154	0.192
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Uranium-235/236	0.0347	UJ	0.0951	0.0625
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Uranium-238	0.683	J	0.112	0.187
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Radium-226	0.427		0.103	0.105
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Americium-241	0.134	UJ	0.218	0.157
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Plutonium-238	-0.0256	UJ	0.292	0.116
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Plutonium-239/240	-0.0166	UJ	0.279	0.114
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Thorium-228	1.15	J	0.328	0.477
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Thorium-230	0.556	J	0.401	0.361
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Thorium-232	1.02	J	0.257	0.436
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Uranium-233/234	0.632		0.0795	0.154
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Uranium-235/236	0.0342		0.0342	0.0454
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Uranium-238	0.611		0.0577	0.15
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Radium-226	0.546		0.0625	0.107
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Americium-241	-0.0327	UJ	0.287	0.111
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Plutonium-238	0.05	UJ	0.271	0.145
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Plutonium-239/240	-0.00625	UJ	0.219	0.0938
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Thorium-228	0.88	J	0.467	0.573
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Thorium-230	0.323	UJ	0.535	0.398
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Thorium-232	0.528	J	0.458	0.456
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Uranium-233/234	0.534	J	0.0972	0.15
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Uranium-235/236	0.0069	UJ	0.0937	0.0461
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Uranium-238	0.653	J	0.0758	0.162
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Radium-226	0.65		0.072	0.127
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Americium-241	-0.0621	U	0.21	0.0599
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Plutonium-238	0.0255	UJ	0.254	0.127
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Plutonium-239/240	0.0921	UJ	0.2	0.136
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Thorium-228	0.383	UJ	0.569	0.382
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Thorium-230	0.637	J	0.486	0.412
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Thorium-232	0.333	UJ	0.545	0.358
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Uranium-233/234	0.519	J	0.113	0.157
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Uranium-235/236	0.0359	UJ	0.0721	0.055
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Uranium-238	0.677	J	0.1	0.175
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Radium-226	0.796		0.0692	0.139
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Americium-241	-0.0183	U	0.284	0.121
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Plutonium-238	-0.0275	UJ	0.241	0.0929
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Plutonium-239/240	-0.0334	UJ	0.283	0.114
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Thorium-228	0.882	J	0.488	0.445
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Thorium-230	0.954	J	0.422	0.437
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Thorium-232	0.451	UJ	0.467	0.347
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Uranium-233/234	0.731		0.0573	0.129
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Uranium-235/236	0.0524	U	0.0558	0.0456
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Uranium-238	0.53		0.0658	0.112
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Radium-226	0.608		0.0606	0.126
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Americium-241	0.0435	UJ	0.208	0.12
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Plutonium-238	0.055	UJ	0.298	0.16
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Plutonium-239/240	0.011	UJ	0.266	0.125
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Thorium-228	0.98	J	0.35	0.459
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Thorium-230	0.692	J	0.425	0.407
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Thorium-232	0.793	J	0.274	0.403
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Uranium-233/234	0.565	J	0.142	0.168
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Uranium-235/236	0.06	UJ	0.0784	0.0668
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Uranium-238	0.74	J	0.0861	0.18

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Radium-226	0.668		0.0459	0.118
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Americium-241	0.178	UJ	0.256	0.185
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Plutonium-238	-0.0346	UJ	0.292	0.118
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Plutonium-239/240	-0.0037	UJ	0.292	0.132
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Thorium-228	0.705	J	0.37	0.379
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Thorium-230	0.442	J	0.393	0.321
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Thorium-232	0.64	J	0.31	0.348
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Uranium-233/234	0.647		0.0794	0.156
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Uranium-235/236	0.0795	U	0.0803	0.0695
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Uranium-238	0.621		0.0921	0.155
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Radium-226	0.633		0.0688	0.119
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Americium-241	0.0731	UJ	0.284	0.162
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Plutonium-238	-0.05	UJ	0.31	0.114
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Plutonium-239/240	0.00143	UJ	0.235	0.106
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Thorium-228	0.608	J	0.346	0.347
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Thorium-230	0.465	J	0.335	0.307
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Thorium-232	0.466	J	0.2	0.283
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Uranium-233/234	0.534		0.0503	0.111
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Uranium-235/236	0.0322	U	0.042	0.0358
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Uranium-238	0.637		0.0408	0.12
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Radium-226	0.853		0.076	0.146
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Americium-241	0.0013	UJ	0.215	0.0967
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Plutonium-238	-0.0513	UJ	0.3	0.0973
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Plutonium-239/240	-0.0205	UJ	0.237	0.0907
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Thorium-228	0.553	J	0.347	0.327
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Thorium-230	0.712	J	0.302	0.348
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Thorium-232	0.683	J	0.234	0.331
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Uranium-233/234	0.551		0.136	0.155
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Uranium-235/236	0.068	U	0.0801	0.0659
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Uranium-238	0.491		0.0972	0.139
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Radium-226	0.737		0.113	0.162
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Americium-241	0.147	UJ	0.303	0.195
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Plutonium-238	-0.0694	UJ	0.27	0.0791
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Plutonium-239/240	-0.0296	UJ	0.259	0.0999
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Thorium-228	0.925	J	0.511	0.466
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Thorium-230	1	J	0.442	0.459
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Thorium-232	0.43	UJ	0.49	0.354
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Uranium-233/234	0.711		0.129	0.148
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Uranium-235/236	0.0709	U	0.0754	0.0598
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Uranium-238	0.586		0.0487	0.122
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Radium-226	0.841		0.0625	0.193
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Americium-241	-0.0465	UJ	0.254	0.0912
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Plutonium-238	-0.016	U	0.156	0.0665
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Plutonium-239/240	0.0387	U	0.091	0.0645
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Thorium-228	0.678	J	0.512	0.473
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Thorium-230	0.69	J	0.44	0.457
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Thorium-232	0.493	J	0.317	0.379
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Uranium-233/234	0.615		0.103	0.151
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Uranium-235/236	0.145		0.0812	0.0854
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Uranium-238	0.77		0.0704	0.163
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Radium-226	0.523	J	0.0676	0.147
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Americium-241	0.11	UJ	0.206	0.151
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Plutonium-238	0.0852	UJ	0.309	0.175
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Plutonium-239/240	-0.0504	UJ	0.275	0.111

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Thorium-228	0.474	J	0.406	0.349
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Thorium-230	0.482	J	0.357	0.336
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Thorium-232	0.549	J	0.234	0.333
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Uranium-233/234	0.588		0.0792	0.149
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Uranium-235/236	0.0792	U	0.08	0.0692
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Uranium-238	0.702		0.0917	0.164
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Radium-226	0.468	J	0.0728	0.15
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Americium-241	0.00134	UJ	0.222	0.0997
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Plutonium-238	-0.00915	U	0.106	0.0436
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Plutonium-239/240	-0.00968	U	0.192	0.0872
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Thorium-228	0.266	UJ	0.312	0.267
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Thorium-230	0.607	J	0.373	0.378
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Thorium-232	0.577	J	0.246	0.35
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Uranium-233/234	0.871		0.0765	0.176
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Uranium-235/236	0.0311	U	0.0945	0.0563
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Uranium-238	0.694		0.091	0.159
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Radium-226	0.546	J	0.0849	0.16
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Americium-241	-0.0424	U	0.196	0.0598
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Plutonium-238	-0.0409	U	0.171	0.0635
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Plutonium-239/240	0.0399	U	0.152	0.0866
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Thorium-228	1.31	J	0.252	0.624
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Thorium-230	1.54	J	0.507	0.686
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Thorium-232	0.476	J	0.349	0.396
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Uranium-233/234	0.61		0.102	0.151
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Uranium-235/236	0.0494	U	0.0824	0.0587
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Uranium-238	0.501		0.0834	0.135
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Radium-226	0.488	J	0.0775	0.144
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Americium-241	0.0869	UJ	0.218	0.141
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Plutonium-238	-0.0479	UJ	0.297	0.109
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Plutonium-239/240	0.0615	UJ	0.24	0.14
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Thorium-228	0.508	UJ	0.546	0.433
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Thorium-230	0.333	UJ	0.482	0.357
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Thorium-232	0.456	J	0.391	0.376
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Uranium-233/234	0.716	J	0.0936	0.181
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Uranium-235/236	0.125	J	0.0417	0.0866
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Uranium-238	0.61	J	0.0703	0.165
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Radium-226	0.73		0.0877	0.186
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Americium-241	-0.0509	UJ	0.25	0.088
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Plutonium-238	0.107	UJ	0.198	0.146
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Plutonium-239/240	0.0273	UJ	0.272	0.136
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Thorium-228	0.549	J	0.293	0.301
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Thorium-230	0.579	J	0.303	0.307
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Thorium-232	0.514	J	0.266	0.285
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Uranium-233/234	0.625	J	0.085	0.173
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Uranium-235/236	0.0735	J	0.0441	0.0714
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Uranium-238	0.665	J	0.0831	0.178
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Radium-226	0.635	J	0.077	0.167
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Americium-241	0.155	UJ	0.179	0.155
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Plutonium-238	0.17	UJ	0.372	0.239
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Plutonium-239/240	0.0904	UJ	0.292	0.18
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Thorium-228	0.7	J	0.34	0.433
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Thorium-230	1.1	J	0.434	0.537
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Thorium-232	0.219	UJ	0.293	0.263
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Uranium-233/234	0.751		0.0997	0.169

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Uranium-235/236	0.0216	U	0.0788	0.047
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Uranium-238	0.591		0.0788	0.148
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Radium-226	0.568	J	0.0831	0.17
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Americium-241	-0.0178	UJ	0.249	0.105
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Plutonium-238	-0.015	UJ	0.173	0.0663
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Plutonium-239/240	0.0237	UJ	0.15	0.0889
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Thorium-228	0.621	J	0.34	0.393
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Thorium-230	0.288	UJ	0.401	0.303
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Thorium-232	0.682	J	0.267	0.395
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Uranium-233/234	1.03	J	0.0988	0.222
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Uranium-235/236	0.133	J	0.0444	0.0924
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Uranium-238	0.794	J	0.075	0.194
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Radium-226	0.564	J	0.0964	0.142
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Americium-241	-0.098	UJ	0.347	0.131
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Plutonium-238	0.0112	UJ	0.272	0.128
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Plutonium-239/240	-0.0575	UJ	0.314	0.113
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Thorium-228	0.263	J	0.231	0.292
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Thorium-230	0.614	J	0.468	0.443
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Thorium-232	0.432	J	0.318	0.36
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Uranium-233/234	0.613		0.0987	0.155
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Uranium-235/236	0.0765		0.0611	0.0649
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Uranium-238	0.723		0.0848	0.166
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Radium-226	0.688		0.0853	0.196
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Americium-241	-0.0611	UJ	0.273	0.0946
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Plutonium-238	-0.0735	UJ	0.309	0.0925
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Plutonium-239/240	-0.0811	UJ	0.363	0.126
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Thorium-228	0.642	J	0.326	0.319
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Thorium-230	0.334	J	0.29	0.24
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Thorium-232	0.572	J	0.179	0.273
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Uranium-233/234	0.648	J	0.124	0.174
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Uranium-235/236	0.0755	J	0.0709	0.0707
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Uranium-238	0.638	J	0.0756	0.166
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Radium-226	0.635	J	0.0991	0.173
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Americium-241	0.187	UJ	0.303	0.219
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Plutonium-238	0.0624	UJ	0.338	0.181
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Plutonium-239/240	-0.0654	UJ	0.302	0.0923
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Thorium-228	0.702	J	0.393	0.392
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Thorium-230	0.348	UJ	0.352	0.29
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Thorium-232	0.469	J	0.22	0.299
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Uranium-233/234	0.416	J	0.119	0.139
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Uranium-235/236	0.0159	U	0.0778	0.0449
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Uranium-238	0.61		0.0533	0.156
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Radium-226	0.601		0.0522	0.128
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Americium-241	-0.0428	UJ	0.22	0.0691
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Plutonium-238	-0.0315	UJ	0.266	0.107
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Plutonium-239/240	0.0528	UJ	0.266	0.143
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Thorium-228	1.01	J	0.448	0.486
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Thorium-230	0.782	J	0.381	0.419
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Thorium-232	0.641	J	0.302	0.371
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Uranium-233/234	0.741		0.12	0.171
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Uranium-235/236	-0.00489	U	0.0909	0.0411
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Uranium-238	0.82		0.0929	0.174
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Radium-226	0.597		0.105	0.143
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Americium-241	-0.0235	U	0.206	0.0795

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Plutonium-238	-0.0358	UJ	0.314	0.121
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Plutonium-239/240	-0.00467	UJ	0.368	0.167
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Thorium-228	0.904	J	0.179	0.342
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Thorium-230	0.974	J	0.262	0.361
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Thorium-232	0.893	J	0.208	0.339
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Uranium-233/234	0.522		0.115	0.136
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Uranium-235/236	0.0541	U	0.0866	0.0604
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Uranium-238	0.554		0.07	0.131
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Radium-226	0.614	J	0.0578	0.117
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Americium-241	0.00938	UJ	0.205	0.098
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Plutonium-238	0.0299	UJ	0.299	0.149
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Plutonium-239/240	0.0741	UJ	0.288	0.164
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Thorium-228	0.492	J	0.422	0.362
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Thorium-230	0.892	J	0.367	0.44
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Thorium-232	1.05	J	0.242	0.458
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Uranium-233/234	0.735	J	0.103	0.179
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Uranium-235/236	0.0819	J	0.0816	0.0741
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Uranium-238	0.513	J	0.0803	0.149
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Radium-226	0.758		0.0585	0.152
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Americium-241	0.0624	UJ	0.243	0.142
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Plutonium-238	-0.0682	UJ	0.287	0.0858
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Plutonium-239/240	-0.0894	UJ	0.412	0.161
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Thorium-228	0.681	J	0.305	0.363
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Thorium-230	0.597	J	0.376	0.355
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Thorium-232	1.03	J	0.239	0.421
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Uranium-233/234	0.6		0.104	0.121
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Uranium-235/236	0.044	U	0.0774	0.0508
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Uranium-238	0.702		0.0682	0.122
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Radium-226	0.446		0.111	0.119
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Americium-241	0.00143	UJ	0.236	0.106
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Plutonium-238	-0.0578	UJ	0.266	0.0815
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Plutonium-239/240	-0.0564	UJ	0.308	0.11
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Thorium-228	1.46	J	0.516	0.623
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Thorium-230	0.984	J	0.533	0.528
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Thorium-232	0.607	J	0.432	0.415
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Uranium-233/234	0.551		0.07	0.111
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Uranium-235/236	0.0514	U	0.0711	0.0504
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Uranium-238	0.583		0.0882	0.117
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Radium-226	0.75		0.0514	0.147
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Americium-241	-0.0362	UJ	0.262	0.0982
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Plutonium-238	0.106	UJ	0.166	0.134
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Plutonium-239/240	-0.00721	UJ	0.144	0.0621
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Thorium-228	0.784	J	0.368	0.394
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Thorium-230	0.767	J	0.391	0.392
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Thorium-232	0.472	J	0.308	0.306
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Uranium-233/234	0.783		0.132	0.158
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Uranium-235/236	0.0751	U	0.103	0.0713
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Uranium-238	0.655		0.109	0.142
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Radium-226	0.575	J	0.0951	0.179
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Americium-241	0.021	U	0.133	0.0789
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Plutonium-238	0.0829	U	0.117	0.0907
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Plutonium-239/240	0.0325	U	0.184	0.0992
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Thorium-228	0.931	J	0.344	0.407
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Thorium-230	1.01	J	0.29	0.408

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Thorium-232	1.64	J	0.194	0.5
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Uranium-233/234	0.672		0.0774	0.152
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Uranium-235/236	0.0697		0.0557	0.0592
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Uranium-238	0.763		0.0734	0.161
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Radium-226	0.594	J	0.0575	0.139
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Americium-241	-0.042	UJ	0.304	0.114
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Plutonium-238	0.0364	U	0.129	0.0784
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Plutonium-239/240	0.0178	U	0.184	0.0934
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Thorium-228	0.356	UJ	0.398	0.296
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Thorium-230	0.876	J	0.345	0.391
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Thorium-232	0.775	J	0.217	0.35
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Uranium-233/234	0.625		0.0818	0.145
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Uranium-235/236	0.122		0.0304	0.072
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Uranium-238	0.59		0.0246	0.137
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Radium-226	0.8		0.0826	0.15
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Americium-241	-0.0155	UJ	0.26	0.107
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Plutonium-238	-0.0231	UJ	0.447	0.21
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Plutonium-239/240	-0.0653	UJ	0.274	0.0821
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Thorium-228	1.16	J	0.273	0.422
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Thorium-230	0.818	J	0.327	0.367
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Thorium-232	0.932	J	0.223	0.371
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Uranium-233/234	0.796	J	0.0897	0.201
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Uranium-235/236	0.0358	UJ	0.0983	0.0645
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Uranium-238	0.779	J	0.0795	0.198
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Radium-226	0.975		0.0856	0.165
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Americium-241	0.187	UJ	0.216	0.187
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Plutonium-238	0.0528	UJ	0.335	0.181
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Plutonium-239/240	0.13	UJ	0.375	0.231
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Thorium-228	1.06	J	0.527	0.486
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Thorium-230	0.766	J	0.461	0.41
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Thorium-232	1.22	J	0.39	0.472
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Uranium-233/234	0.621	J	0.108	0.167
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Uranium-235/236	0.0601	UJ	0.1	0.0714
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Uranium-238	0.709	J	0.081	0.174
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Radium-226	0.829		0.0572	0.154
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Americium-241	0.0218	U	0.191	0.0975
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Plutonium-238	-0.0687	UJ	0.317	0.0969
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Plutonium-239/240	0.155	UJ	0.287	0.202
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Thorium-228	0.301	UJ	0.369	0.275
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Thorium-230	0.772	J	0.349	0.379
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Thorium-232	0.704	J	0.201	0.342
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Uranium-233/234	0.94	J	0.138	0.233
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Uranium-235/236	0.12	J	0.0516	0.0962
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Uranium-238	1.09	J	0.0871	0.245
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Radium-226	0.705		0.0592	0.138
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Americium-241	0.0379	UJ	0.223	0.119
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Plutonium-238	-0.0295	UJ	0.412	0.173
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Plutonium-239/240	-0.0718	UJ	0.498	0.205
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Thorium-228	0.839	J	0.322	0.366
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Thorium-230	0.888	J	0.336	0.374
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Thorium-232	0.573	J	0.228	0.291
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Uranium-233/234	0.627	J	0.102	0.169
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Uranium-235/236	0.0174	UJ	0.085	0.049
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Uranium-238	0.589	J	0.0836	0.162

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Radium-226	0.643		0.0685	0.131
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Americium-241	-0.0494	UJ	0.357	0.134
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Plutonium-238	-0.00936	UJ	0.187	0.0808
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Plutonium-239/240	0.0905	UJ	0.302	0.179
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Thorium-228	0.5	J	0.353	0.315
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Thorium-230	0.556	J	0.294	0.311
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Thorium-232	0.628	J	0.249	0.319
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Uranium-233/234	0.557	J	0.135	0.186
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Uranium-235/236	0.0276	UJ	0.134	0.0747
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Uranium-238	0.371	J	0.1	0.15
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Radium-226	0.198		0.0327	0.0501
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Americium-241	-0.0303	UJ	0.208	0.0702
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Plutonium-238	-0.0624	UJ	0.321	0.101
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Plutonium-239/240	0.12	UJ	0.208	0.172
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Thorium-228	0.857	J	0.238	0.372
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Thorium-230	0.863	J	0.294	0.376
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Thorium-232	0.586	J	0.188	0.303
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Uranium-233/234	0.503		0.0809	0.109
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Uranium-235/236	-0.00766	U	0.0617	0.0261
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Uranium-238	0.563		0.0838	0.116
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Radium-226	0.624	J	0.0658	0.171
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Americium-241	0.00142	UJ	0.235	0.106
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Plutonium-238	0.0318	UJ	0.0954	0.0894
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Plutonium-239/240	0.0165	UJ	0.176	0.0918
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Thorium-228	0.67	J	0.363	0.358
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Thorium-230	0.771	J	0.472	0.405
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Thorium-232	0.77	J	0.298	0.361
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Uranium-233/234	0.643	J	0.121	0.172
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Uranium-235/236	0.0476	UJ	0.0693	0.0587
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Uranium-238	0.464	J	0.0739	0.141
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Radium-226	0.722		0.0755	0.181
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Americium-241	0.0126	UJ	0.305	0.143
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Plutonium-238	-0.0278	UJ	0.235	0.0838
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Plutonium-239/240	-0.037	UJ	0.254	0.0857
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Thorium-228	0.449	J	0.23	0.248
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Thorium-230	0.346	J	0.255	0.227
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Thorium-232	0.604	J	0.18	0.27
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Uranium-233/234	0.526	J	0.123	0.157
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Uranium-235/236	0.00361	UJ	0.0807	0.0391
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Uranium-238	0.644	J	0.0554	0.163
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Radium-226	0.805		0.0789	0.203
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Americium-241	-0.00667	UJ	0.234	0.1
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Plutonium-238	-0.0154	UJ	0.177	0.068
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Plutonium-239/240	0.00256	UJ	0.259	0.118
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Thorium-228	1.01	J	0.521	0.474
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Thorium-230	0.393	UJ	0.456	0.328
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Thorium-232	1.45	J	0.385	0.506
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Uranium-233/234	0.756		0.0871	0.162
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Uranium-235/236	0.052		0.0312	0.0504
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Uranium-238	0.691		0.0685	0.153
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Radium-226	1.09	J	0.0862	0.224
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Americium-241	-0.028	UJ	0.238	0.0846
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Plutonium-238	0.0169	UJ	0.18	0.0937
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Plutonium-239/240	0.0182	UJ	0.24	0.117

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Thorium-228	0.847	J	0.34	0.415
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Thorium-230	0.811	J	0.395	0.414
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Thorium-232	0.586	J	0.277	0.34
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Uranium-233/234	0.638	J	0.0919	0.17
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Uranium-235/236	0.0224	UJ	0.0724	0.0483
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Uranium-238	0.721	J	0.0691	0.178
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Radium-226	0.814		0.0566	0.14
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Americium-241	-0.00728	UJ	0.145	0.0628
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Plutonium-238	0.0726	UJ	0.195	0.128
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Plutonium-239/240	0.0178	UJ	0.235	0.115
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Thorium-228	0.725	J	0.337	0.358
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Thorium-230	0.665	J	0.322	0.339
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Thorium-232	1.01	J	0.184	0.385
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Uranium-233/234	0.518		0.0965	0.147
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Uranium-235/236	0.0278	U	0.0763	0.0501
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Uranium-238	0.518		0.075	0.144
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Radium-226	0.807		0.0522	0.129
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Americium-241	0.0316	UJ	0.2	0.108
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Plutonium-238	0.0522	UJ	0.283	0.152
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Plutonium-239/240	0.0013	UJ	0.215	0.0966
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Thorium-228	0.595	J	0.277	0.344
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Thorium-230	0.443	J	0.336	0.312
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Thorium-232	0.771	J	0.218	0.373
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Uranium-233/234	0.606		0.103	0.156
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Uranium-235/236	0.0223	U	0.0812	0.0484
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Uranium-238	0.582		0.0813	0.15
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Radium-226	0.972		0.0621	0.155
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Americium-241	0.0108	UJ	0.235	0.113
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Plutonium-238	0.025	UJ	0.157	0.0936
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Plutonium-239/240	0.0249	UJ	0.157	0.0936
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Thorium-228	0.498	J	0.381	0.331
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Thorium-230	0.323	J	0.313	0.264
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Thorium-232	0.438	J	0.268	0.286
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Uranium-233/234	0.642		0.0738	0.149
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Uranium-235/236	0.0517	U	0.0735	0.0565
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Uranium-238	0.577		0.0843	0.143
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Radium-226	0.787		0.0744	0.135
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Americium-241	-0.0971	UJ	0.338	0.121
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Plutonium-238	0.0149	UJ	0.234	0.117
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Plutonium-239/240	0.0743	UJ	0.253	0.147
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Thorium-228	0.793	J	0.438	0.36
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Thorium-230	0.753	J	0.362	0.327
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Thorium-232	0.861	J	0.419	0.361
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Uranium-233/234	0.494		0.0964	0.147
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Uranium-235/236	0.00357	U	0.0798	0.0386
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Uranium-238	0.491		0.0547	0.142
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Radium-226	0.674		0.0432	0.119
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Americium-241	0.0079	UJ	0.172	0.0826
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Plutonium-238	0.00129	UJ	0.212	0.0953
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Plutonium-239/240	0.0899	UJ	0.225	0.146
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Thorium-228	0.767	J	0.261	0.389
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Thorium-230	0.298	UJ	0.44	0.305
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Thorium-232	0.714	J	0.228	0.369
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Uranium-233/234	0.554		0.0669	0.127

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Uranium-235/236	0.0994		0.0551	0.0632
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Uranium-238	0.601		0.0446	0.13
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Radium-226	0.756		0.0797	0.155
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Americium-241	-0.0585	UJ	0.246	0.0736
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Plutonium-238	0.043	UJ	0.272	0.147
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Plutonium-239/240	-0.0182	UJ	0.305	0.125
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Thorium-228	0.87	J	0.2	0.312
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Thorium-230	0.858	J	0.237	0.312
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Thorium-232	0.927	J	0.134	0.311
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Uranium-233/234	0.405	J	0.148	0.172
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Uranium-235/236	0.0056	UJ	0.122	0.0585
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Uranium-238	0.681	J	0.149	0.217
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Radium-226	0.907		0.0784	0.165
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Americium-241	0.0693	UJ	0.269	0.153
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Plutonium-238	0.0667	UJ	0.243	0.153
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Plutonium-239/240	-0.0193	UJ	0.324	0.133
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Thorium-228	0.752	J	0.374	0.375
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Thorium-230	0.579	J	0.358	0.332
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Thorium-232	0.603	J	0.233	0.312
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Uranium-233/234	0.635		0.0751	0.145
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Uranium-235/236	0.0294	U	0.0704	0.0464
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Uranium-238	0.498		0.0775	0.13
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Radium-226	0.831		0.0637	0.155
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Americium-241	0.0513	U	0.14	0.101
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Plutonium-238	0.0559	UJ	0.267	0.154
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Plutonium-239/240	0.00175	UJ	0.288	0.129
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Thorium-228	0.676	J	0.288	0.33
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Thorium-230	0.496	J	0.299	0.29
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Thorium-232	0.505	J	0.175	0.271
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Uranium-233/234	0.561		0.0681	0.132
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Uranium-235/236	0.0459	U	0.0819	0.0554
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Uranium-238	0.532		0.0788	0.131
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Radium-226	0.889		0.124	0.174
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Americium-241	0.201	UJ	0.226	0.184
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Plutonium-238	0.0643	UJ	0.234	0.148
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Plutonium-239/240	0.00338	UJ	0.342	0.156
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Thorium-228	0.837	J	0.355	0.396
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Thorium-230	0.506	J	0.324	0.314
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Thorium-232	1.17	J	0.199	0.432
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Uranium-233/234	0.705		0.0956	0.168
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Uranium-235/236	0.0721		0.0361	0.0629
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Uranium-238	0.593		0.0292	0.15
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Radium-226	0.587		0.0789	0.133
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Americium-241	0.0432	UJ	0.157	0.0992
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Plutonium-238	0.0478	UJ	0.28	0.15
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Plutonium-239/240	0.0651	UJ	0.254	0.148
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Thorium-228	0.638	J	0.205	0.3
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Thorium-230	0.307	J	0.307	0.241
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Thorium-232	0.28	J	0.23	0.212
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Uranium-233/234	0.487		0.0945	0.137
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Uranium-235/236	0.0511	U	0.0584	0.054
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Uranium-238	0.565		0.081	0.144
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Radium-226	0.546		0.0733	0.156
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Americium-241	0.0736	UJ	0.162	0.117

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Plutonium-238	-0.0133	UJ	0.223	0.0915
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Plutonium-239/240	-0.00722	UJ	0.144	0.0623
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Thorium-228	1.04	J	0.535	0.486
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Thorium-230	0.611	J	0.467	0.382
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Thorium-232	0.489	J	0.395	0.333
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Uranium-233/234	0.604		0.078	0.149
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Uranium-235/236	0.0449		0.0337	0.0498
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Uranium-238	0.647		0.0568	0.152
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Radium-226	0.639		0.086	0.147
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Americium-241	0.133	UJ	0.231	0.192
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Plutonium-238	0.0913	UJ	0.198	0.135
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Plutonium-239/240	-0.0048	UJ	0.252	0.111
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Thorium-228	0.956	J	0.367	0.417
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Thorium-230	0.398	J	0.378	0.299
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Thorium-232	0.845	J	0.259	0.372
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Uranium-233/234	0.571	J	0.109	0.173
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Uranium-235/236	-0.00558	UJ	0.0822	0.0341
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Uranium-238	0.614	J	0.0877	0.177
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Radium-226	1.13		0.0891	0.168
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Americium-241	0.0502	UJ	0.137	0.0988
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Plutonium-238	-0.103	UJ	0.505	0.212
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Plutonium-239/240	-0.0353	UJ	0.31	0.119
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Thorium-228	0.827	J	0.326	0.324
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Thorium-230	0.79	J	0.429	0.349
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Thorium-232	0.617	J	0.26	0.27
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Uranium-233/234	0.736	J	0.0803	0.181
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Uranium-235/236	0.00876	UJ	0.0726	0.0403
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Uranium-238	0.889	J	0.0693	0.197
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Radium-226	0.728		0.081	0.14
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Americium-241	0.0848	UJ	0.186	0.135
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Plutonium-238	0.0462	UJ	0.221	0.127
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Plutonium-239/240	0.0361	UJ	0.108	0.102
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Thorium-228	0.773	J	0.295	0.367
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Thorium-230	0.926	J	0.349	0.403
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Thorium-232	0.891	J	0.24	0.378
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Uranium-233/234	0.68	J	0.122	0.177
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Uranium-235/236	0.00737	UJ	0.1	0.0493
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Uranium-238	0.555	J	0.101	0.158
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Radium-226	0.412		0.083	0.142
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Americium-241	0.0242	UJ	0.213	0.109
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Plutonium-238	-0.0518	UJ	0.283	0.102
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Plutonium-239/240	0.0656	UJ	0.255	0.145
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Thorium-228	1.09	J	0.435	0.486
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Thorium-230	0.803	J	0.44	0.427
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Thorium-232	0.683	J	0.306	0.372
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Uranium-233/234	0.717	J	0.106	0.18
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Uranium-235/236	0.0173	UJ	0.0845	0.0487
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Uranium-238	0.585	J	0.0831	0.161
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Radium-226	0.911		0.0869	0.206
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Americium-241	0.0535	UJ	0.254	0.141
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Plutonium-238	0.0347	UJ	0.22	0.119
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Plutonium-239/240	-0.0481	UJ	0.247	0.0775
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Thorium-228	0.809	J	0.246	0.369
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Thorium-230	0.77	J	0.361	0.377

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Thorium-232	0.57	J	0.276	0.316
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Uranium-233/234	0.52		0.0934	0.138
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Uranium-235/236	0.0306	U	0.0733	0.0483
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Uranium-238	0.687		0.0593	0.152
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Radium-226	0.935		0.154	0.266
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Americium-241	-0.171	UJ	0.384	0.116
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Plutonium-238	-0.0204	UJ	0.443	0.191
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Plutonium-239/240	-0.049	UJ	0.336	0.113
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Thorium-228	0.559	J	0.359	0.339
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Thorium-230	0.392	J	0.326	0.286
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Thorium-232	0.586	J	0.201	0.314
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Uranium-233/234	0.541		0.107	0.141
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Uranium-235/236	0.0955		0.0643	0.068
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Uranium-238	0.62		0.0756	0.145
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Radium-226	0.719		0.152	0.227
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Americium-241	-0.0296	UJ	0.31	0.128
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Plutonium-238	0.029	UJ	0.254	0.13
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Plutonium-239/240	0.0188	UJ	0.201	0.105
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Thorium-228	0.772	J	0.347	0.389
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Thorium-230	1.07	J	0.29	0.433
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Thorium-232	0.839	J	0.259	0.384
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Uranium-233/234	0.81		0.1	0.181
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Uranium-235/236	0.0487		0.0366	0.0541
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Uranium-238	0.606		0.0896	0.157
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Radium-226	0.959		0.142	0.257
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Americium-241	-0.0189	UJ	0.265	0.111
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Plutonium-238	-0.0285	UJ	0.241	0.0859
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Plutonium-239/240	-0.0569	UJ	0.292	0.0917
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Thorium-228	0.865	J	0.226	0.38
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Thorium-230	0.835	J	0.383	0.396
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Thorium-232	0.926	J	0.278	0.393
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Uranium-233/234	0.511		0.118	0.153
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Uranium-235/236	0.0589	U	0.0673	0.0622
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Uranium-238	0.728		0.0717	0.172
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Radium-226	0.554		0.103	0.159
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Americium-241	-0.0541	UJ	0.295	0.106
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Plutonium-238	-0.0716	UJ	0.33	0.101
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Plutonium-239/240	-0.00852	UJ	0.299	0.128
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Thorium-228	0.78	J	0.168	0.285
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Thorium-230	0.652	J	0.254	0.275
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Thorium-232	0.798	J	0.126	0.28
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Uranium-233/234	0.632	J	0.129	0.199
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Uranium-235/236	0.0559	UJ	0.121	0.0829
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Uranium-238	0.402	J	0.0981	0.158
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Radium-226	0.653		0.0834	0.17
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Americium-241	0.0456	UJ	0.166	0.105
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Plutonium-238	0.0653	UJ	0.31	0.172
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Plutonium-239/240	0.0737	UJ	0.201	0.145
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Thorium-228	0.41	J	0.157	0.212
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Thorium-230	0.647	J	0.212	0.266
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Thorium-232	0.384	J	0.127	0.199
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Uranium-233/234	0.543		0.0928	0.147
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Uranium-235/236	0.0266	U	0.073	0.0479
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Uranium-238	0.355		0.0718	0.118

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Radium-226	0.641		0.0608	0.108
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Americium-241	-0.042	UJ	0.216	0.0678
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Plutonium-238	0.0302	UJ	0.19	0.113
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Plutonium-239/240	-0.0666	UJ	0.307	0.094
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Thorium-228	0.834	J	0.251	0.334
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Thorium-230	0.51	J	0.302	0.28
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Thorium-232	0.641	J	0.173	0.283
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Uranium-233/234	0.968		0.0707	0.146
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Uranium-235/236	0.0501	U	0.0533	0.0435
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Uranium-238	0.817		0.0543	0.133
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Radium-226	0.734		0.0529	0.109
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Americium-241	0.0136	UJ	0.339	0.161
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Plutonium-238	0.11	UJ	0.165	0.189
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Plutonium-239/240	-0.011	UJ	0.386	0.165
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Thorium-228	0.766	J	0.391	0.396
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Thorium-230	0.732	J	0.347	0.376
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Thorium-232	0.742	J	0.162	0.354
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Uranium-233/234	0.639		0.0807	0.146
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Uranium-235/236	0.0227	U	0.0623	0.0409
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Uranium-238	0.633		0.0733	0.144
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Radium-226	0.671		0.0423	0.119
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Americium-241	-0.0245	UJ	0.257	0.106
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Plutonium-238	0.00189	UJ	0.311	0.14
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Plutonium-239/240	0.0868	UJ	0.395	0.218
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Thorium-228	0.837	J	0.229	0.377
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Thorium-230	0.529	J	0.296	0.314
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Thorium-232	0.652	J	0.226	0.332
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Uranium-233/234	0.612		0.0813	0.143
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Uranium-235/236	0.0201	U	0.0301	0.0348
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Uranium-238	0.528		0.0244	0.13
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Radium-226	0.359	J	0.0762	0.1
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Americium-241	-0.0325	UJ	0.276	0.0982
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Plutonium-238	0.166	UJ	0.211	0.195
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Plutonium-239/240	0.0229	UJ	0.244	0.127
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Thorium-228	0.7	J	0.31	0.38
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Thorium-230	0.953	J	0.362	0.439
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Thorium-232	0.722	J	0.176	0.367
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Uranium-233/234	0.403		0.102	0.125
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Uranium-235/236	0.0165	U	0.0803	0.0446
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Uranium-238	0.369		0.0696	0.115
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Radium-226	0.707	J	0.073	0.133
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Americium-241	0.00414	UJ	0.318	0.147
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Plutonium-238	-0.0477	UJ	0.279	0.0903
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Plutonium-239/240	0.14	UJ	0.22	0.177
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Thorium-228	0.655	J	0.377	0.363
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Thorium-230	0.724	J	0.296	0.357
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Thorium-232	0.67	J	0.265	0.34
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Uranium-233/234	0.588	J	0.0875	0.172
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Uranium-235/236	0.0556	UJ	0.081	0.0686
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Uranium-238	0.424	J	0.0773	0.146
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Radium-226	0.691		0.0562	0.142
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Americium-241	0.168	UJ	0.382	0.235
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Plutonium-238	0.0293	UJ	0.257	0.131
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Plutonium-239/240	0.019	UJ	0.203	0.106

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Thorium-228	0.881	J	0.23	0.414
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Thorium-230	0.733	J	0.419	0.407
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Thorium-232	1.03	J	0.26	0.441
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Uranium-233/234	0.629		0.0602	0.121
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Uranium-235/236	0.0456		0.0412	0.0402
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Uranium-238	0.546		0.057	0.112
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Radium-226	0.634		0.0785	0.137
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Americium-241	0.18	UJ	0.3	0.204
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Plutonium-238	0.014	UJ	0.306	0.147
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Plutonium-239/240	-0.048	UJ	0.33	0.111
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Thorium-228	0.792	J	0.234	0.305
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Thorium-230	0.742	J	0.221	0.291
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Thorium-232	0.778	J	0.109	0.285
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Uranium-233/234	0.585		0.0789	0.131
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Uranium-235/236	0.0171	U	0.0607	0.0368
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Uranium-238	0.619		0.0608	0.132
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Radium-226	0.523		0.0486	0.108
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Americium-241	0.0844	UJ	0.211	0.137
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Plutonium-238	-0.138	UJ	0.493	0.193
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Plutonium-239/240	-0.0345	UJ	0.303	0.117
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Thorium-228	0.588	J	0.279	0.332
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Thorium-230	0.839	J	0.395	0.406
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Thorium-232	0.804	J	0.204	0.368
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Uranium-233/234	0.639		0.0774	0.152
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Uranium-235/236	0.0221	U	0.0332	0.0383
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Uranium-238	0.637		0.0559	0.15
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Radium-226	0.677		0.069	0.123
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Americium-241	0.0103	U	0.257	0.122
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Plutonium-238	-0.0174	UJ	0.293	0.12
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Plutonium-239/240	0.0697	UJ	0.19	0.137
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Thorium-228	0.626	J	0.414	0.429
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Thorium-230	0.978	J	0.617	0.558
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Thorium-232	0.757	J	0.343	0.448
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Uranium-233/234	0.401	J	0.0858	0.128
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Uranium-235/236	0.0676	J	0.0635	0.0633
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Uranium-238	0.493	J	0.0837	0.141
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Radium-226	1.17		0.0644	0.158
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Americium-241	0.0531	UJ	0.145	0.104
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Plutonium-238	0.0827	UJ	0.222	0.146
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Plutonium-239/240	-0.042	UJ	0.304	0.114
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Thorium-228	0.668	J	0.402	0.433
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Thorium-230	0.56	J	0.432	0.405
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Thorium-232	0.881	J	0.222	0.463
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Uranium-233/234	0.596	J	0.102	0.162
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Uranium-235/236	0.0557	UJ	0.0814	0.0645
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Uranium-238	0.553	J	0.08	0.154
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Radium-226	0.703		0.0448	0.12
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Americium-241	0.0316	UJ	0.26	0.133
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Plutonium-238	-0.0147	UJ	0.169	0.065
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Plutonium-239/240	0.0232	UJ	0.147	0.0872
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Thorium-228	0.667	J	0.351	0.359
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Thorium-230	0.732	J	0.373	0.374
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Thorium-232	0.528	J	0.293	0.311
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Uranium-233/234	0.619		0.106	0.145

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Uranium-235/236	0.0475	U	0.0672	0.052
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Uranium-238	0.551		0.0452	0.129
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Radium-226	0.818		0.0594	0.144
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Americium-241	-0.102	UJ	0.503	0.211
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Plutonium-238	-0.0388	UJ	0.227	0.0736
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Plutonium-239/240	0.00259	UJ	0.261	0.119
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Thorium-228	0.826	J	0.391	0.4
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Thorium-230	0.608	J	0.369	0.346
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Thorium-232	0.823	J	0.242	0.367
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Uranium-233/234	0.549		0.0893	0.126
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Uranium-235/236	0.0568	U	0.071	0.0535
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Uranium-238	0.598		0.0731	0.128
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Radium-226	0.684		0.0849	0.178
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Americium-241	0.0555	UJ	0.301	0.161
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Plutonium-238	0.0759	UJ	0.223	0.135
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Plutonium-239/240	0.0501	UJ	0.255	0.139
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Thorium-228	0.717	J	0.297	0.434
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Thorium-230	0.802	J	0.436	0.471
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Thorium-232	0.517	J	0.294	0.371
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Uranium-233/234	0.602		0.0957	0.157
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Uranium-235/236	0.0155	U	0.0756	0.0436
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Uranium-238	0.67		0.0744	0.162
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Radium-226	0.687		0.0835	0.194
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Americium-241	-0.0633	UJ	0.266	0.0796
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Plutonium-238	0.0316	UJ	0.34	0.169
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Plutonium-239/240	-0.076	UJ	0.339	0.118
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Thorium-228	0.718	J	0.337	0.361
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Thorium-230	0.498	J	0.285	0.297
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Thorium-232	0.665	J	0.19	0.322
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Uranium-233/234	0.709		0.0981	0.163
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Uranium-235/236	0.0765	U	0.0772	0.0669
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Uranium-238	0.643		0.0773	0.153
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Radium-226	0.48	J	0.0876	0.153
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Americium-241	0.0348	UJ	0.221	0.119
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Plutonium-238	-0.082	UJ	0.366	0.127
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Plutonium-239/240	-0.034	UJ	0.356	0.147
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Thorium-228	0.518	J	0.233	0.306
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Thorium-230	0.977	J	0.403	0.432
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Thorium-232	0.392	J	0.287	0.278
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Uranium-233/234	0.589	J	0.107	0.163
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Uranium-235/236	0.132	J	0.0395	0.0861
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Uranium-238	0.599	J	0.0868	0.161
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Radium-226	0.413	J	0.0946	0.12
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Americium-241	-0.0314	UJ	0.216	0.0728
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Plutonium-238	0.00954	UJ	0.208	0.0997
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Plutonium-239/240	0.0776	UJ	0.208	0.137
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Thorium-228	0.532	J	0.445	0.396
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Thorium-230	0.818	J	0.391	0.454
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Thorium-232	0.54	J	0.277	0.364
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Uranium-233/234	0.777		0.0955	0.173
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Uranium-235/236	0.104		0.0347	0.0721
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Uranium-238	0.797		0.0762	0.173
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Radium-226	0.838		0.0729	0.164
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Americium-241	0.0741	U	0.129	0.107

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Plutonium-238	-0.0152	UJ	0.33	0.142
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Plutonium-239/240	-0.0638	UJ	0.294	0.09
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Thorium-228	1.11	J	0.472	0.542
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Thorium-230	0.595	J	0.491	0.424
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Thorium-232	0.706	J	0.32	0.418
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Uranium-233/234	0.462		0.0653	0.113
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Uranium-235/236	0.0593		0.0543	0.0506
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Uranium-238	0.472		0.0539	0.112
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Radium-226	0.691		0.0914	0.145
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Americium-241	0.0652	UJ	0.218	0.129
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Plutonium-238	0.00939	UJ	0.205	0.0981
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Plutonium-239/240	0.00938	UJ	0.205	0.0981
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Thorium-228	0.585	J	0.492	0.401
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Thorium-230	0.666	J	0.413	0.394
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Thorium-232	0.394	J	0.265	0.291
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Uranium-233/234	0.693		0.1	0.131
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Uranium-235/236	0.0809		0.0746	0.0591
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Uranium-238	0.748		0.0786	0.131
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Radium-226	0.568	J	0.0591	0.125
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Americium-241	0.0225	U	0.198	0.101
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Plutonium-238	-0.0096	U	0.148	0.0635
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Plutonium-239/240	-0.019	U	0.163	0.066
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Thorium-228	0.652	J	0.323	0.338
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Thorium-230	0.821	J	0.298	0.364
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Thorium-232	0.421	J	0.182	0.256
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Uranium-233/234	0.764		0.0798	0.165
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Uranium-235/236	0.0858		0.0757	0.0689
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Uranium-238	0.72		0.0834	0.16
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Radium-226	0.669		0.0888	0.144
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Americium-241	-0.0652	UJ	0.356	0.128
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Plutonium-238	0.0145	UJ	0.36	0.171
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Plutonium-239/240	-0.037	UJ	0.325	0.125
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Thorium-228	0.771	J	0.205	0.327
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Thorium-230	0.504	J	0.306	0.287
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Thorium-232	0.731	J	0.23	0.318
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Uranium-233/234	0.574		0.111	0.134
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Uranium-235/236	0.0272	U	0.0553	0.04
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Uranium-238	0.517		0.0852	0.123
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Radium-226	0.518		0.0829	0.158
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Americium-241	-0.0166	UJ	0.279	0.115
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Plutonium-238	-0.00813	UJ	0.162	0.0701
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Plutonium-239/240	-0.0568	UJ	0.262	0.0802
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Thorium-228	0.449	J	0.312	0.286
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Thorium-230	0.562	J	0.31	0.308
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Thorium-232	0.327	J	0.199	0.227
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Uranium-233/234	0.649		0.067	0.16
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Uranium-235/236	0.0557	U	0.0928	0.0662
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Uranium-238	0.665		0.0618	0.161
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Radium-226	0.539		0.0502	0.0809
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Americium-241	0.0831	UJ	0.223	0.147
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Plutonium-238	-0.00689	UJ	0.242	0.103
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Plutonium-239/240	-0.0661	UJ	0.278	0.0831
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Thorium-228	0.762	J	0.272	0.38
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Thorium-230	0.557	J	0.394	0.353

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Thorium-232	0.889	J	0.305	0.406
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Uranium-233/234	0.627	J	0.0815	0.169
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Uranium-235/236	0.0419	J	0.0419	0.0556
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Uranium-238	0.655	J	0.079	0.172
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Radium-226	0.606		0.0366	0.0897
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Americium-241	-0.00762	UJ	0.267	0.114
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Plutonium-238	-0.035	UJ	0.205	0.0664
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Plutonium-239/240	-0.014	UJ	0.162	0.0619
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Thorium-228	0.481	J	0.34	0.304
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Thorium-230	0.723	J	0.353	0.355
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Thorium-232	0.569	J	0.24	0.299
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Uranium-233/234	0.578		0.086	0.155
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Uranium-235/236	0.0252	U	0.0378	0.0437
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Uranium-238	0.604		0.0638	0.157
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Radium-226	0.686		0.0796	0.113
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Americium-241	-0.038	UJ	0.366	0.155
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Plutonium-238	-0.0479	UJ	0.346	0.13
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Plutonium-239/240	-0.0892	UJ	0.346	0.102
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Thorium-228	0.58		0.165	0.211
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Thorium-230	0.535		0.212	0.213
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Thorium-232	0.403		0.124	0.172
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Uranium-233/234	0.555		0.0956	0.137
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Uranium-235/236	0.00192	U	0.0781	0.0365
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Uranium-238	0.477		0.0705	0.123
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Radium-226	0.565		0.0791	0.15
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Americium-241	-0.0236	UJ	0.201	0.0714
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Plutonium-238	-0.0707	UJ	0.291	0.0994
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Plutonium-239/240	0.00958	UJ	0.232	0.109
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Thorium-228	0.521	J	0.394	0.364
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Thorium-230	0.569	J	0.418	0.379
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Thorium-232	0.623	J	0.245	0.361
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Uranium-233/234	0.652	J	0.0902	0.169
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Uranium-235/236	0.0388	UJ	0.0927	0.0611
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Uranium-238	0.5	J	0.128	0.156
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Radium-226	0.329		0.0915	0.132
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Americium-241	0.00265	UJ	0.268	0.122
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Plutonium-238	-0.0996	UJ	0.338	0.0962
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Plutonium-239/240	-0.0588	UJ	0.408	0.168
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Thorium-228	0.489	J	0.291	0.301
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Thorium-230	0.648	J	0.343	0.345
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Thorium-232	0.576	J	0.237	0.308
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Uranium-233/234	0.696		0.079	0.15
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Uranium-235/236	0.025	U	0.0741	0.0454
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Uranium-238	0.462		0.06	0.121
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Radium-226	0.575		0.0465	0.111
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Americium-241	-0.0209	UJ	0.292	0.123
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Plutonium-238	0.026	UJ	0.164	0.0977
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Plutonium-239/240	-0.0164	UJ	0.19	0.0727
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Thorium-228	0.629	J	0.268	0.307
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Thorium-230	0.652	J	0.281	0.311
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Thorium-232	0.727	J	0.163	0.309
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Uranium-233/234	0.535		0.107	0.146
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Uranium-235/236	0.0174	U	0.0849	0.0472
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Uranium-238	0.58		0.0736	0.146

Table 5-40. RBA-SanBruno - Alpha Spectroscopy Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Radium-226	0.981		0.116	0.248
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Americium-241	-0.055	UJ	0.3	0.108
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Plutonium-238	-0.00755	UJ	0.265	0.113
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Plutonium-239/240	0.0407	UJ	0.305	0.157
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Thorium-228	0.635	J	0.402	0.362
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Thorium-230	0.384	J	0.347	0.286
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Thorium-232	0.743	J	0.219	0.345
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Uranium-233/234	0.625		0.0865	0.157
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Uranium-235/236	0.0194	U	0.0629	0.042
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Uranium-238	0.795		0.0829	0.175
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Radium-226	0.809		0.0913	0.206
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Americium-241	-0.021	UJ	0.178	0.0634
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Plutonium-238	-0.0228	UJ	0.319	0.134
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Plutonium-239/240	-0.0684	UJ	0.288	0.086
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Thorium-228	0.887	J	0.228	0.321
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Thorium-230	0.651	J	0.245	0.28
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Thorium-232	0.452	J	0.207	0.233
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Uranium-233/234	0.499	J	0.137	0.216
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Uranium-235/236	0.0211	UJ	0.133	0.0792
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Uranium-238	0.411	J	0.137	0.198

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

J - Analyte present. Reported value may or may not be accurate or precise

pCi/g - picocure per gram

U - Not Detected

UJ - Not detected, quantitation limit may be inaccurate or imprecise

Table 5-41. RBA-SanBruno - Gas Flow Proportional Counting Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Strontium-90	0.038	U	0.146	0.0839
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Strontium-90	0.0858	U	0.148	0.0884
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Strontium-90	0.041	U	0.144	0.084
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Strontium-90	-0.0145	U	0.129	0.0631
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Strontium-90	-0.104	U	0.144	0.0744
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Strontium-90	0.0573	U	0.144	0.0846
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Strontium-90	-0.0307	U	0.143	0.0736
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Strontium-90	-0.0297	U	0.147	0.0765
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Strontium-90	-0.0676	U	0.147	0.0768
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Strontium-90	-0.0503	U	0.144	0.0767
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Strontium-90	-0.0157	U	0.144	0.0794
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Strontium-90	-0.0222	U	0.144	0.0744
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Strontium-90	0.0791	U	0.146	0.0869
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Strontium-90	0.1	U	0.146	0.088
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Strontium-90	-0.0682	U	0.144	0.0732
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Strontium-90	0.0337	U	0.148	0.0845
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Strontium-90	0.0071	U	0.143	0.074
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Strontium-90	-0.0569	U	0.148	0.0739
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Strontium-90	0.0629	U	0.148	0.087
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Strontium-90	-0.068	U	0.143	0.0683
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Strontium-90	-0.038	U	0.0989	0.0448
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Strontium-90	0.00314	U	0.145	0.0785
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Strontium-90	0.0133	U	0.147	0.0818
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Strontium-90	-0.0107	U	0.144	0.073
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Strontium-90	0.00039	U	0.143	0.0744
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Strontium-90	-0.0244	U	0.121	0.0618
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Strontium-90	-0.0586	U	0.145	0.0717
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Strontium-90	0.0316	U	0.148	0.0829
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Strontium-90	-0.0888	U	0.149	0.0699
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Strontium-90	-0.0923	U	0.142	0.0631
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Strontium-90	-0.0215	U	0.148	0.0826
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Strontium-90	-0.00658	U	0.145	0.079
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Strontium-90	0.0121	U	0.144	0.0801
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Strontium-90	-0.00702	U	0.146	0.0792
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Strontium-90	-0.107	U	0.147	0.0739
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Strontium-90	-0.0956	U	0.124	0.0625
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Strontium-90	-0.0625	U	0.14	0.064
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Strontium-90	-0.0986	U	0.149	0.0758
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Strontium-90	-0.0189	U	0.144	0.0795
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Strontium-90	0.0474	U	0.144	0.0836
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Strontium-90	0.135	U	0.148	0.092
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Strontium-90	0.106	U	0.142	0.0892
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Strontium-90	0.0616	U	0.145	0.0849
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Strontium-90	0.0247	U	0.148	0.0836
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Strontium-90	-0.113	U	0.145	0.0785
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Strontium-90	0.00783	U	0.145	0.0823
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Strontium-90	0.0428	U	0.147	0.0852
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Strontium-90	-0.00588	U	0.146	0.0802
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Strontium-90	0.0325	U	0.124	0.069
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Strontium-90	0.0453	U	0.145	0.0842
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Strontium-90	-0.111	U	0.147	0.073
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Strontium-90	-0.0784	U	0.147	0.0738
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Strontium-90	0.0338	U	0.144	0.0836
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Strontium-90	0.018	U	0.145	0.0814

Table 5-41. RBA-SanBruno - Gas Flow Proportional Counting Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Strontium-90	0.00737	U	0.147	0.0825
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Strontium-90	-0.0592	U	0.146	0.0697
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Strontium-90	-0.0498	U	0.147	0.0716
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Strontium-90	0.0308	U	0.118	0.0663
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Strontium-90	-0.0893	U	0.139	0.0703
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Strontium-90	0.0347	U	0.139	0.0779
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Strontium-90	-0.0531	U	0.141	0.074
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Strontium-90	-0.03	U	0.142	0.0695
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Strontium-90	-0.0469	U	0.11	0.0499
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Strontium-90	0.0202	U	0.143	0.0799
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Strontium-90	0.105	U	0.146	0.0897
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Strontium-90	-0.0193	U	0.146	0.0741
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Strontium-90	0.0436	U	0.144	0.0837
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Strontium-90	-0.0242	U	0.142	0.0721
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Strontium-90	-0.0945	U	0.144	0.0743
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Strontium-90	-0.0199	U	0.135	0.0727
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Strontium-90	0.0845	U	0.15	0.0895
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Strontium-90	0.0015	U	0.143	0.0802
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Strontium-90	-0.0688	U	0.147	0.0668
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Strontium-90	-0.00382	U	0.109	0.0566
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Strontium-90	0.0145	U	0.0911	0.0488
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Strontium-90	-0.0317	U	0.138	0.067
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Strontium-90	0.106	U	0.147	0.0889
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Strontium-90	0.122	U	0.146	0.0892
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Strontium-90	-0.0393	U	0.145	0.0795
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Strontium-90	-0.0925	U	0.146	0.0776
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Strontium-90	-0.0917	U	0.147	0.0746
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Strontium-90	0.0119	U	0.143	0.0781
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Strontium-90	0.0972	U	0.147	0.09
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Strontium-90	-0.026	U	0.147	0.0807
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Strontium-90	-0.0871	U	0.145	0.0682
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Strontium-90	-0.0463	U	0.135	0.0663
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Strontium-90	-0.04	U	0.143	0.074
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Strontium-90	0.042	U	0.145	0.0849
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Strontium-90	0.135	U	0.148	0.092
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Strontium-90	0.098	U	0.142	0.0869
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Strontium-90	-0.0274	U	0.13	0.0664
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Strontium-90	-0.0127	U	0.145	0.0754
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Strontium-90	-0.065	U	0.14	0.0639
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Strontium-90	-0.05	U	0.148	0.0682
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Strontium-90	0.0424	U	0.148	0.0843
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Strontium-90	0.046	U	0.149	0.0859
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Strontium-90	0.109	U	0.142	0.0887
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Strontium-90	-0.0107	U	0.145	0.0833
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Strontium-90	-0.0951	U	0.144	0.0723
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Strontium-90	-0.0946	U	0.148	0.0742
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Strontium-90	0.0302	U	0.147	0.0828
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Strontium-90	-0.0223	U	0.148	0.0748
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Strontium-90	0.0415	U	0.135	0.0761
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Strontium-90	-0.0815	U	0.148	0.0769
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Strontium-90	0.0967	U	0.144	0.0867
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Strontium-90	-0.0894	U	0.137	0.0674
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Strontium-90	-0.007	U	0.148	0.0767
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Strontium-90	0.0958	U	0.131	0.0801

Table 5-41. RBA-SanBruno - Gas Flow Proportional Counting Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Strontium-90	-0.0146	U	0.149	0.074
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Strontium-90	0.0237	U	0.145	0.084

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

pCi/g - picocure per gram

U - Not Detected

Table 5-42. RBA-SanBruno - Radon Emanation Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB01-011H-0919	09/06/2019 09:44	Radium-226	0.743		0.0875	0.183
HPRBAS-SB01-0H01-0919	09/06/2019 09:42	Radium-226	0.531		0.185	0.18
HPRBAS-SB01-1H02-0919	09/06/2019 09:46	Radium-226	0.8		0.202	0.219
HPRBAS-SB02-011H-0919	09/06/2019 11:42	Radium-226	0.58	J	0.16	0.193
HPRBAS-SB02-0H01-0919	09/06/2019 11:40	Radium-226	0.353	J	0.131	0.134
HPRBAS-SB02-1H02-0919	09/06/2019 11:44	Radium-226	0.373	J	0.124	0.133
HPRBAS-SB03-011H-0919	09/06/2019 11:26	Radium-226	0.555	J	0.163	0.17
HPRBAS-SB03-0H01-0919	09/06/2019 11:24	Radium-226	0.644	J	0.14	0.187
HPRBAS-SB03-1H02-0919	09/06/2019 11:28	Radium-226	0.405	J	0.0843	0.122
HPRBAS-SB04-011H-0919	09/06/2019 11:06	Radium-226	0.756		0.188	0.205
HPRBAS-SB04-0H01-0919	09/06/2019 11:04	Radium-226	0.788		0.122	0.202
HPRBAS-SB04-1H02-0919	09/06/2019 11:08	Radium-226	0.516		0.141	0.159
HPRBAS-SB05-011H-0919	09/06/2019 10:50	Radium-226	0.855		0.135	0.209
HPRBAS-SB05-0H01-0919	09/06/2019 10:48	Radium-226	0.755		0.115	0.192
HPRBAS-SB05-1H02-0919	09/06/2019 10:52	Radium-226	0.588		0.185	0.203
HPRBAS-SB06-011H-0919	09/06/2019 12:01	Radium-226	0.337		0.194	0.161
HPRBAS-SB06-0H01-0919	09/06/2019 11:59	Radium-226	0.546		0.183	0.184
HPRBAS-SB06-1H02-0919	09/06/2019 12:03	Radium-226	0.464		0.0724	0.132
HPRBAS-SB07-011H-0919	09/06/2019 12:22	Radium-226	0.598		0.114	0.162
HPRBAS-SB07-0H01-0919	09/06/2019 12:18	Radium-226	0.544		0.162	0.189
HPRBAS-SB07-1H02-0919	09/06/2019 12:24	Radium-226	0.532		0.166	0.173
HPRBAS-SB07P-0H01-0919	09/06/2019 12:20	Radium-226	0.467		0.168	0.159
HPRBAS-SB08-011H-0919	09/06/2019 13:24	Radium-226	0.507		0.0809	0.146
HPRBAS-SB08-0H01-0919	09/06/2019 13:22	Radium-226	0.514		0.154	0.179
HPRBAS-SB08-1H02-0919	09/06/2019 13:26	Radium-226	0.418		0.156	0.154
HPRBAS-SB09-011H-0919	09/06/2019 13:54	Radium-226	0.97		0.233	0.269
HPRBAS-SB09-0H01-0919	09/06/2019 13:52	Radium-226	0.604		0.109	0.159
HPRBAS-SB09-1H02-0919	09/06/2019 13:56	Radium-226	0.3		0.133	0.131
HPRBAS-SB10-011H-0919	09/06/2019 14:04	Radium-226	0.445	J	0.126	0.136
HPRBAS-SB10-0H01-0919	09/06/2019 14:02	Radium-226	0.682	J	0.175	0.189
HPRBAS-SB10-1H02-0919	09/06/2019 14:06	Radium-226	0.408	J	0.122	0.142
HPRBAS-SB11-011H-0919	09/09/2019 09:54	Radium-226	0.648		0.22	0.217
HPRBAS-SB11-0H01-0919	09/09/2019 09:52	Radium-226	0.545		0.152	0.169
HPRBAS-SB11-1H02-0919	09/09/2019 09:58	Radium-226	0.586		0.122	0.167
HPRBAS-SB11P-011H-0919	09/09/2019 09:56	Radium-226	0.551		0.189	0.182
HPRBAS-SB12-011H-0919	09/09/2019 09:18	Radium-226	0.691		0.121	0.179
HPRBAS-SB12-0H01-0919	09/09/2019 09:16	Radium-226	0.458		0.116	0.153
HPRBAS-SB12-1H02-0919	09/09/2019 09:20	Radium-226	0.603		0.131	0.175
HPRBAS-SB13-011H-0919	09/09/2019 08:54	Radium-226	0.56		0.0857	0.158
HPRBAS-SB13-0H01-0919	09/09/2019 08:52	Radium-226	0.639		0.0922	0.175
HPRBAS-SB13-1H02-0919	09/09/2019 08:58	Radium-226	0.625		0.133	0.166
HPRBAS-SB13P-011H-0919	09/09/2019 08:56	Radium-226	0.584		0.156	0.172
HPRBAS-SB14-011H-0919	09/06/2019 14:44	Radium-226	0.459	J	0.178	0.17
HPRBAS-SB14-0H01-0919	09/06/2019 14:42	Radium-226	0.707	J	0.0833	0.175
HPRBAS-SB14-1H02-0919	09/06/2019 14:46	Radium-226	0.639	J	0.0997	0.182
HPRBAS-SB15-011H-0919	09/06/2019 14:26	Radium-226	0.537	J	0.158	0.164
HPRBAS-SB15-0H01-0919	09/06/2019 14:24	Radium-226	0.376	J	0.165	0.158
HPRBAS-SB15-1H02-0919	09/06/2019 14:28	Radium-226	0.647	J	0.16	0.178
HPRBAS-SB16-011H-0919	09/09/2019 10:14	Radium-226	0.569		0.123	0.165
HPRBAS-SB16-0H01-0919	09/09/2019 10:12	Radium-226	0.475		0.0967	0.141
HPRBAS-SB16-1H02-0919	09/09/2019 10:16	Radium-226	0.609	J	0.123	0.163
HPRBAS-SB16P-1H02-0919	09/09/2019 10:18	Radium-226	1.55	J	0.148	0.276
HPRBAS-SB17-011H-0919	09/09/2019 10:32	Radium-226	0.89		0.118	0.211
HPRBAS-SB17-0H01-0919	09/09/2019 10:28	Radium-226	0.684		0.133	0.187

Table 5-42. RBA-SanBruno - Radon Emanation Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SB17-1H02-0919	09/09/2019 10:34	Radium-226	0.745		0.178	0.201
HPRBAS-SB17P-0H01-0919	09/09/2019 10:30	Radium-226	0.846		0.169	0.217
HPRBAS-SB18-011H-0919	09/09/2019 10:56	Radium-226	0.615	J	0.0713	0.151
HPRBAS-SB18-0H01-0919	09/09/2019 10:54	Radium-226	0.436		0.145	0.155
HPRBAS-SB18-1H02-0919	09/09/2019 11:00	Radium-226	0.451		0.138	0.144
HPRBAS-SB18P-011H-0919	09/09/2019 10:58	Radium-226	0.238	J	0.133	0.113
HPRBAS-SB19-011H-0919	09/09/2019 11:14	Radium-226	0.464		0.108	0.134
HPRBAS-SB19-0H01-0919	09/09/2019 11:12	Radium-226	0.642		0.123	0.157
HPRBAS-SB19-1H02-0919	09/09/2019 11:16	Radium-226	0.369		0.118	0.121
HPRBAS-SB20-011H-0919	09/06/2019 10:14	Radium-226	0.757		0.155	0.204
HPRBAS-SB20-0H01-0919	09/06/2019 10:12	Radium-226	0.638		0.131	0.172
HPRBAS-SB20-1H02-0919	09/06/2019 10:16	Radium-226	1.43		0.211	0.31
HPRBAS-SB21-011H-0919	09/09/2019 13:37	Radium-226	0.0737	U	0.0941	0.0681
HPRBAS-SB21-0H01-0919	09/09/2019 13:35	Radium-226	0.688		0.12	0.208
HPRBAS-SB21-1H02-0919	09/09/2019 13:39	Radium-226	0.675		0.134	0.178
HPRBAS-SB22-011H-0919	09/09/2019 11:54	Radium-226	0.984		0.152	0.253
HPRBAS-SB22-0H01-0919	09/09/2019 11:52	Radium-226	1.08		0.164	0.258
HPRBAS-SB22-1H02-0919	09/09/2019 11:56	Radium-226	0.704		0.134	0.19
HPRBAS-SB23-011H-0919	09/09/2019 11:34	Radium-226	0.305		0.108	0.123
HPRBAS-SB23-0H01-0919	09/09/2019 11:32	Radium-226	0.691		0.129	0.17
HPRBAS-SB23-1H02-0919	09/09/2019 11:38	Radium-226	0.778		0.125	0.191
HPRBAS-SB23P-011H-0919	09/09/2019 11:36	Radium-226	0.445		0.109	0.133
HPRBAS-SB24-011H-0919	09/09/2019 13:50	Radium-226	0.574		0.0862	0.161
HPRBAS-SB24-0H01-0919	09/09/2019 13:48	Radium-226	1.07		0.245	0.282
HPRBAS-SB24-1H02-0919	09/09/2019 13:52	Radium-226	0.736		0.084	0.179
HPRBAS-SB25-011H-0919	09/06/2019 10:26	Radium-226	1.35		0.245	0.304
HPRBAS-SB25-0H01-0919	09/06/2019 10:24	Radium-226	0.961		0.183	0.223
HPRBAS-SB25-1H02-0919	09/06/2019 10:28	Radium-226	0.83		0.159	0.208
HPRBAS-SS01-000H-0919	09/06/2019 09:40	Radium-226	0.788		0.202	0.241
HPRBAS-SS02-000H-0919	09/06/2019 11:38	Radium-226	0.64		0.188	0.211
HPRBAS-SS03-000H-0919	09/06/2019 11:20	Radium-226	0.567	J	0.102	0.158
HPRBAS-SS03P-000H-0919	09/06/2019 11:22	Radium-226	0.701		0.0982	0.16
HPRBAS-SS04-000H-0919	09/06/2019 11:02	Radium-226	0.651		0.153	0.183
HPRBAS-SS05-000H-0919	09/06/2019 10:46	Radium-226	0.961		0.152	0.224
HPRBAS-SS06-000H-0919	09/06/2019 11:57	Radium-226	0.585		0.125	0.168
HPRBAS-SS07-000H-0919	09/06/2019 12:16	Radium-226	0.547		0.15	0.168
HPRBAS-SS08-000H-0919	09/06/2019 13:20	Radium-226	0.496		0.178	0.175
HPRBAS-SS09-000H-0919	09/06/2019 13:50	Radium-226	0.867		0.132	0.221
HPRBAS-SS10-000H-0919	09/06/2019 14:00	Radium-226	0.459		0.147	0.151
HPRBAS-SS11-000H-0919	09/09/2019 09:50	Radium-226	0.69		0.125	0.173
HPRBAS-SS12-000H-0919	09/09/2019 09:12	Radium-226	0.704		0.201	0.222
HPRBAS-SS12P-000H-0919	09/09/2019 09:14	Radium-226	0.517		0.122	0.157
HPRBAS-SS13-000H-0919	09/09/2019 08:50	Radium-226	0.488		0.135	0.162
HPRBAS-SS14-000H-0919	09/06/2019 14:40	Radium-226	0.69	J	0.119	0.177
HPRBAS-SS15-000H-0919	09/06/2019 14:22	Radium-226	0.468	J	0.141	0.157
HPRBAS-SS16-000H-0919	09/09/2019 10:10	Radium-226	0.419		0.148	0.15
HPRBAS-SS17-000H-0919	09/09/2019 10:26	Radium-226	0.592		0.139	0.18
HPRBAS-SS18-000H-0919	09/09/2019 10:52	Radium-226	0.674		0.0726	0.159
HPRBAS-SS19-000H-0919	09/09/2019 11:08	Radium-226	0.638		0.151	0.186
HPRBAS-SS19P-000H-0919	09/09/2019 11:10	Radium-226	0.528		0.0642	0.133
HPRBAS-SS20-000H-0919	09/06/2019 10:10	Radium-226	0.872		0.19	0.219
HPRBAS-SS21-000H-0919	09/09/2019 13:33	Radium-226	0.541		0.173	0.174
HPRBAS-SS22-000H-0919	09/09/2019 11:50	Radium-226	0.658		0.176	0.2
HPRBAS-SS23-000H-0919	09/09/2019 11:30	Radium-226	0.312		0.0854	0.109

Table 5-42. RBA-SanBruno - Radon Emanation Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Sample Name	Collection Date	Nuclide	Result (pCi/g)	Qualifier	Detection Limit (pCi/g)	Uncertainty[a] (pCi/g)
HPRBAS-SS24-000H-0919	09/09/2019 13:46	Radium-226	0.66		0.146	0.194
HPRBAS-SS25-000H-0919	09/06/2019 10:22	Radium-226	0.473		0.173	0.165

Notes:

[a] Reported counting uncertainty calculated at the 95% confidence level (1.96-sigma)

J - Analyte present. Reported value may or may not be accurate or precise

pCi/g - picocure per gram

U - Not Detected

Table 5-43. RBA-SanBruno - Summary of Combined Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	100 / 100	0.439	1.08	0.783	0.113	0.0113	0.78
	Am-241	1 / 100	-0.12	0.204	0.00836	0.0502	0.00502	0.00652
	Bi-212	81 / 100	0	1.56	0.898	0.348	0.0348	0.969
	Bi-214	100 / 100	0.482	0.827	0.64	0.0689	0.00689	0.627
	Co-60	0/100	-0.0191	0.0332	0.00105	0.0109	0.00109	0.000069
	Cs-137	37 / 100	-0.0249	0.141	0.0377	0.0376	0.00376	0.027
	Eu-152	0/100	-0.0763	0.085	0.00084675	0.0326	0.00326	0.0002175
	Eu-154	0/100	-0.0871	0.0817	0.00314	0.0396	0.00396	0.00185
	Eu-155	0/100	-0.0387	0.128	0.0291	0.0321	0.00321	0.0259
	K-40	100 / 100	5.25	13.5	11.9	0.921	0.0921	12
	Pa-231	0/100	-0.238	0.482	0.105	0.164	0.0164	0
	Pa-234	0/100	-0.23	0.229	-0.0141	0.0863	0.00863	-0.0143
	Pa-234m	0/100	-3.78	5.98	0.831	2.057	0.206	0.711
	Pb-212	100 / 100	0.597	1.19	0.833	0.0757	0.00757	0.824
	Pb-214	100 / 100	0.649	1.03	0.763	0.0623	0.00623	0.763
	Ra-223	0/100	-0.455	0.526	-0.017	0.186	0.0186	-0.0256
	Ra-224	61 / 100	0	2.42	0.838	0.589	0.0589	0.982
	Ra-226	100 / 100	0.482	0.827	0.64	0.0689	0.00689	0.627
	Tl-208	100 / 100	0.16	0.329	0.24	0.0329	0.00329	0.235
	Th-227	0/100	-0.171	0.216	0.0052	0.0797	0.00797	-0.00274
	Th-228	100 / 100	0.597	1.19	0.833	0.0757	0.00757	0.824
	Th-232	100 / 100	0.439	1.08	0.783	0.113	0.0113	0.78
Alpha Spectroscopy	Am-241	0/100	-0.171	0.201	0.0199	0.0699	0.00699	0.0106
	Pu-238	0/100	-0.138	0.224	0.00844	0.0641	0.00641	-0.0028
	Pu-239/240	0/100	-0.13	0.164	0.00186	0.0592	0.00592	-0.00474
	Ra-226	100 / 100	0.329	1.17	0.669	0.154	0.0154	0.67
	Th-228	95 / 100	0.263	1.46	0.717	0.209	0.0209	0.703
	Th-230	95 / 100	0.288	1.1	0.676	0.2	0.02	0.683
	Th-232	96 / 100	0.219	1.64	0.681	0.237	0.0237	0.641
	U-233/234	100 / 100	0.401	1.03	0.623	0.115	0.0115	0.614
	U-235/236	29 / 100	-0.00558	0.145	0.0469	0.0315	0.00315	0.0447
	U-238	100 / 100	0.355	1.09	0.617	0.12	0.012	0.615
Gas Flow Proportional Counting	Sr-90	0/100	-0.113	0.135	-0.00376	0.0625	0.00625	-0.00886
Radon Emanation	Ra-226	99 / 100	0.0737	1.43	0.625	0.206	0.0206	0.607

Notes:

pCi/g - picocurie per gram

Table 5-44. RBA-SanBruno - Summary of Surface Soil Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	25/25	0.439	1.05	0.739	0.146	0.0291	0.753
	Am-241	0/25	-0.12	0.0711	-0.00973	0.0541	0.0108	-0.00107
	Bi-212	21/25	0	1.53	0.877	0.364	0.0728	0.93
	Bi-214	25/25	0.534	0.827	0.66	0.0797	0.0159	0.668
	Co-60	0/25	-0.0184	0.0207	-0.0001959	0.0106	0.00213	0.000763
	Cs-137	22/25	-0.0249	0.141	0.0827	0.035	0.00701	0.0855
	Eu-152	0/25	-0.0627	0.0632	-0.0051	0.0324	0.00647	-0.00821
	Eu-154	0/25	-0.0871	0.0723	0.00323	0.0452	0.00904	0.00894
	Eu-155	0/25	-0.0321	0.0943	0.019	0.0321	0.00641	0.0187
	K-40	25/25	5.25	13.5	11.76	1.515	0.303	12.1
	Pa-231	0/25	0	0.482	0.102	0.14	0.028	0
	Pa-234	0/25	-0.18	0.229	0.00227	0.106	0.0211	0.00479
	Pa-234m	0/25	-2.77	5.98	1.499	2.219	0.444	1.06
	Pb-212	25/25	0.715	1.17	0.828	0.0915	0.0183	0.804
	Pb-214	25/25	0.649	1.03	0.777	0.0812	0.0162	0.764
	Ra-223	0/25	-0.281	0.44	0.028	0.211	0.0421	0.00533
	Ra-224	15/25	0	2.42	0.947	0.696	0.139	1.15
	Ra-226	25/25	0.534	0.827	0.66	0.0797	0.0159	0.668
	Tl-208	25/25	0.16	0.329	0.236	0.0367	0.00735	0.227
	Th-227	0/25	-0.162	0.195	0.00255	0.0805	0.0161	-0.00741
	Th-228	25/25	0.715	1.17	0.828	0.0915	0.0183	0.804
	Th-232	25/25	0.439	1.05	0.739	0.146	0.0291	0.753
Alpha Spectroscopy	Am-241	0/25	-0.102	0.18	0.014	0.0691	0.0138	0.00265
	Pu-238	0/25	-0.138	0.166	0.00294	0.0627	0.0125	-0.00689
	Pu-239/240	0/25	-0.0892	0.0868	-0.011	0.0509	0.0102	-0.0164
	Ra-226	25/25	0.329	1.17	0.661	0.182	0.0364	0.677
	Th-228	25/25	0.449	1.11	0.696	0.147	0.0294	0.668
	Th-230	25/25	0.384	0.978	0.667	0.147	0.0293	0.651
	Th-232	25/25	0.327	1.03	0.657	0.176	0.0353	0.706
	U-233/234	25/25	0.401	0.777	0.604	0.0948	0.019	0.619
	U-235/236	7/25	0.00192	0.104	0.0417	0.0266	0.00532	0.0388
	U-238	25/25	0.369	0.797	0.586	0.113	0.0226	0.58
Gas Flow Proportional Counting	Sr-90	0/25	-0.0951	0.135	0.00678	0.07	0.014	-0.0107
Radon Emanation	Ra-226	25/25	0.312	0.961	0.618	0.151	0.0302	0.638

Notes:

pCi/g - picocurie per gram

Table 5-45. RBA-SanBruno - Summary of Subsrface Soil Analytical Results

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Analytical Method	Nuclide	Number of Detections	Minimum (pCi/g)	Maximum (pCi/g)	Mean (pCi/g)	Standard Deviation (pCi/g)	Standard Error of Mean (pCi/g)	Median (pCi/g)
Gamma Spectroscopy	Ac-228	75/75	0.607	1.08	0.797	0.0975	0.0113	0.792
	Am-241	1/75	-0.0923	0.204	0.0144	0.0478	0.00551	0.00673
	Bi-212	60/75	0	1.56	0.907	0.346	0.0403	0.972
	Bi-214	75/75	0.482	0.772	0.633	0.0646	0.00751	0.624
	Co-60	0/75	-0.0191	0.0332	0.00146	0.011	0.00127	0
	Cs-137	15/75	-0.0179	0.114	0.0227	0.0241	0.00278	0.0176
	Eu-152	0/75	-0.0763	0.085	0.00283	0.0327	0.00377	0.00388
	Eu-154	0/75	-0.0871	0.0817	0.0031	0.0379	0.00438	0.000668
	Eu-155	0/75	-0.0387	0.128	0.0324	0.0316	0.00365	0.0309
	K-40	75/75	10.3	13.5	11.95	0.617	0.0712	11.9
	Pa-231	0/75	-0.238	0.451	0.106	0.172	0.0199	0
	Pa-234	0/75	-0.23	0.176	-0.0196	0.0789	0.00911	-0.0164
	Pa-234m	0/75	-3.78	4.47	0.608	1.966	0.227	0.407
	Pb-212	75/75	0.597	1.19	0.835	0.0703	0.00811	0.829
	Pb-214	75/75	0.657	0.91	0.759	0.0546	0.0063	0.762
	Ra-223	0/75	-0.455	0.526	-0.032	0.176	0.0203	-0.0282
	Ra-224	46/75	0	1.79	0.801	0.55	0.0635	0.959
	Ra-226	75/75	0.482	0.772	0.633	0.0642	0.00741	0.624
	Tl-208	75/75	0.184	0.327	0.242	0.0316	0.00365	0.242
	Th-227	0/75	-0.171	0.216	0.00608	0.08	0.00924	-0.000862
	Th-228	75/75	0.597	1.19	0.835	0.0703	0.00811	0.829
	Th-232	75/75	0.607	1.08	0.797	0.0975	0.0113	0.792
Alpha Spectroscopy	Am-241	0/75	-0.171	0.201	0.0218	0.0704	0.00813	0.0126
	Pu-238	0/75	-0.112	0.224	0.0103	0.0648	0.00748	0.00129
	Pu-239/240	0/75	-0.13	0.164	0.00616	0.0614	0.00709	-0.0037
	Ra-226	75/75	0.35	1.13	0.672	0.145	0.0167	0.653
	Th-228	70/75	0.263	1.46	0.725	0.226	0.0261	0.716
	Th-230	70/75	0.288	1.1	0.68	0.215	0.0249	0.692
	Th-232	71/75	0.219	1.64	0.688	0.254	0.0293	0.626
	U-233/234	75/75	0.405	1.03	0.629	0.121	0.014	0.613
	U-235/236	22/75	-0.00558	0.145	0.0486	0.033	0.00381	0.0459
	U-238	75/75	0.355	1.09	0.628	0.121	0.014	0.616
Gas Flow Proportional Counting	Sr-90	0/75	-0.113	0.135	-0.00728	0.0599	0.00692	-0.00702
Radon Emanation	Ra-226	74/75	0.0737	1.43	0.628	0.222	0.0256	0.604

Notes:

pCi/g - picocurie per gram

Table 5-46. Kruskal-Wallis (Nonparametric) ANOVA Comparisons Between Radium-226 Methods

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Site	Total Samples	Detect Results	Calculated Probability	Decision	Methods Statisticaly Different
RBA1	144	133	0.635	No Difference	none
RBA2	108	107	0.063	No Difference	none
RBA3	150	146	0.002	Significant Difference	Alpha - Gamma and Alpha - Radon
RBA4	96	92	0.815	No Difference	none
RBAS	300	299	0.032	Significant Difference	Alpha - Radon

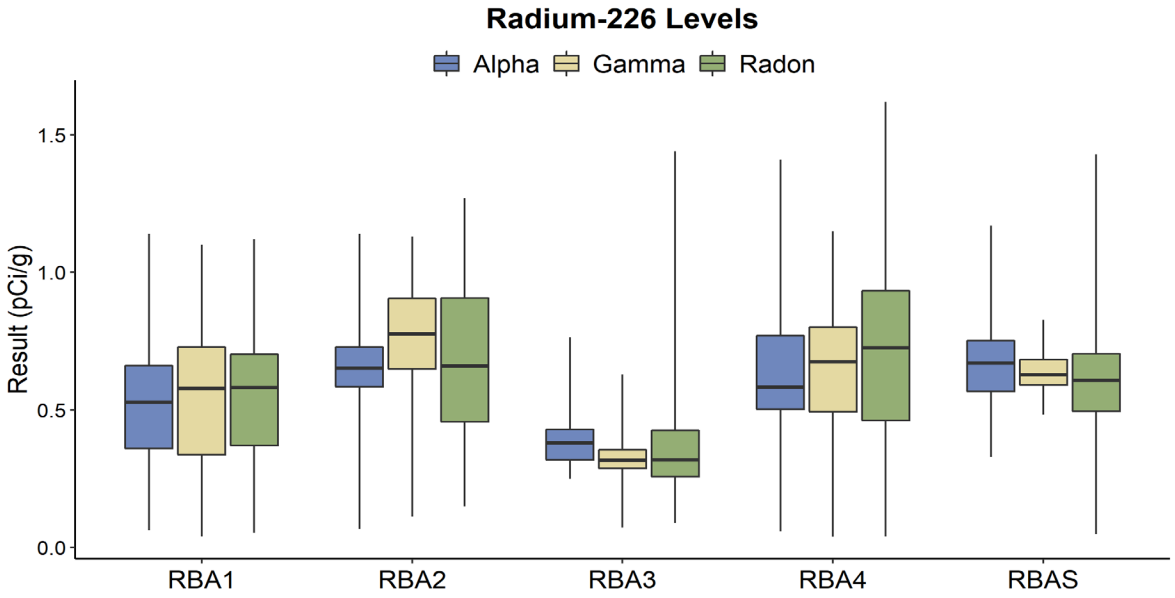

Table 5-47. Central Tendency Comparison Test Results for Thorium-232 Alpha and Gamma Levels

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

	Alpha Levels				Gamma Levels										
Location	No. of Samples	No. of Non-Detects	Percent Non-Detects	Normality Test (p-value)	No. of Samples	No. of Non-Detects	Percent Non-Detects	Normality Test (p-value)	F-Test for Equal Variance (p-value)	Student's t-test (p-value)	Welch's t-test (p-value)	KS Test (p-value)	Wilcoxon Rank Sum Test[(1)] (p-value)	Are results significantly different?	Basis of Decision
RBA1	48	7	15	0.006	48	6	13	0.831	0.880	0.169	0.169	0.100	0.078	No	TW
RBA2	36	5	14	0.930	36	0	0	0.027	0.211	0.405	0.406	0.699	0.373	No	TW
RBA3	50	6	12	0.005	50	4	8	0.601	0.885	0.000	0.000	0.000	0.000	Yes	TW
RBA4	32	4	13	0.327	32	2	6	0.149	0.790	0.074	0.074	0.270	0.084	No	TW
RBAS	100	4	4	0.000	100	0	0	0.361	0.000	0.000	0.000	0.000	0.000	Yes	KS

Notes:

KS = Kolmogorov-Smirnov

NP = nonparametric

WRS = Wilcoxon Rank Sum

[(1)]For data containing greater than 10 percent non-detect results, the Tarone-Ware two-sample test was utilized instead of the Wilcoxon Rank Sum test.

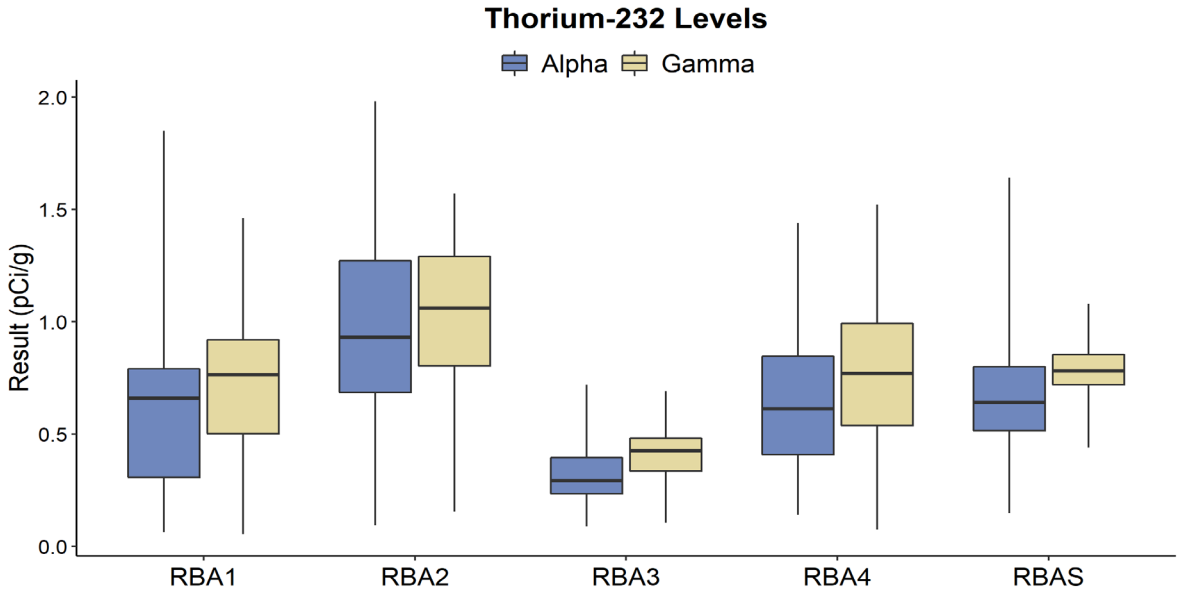

Table 6-1. Statistical Outliers in Combined Surface and Subsurface Depth Intervals

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Area	Parameter	Sample	FOD	Result (pCi/g)	Next Closest Value (pCi/g)	RPD	Test Statistic	Critical Value	Distribution of data with outlier	Distribution of data after removal of outlier	Did result remain statistical outlier after log transformation?	Determined to be an actual outlier?
RBA1	Thorium-232	HPRBA1-SS09-000H-0819	41/48	1.85	1.33	32.7	3.52	3.11	Normal	Normal	No	No
RBA3	Radium-226	HPRBA3-SS05-000H-0819	49/50	0.629	0.604	4.1	3.31	3.13	NP	Lognormal	No	No
RBA3	Radium-226	HPRBA3-SS13-000H-0819	48/49	0.604	0.539	11.4	3.44	3.12	Lognormal	Log / Gamma	Yes	No
RBA3	Radium-226	HPRBA3-SS01-000H-0819	47/48	0.539	0.485	10.6	3.50	3.10	Log / Gamma	Normal	No	No
RBA3	Radium-226	HPRBA3-SS21-000H-0819	46/47	0.485	0.402	18.7	3.12	3.09	Normal	Normal	No	No
RBA3	Thorium-232	HPRBA3-SS13-000H-0819	44/50	0.719	0.552	26.3	3.33	3.13	Log / Gamma	Normal	No	No
RBAS	Thorium-232	HPRBAS-SB16-011H-0919	96/100	1.64	1.45	12.3	3.96	3.38	Log / Gamma	Normal	No	No
RBAS	Thorium-232	HPRBAS-SB18-1H02-0919	95/99	1.45	1.23	16.4	3.48	3.38	Normal	Normal	No	No

Notes:

FOD = frequency of detection

pCi/g = picocuries per gram

RPD = relative percent difference

Statistical outliers identified for constituents with a detection frequency greater than or equal to 50 percent using Rosner's test at a significance level of 0.05.

Table 6-2. Kruskal-Wallis (Nonparametric) ANOVA Comparisons Between Areas

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

Parameter	Soil Horizon	Total Samples	Detect Results	Calculated Probability	Decision	Areas Statistically Different
Radium-226	SS	125	125	0.000	Significant Difference	RBA1-RBA2; RBA1-RBA3; RBA2-RBA3; RBA2-RBA4; RBA2-RBAS; RBA3-RBA4; RBA3-RBAS
	SB	141	135	0.000	Significant Difference	RBA1-RBA3; RBA1-RBAS; RBA2-RBAS; RBA3-RBAS; RBA4-RBAS
	SS + SB	266	260	0.000	Significant Difference	RBA1-RBA2; RBA1-RBA3; RBA1-RBAS; RBA2-RBA3; RBA2-RBA4; RBA2-RBAS; RBA3-RBA4; RBA3-RBAS
Thorium-232	SS	125	120	0.000	Significant Difference	RBA1-RBA2; RBA1-RBA3; RBA2-RBA3; RBA2-RBA4; RBA2-RBAS; RBA3-RBA4; RBA3-RBAS
	SB	141	120	0.000	Significant Difference	RBA1-RBA3; RBA1-RBAS; RBA2-RBA3; RBA3-RBAS; RBA4-RBAS
	SS + SB	266	240	0.000	Significant Difference	RBA1-RBA2; RBA1-RBA3; RBA2-RBA3; RBA2-RBA4; RBA2-RBAS; RBA3-RBA4; RBA3-RBAS

Notes:

SS - surface soil

SB - subsurface soil

Table 6-3. Central Tendency Comparison Test Results for Radium-226 in Surface and Subsurface Depth Intervals

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

	Shallow Soil				Deep Soil										
Location	No. of Samples	No. of Non-Detects	Percent Non-Detects	Normality Test (p-value)	No. of Samples	No. of Non-Detects	Percent Non-Detects	Normality Test (p-value)	F-Test for Equal Variance (p-value)	Student's t-test (p-value)	Welch's t-test (p-value)	KS Test (p-value)	Wilcoxon Rank Sum Test[(1)] (p-value)	Are results significantly different?	Basis of Decision
RBA1	25	0	0	0.531	23	4	17	0.190	0.001	0.006	0.009	0.003	0.023	Yes	KS
RBA2	25	0	0	0.889	11	0	0	0.593	0.007	0.000	0.001	0.001	0.000	Yes	Welch
RBA3	25	0	0	0.000	25	1	4	0.754	0.107	0.038	0.039	0.468	0.114	No	WRS
RBA4	25	0	0	0.234	7	1	14	0.001	0.129	0.010	0.065	0.000	0.004	Yes	TW
RBAS	25	0	0	0.735	75	0	0	0.138	0.162	0.099	0.143	0.180	0.150	No	t-test

Notes:

KS = Kolmogorov-Smirnov

NP = nonparametric

WRS = Wilcoxon Rank Sum

[(1)]For data containing greater than 10 percent non-detect results, the Tarone-Ware two-sample test was utilized instead of the Wilcoxon Rank Sum test.

Table 6-4. Central Tendency Comparison Test Results for Thorium-232 in Surface and Subsurface Depth Intervals

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

	Shallow Soil				Deep Soil										
Location	No. of Samples	No. of Non-Detects	Percent Non-Detects	Normality Test (p-value)	No. of Samples	No. of Non-Detects	Percent Non-Detects	Normality Test (p-value)	F-Test for Equal Variance (p-value)	Student's t-test (p-value)	Welch's t-test (p-value)	KS Test (p-value)	Wilcoxon Rank Sum Test[(1)] (p-value)	Are results significantly different?	Basis of Decision
RBA1	25	0	0	0.088	23	7	30	0.197	0.287	0.000	0.000	0.001	0.000	Yes	TW
RBA2	25	0	0	0.760	11	5	45	0.169	0.212	0.000	0.003	0.004	0.004	Yes	TW
RBA3	25	4	16	0.009	25	2	8	0.771	0.096	0.681	0.681	0.994	0.854	No	TW
RBA4	25	1	4	0.679	7	3	43	0.213	0.210	0.000	0.000	0.000	0.001	Yes	TW
RBAS	25	0	0	0.717	75	4	5	0.000	0.013	0.792	0.742	0.723	0.987	No	KS

Notes:

KS = Kolmogorov-Smirnov

NP = nonparametric

WRS = Wilcoxon Rank Sum

[(1)]For data containing greater than 10 percent non-detect results, the Tarone-Ware two-sample test was utilized instead of the Wilcoxon Rank Sum test.

Table 6-5. Summary Statistics for Combined Surface and Subsurface Depth Intervals

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

		Frequency of Detection			Minimum Values		Maximum Values							Background Threshold Value	
Area	Parameter	Total Samples	Detect Results	Detect Freq. (%)	Non-Detect	Detect	Non-Detect	Detect	Mean	Median	Standard Deviation	95th Percentile	99th Percentile	BTV	Basis
RBA1	Cesium-137	48	4	8	0.0250	0.0413	0.0528	0.117	---	---	---	---	---	0.117	Max Detect (< 8 detects)
	Plutonium-239/240	48	0	0	0.0463	---	0.494	---	---	---	---	---	---	0.494	Max DL (no detections)
	Radium-226	48	44	92	0.0787	0.117	0.146	1.10	0.544	0.578	0.255	0.862	1.09	1.29	KM Normal USL95
	Strontium-90	48	0	0	0.0881	---	0.150	---	---	---	---	---	---	0.150	Max DL (no detections)
	Thorium-232	48	41	85	0.124	0.186	0.507	1.85	0.623	0.659	0.342	1.22	1.61	1.63	KM Normal USL95
	Uranium-235/236	48	7	15	0.0483	0.0281	0.132	0.169	---	---	---	---	---	0.169	Max Detect (< 8 detects)
RBA2	Cesium-137	36	0	0	0.0249	---	0.0523	---	---	---	---	---	---	0.0523	Max DL (no detections)
	Plutonium-239/240	36	0	0	0.0411	---	0.378	---	---	---	---	---	---	0.378	Max DL (no detections)
	Radium-226	36	36	100	---	0.111	---	1.13	0.733	0.776	0.268	1.06	1.13	1.13	Nonparametric USL95
	Strontium-90	36	0	0	0.104	---	0.149	---	---	---	---	---	---	0.149	Max DL (no detections)
	Thorium-232	36	31	86	0.187	0.282	0.721	1.98	0.934	0.930	0.451	1.61	1.87	2.21	KM Normal USL95
	Uranium-235/236	36	9	25	0.0313	0.0393	0.245	0.0899	---	---	---	---	---	0.245	Nonparametric USL95
RBA3	Cesium-137	50	1	2	0.0197	0.0175	0.0532	0.0175	---	---	---	---	---	0.0175	Single Detect
	Plutonium-239/240	50	0	0	0.0333	---	0.222	---	---	---	---	---	---	0.222	Max DL (no detections)
	Radium-226	50	49	98	0.144	0.191	0.144	0.629	0.335	0.317	0.0857	0.515	0.617	0.629	Nonparametric USL95
	Strontium-90	50	0	0	0.109	---	0.149	---	---	---	---	---	---	0.149	Max DL (no detections)
	Thorium-232	50	44	88	0.178	0.141	0.519	0.719	0.312	0.294	0.117	0.511	0.637	0.759	KM Gamma USL95
	Uranium-235/236	50	5	10	0.0217	0.0298	0.112	0.0630	---	---	---	---	---	0.0630	Max Detect (< 8 detects)
RBA4	Cesium-137	32	1	3	0.0247	0.477	0.0530	0.477	---	---	---	---	---	0.477	Single Detect
	Plutonium-239/240	32	0	0	0.0840	---	0.410	---	---	---	---	---	---	0.410	Max DL (no detections)
	Radium-226	32	31	97	0.0743	0.355	0.0743	1.15	0.662	0.674	0.247	1.10	1.14	1.35	KM Normal USL95
	Strontium-90	32	0	0	0.125	---	0.149	---	---	---	---	---	---	0.149	Max DL (no detections)
	Thorium-232	32	28	88	0.281	0.279	0.591	1.44	0.645	0.612	0.279	1.07	1.34	1.42	KM Normal USL95
	Uranium-235/236	32	5	16	0.0337	0.0567	0.142	0.129	---	---	---	---	---	0.129	Max Detect (< 8 detects)
RBAS	Cesium-137	100	37	37	0.0339	0.0409	0.0544	0.141	---	---	---	---	---	0.141	Nonparametric USL95
	Plutonium-239/240	100	0	0	0.0910	---	0.515	---	---	---	---	---	---	0.515	Max DL (no detections)
	Radium-226	100	100	100	---	0.482	---	0.827	0.640	0.627	0.0689	0.756	0.792	0.861	Normal USL95
	Strontium-90	100	0	0	0.0911	---	0.150	---	---	---	---	---	---	0.150	Max DL (no detections)
	Thorium-232	100	96	96	0.293	0.280	0.545	1.64	0.682	0.641	0.234	1.05	1.45	1.63	KM Gamma USL95
	Uranium-235/236	100	29	29	0.0301	0.0337	0.134	0.145	---	---	---	---	---	0.145	Nonparametric USL95

Notes:

"---" = not applicable

% = percent

BTV = Background Threshold Value

DL = detection limit

Freq. = frequency

KM = Kaplan-Meier

Max = maximum

USL95 = 95% upper simultaneous limit

Concentrations given in picocuries per gram (pCi/g).

Summary statistics calculated using the Kaplan-Meier product-limit estimator for non-detects with the detection limit set as the censoring limit.

Table 6-6. Background Threshold Value Summary for Combined Surface and Subsurface Depth Intervals

Background Soil Study Report, Former Hunters Point Naval Shipyard, San Francisco, CA

	Onsite BTV				Offsite BTV	Onsite Range of BTVs
Parameter	**RBA1**	**RBA2**	**RBA3**	**RBA4**	**RBAS**	
Cesium-137	0.117	0.0523	0.0175	0.477	0.141	0.0175 - 0.477
Plutonium-239/240	0.494	0.378	0.222	0.410	0.515	0.222 - 0.494
Radium-226	1.29	1.13	0.629	1.35	0.861	0.629 - 1.35
Strontium-90	0.150	0.149	0.149	0.149	0.150	0.149 - 0.150
Thorium-232	1.63	2.21	0.759	1.42	1.63	0.759 - 2.21
Uranium-235/236	0.169	0.245	0.0630	0.129	0.145	0.0630 - 0.245

Notes:

BTV = Background Threshold Value

Concentrations given in picocuries per gram (pCi/g).

Figures

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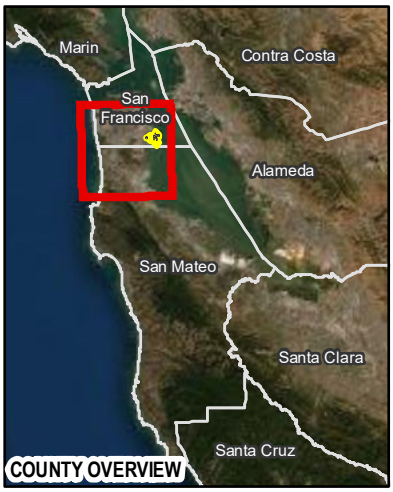

BASE MAP SOURCE:
Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 1-1
Installation Location
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

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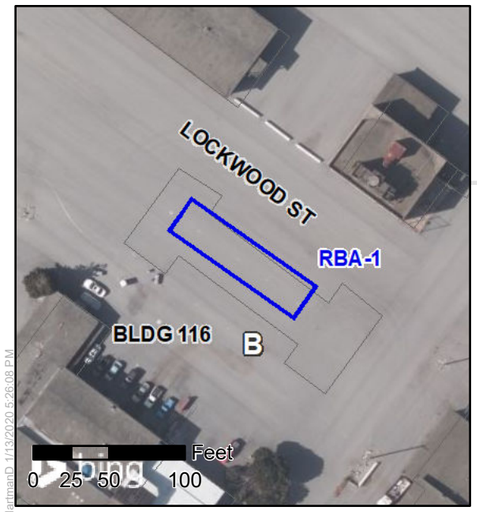

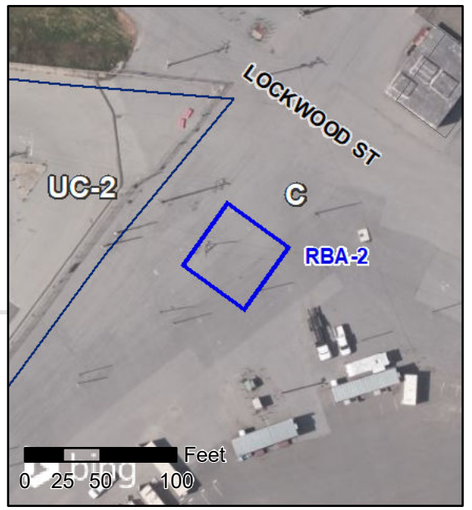

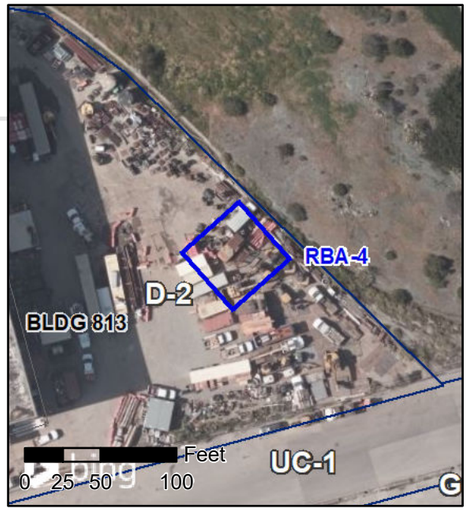

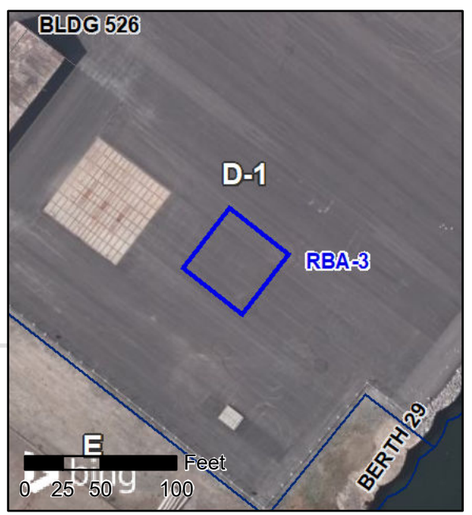

Legend:

- Reference Background Area
- Installation Boundary
- Parcel Boundary
- Current and Former Building Site

N

Feet
0 250 500 1,000

BASE MAP SOURCE:
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Figure 1-2
HPNS Reference Background Areas
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

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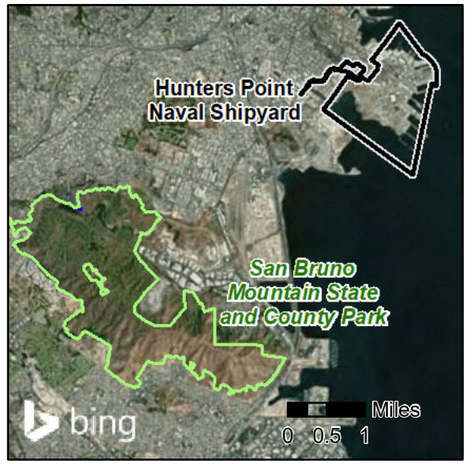

Legend:

- Reference Background Area*
- Park
- Hunters Point Naval Shipyard

* NOTE:
The exact location of the RBA within San Bruno Mountain State Park may be adjusted based on consultation with County of San Mateo Parks Department personnel.

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San Mateo County GIS (2016).

Figure 1-3
Offsite Reference Background Area
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

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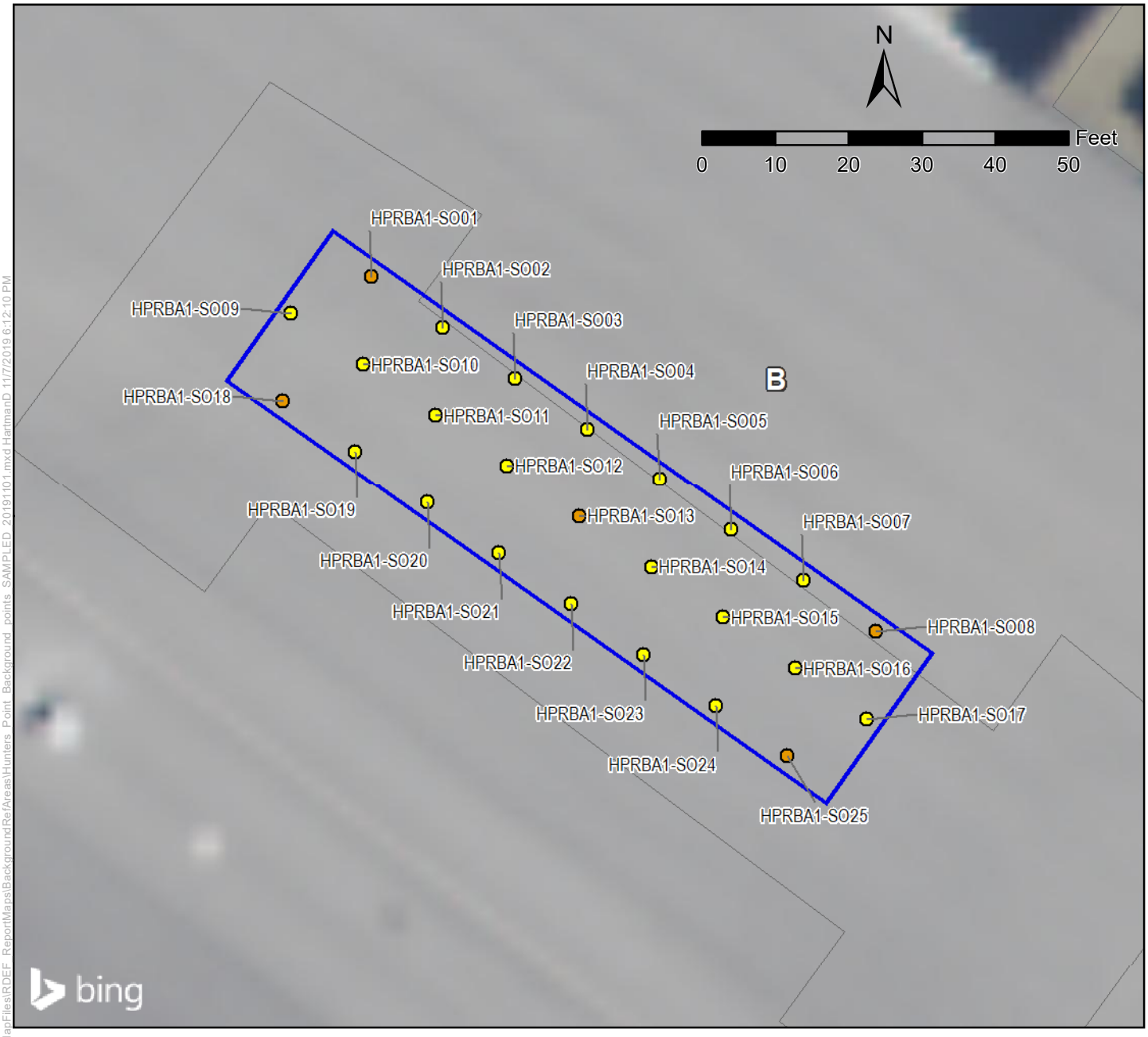

Legend:

- Surface Sample Location
- Surface and Subsurface Sample Location
- Reference Background Area
- Installation Boundary
- Parcel Boundary
- Current and Former Building Site

COORDINATE SYSTEM:
NAD 1983 StatePlane California III FIPS 0403 Feet

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Esri, USDA Farm Service Agency

Figure 2-1
Soil Sample Locations - RBA-1 (Parcel B)
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

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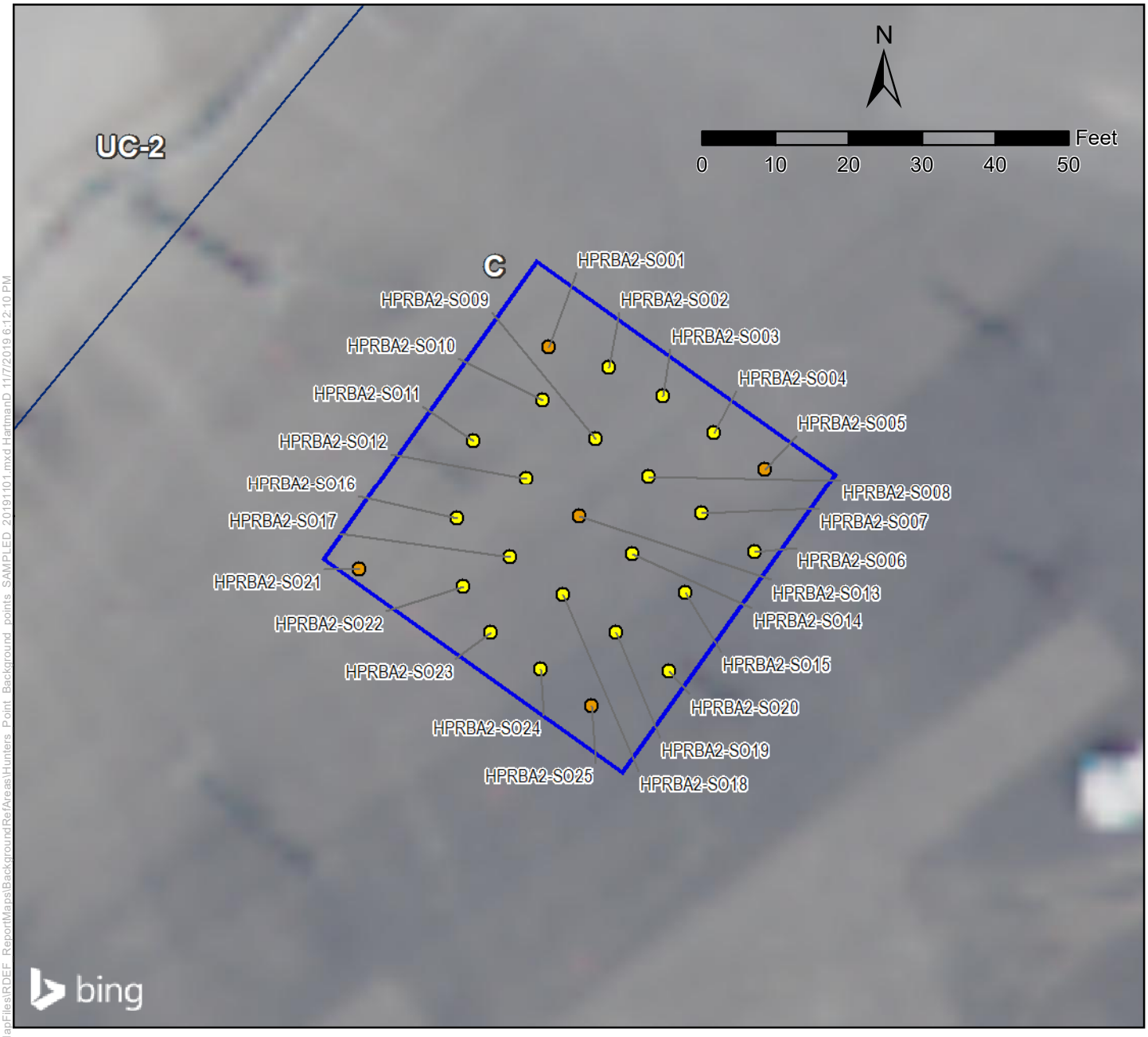

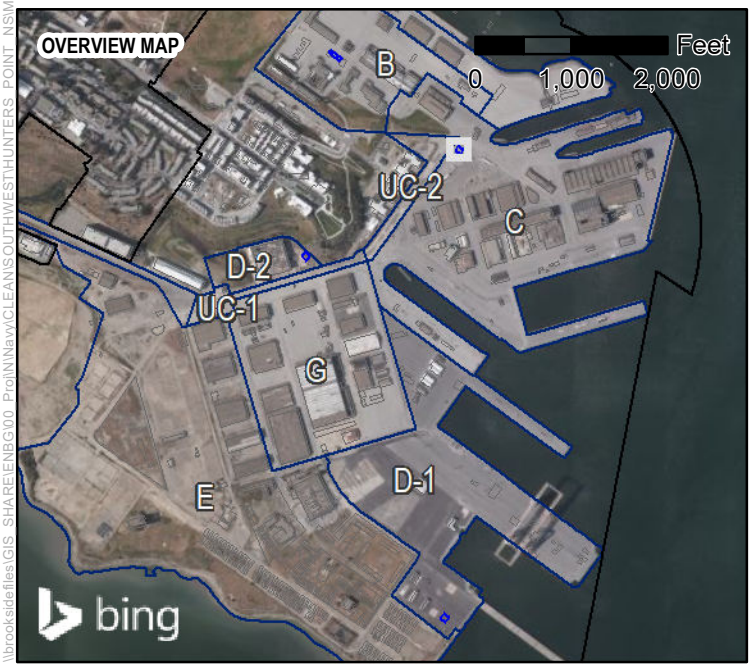

Legend:

- Surface Sample Location
- Surface and Subsurface Sample Location
- Reference Background Area
- Installation Boundary
- Parcel Boundary
- Current and Former Building Site

COORDINATE SYSTEM:
NAD 1983 StatePlane California III FIPS 0403 Feet

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Esri, USDA Farm Service Agency

Figure 2-2
Soil Sample Locations - RBA-2 (Parcel C)
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

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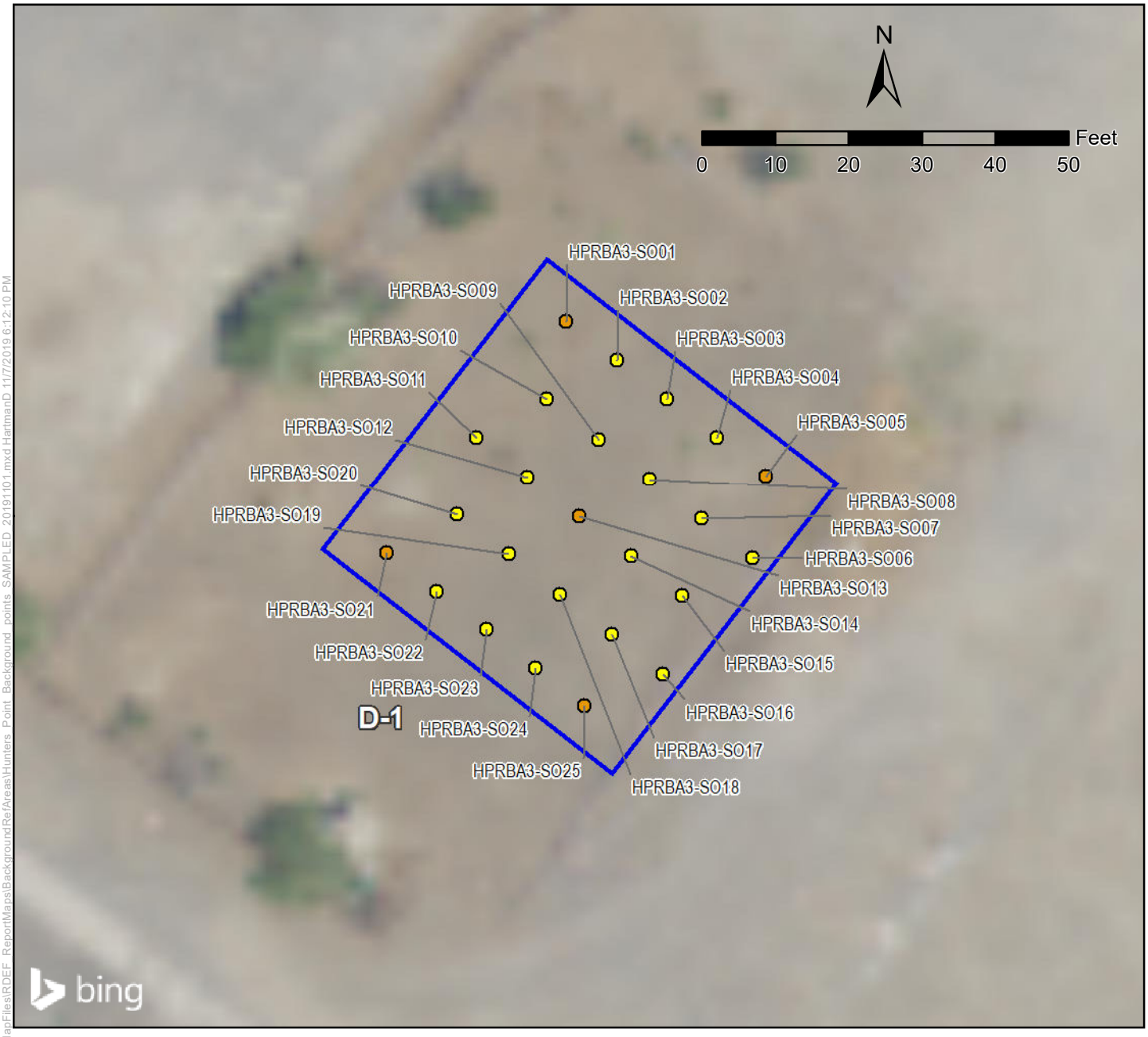

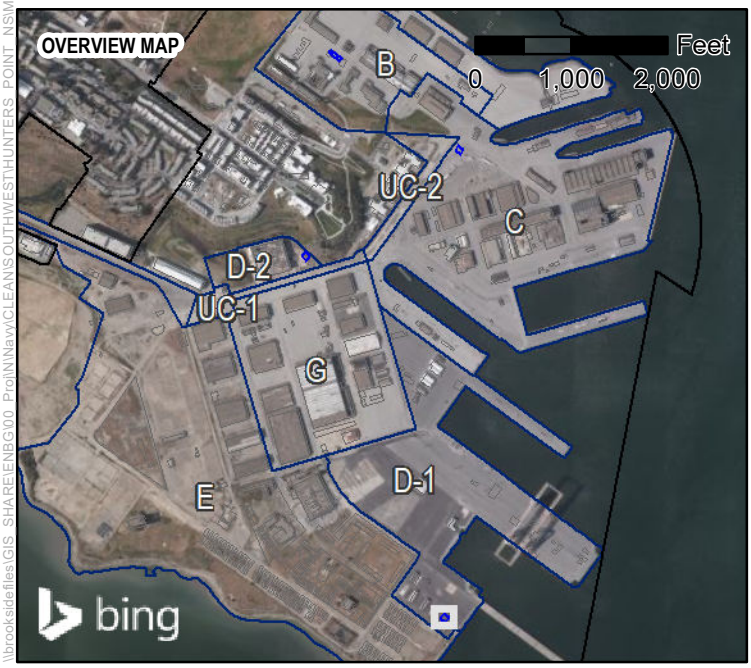

Legend:

- Surface Sample Location
- Surface and Subsurface Sample Location
- Reference Background Area
- Installation Boundary
- Parcel Boundary
- Current and Former Building Site

COORDINATE SYSTEM:
NAD 1983 StatePlane California III FIPS 0403 Feet

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Figure 2-3
Soil Sample Locations - RBA-3 (Parcel D-1)
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

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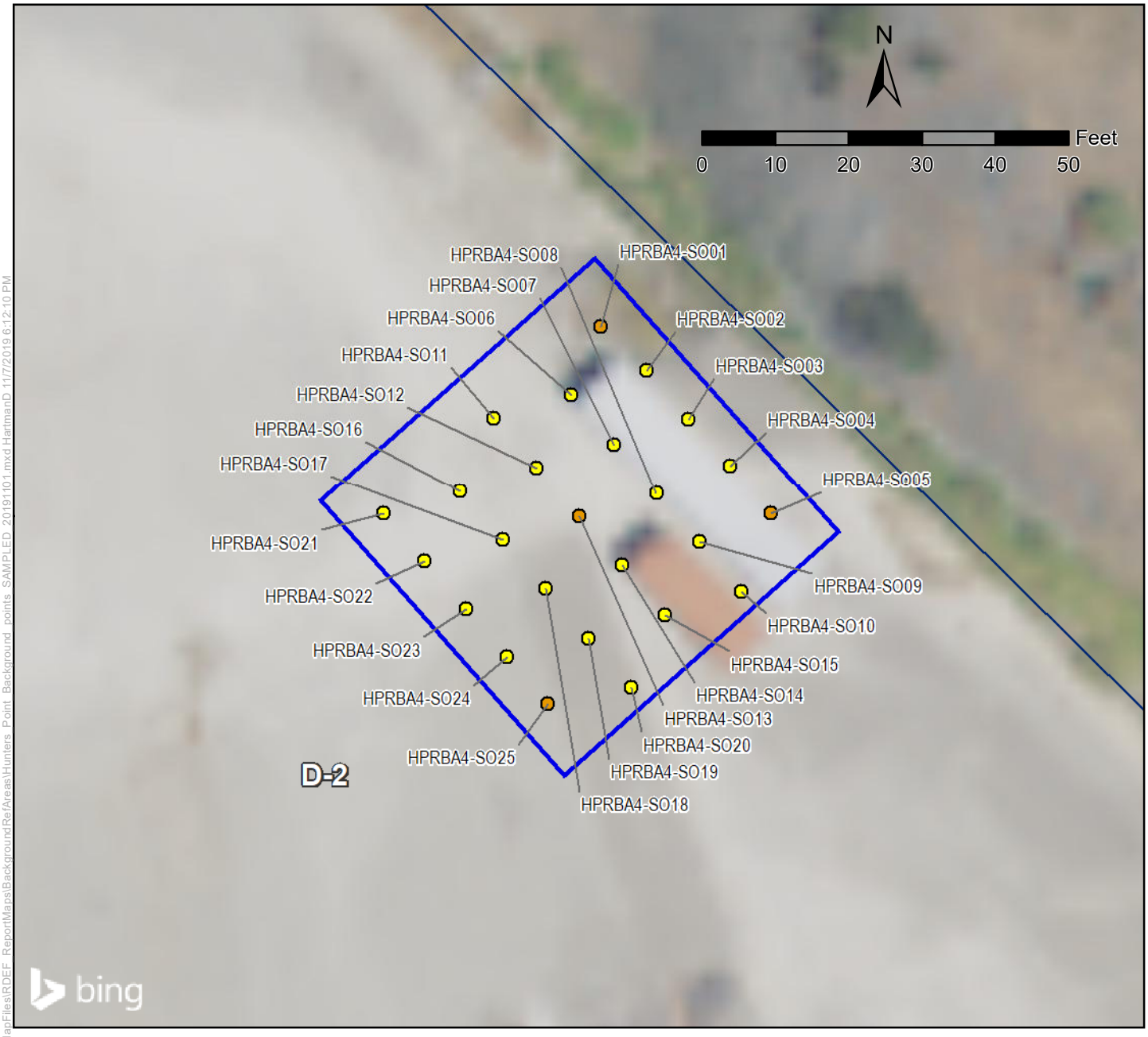

Legend:

- Surface Sample Location
- Surface and Subsurface Sample Location
- Reference Background Area
- Installation Boundary
- Parcel Boundary
- Current and Former Building Site

COORDINATE SYSTEM:
NAD 1983 StatePlane California III FIPS 0403 Feet

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Figure 2-4
Soil Sample Locations - RBA-4 (Parcel D-2)
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

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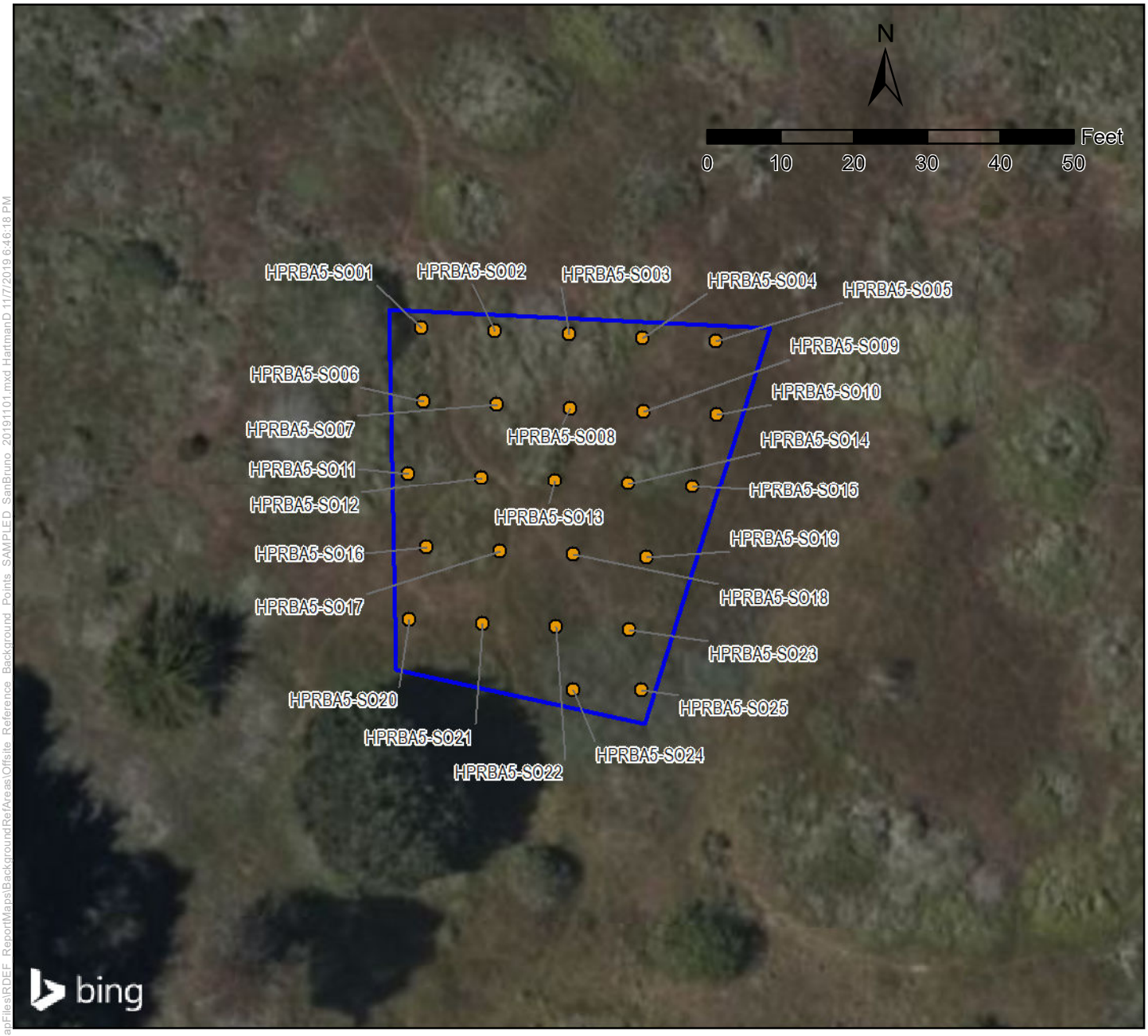

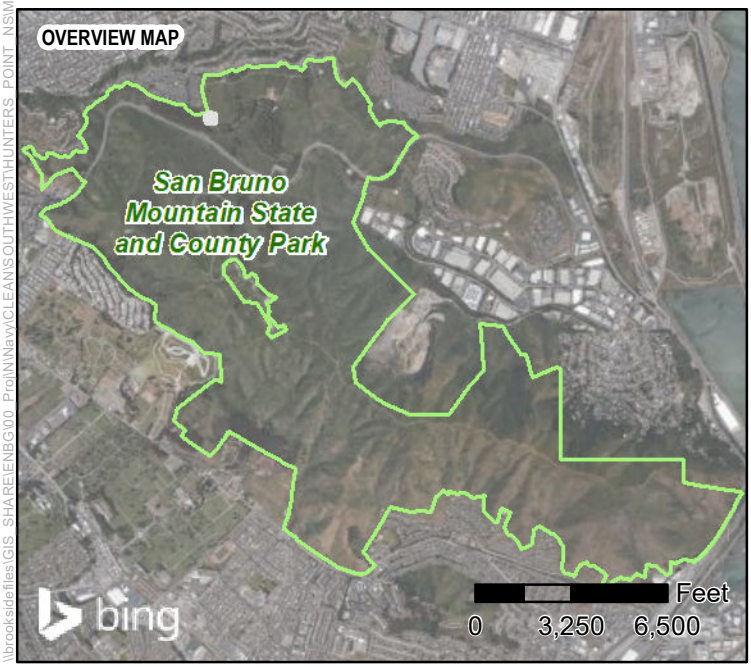

Legend:

- Surface and Subsurface Sample Location
- Reference Background Area
- Park

COORDINATE SYSTEM: NAD 1983 StatePlane California III FIPS 0403 Feet

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San Mateo County GIS (2016).

Figure 2-5
Soil Sample Locations - RBA-SanBruno
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

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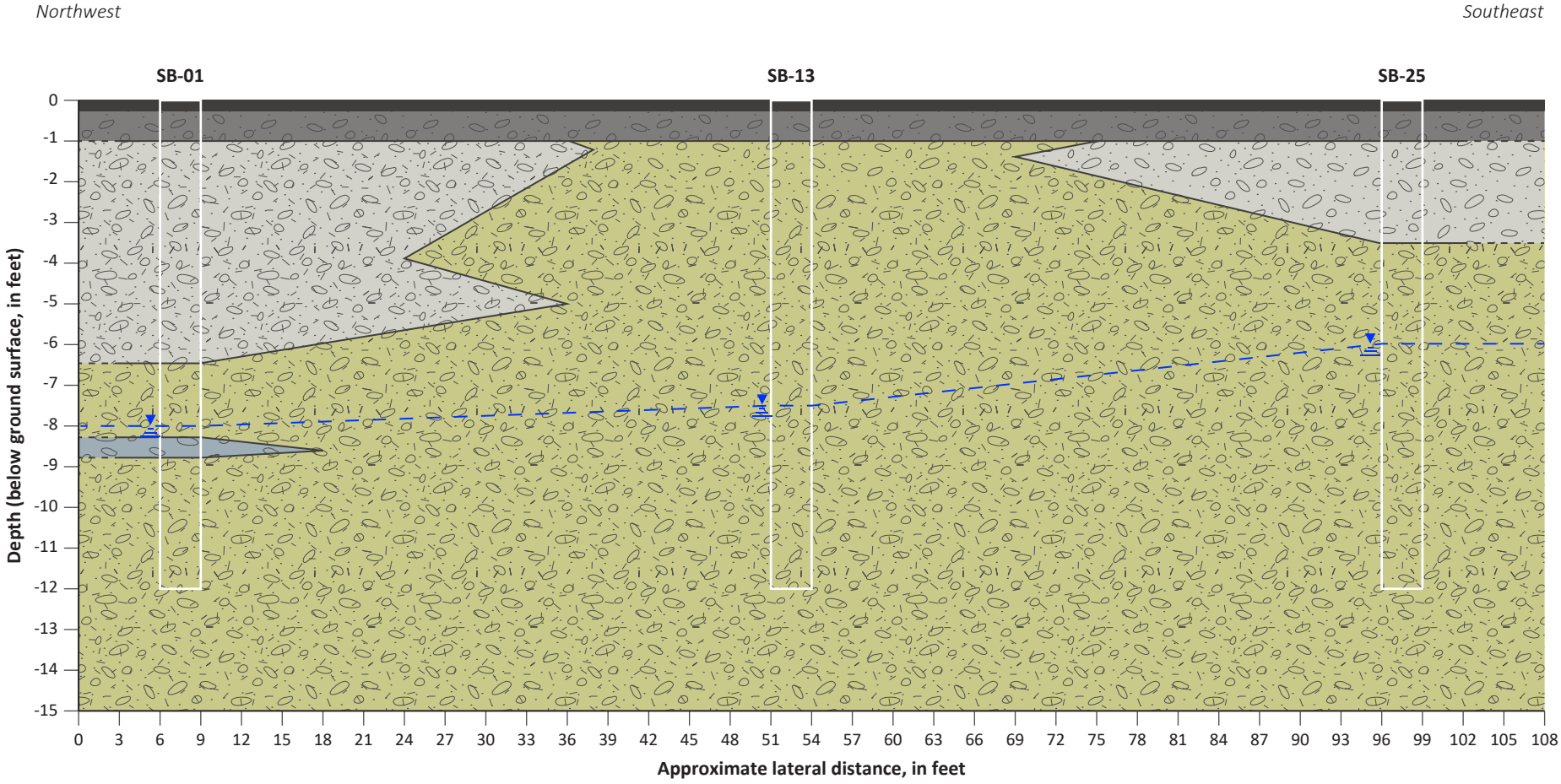
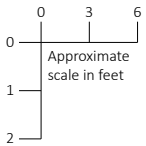


LEGEND

- Asphalt
- Road base (sandy gravel)
- Silty sand with gravel
- Well-graded sand with gravel
- Well-graded gravel
- Silt, silt with sand, silt with gravel
- Water table



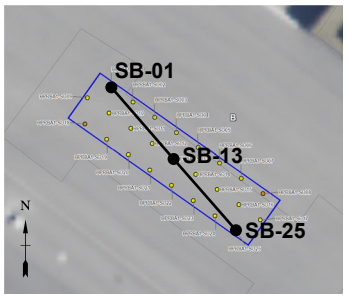


Figure 3-1
RBA-1 – Cross Section
Northwest to Southeast

Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

AX1219191219SDO Figure 3-1- RBA1_NW-SE_CrossSection_rev2

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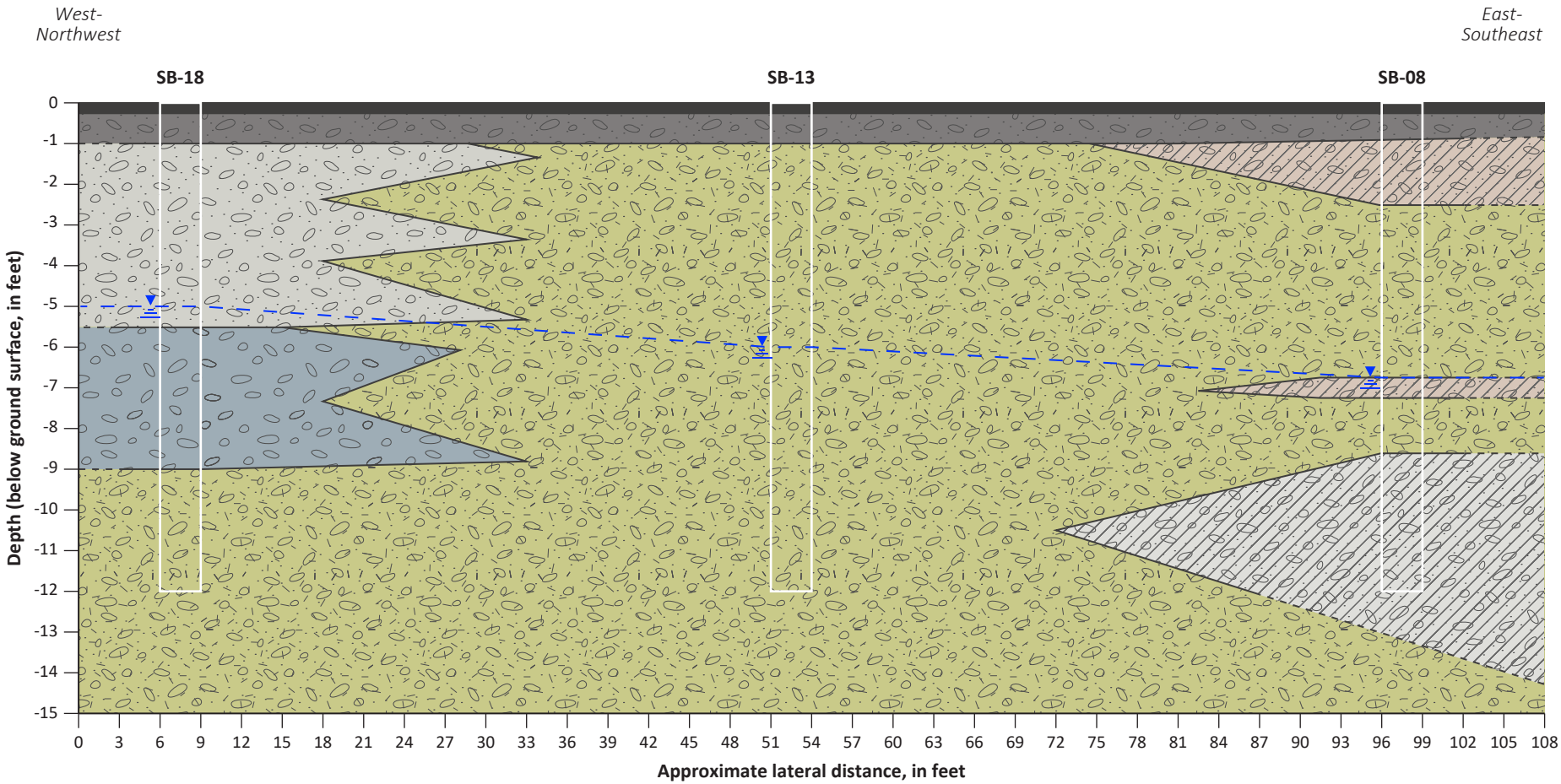
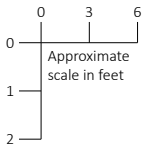


LEGEND

- Asphalt
- Road base (sandy gravel)
- Fat clay with sand and gravel
- Clayey sand with gravel
- Well-graded sand with gravel
- Well-graded gravel
- Silt, silt with sand, silt with gravel
- Water table



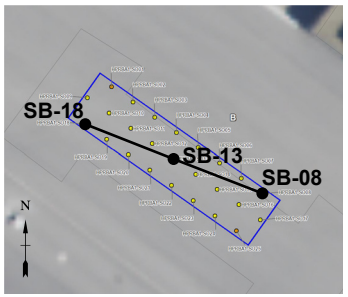


Figure 3-2
RBA-1 – Cross Section
West-Northwest to East-Southeast
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

AX1219191219SDO Figure 3-2- RBA1_WNW-ESE_CrossSection_rev2

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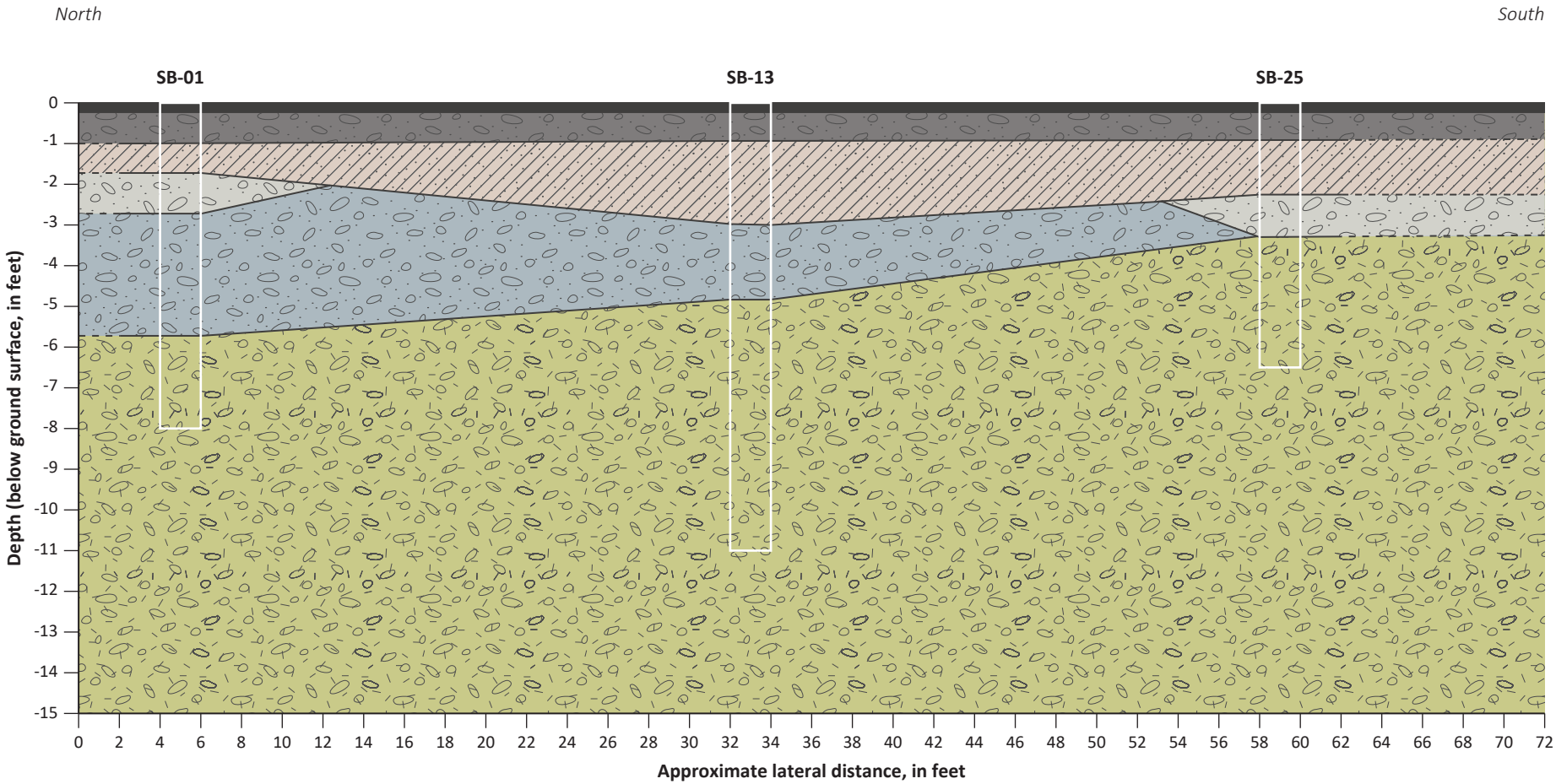
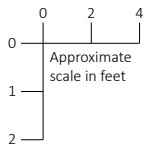
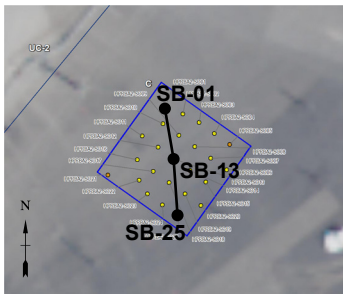


LEGEND

- Asphalt
- Road base (sandy gravel)
- Fat clay with sand
- Well-graded sand with gravel
- Well-graded gravel with sand
- Silt with gravel





AX1219191219SDO Figure 3-3- RBA2_N-S_CrossSection_rev2

Figure 3-3
RBA-2 – Cross Section
North to South
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

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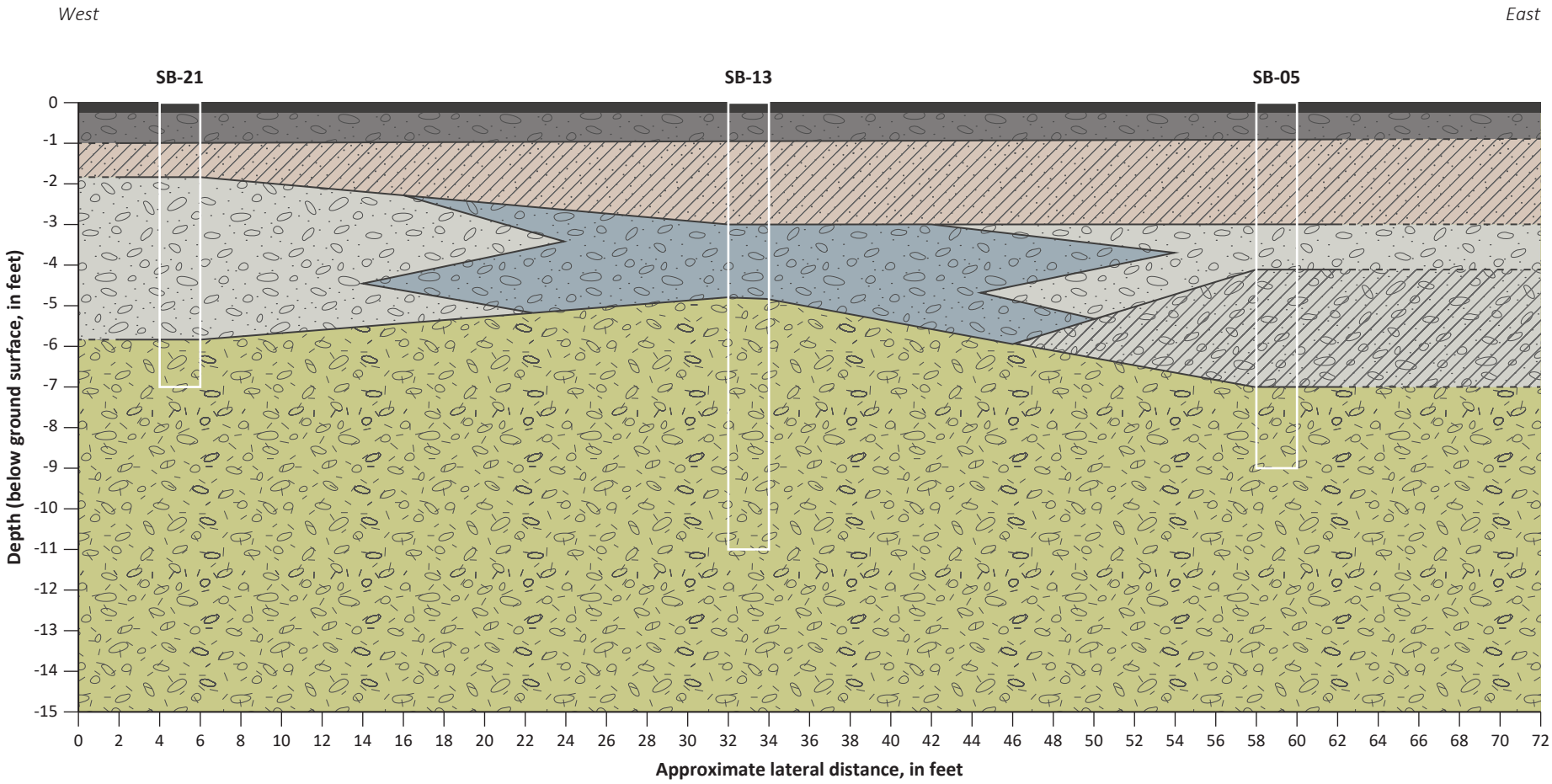
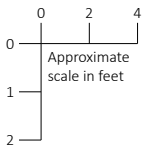


LEGEND

- Asphalt
- Road base (sandy gravel)
- Fat clay with sand
- Clayey sand with gravel
- Well-graded sand with gravel
- Well-graded gravel with sand
- Silt with gravel



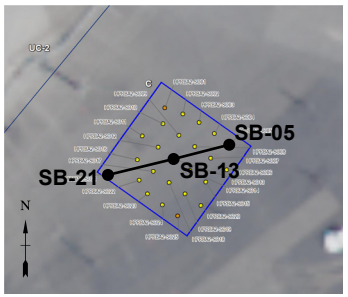


Figure 3-4
RBA-2 – Cross Section
West to East

Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

AX1219191219SDO Figure 3-4- RBA2_W-E_CrossSection_rev2

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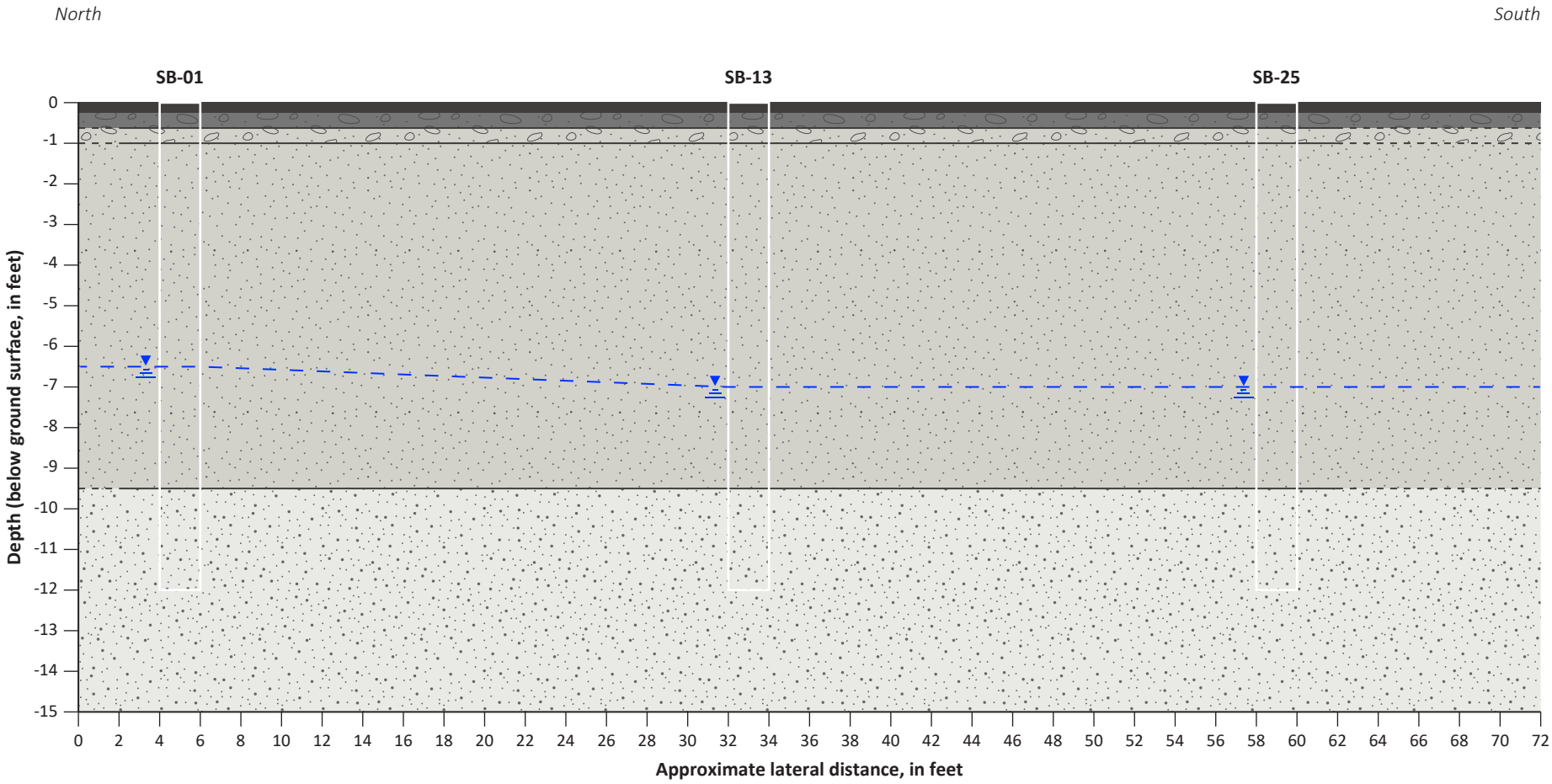
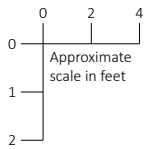


LEGEND

- Asphalt
- Road base (sandy gravel)
- Well-graded sand with gravel
- Well-graded sand
- Poorly graded sand
- Water table



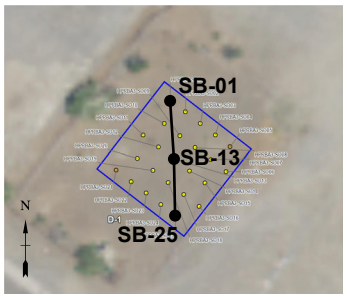


Figure 3-5
RBA-3 – Cross Section
North to South

Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

AX1219191219SDO Figure 3-5- RBA3_N-S_CrossSection_rev2

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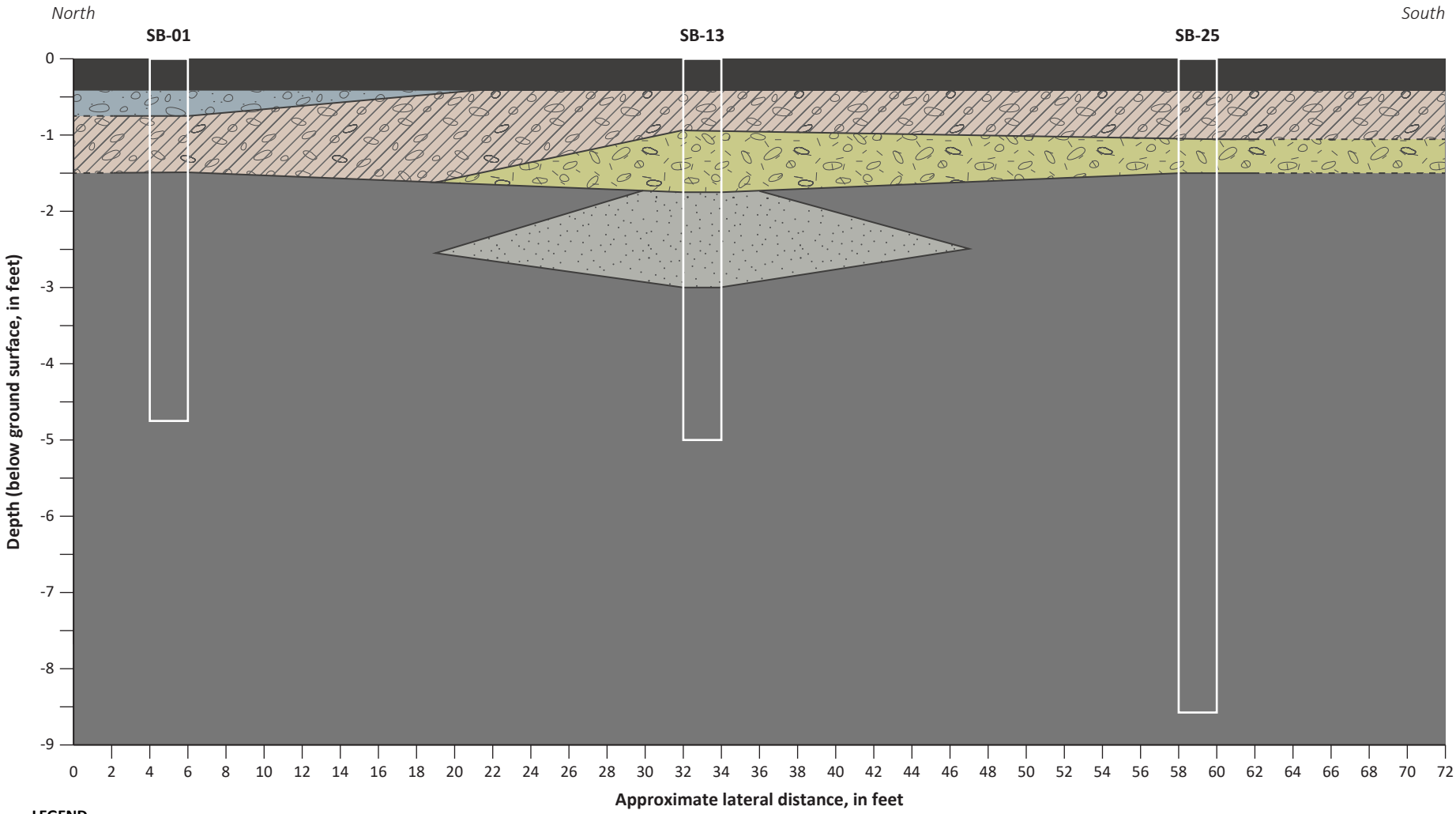
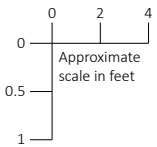


LEGEND

- Asphalt
- Well-graded gravel with sand
- Fat clay with gravel/gravelly fat clay
- Silt with gravel
- Sandstone
- Shale



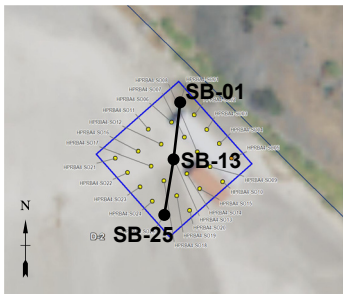


Figure 3-6
RBA-4 – Cross Section
North to South
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

AX1219191219SDO Figure 3-6- RBA4_N-S_CrossSection_rev2

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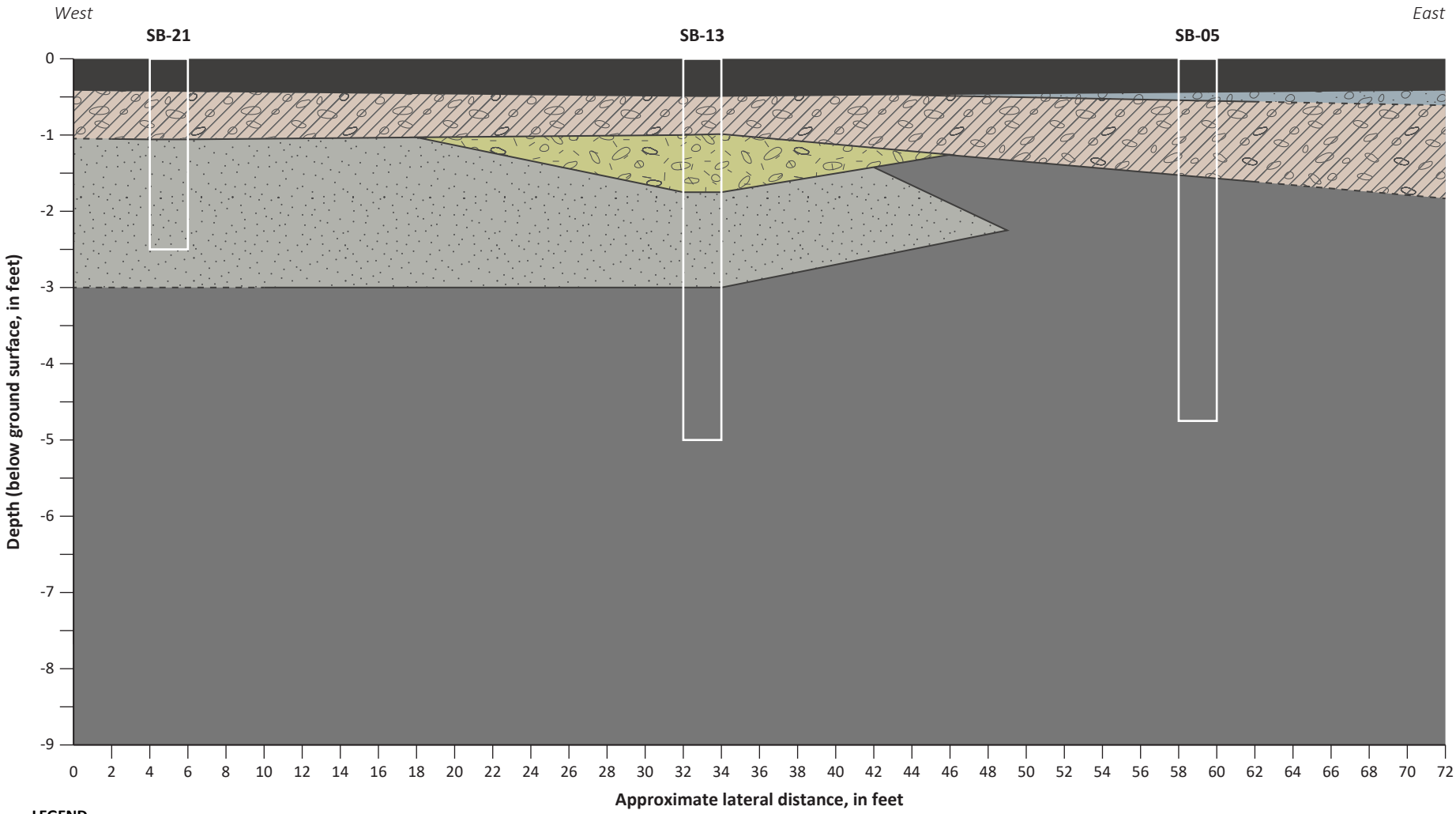
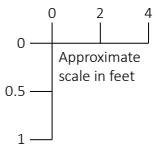


LEGEND

- Asphalt
- Well-graded gravel with sand
- Fat clay with gravel/gravelly fat clay
- Silt with gravel
- Sandstone
- Shale



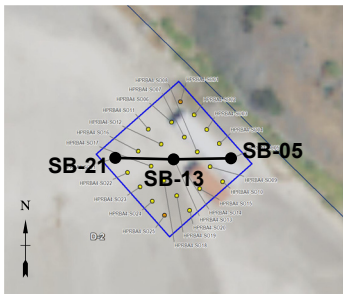


Figure 3-7
RBA-4 – Cross Section
West to East

Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

AX1219191219SDO Figure 3-7- RBA4_W-E_CrossSection_rev2

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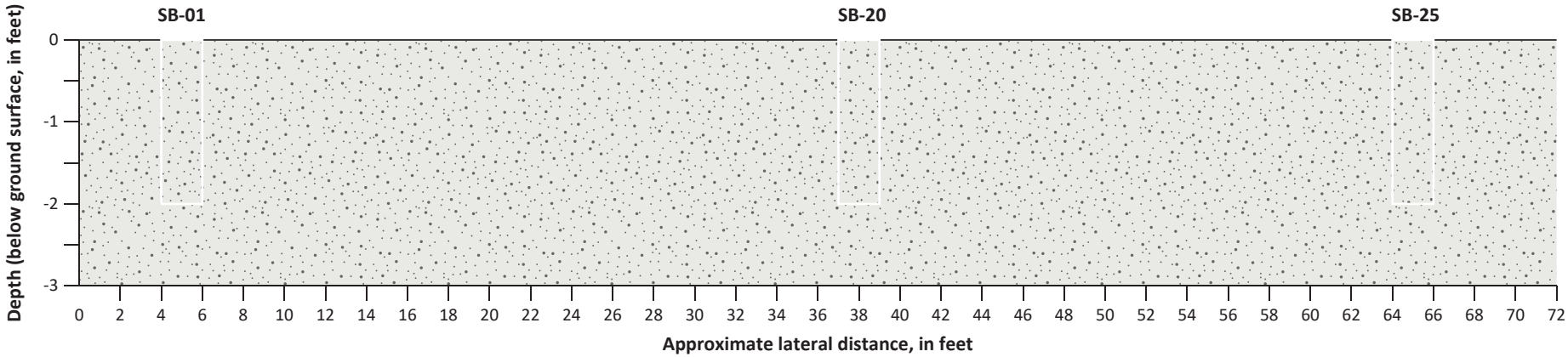
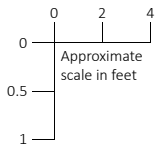
Northwest *Southeast*



LEGEND

Poorly graded sand



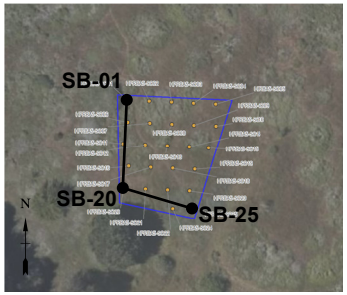


Figure 3-8
RBA-SanBruno – Cross Section Northwest to Southeast
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, CA

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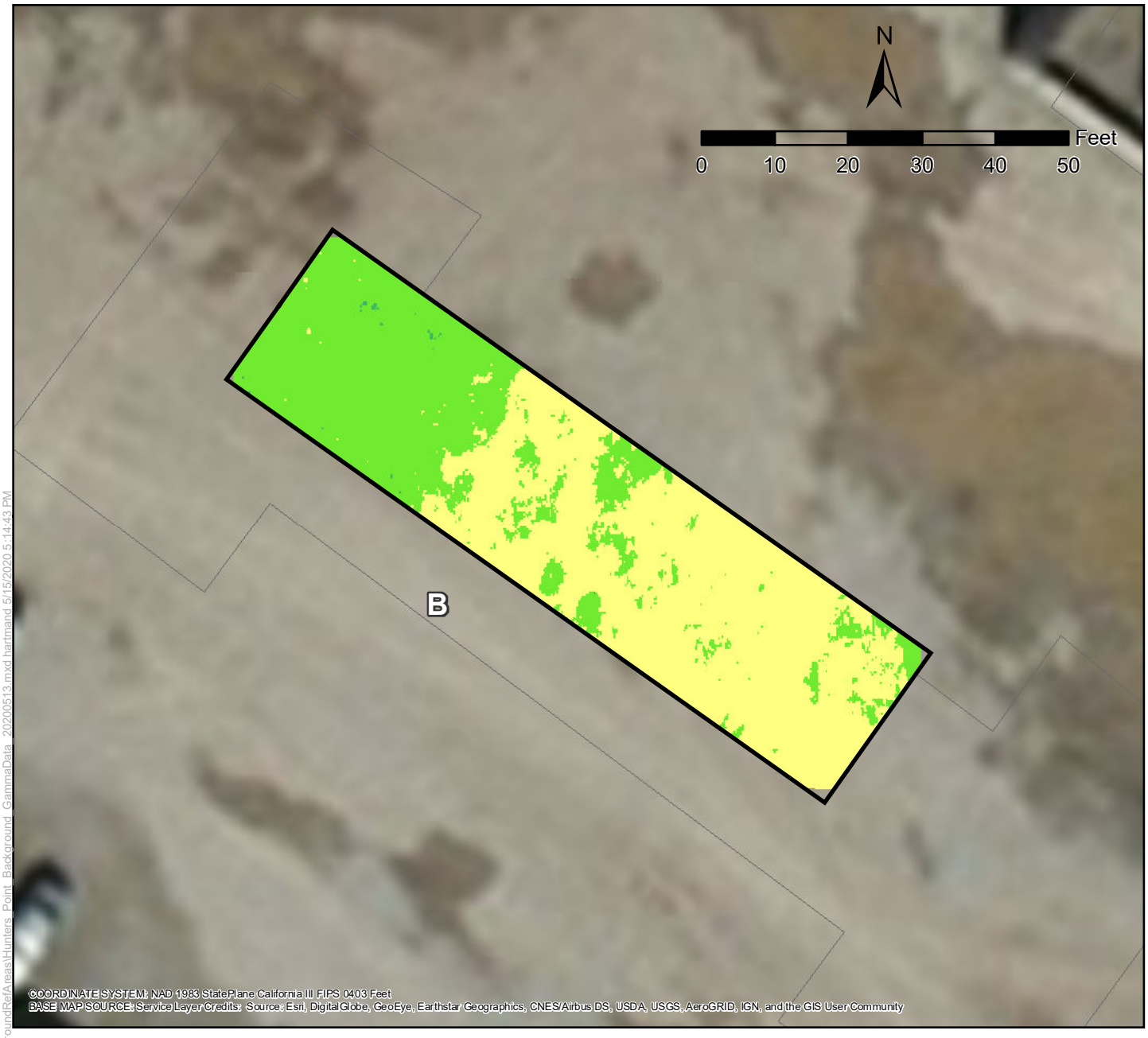

Legend:

Total CPS

- < 138 CPS (Mean)
- 138 - 159 CPS (Mean +1σ)
- 159 - 180 CPS (Mean +2σ)
- 180 - 201 CPS (Mean +3σ)
- > 201 CPS (> Mean + 3σ)
- Reference Background Area
- Parcel Boundary
- Current and Former Building Site

Figure 4-1
Gamma Walkover Survey Data - RBA-1 (Parcel B)
Former Hunters Point Naval Shipyard
San Francisco, California

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Legend:

Total CPS

- < 135 CPS (Mean)
- 135 - 160 CPS (Mean + 1σ)
- 160 - 185 CPS (Mean + 2σ)
- 185 - 210 CPS (Mean + 3σ)
- > 210 CPS (> Mean + 3σ)
- Reference Background Area
- Parcel Boundary
- Current and Former Building Site

Figure 4-2
Gamma Walkover Survey Data - RBA-2 (Parcel C)
Former Hunters Point Naval Shipyard
San Francisco, California

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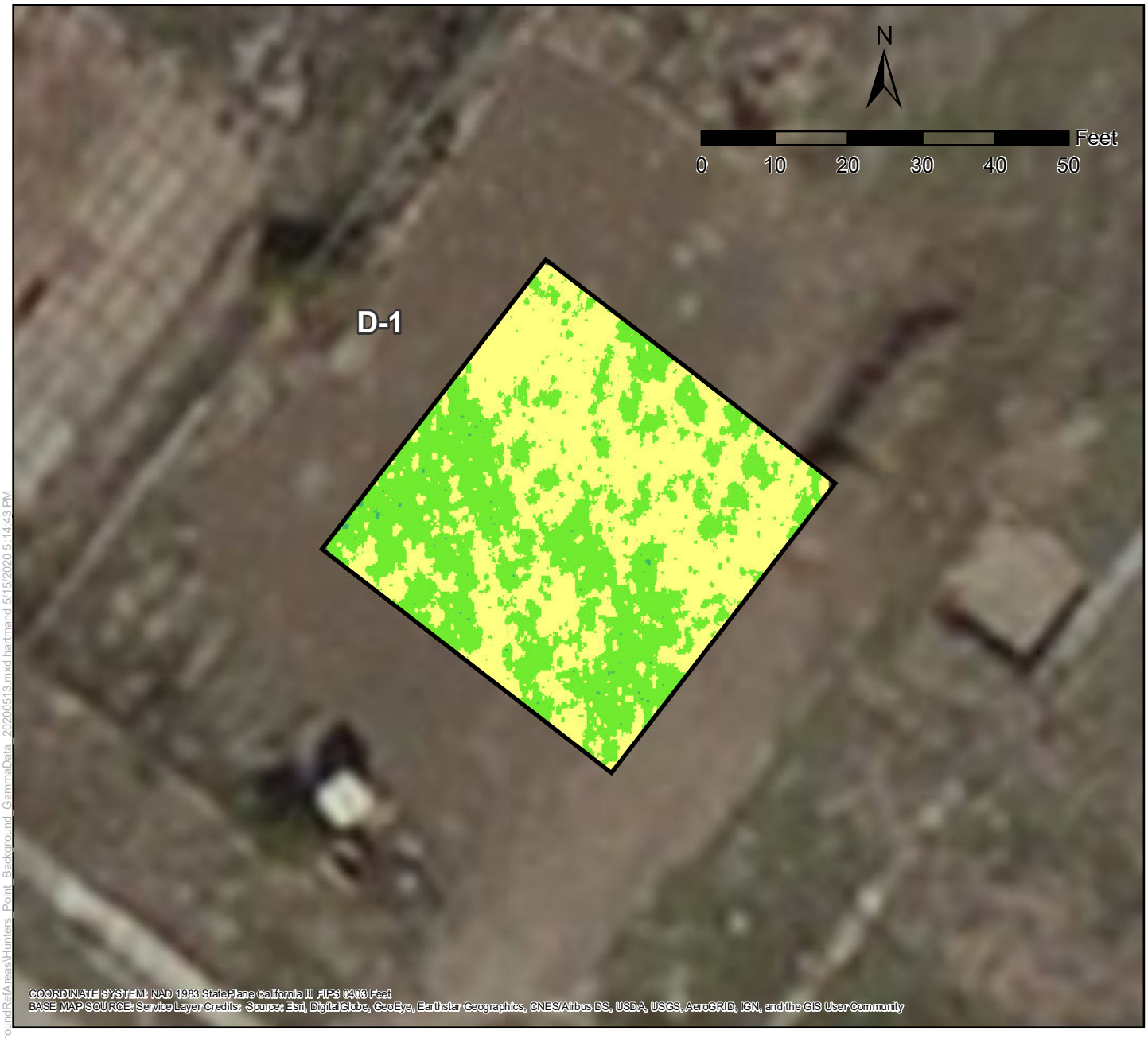

Legend:

Total CPS

- < 154 CPS (Mean)
- 154 - 176 CPS (Mean +1σ)
- 176 - 199 CPS (Mean +2σ)
- 199 - 221 CPS (Mean +3σ)
- > 221 CPS (> Mean + 3σ)
- Reference Background Area
- Parcel Boundary
- Current and Former Building Site

Figure 4-3
Gamma Walkover Survey Data - RBA-3 (Parcel D-1)
Former Hunters Point Naval Shipyard
San Francisco, California

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Legend:

Total CPS

- < 217 CPS (Mean)
- 217 - 263 CPS (Mean + 1σ)
- 263 - 308 CPS (Mean + 2σ)
- 308 - 353 CPS (Mean + 3σ)
- > 353 CPS (> Mean + 3σ)
- Reference Background Area
- Parcel Boundary
- Current and Former Building Site

Figure 4-4
Gamma Walkover Survey Data - RBA-4 (Parcel D-2)
Former Hunters Point Naval Shipyard
San Francisco, California

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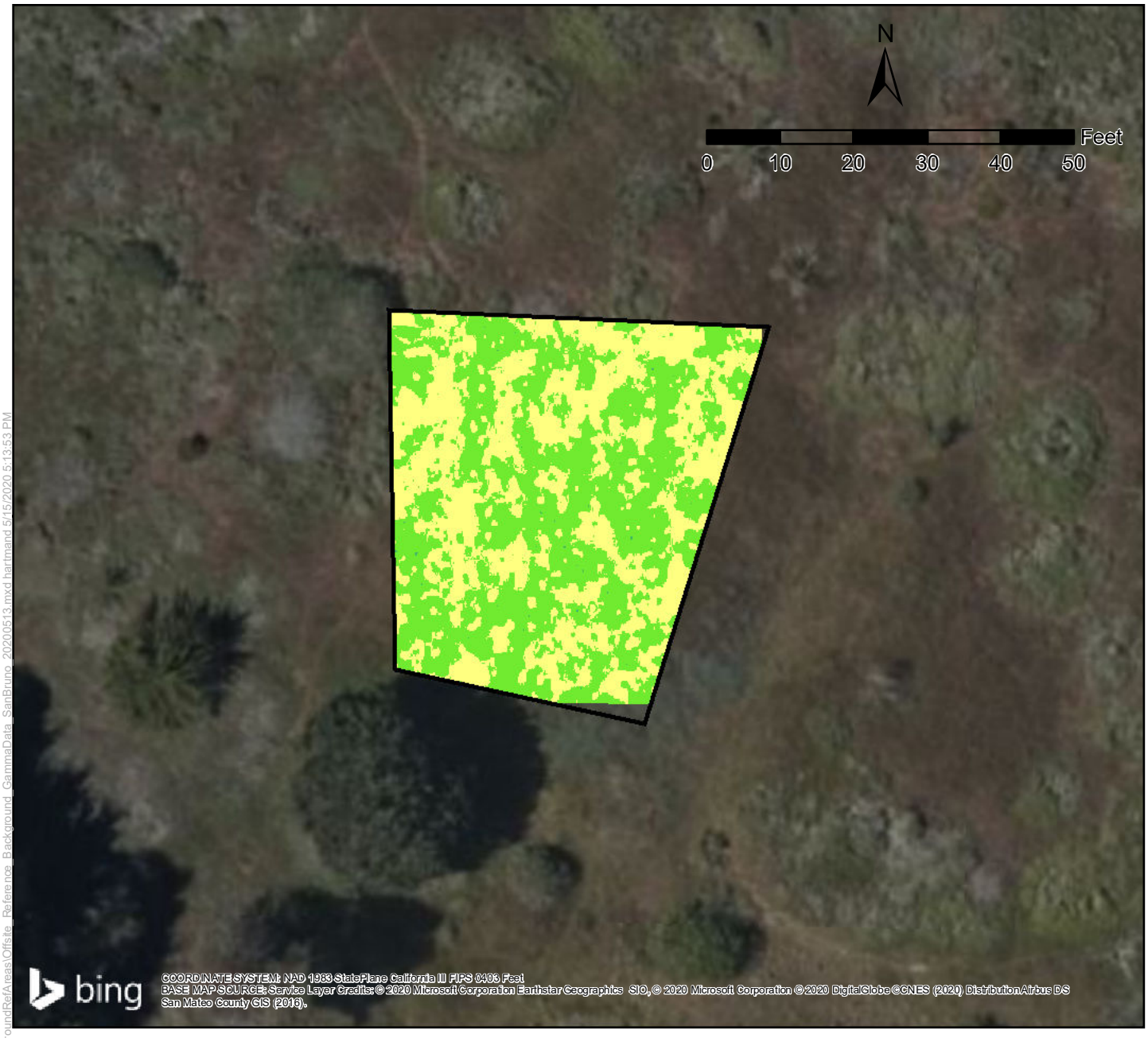

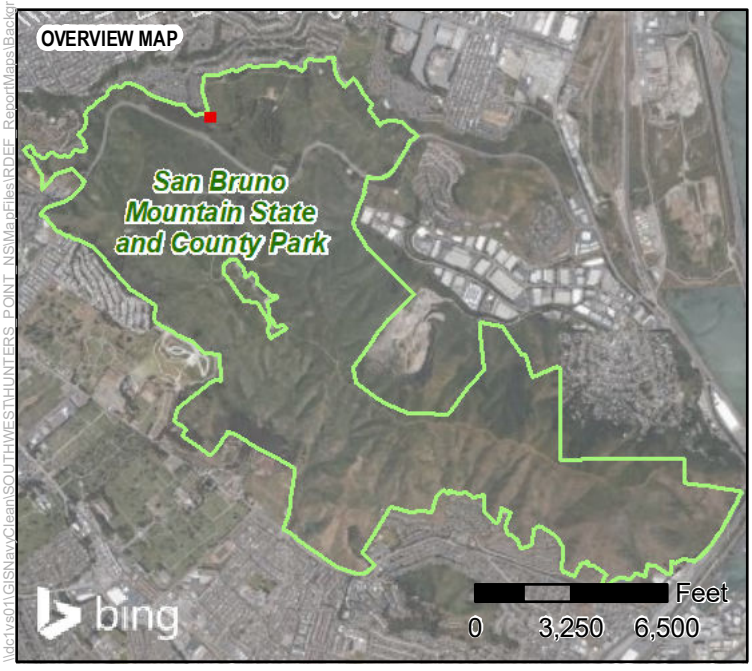

Legend:

Total CPS

- < 281 CPS (Mean)
- 281 - 323 CPS (Mean +1σ)
- 323 - 364 CPS (Mean +2σ)
- 364 - 405 CPS (Mean +3σ)
- > 405 CPS (> Mean + 3σ)
- Reference Background Area
- Park

Figure 4-5
Gamma Walkover Survey Data - RBA SanBruno
Background Soil Study Report
Former Hunters Point Naval Shipyard
San Francisco, California

\\dc1vs01\GIS\Navy\Clean\SOUTHWESTHUNTERS_POINT_NS\MapFiles\RDEF_ReportMaps\BackgroundRefAreas\Offsite_Reference_Background_GammaData_SanBruno_20200513.mxd hartmand 5/15/2020 5:13:53 PM

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Appendix A
Comments and Responses to Comments

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Responses to Comments
Draft Background Soil Study Report
Former Hunters Point Naval Shipyard, San Francisco, California

The purpose of this document is to address comments on the Draft Background Soil Study Report, dated February 2020, for Former Hunters Point Naval Shipyard, San Francisco, California. The United States Environmental Protection Agency (USEPA) and Department of Toxic Substances Control (DTSC) comments received April 17, 2020 and California Department of Public Health (CDPH) comments received April 21, 2020 are listed below and responses to comments are provided in bold. The responses were submitted on May 18, 2020 and clarification and/or additional comments were received from CDPH on June 1, 2020 and from USEPA on June 3, 2020. DTSC indicated that they have no comments on the responses on June 1, 2020. The work plan will be updated to address these comments and a final version will be submitted.

USEPA Comments (April 17, 2020 and June 3, 2020)

1. Section 2.4, Soil Sampling (and Table 2-2, Radiological Sample Details) - The table indicates that EPA collected a soil sample to compare to the corresponding Navy sample (a "split sample") from soil boring 21 in RBA-2. The table does not indicate that a split sample was collected from soil boring 25.

   EPA collected a total of 30 split samples. At RBA-2, EPA collected a split sample from soil boring 25 (sample HPRBA2-SB25-0102-0919), but not from soil boring 21. Please revise the table to designate the correct split sample location.

   Table 2-2 will be revised to show the EPA split sample collected at HPRBA2-SB25-0102-0919.

2. Section 3.1, Onsite Geology, Sections 3.1.1 through 3.1.4, Reference Background Areas - These sections describe soil and material types observed in the borings. Were efforts made to determine whether there were common soil or material types across RBAs and whether they represent distinct radiological statistical populations?

   Some samples are described as possible road base, durable cover base, ballast, or crushed bedrock. Are these materials distinct radiologically? Do the seven RBA-4 samples determined to be road base contain elevated Cs-137 concentrations, a possibility discussed in Section 2.7?

   As part of the sample collection process, common soil types (e.g., sand, gravel, silt) were observed and are described in the boring logs. However, due to the general heterogeneity of soil types and fill at HPNS, attribution of specific radionuclide concentrations to individual soil types in areas that were previously excavated, homogenized, and then backfilled is not feasible on a large scale. No analysis was conducted to evaluate the data by soil type, but analysis on a case by case basis may be made in the future, as appropriate.

   Road base, durable cover base, ballast, and crushed bedrock likely have different radiological characteristics. Table 5-31 presents the results of the seven road base samples from RBA-4; all of those samples had non-detected Cs-137 results. Data from samples collected from road base were not included in development of the BTVs.

3. Section 3.1, Onsite Geology - There appears to be a typo in the first paragraph: “foo” should be “foot.”

   The typo will be corrected.

4. Section 5.1.3, Data Validation Findings - The text states that “For the evaluation of precision between the native sample and its associated field duplicate, the sample results must be greater than 5 times the minimum detectable concentration (MDC) for the RPD [relative percent difference] criteria to apply. When either the sample or field duplicate results are less than 5 times the MDC, then the RER [relative error ratio] must be less than 1.”

   Please include the following information (available in the Sampling and Analysis Plan in the Parcel G Work Plan) in the report: formulas/ definitions for RPD and RER, and the RPD criterion.

   Also, please provide a reference for, or describe the source of, the RER formula.

   The requested information from the SAP will be added to Section 5.1.3 of the report.

5. Section 5.3, Comparison of Analytical Methods (and Appendix K) - As part of the background study, the Navy used multiple laboratory analytical methods to measure the concentrations of Th-232 and Ra-226. Appendix K graphically compares the results of the analyses.

   The report states that the Th-232 gamma spectroscopy results appear, on average, greater than results from alpha spectroscopy for both RBA-3 and RBA-S. We agree. We note that one of the graphical approaches, the Q-Q plots, shows that data generated using two of the methods (alpha spectroscopy and gamma spectroscopy) at RBA-S have significantly different slopes (and higher alpha spectroscopy results for samples with the highest Th-232 concentrations). Please comment on the significance of this difference.

   The overlapping probability plots for Th-232 at RBA-S as measured by gamma spectroscopy and alpha spectroscopy indicate higher concentrations in the upper tail of the Th-232 alpha spectroscopy results. The Th-232 alpha spectroscopy results exhibit higher variability than the gamma spectroscopy results as indicated by the differences in the slopes on the Q-Q plots. The lower variability shown in the gamma spectroscopy results is likely due to the larger sample size subject to the analysis. The smaller aliquots subject to the wet chemistry and alpha spectroscopy for direct Th-232 analysis are likely to exhibit more localized variability, as noted in USEPA Comment 6.

   Evaluation of the Response to EPA Comment 5 (Interpretation of Q-Q Plots): EPA’s comment asked about one of the Q-Q plots provided as part of the comparison of laboratory analytical methods. The redline version of the Report includes a statement in Section 7.2.1.3 that “If the Q-Q plot for an ROC represents a continuous display without breaks or inflection points of significant magnitude, then the entire dataset represented by the QQ plot is considered to represent a single statistical population (Singh et al., 2014).”

   We agree that a Q-Q plot without breaks or inflection points may provide supporting evidence that the dataset represents a single statistical population. It should not, however, be the only line of evidence (LOE) considered. Potential differences in sample collection methodology, soil type, or other factors also need to be considered.

The Q-Q plots are one piece of the data evaluation, and other lines of evidence will be considered. However, it should be noted that populations can be statistically similar and still be collected using different methodologies and from different soil types.

6. Section 5.4, Review of Equilibrium Conditions (and Appendix L) - Section 5.4 provides the results of an evaluation of radionuclides expected to be in secular equilibrium with Ra-226. The report concludes that "the plots show little, if any, secular equilibrium relationships between the 226Ra and the parent radionuclides at the low activity levels observed at HPNS." This conclusion reflects higher than expected variability between the concentrations of Ra-226 and its parent radionuclides U-238 and Th-230.

   One possible contributor to the variability is sample heterogeneity, and the use of different sample aliquots for the alpha spectroscopy analyses of the three radionuclides.

   In circumstances where it is important to minimize sample variability, such as in future evaluations of secular equilibrium, has the Navy considered steps that could be taken to reduce sample heterogeneity? One approach would be to grind and sieve the soil to be used in the alpha spectroscopy analyses to uniform fineness. EPA has used this method with good success and high. R-squared values between split samples for analysis of metals in soil.

   After completion of the draft report, the Navy provided supplemental information on the extent to which the data show secular equilibrium, including the results of additional statistical evaluations. Please include the additional statistical evaluations in the report.

   It is agreed that, in addition to environmental factors, variability within the analysis and sample preparation is a potential contributor to apparent disequilibrium. As noted in the comment, additional statistical evaluation consisting of population to population comparisons was performed in March 2020 to evaluate the conditions from each RBA. The results for each analysis from all the samples in a data grouping (RBA-1 Surface, RBA-1 Subsurface, etc.) were compared using the Kruskal-Wallis analysis of variance test. A p-value greater than 0.05 indicated that there was not a significant difference between the populations. If the Kruskal-Wallis test identified that at least one of the populations was statistically significant (p-value less than 0.05), then the populations of each individual nuclide were compared with the others in pairs (e.g., Ra-226 to Th-230, Ra-226 to U-234, etc.) using the Wilcoxon Rank Sum test.

   The key observations from this additional testing were as follows:

   - **RBA-1: The Th-230 population was statistically different than the U-234 and U-238 populations in surface soil. There were no statistically significant differences in subsurface soil populations.**
   - **RBA-2: The Th-230 population was statistically different than the Ra-226, U-234, and U-238 populations in surface soil. There were no statistically significant differences in subsurface soil populations.**
   - **RBA-3: The Ra-226 population was statistically different than the U-234 and U-238 populations in surface soil. Ra-226 and Th-230 populations were statistically different than the U-234 and U-238 populations in subsurface soil.**
   - **RBA-4: There are no statistically significant differences in surface and subsurface soil populations.**

- **RBA-S: There are no statistically significant differences in surface and subsurface soil populations.**

Discussion of the population to population comparisons will be added to Section 5.4, Section 7, and Appendix L.

7. Section 5.2.4, Reference Background Area-4, (and Table 5-35, RBA-4 -Summary of Combined Analytical Results) - There appears to be one or more errors in the table. For the Th-232 gamma spectroscopy results, the median value (0.857 pCi/g) exceeds the maximum (0.456). Similarly, for Tl-208, the median (0.265) exceeds the maximum (0.108). Please review and correct any errors in the table.

   Table 5-35 was reviewed and will be corrected.

   Evaluation of the Response to EPA Comment 7 (Table 5-35 Errors): EPA's comment noted one or more apparent errors in Table 5-35. The Response to Comment (RTC) states that the table will be corrected but the table in the redline version of the Report appears unchanged. Please ensure that the necessary changes are made to Table 5-35 in the final version of the report.

   The corrected table will be included in the final report.

8. Section 5.5, USEPA Split Sample Results - The text states that EPA split samples will be compared with the Navy's sample results using relative percent difference (RPD). EPA is using a different statistic, the duplicate error ratio (DER), to compare split sample pairs.

   In late April or May, we expect to complete a report summarizing the split sampling effort, including a comparison of the Navy and EPA split sample results.

   The text will be revised to note that the USEPA is conducting a statistical comparison and sources of discrepancies identified in that evaluation will be investigated and addressed.

9. Section 6.2.2, Evaluation of Outliers - The reports states that, among other reasons, outliers might be excluded if "…values [were] significantly outside the historical ranges of background data."

   Section 1.2 notes that four onsite RBAs were previously used as background areas at the Site. How do results from the 2019 sampling effort compare to historical background data?

   Historical background data from HPNS have not been reviewed as part of this study.

10. Section 6.2.2, Evaluation of Outliers (and Table 6-1, Statistical Outliers in Combined Surface and Subsurface Depth Intervals)- The table provides the results of the outlier analysis for Ra-226 and Th-232. Please indicate whether the remaining two datasets with detectable radionuclide concentrations (Cs-137 and U-235) were examined for outliers.

    We note that the 0.477 pCi/g Cs-137 result from RBA-4 is nine or more times greater than the other samples collected in RBA-4 and more than three times greater than the next highest sample from any of the five RBAs. The report states that "Because extreme outliers can adversely affect the results of statistical calculations, it may be advisable at times to remove

high-magnitude outliers in background, even if the reasons for these apparently extreme observations are not known."

Formal outlier testing was not conducted for Cs-137 or U-235. The detection frequencies for Cs-137 at the five RBAs range from 0 to 37%. The detection frequencies for U-235 at the five RBAs range from 10 to 29%. Rosner's outlier test assumes that the data values (aside from those being tested as potential outliers) are normally distributed. The best goodness-of-fit tests attempt to assess whether the sample data closely resemble the tails of the candidate distributional model. Because non-detects represent left-censored observations where the exact concentrations are unknown for the lower tail of the sample distribution, results from standard normality tests on data containing greater than 60% non-detects would be highly uncertain.

The Cs-137 concentration of 0.477 pCi/g reported at RBA-4 is within the range of background (0.083 to 1.67 pCi/g) reported in literature. USEPA (2002, pp.4–6)[1] states: *"…background areas are not necessarily pristine areas. A data point should not be eliminated from the background dataset simply because it is the highest value that was observed.*"

Evaluation of the Response to EPA Comment 10 (Statistical Outliers): EPA's comment noted that the 0.477 pCi/g Cs-137 result from RBA-4 is more than three times greater than the next highest sample from any of the five RBAs. The RTC notes that the 0.477 pCi/g result is within the range of background reported in the literature.

The 0.477 result is from RBA-4, not the San Bruno area, and is not used in calculating the 0.141 pCi/g Cs-137 BTV. Nevertheless, we advise caution in using the value in any future BTV calculations especially when a statistically-based upper limit such as a USL is used. The presence of an extreme value can skew and adversely impact the calculated value.

Because the 0.477 pCi/g value may represent a concentration that is possible in areas where surface runoff may cause Cs-137 from fallout to accumulate over time, it will be included in the BTV calculation for RBA-4 and a footnote will be added to clarify that the BTV for RBA-4 is primarily applicable to where topography and surface runoff may have caused Cs-137 from fallout to accumulate over time. Comparisons with the offsite BTVs will be used as the first line of evidence for site data exceeding the RGs collected during the removal site evaluation.

11. Section 6.2.3, Determination of Soil Groupings - Please clarify why the gamma spectroscopy results were used to evaluate differences in Ra-226 between RBAs and soil depth (rather than alpha spectroscopy or radon emanation) and why the alpha spectroscopy results were used to evaluate Th-232 (rather than gamma spectroscopy).

The gamma spectroscopy data for Ra-226 and alpha spectroscopy data for Th-232 were selected for grouping based on the common use of those analyses for measuring levels of Ra-226 and Th-232 in soil samples. As noted in Section 5.3, visual inspection of the graphical plots

[1] Reference: USEPA. 2002. Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites, EPA 540-R-01-003, Washington, DC, Office of Emergency and Remedial Response.

from the comparison of different analyses presented in Appendix K does not suggest significant, systematic differences in results except for Th-232 in RBA-3.

12. Section 6.2.4, Development of Background Threshold Values (and Table 6-5, Summary Statistics for Combined Surface and Subsurface Depth Intervals) - The text states that "Background Threshold Values" (BTVs) were developed for each RBA using a combined dataset representing surface and subsurface soil, and that the statistic chosen for the BTVs is the 95 percent upper simultaneous limit (USL). The USL was chosen "…to control the false positive error rate."

    A condition for use of a USL is that the dataset represent a single statistical population. The use of a USL is not advised when the background data set may represent several geological formations or soil types (ProUCL Technical Guide, USEPA, EPA/600/R-07/041, October 2015). As described in Section 6.2.3.2 and summarized in Tables 6-3 and 6-4, three of the five RBAs (RBAs 1, 2, and 4) do not appear to meet this requirement. In each case, the shallow and deep soils appear to represent different statistical populations for the two radionuclides examined (Ra-226 and Th-232). The differences are apparent in the figures comparing the Ra-226 and Th-232 concentrations in shallow and deep soils (Appendix P).

    Most statistical analyses assume that the data are defined by a single distribution. For example, a fundamental underlying assumption of the Kaplan-Meier and robust ROS methods is that the data are assumed to arise from a single distribution. Both methods are used by ProUCL to estimate BTVs, including USLs and UTLs, for censored data sets. Additionally, the ProUCL Technical Guide states that "*Inclusion of multiple populations and/or outliers tends to yield elevated values of USLs (and also of UPLs and UTLs)…*" Thus, the assumption of a single statistical population is not limited to the calculation of USLs, but also applicable to UTLs and UPLs.

    Most important when developing BTVs is that the statistical calculations are based upon a defensible background dataset that is of adequate size and free of extreme outliers that are not representative of the background population. The combined shallow and deep soil datasets for each RBA provides an adequate sample size to ensure target coverage at a 95% confidence level for the estimated BTVs. The censored normal and lognormal probability plots indicate that the final datasets do not contain extreme outlying observations. As mentioned in USEPA's cover letter accompanying these comments, "*Developing appropriate BTVs for the Site is complicated by the natural occurrence of some of the radionuclides of concern, global fallout from atomic bomb testing in the 1950s and 60s…*" thus, acknowledging that anthropogenic background concentrations of radionuclides at HPNS are due to different physical processes, likely resulting in a mixed distribution. As discussed in Section 7.1 of the report, historical remediation activities associated with the sanitary sewer and storm drain removals would have mixed surface and subsurface soil. While different surface and subsurface populations were observed for Ra-226 and Th-232 in the RBAs, at the trench sites the soil is expected to be more mixed. The ProUCL Technical Guide includes methods to compute BTVs, including USLs, using nonparametric methods when the data cannot be reasonably fit to a single distribution.

    At HPNS, thousands of onsite observations will be compared to the estimated BTVs. USEPA (2009, pp.102-103) states: "*However, when a large number of observations coming from the target population (background, comparable to background) are compared with a UTL95-95,*

***the number of exceedances (not the percentage of exceedances) of UTL95-95 by background observations can be quite large. This implies that a larger number (but not greater than 5%) of onsite locations comparable to background may be falsely declared as requiring additional investigation which may not be cost-effective.*" USLs are the logical choice for estimating background at HPNS because they were developed to minimize the false positive rate when many site-to-background comparisons will be made. The alternate options (UTLs and UPLs) include the same single population assumption, but include a higher false positive rate.**

13. Section 6.2.4, Development of Background Threshold Values (and Table 6-5, Summary Statistics for Combined Surface and Subsurface Depth Intervals) - Section 6.2.4 states that if a dataset did not include detectable concentrations of a radionuclide (i.e., all non-detects) the highest detection limit of any sample in the dataset was used as the BTV. This was the case for Pu-239 and Sr-90 in all five RBAs and Cs-137 in RBA2. We do not agree with this approach for the Site radiological data because an elevated detection limit can be caused by sampling and analysis limitations that should not dictate the BTV.

    For example, the proposed BTV for Pu-239 (0.515 pCi/g) is based on the highest reported detection limit in any of the 266 samples collected as part of the background study (sample HPRBAS-SB06-1H02-0919). Detection limits in the other 265 samples were lower, ranging from 0.0333 to 0.498 pCi/g. The higher detection limit in sample HPRBAS-SB06-1H02-0919 appears to be due primarily to small sample size (0.209 grams; less than half the mass of the sample with the lowest detection limit). Other factors that can affect the detection limit for a particular sample include the laboratory count time, detector efficiency, and tracer yield.

    At this time, using a maximum detection limit for Pu-239 or Sr-90 as the basis for a BTV is not expected to have any practical significance on Site cleanup efforts, specifically on the remediation goals (RGs) for the two radionuclides. Neither of the maximum detection limits exceed their corresponding RG (i.e., the maximum detection limit for Pu-239 is 0.515 pCi/g and the RG for Pu-239 is expected to remain 2.59 pCi/g; the maximum detection limit for Sr-90 is 0.150 pCi/g and the RG for Sr-90 is expected to remain 0.331 pCi/g).

    This approach is consistent with the approach used by USEPA as documented in the *Final Radiological Background Study Report Santa Susana Field Laboratory Ventura County, California*, October 2011, which states that "*BTVs were estimated using maximum nondetect values for radionuclides with fewer than five detections*." This approach is consistent with USEPA's ProUCL Technical Manual.

    As noted in the comment, the detection limits (DLs) for Pu-239 range from 0.0333 to 0.498 pCi/g. The target DL identified in the SAP was 0.5 pCi/g. Of the 266 primary samples, 229 samples have detection limits that exceed 0.1 pCi/g. There are 53 samples with DLs that exceed 0.3 pCi/g and 15 samples with DLs that exceed 0.4 pCi/g. The second highest DL for Pu-239 is 0.498 pCi/g, which meets the target DL and represents a relative difference of 3% with the highest DL. Based on the data, the maximum DL of 0.515 pCi/g is not considered unreasonable or extreme.

    It is agreed that the BTVs for Pu-239 and Sr-90 are not likely to have a significant effect on Site cleanup efforts based on the RGs for these radionuclides, as noted by USEPA in the conclusion of the comment above.

14. Section 6.2.4, Development of Background Threshold Values (and Table 6-5, Summary Statistics for Combined Surface and Subsurface - We understand that the proposed BTV for Uranium-235 is based on the maximum detection limit in RBA2 (0.245 pCi/g, measured in sample HPRBA2-SB21-0304-0919). This concentration is more than twice the highest detected U-235 concentration in RBA2 (0.0899 pCi/g) and much higher than the detection limits for most of the background samples. The elevated detection limit for sample HPRBA2-SB21-0304-0919 appears to be the result of matrix interference. The laboratory report indicates that the sample aliquot used for the laboratory analysis was limited due to the need to reanalyze the sample because of low tracer yield in the initial two analyses.

    Similar to comment #13, we do not believe that it is appropriate to base a BTV on a sample with an elevated detection limit.

    While the DL for the U-235 result in sample HPRBA2-SB21-0304-0919 was the only DL for the U-235 analyses that exceeded the RG for U-235, it was considered acceptable for reporting by both the laboratory and the data validator, and is therefore used for BTVs in the same manner as described for Sr-90 and Pu-239 in the response to Comment 13.

    The proposed BTV for U-235 in soil at RBA-2 is based on a nonparametric method due to the low frequency of detection. The maximum result in the dataset was selected for the BTV because the sample size is 36 and although the target statistic is a 95% USL, with only 36 samples, the actual confidence coefficient is 84%. If the next highest result is selected as the BTV, the confidence coefficient will be even lower than 84%. The estimated BTV for U-235 in soil at RBA-1 is 0.169 pCi/g, which is based on the maximum value detected. The relative percent difference (RPD) between the maximum detected value in RBA-1 and the maximum non-detect in RBA-2 is approximately 37%. Nonparametric ANOVA suggest that Ra-226 and Th-232 levels are higher in soil at RBA-2 than in soil at RBA-1. It's reasonable to assume that U-235 in soil also may be higher in soil at RBA-2 than at RBA-1. Using a value of U-235 lower than the maximum non-detect of 0.245 pCi/g will lower the already reduced confidence coefficient, resulting in an increase in the false positive rate.

    Evaluation of the Responses to Comment 13, 14 (BTVs Based on Maximum Detection Limits): As stated in our April 2020 comment, we do not support the use of a maximum detection limit to calculate a BTV when the detection limit is elevated due to sampling or analytical limitations such as limited sample volume or limited count time.

    Comment noted. Please note that the DQOs and analytical requirements for future work will be stipulated in Work Plans and Sampling and Analysis Plans that will be subject to regulatory review. As noted in Section 7.2.1 of the report, the initial criterion for data will be comparison directly with the RG; therefore, analytical detection limits will at a minimum be required to meet the RG. Site samples that do not meet this requirement may be subject to re-analysis or re-sampling.

15. Section 6.2.4, Development of Background Threshold Values (and Table 6-5, Summary Statistics for Combined Surface and Subsurface Depth Intervals, and Table 6-6, Background Threshold Value Summary for Combined Surface and Subsurface Depth Intervals) - The second to last column in Table 6-5 is labeled "USL95" and the footnote in Table 6-6 refers to all BTVs as USLs. BTVs that are based on Maximum Detections or Maximum Detection Limits are not USLs. Please

re-label the columns and modify the footnote. In the table, we suggest including USL95 in the column labeled “Basis” and replacing the column header “USL95” with “BTV”.

The changes will be made as requested.

16. Section 7.2, Other Background Data, Section 7.3, HPNS BTVs Comparison to Other Background Values (and Table 7-2, Background Soil Concentrations of Radionuclides Reported in Literature) - The table summarizes radionuclide concentrations believed to represent background concentrations in soil in multiple locations in the United States. In the report, the Navy cites eight studies as sources of the data. The report does not present information on soil type or other site-specific parameters that could affect the reported radionuclide concentrations, or the level of confidence that the reported concentrations represent background. Nor does it present information on sampling depth, local topography, or other factors known to affect the soil concentrations of radionuclides associated with fallout from atomic bomb testing in the 1950s and 1960s, such as cesium and strontium.

    Section 7.3 includes statements that Site BTVs are representative of background soil because they are within the range reported in the eight studies. The absence of detailed information on the eight studies used to develop the “Range of Literature Values” provided in the table makes it difficult to evaluate this conclusion.

    It is agreed that geology and other site-specific information noted above are relevant considerations when evaluating background data. However, the reported literature values were not intended to be used as screening values for future investigations at the site. The literature review was performed to determine if the observed background values at HPNS were consistent with values reported in literature. Comparison with literature values may be used as a line of evidence for future site evaluations when appropriate to determine whether site conditions are consistent with NORM or anthropogenic background.

17. Section 7.3, HPNS BTVs Comparison to Other Background Values - This section notes that the range of the Site BTVs for Pu-239 is higher than the reported concentrations in the eight studies. It then notes that the detection limits reported for the analyses of RBA samples are consistent with the quantitation limit goals presented in the SAP and are approximately an order of magnitude below the respective RG for the Site. We agree with the latter statements but are unclear on their relevance to the discussion of whether the proposed BTVs are representative of background soil.

    Please see response to USEPA Comment 13.

18. Section 7.3, HPNS BTVs Comparison to Other Background Values - The report includes the following statement: “Based on the uncertainty in the BTV estimates and the potential for false positives…, an exceedance of a BTV for an ROC should not automatically be considered a site release; rather, an exceedance in this case warrants further consideration with respect to literature values and discussion with the project team.”

    We agree that an exceedance of a BTV for a radionuclide of concern (ROC) does not always indicate a site release (i.e., that there is a chance that a sample result above a BTV could still represent background). The likelihood and frequency with which this may occur depends on the methodology used to determine the BTVs. We do not object to consideration of values in the

eight studies but do not believe the values summarized in Table 7.2 necessarily represent background concentrations at the Site. We discuss this further in comment #19.

As noted in the response to USEPA Comment 16, the intent of values reported in Table 7-2 was to describe ranges of concentrations observed in other background data sets and demonstrate reasonableness of the values determined by the study at HPNS. Comparison with literature values would be part of a line of evidence approach to determine if anomalous site data are the result of site impacts or localized background. The use of data from specific studies would be based on similarities to site conditions.

19. Section 6, Statistical Data Evaluation, and Section 7, Use of Background Data - The report provides BTVs for each of six radionuclides at each of the five RBAs. Four of the RBAs are onsite (in areas believed to be uncontaminated by past Navy activities) and one area is offsite (in the San Bruno Mountain State and County Park). The report also provides general statements about planned uses of the BTVs (e.g., "sample data [will be compared] to appropriate RBA data from HPNS"). We are unable, however, to find a clear statement about how the multiple BTVs calculated for each radionuclide will be used at the Site.

    An approach used at many Superfund sites is to calculate multiple BTVs and match each BTV to specific parcels or portions of a site. We understand that the Navy does not, at this time, believe this approach is practical due to the complex and poorly documented fill history of the Site and past excavation and backfilling in many of the locations to be retested. This approach remains an option in the future if a subset of the onsite background data can be shown to be representative of a specific parcel or portion of the Site.

    A second approach, which we understand the Navy prefers, is to apply the highest BTV calculated for any of the five RBAs presented in the report sitewide. This approach would result in BTVs above the current RGs for three radionuclides. For Cs-137, the BTV would be established at 0.477 pCi/g compared to the current RG of 0.113 pCi/g; for Th-232, the BTV would be established at 2.21 pCi/g compared to the current RG of 1.69 pCi/g; for U-235, the BTV would be established at 0.245 pCi/g compared to the current RG of 0.195 pCi/g. We have several concerns about this approach.

    First, the BTVs calculated for each RBA are based on datasets that, in three of the five RBAs, combine data from shallow and deep soils representing multiple statistical populations (as summarized in Tables 6-3 and 6-4). The Upper Simultaneous Level (USL), the statistic proposed for calculation of many of the BTVs, is not advised when the dataset used to calculate a BTV represents multiple populations.

    Second, this approach, in which the highest BTV calculated for any of the five RBAs would be applied sitewide, effectively combines data from multiple areas representing different statistical populations (as summarized in Section 6.3.2.1 and Tables 6-2). As noted above, the USL is not advised when a dataset represents multiple populations.

    Third, given the relatively large variability across the five RBAs, and the expected variability in the soils to be retested, applying the highest of the five BTVs sitewide is likely to overestimate the background radionuclide concentrations in an unknown but potentially significant fraction of the soils to be retested (i.e., "false negatives").

An alternative approach would be to calculate BTVs based on a subset of the RBAs. We considered the use of a dataset that combined sample results from a subset of RBAs, as well as the use of data from a single RBA. We recommend the calculation of BTVs using only the offsite RBA-S data (San Bruno Mountain State and County Park). Data from the four onsite RBAs would not be used to calculate the BTVs. This approach would result in one BTV above its current RG, establishing the BTV for Cs-137 at 0.141 pCi/g compared to the RG at 0.113 pCi/g.

We support this alternative approach because, unlike most of the onsite RBAs, RBA-S appears to represent a single statistical population for five of the six radionuclides. This fulfills one of the requirements for use of the USL. This approach would make it unnecessary to combine data from multiple RBAs representing distinct statistical populations, does not increase an RG because of a BTV based on a detection limit (see comment #14), and excludes the elevated 0.477 pCi/g Cs-137 result at RBA-4 (see comment #10).

This alternative approach would, compared to the Navy's preferred approach, decrease the chances of incorrectly concluding that soils are representative of background when they are actually affected by Site contamination (i.e., "false negatives") but increase the chance of incorrectly concluding that a sample result represents site-related contamination when it actually reflects background (a "false positive"). For several radionuclides, the highest concentrations measured in the four onsite RBAs exceed the BTV that would be calculated using RBA-S data alone. The frequency of false positives would be reduced but not eliminated by using the USL as the background statistic.

Given the potential for a non-negligible frequency of false positives, we would not necessarily conclude that a retesting result exceeding a BTV represents Site-related contamination. This consideration would apply to two of the radionuclides, Cs-137 and Th-232, where the RG would be equal to or close to the BTV. We propose that several criteria be used to determine whether a sample result that exceeds a BTV represents background or Site-related contamination, including: 1) whether the sample was collected in an area with a known or suspected release of the radionuclide; 2) whether the sample result exceeds the maximum concentration in soil with a similar soil type, color, and/or local environment; and 3) whether nearby samples also exceed the BTV.

For the other four radionuclides examined in the background study (Pu-239, Ra-226, Sr-90, and U-235), the RG exceeds the BTV by a greater margin compared to Cs-137 and Th-232, reducing the chances that a false positive (i.e., a retesting value above the BTV that represents background) would have any practical consequences.

Whichever approach is used to develop and apply the BTVs, there will be a risk of both false positive and false negative errors when Site data are compared to the BTVs. We believe that the use of RBA-S data alone better balances the relative risk of the two types of error compared to the Navy's preferred approach.

In order to move forward with planned field activities, the Navy agrees with USEPA's proposal to use BTVs based on the offsite RBA-S data. Note that applying the BTVs established for RBA-S across HPNS is likely to underestimate the background radionuclide concentrations in a significant fraction of the soils to be retested based on the observed variability in data from RBA-1, RBA-2, and RBA-4. As noted in USEPA's comment, although this approach will minimize

false negative errors, it will increase the likelihood of false positive errors, particularly for Cs-137 and Th-232 due to the small margin between the RG and RBA-S BTV as noted by USEPA; and also potentially for Ra-226, which exhibited a much wider range of concentrations in the onsite RBAs than at RBA-S (Appendix M of the report). Using USEPA's proposed criteria to determine whether a sample result that exceeds a BTV represents background or site-related contamination may help minimize false positives.

Based on the differences observed between RBA-S and the onsite RBAs in data from the background study, and because RBA-1, RBA-2, and RBA-4 represent areas with no known or suspected release of radionuclides, the Navy will use data collected from RBA-1, RBA-2, and RBA-4 as part of a secondary evaluation when determining whether a sample result that exceeds both the RG and a RBA-S BTV represents background or site-related contamination. If RBA-1, RBA-2, or RBA-4 are not considered to be representative of the investigation area, other background data may be obtained and evaluated. Multiple lines of evidence are proposed in Section 7 and should be used as part of an iterative approach to demonstrate compliance. Section 7 will be revised to provide additional details of the approach using RBA-S as the initial background for comparison with HPNS site data.

Please also note the following in response to general concepts noted within Comment 19:

<u>Shallow and deep soils</u> – As discussed in the response to USEPA Comment 12, the assumption of a single statistical population is not limited to the calculation of USLs, but also applicable to UTLs and UPLs. USEPA has acknowledged that anthropogenic background concentrations of radionuclides at HPNS are due to different physical processes, likely resulting in a mixed distribution. Thousands of onsite observations will be compared to the estimated BTVs at HPNS, requiring the use of an upper threshold level that minimizes the false positive rate when many site-to-background comparisons will be made. Additionally, the combined shallow and deep soil datasets for each RBA provide an adequate sample size to ensure target coverage at a 95% confidence level for the estimated BTVs. Smaller sample sizes would likely reduce the confidence level, resulting in higher false positives. The final combined datasets do not contain extreme outlying observations, which is the main concern when developing upper threshold levels, such as USLs.

<u>Use of the highest BTV</u> - Due to the complex fill history at HPNS, variability in the soils to be retested at HPNS is expected to be high. The fill history also limits the ability to separate soil by main lithologic characteristics. These issues combined with the complicated processes associated with the origin of anthropogenic background have resulted in a relatively large range in background radionuclide concentrations in site soils. With these conditions in mind, the proposed approach presented by the Navy of using a range of BTVs is reasonable based on the unique site conditions at HPNS.

Although the Navy has proposed using a range of BTVs based on the complex fill history at HPNS, applying the highest BTV across the site is consistent with that of the USEPA as documented in the *Final Radiological Background Study Report Santa Susana Field Laboratory Ventura County, California*, October 2011. As stated by USEPA: "*However, because of the soil disturbances that have occurred at the SSFL (such as construction, demolition, remediation, etc.), it may be difficult to distinguish surface from subsurface soil on site. Therefore, one option that should be considered when developing the Look-Up Table is to select the higher*

***value between surface soil BTV and the subsurface BTV as a Clean-Up Value*.” USEPA further states that: “*it may be very difficult to determine if the soil sampling location is in the Chatsworth Formation or the Santa Susana Formation. Therefore, one option that should be considered is using the BTV calculated using all the results as the Clean-Up Value…*”**

<u>Variability and false positives</u> - A background reference area should have the same physical, chemical, geological, and biological characteristics as the site being investigated, but has not been affected by activities on the site. At sites with anthropogenic background concerns, the background reference area should have a similar historical use pattern. Radionuclide spatial patterns are strongly correlated with both geologic features and physiographic features. It's uncertain how the lithological homogeneity of RBA-S, consisting mostly of sand, would adequately capture the statistical variation in radionuclide levels at HPNS based on the significant differences in geologic environment between RBA-S and the onsite RBAs.

Variability in the soils to be retested at HPNS is expected to be high, and based on field observations made during background sample collection, this variability is not present at RBA-S.

Evaluation of the Responses to Comment 19 (Secondary Evaluation of Sample Results): EPA’s April 2020 comment proposes the calculation of BTVs using the San Bruno RBA-S background data and allows for a secondary evaluation of sample results exceeding a BTV to determine whether the result represents background or Site-related contamination. The RTCs indicate agreement with EPA’s proposal to use BTVs based on the RBA-S data and to allow for a secondary evaluation of sample results exceeding a BTV.

Section 7.2.1.2 in the redline version of the report states that, as part of a secondary evaluation of the data, “Comparisons will be performed using a common null hypothesis that concentrations in the on-site sample population are less than or equal to background concentration levels measured in the RBA.” We do not support this approach. If hypothesis testing is used as part of a secondary evaluation, the null hypothesis should be that the concentrations in the on-site sample population are greater than or equal to the concentrations in the background dataset. EPA and its regulatory partners would also need to approve the acceptable Type 1 and Type 2 error rates and other key provisions of the statistical testing.

Also, in Section 7.2.1.1 of the redline version of the Report and in the Executive Summary, there is a statement that “The Navy will use data collected from onsite RBA-1, RBA-2, and RBA-4 as part of a secondary evaluation when determining whether a sample result that exceeds both the RG and offsite BTV represents background or site-related contamination.” It is premature to conclude that any or all of the onsite data will be comparable to future sample data. In the referenced sentence, please change “will use” to “may consider.”

Please see the cover letter for further discussion of EPA expectations regarding a secondary evaluation of sample results.

The text in Section 7.2.1.1 will be revised as suggested. Section 7.2.1.2 will be revised to state that specific statistical tests and decision errors associated with these comparisons will be established during the planning phase and subject to regulatory approval. Please note that the Type I and II decision errors for the Parcel G removal site evaluation were established in Section 3.4.1 of the Final Parcel G Work Plan.

DTSC Comments (April 17, 2020)

1. Our Geological Services Unit (GSU) has reviewed the geological aspect of the soil collected from the background reference locations. Their findings indicate that RB-3 is unique in that it is composed almost entirely of fill material reclaimed directly from the Bay. This is unlike the other three onsite background locations, which are a mixture of soils or native shale bedrock. Given this information, DTSC suggests that the RB-3 location be eliminated as a reference location. I will send the GSU memo in a follow up email.

   As suggested, RBA-3 data will not be used for background comparisons and the report will be revised to reflect this. The GSU memo was received and reviewed and the relevant details listed in the general comments below will be incorporated into Section 3.

Geological Services Unit General Comments:

1. The locations of the reference background areas, relative to the historic pre-development shoreline of the Former Hunters Point Naval Shipyard are not discussed in detail in the specific Reference Background Area section. After comparing to historic predevelopment shoreline maps of the Point Avisadero area, which would later become the Hunters Point Shipyard, the following observations were noted; RBA-1 is located downslope approximately 400ft from the pre development historic shoreline, RBA-2 is located upslope approximately 300ft from the pre development historic shoreline RBA-3 is located downslope approximately 2500ft from the pre development historic shoreline, and RBA-4 is located upslope approximately 500ft from the predevelopment historic shoreline.

2. RBA 1 and RBA 2 are both located within 500ft of the predevelopment historic shoreline and both share similar soil conditions with mixed sands and gravels with occasional serpentinite rock fragments overlain by a 1-3ft thick section of sandy clays.

3. RBA-3 is located furthest away from the historic predevelopment shoreline and the fill material used at the location is markedly different from the other RBAs. RBA-3 and is composed of a well graded sand and gravel cover placed over well graded sand fill. A review of available historical boring logs from the Parcel D Remedial Investigation Draft Final Report, Hunters Point Shipyard, San Francisco, California dated October 25, 1996 show that similar soil conditions consisting of a well graded sand and gravel cover placed over poorly graded sand fill with shell fragments extend throughout much of Parcel D and E, generally in the locations furthest away from the historic predevelopment shoreline.

4. RBA-4 is located the furthest upslope from the predevelopment historic shoreline and is also markedly different from the other RBAs. Sandstone sand shale bedrock was encountered in borings at RBA-4 and only the upper 1-3ft was composed of soils which were characterized as well graded sandy gravels and gravelly fat clays overlain by an asphalt cap. A review of available historical boring logs from the Parcel D Remedial Investigation Draft Final Report, Hunters Point Shipyard, San Francisco, California dated October 25, 1996 show that similar soil conditions exist throughout parcel D-2 in the vicinity of the base of the small hill that is located in the center of the· Former Hunters Point Shipyard.

5. The provenance of imported fill is discussed in the geologic section for each RBA, however the implications of import fill provenance on the radiological results is not discussed in detail, RBA-1 and RBA-2 likely are composed of a mix of fill both brought down from the nearby hill during

grading and reclaimed from the bay during the expansion of the naval station. RBA-3 is likely composed entirely of import fill reclaimed from the bay during the expansion of the naval station. RBA-4 likely does not contain import fill but was excavated down to present elevation during the expansion of the naval station.

CDPH Comments (April 21, 2020)

General Comments:

1. The comments presented in this document are representative of a joint California Department of Public Health (CDPH) effort involving the Radiologic Health Branch (RHB) (radiological restricted release), and the Environmental Management Branch (EMB) (radiological unrestricted release).

   Comment noted.

2. Please be aware that CDPH-RHB may use Health and Safety Code (HSC) 114715, HSC 114960 - 115273, and other applicable regulations and guidance, while CDPH-EMB uses Title 17 of the California Code of Regulations, Section 30256(k) [17 CCR § 30256(k)] as a basis for regulatory guidance.

   Comment noted.

3. It is beneficial to CDPH to understand how the background soil investigation will be utilized during future projects. For example, Section 7.4, and applicable subsections, indicate the establishment of background threshold values (BTVs) which appear to adjust or create de facto release criteria. As a result, the BTVs appear to override guidance supplied in records of decision (RODs). How does the Navy plan to utilize background threshold values (BTVs) during future projects? Please discuss how the BTVs from this study will be used in conjunction with the release criteria established in the site ROD. CDPH expects Navy to comply with the legally binding ROD findings.

   Furthermore, should a radionuclide of concern (ROC) exceed the release criteria but not exceed a BTV, please explain how the Navy (or Navy contractors) will confidently prove that the exceedance is not radiological contamination.

   As noted in Section 7 of the report, ROC concentrations will first be compared to the RGs to determine compliance with the ROD. If concentrations are above the RGs, an iterative, lines of evidence based approach will be used to evaluate site data. The lines of evidence approach will include but not be limited to review of specific site history for spills or evidence of release, statistical evaluations of local or regional background data, graphical review and spatial analysis of data, and evaluation of equilibrium conditions for naturally occurring radionuclides (see response to USEPA Comment 19). The need for a ROD change will be evaluated after site-specific data is collected.

4. Please clarify if any efforts have been made to review historic HPNS radiological data (potentially 30 years' worth of data) to compare to the BTVs and literature data? Furthermore, how do the data from this background study compare to soil sample results from previous projects at Hunters Point?

Historical background data from HPNS have not been reviewed as part of this study.

5. Measurements exceeding the release criteria for any future projects (e.g., results linked to the presence of naturally occurring radioactive material [NORM], or to the accumulation of Cesium-137 [^{137}Cs], etc.), will need to be identified and evaluated on a case by case basis. These evaluations need to include a strong narrative and sufficient supporting evidence.

   Comment noted.

6. Portions of Parcel D-1 are radiologically impacted and will require radiological restrictions. Please explain how radiological data can be confidently collected from a radiologically impacted area and considered suitable as background data. CDPH will not accept results from Parcel D-1 or any other radiologically impacted area.

   RBA-3 (Parcel D-1) data will not be used for background comparisons and the report will be revised to reflect this.

7. Please explain why the ^{137}Cs result of 0.477 pico-curies per gram (pCi/g) was not identified as an outlier to the data set.

   Formal outlier testing was not conducted for Cs-137. The detection frequencies for Cs-137 at the five RBAs range from 0 to 37%. Rosner's outlier test assumes that the data values (aside from those being tested as potential outliers) are normally distributed. The best goodness-of-fit tests attempt to assess whether the sample data closely resemble the tails of the candidate distributional model. Because non-detects represent left-censored observations where the exact concentrations are unknown for the lower tail of the sample distribution, results from standard normality tests on data containing greater than 60% non-detects would be highly uncertain.

   The Cs-137 concentration of 0.477 pCi/g reported at RBA-4 is within the range of background (0.083 to 1.67 pCi/g) reported in literature. USEPA (2002, pp.4–6)[2] states: "…*background areas are not necessarily pristine areas. A data point should not be eliminated from the background dataset simply because it is the highest value that was observed*."

8. CDPH has concerns regarding the Navy's methodology for outlier identification, BTV calculation, and usage of detection limits (DL) in statistical data evaluation. These issues are addressed in more detail in the Specific Comments section.

   See responses to Specific Comments.

9. The data quality objectives for this background study need to be clearly identified, including the targeted minimum detection limits for each of the radionuclides of concern.

[2] Reference: USEPA. 2002. Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites, EPA 540-R-01-003, Washington, DC, Office of Emergency and Remedial Response.

The data quality objectives for the study were defined in Worksheet 11 of the SAP (Appendix B of the Parcel G Work Plan). The targeted laboratory detection limits for soil samples were provided in Worksheets 15a through 15d of the SAP.

Specific Comments:

10. Section "Evaluation of Background Values", Page vii, Table ES-1 "BTV Background Threshold Values] for Combined Surface and Subsurface Soil": The "Range of Onsite BTVs (pCi/g)" for ^{137}Cs is listed as 0.0175 - 0.477. The incorporation of the 0.477 pCi/g as part of the range is not justified in the text. As this was the only result above the minimum detectable concentration (MDC) for the respective reference background area (RBA), it may not be representative of ^{137}Cs at Hunters Point (please refer to General Comment #7).

    See response to CDPH General Comment 7.

11. Section 1.2 "Reference Background Area Identification", Page 1-2, Bullet 3: RBA-3 appears to be located on Parcel D-1 within a radiologically restricted area. CDPH will not accept any data for background use from any radiologically restricted areas (please refer to General Comment #6).

    See response to CDPH General Comment 6.

12. Section 2.7 "Deviation from Work Plan", Page 2-6:

    a) Bullet 1: This bullet point states that, "additional samples from material determined to be road base were collected from RBA-4. The representatives from RASO indicated that the material may have been representative of the material identified during previous radiological investigations at HPNS that contained naturally higher ^{137}Cs concentrations. Seven additional samples were collected." Please provide more detail regarding the additional sampling performed in RBA-4, including the justification for collecting additional samples and the sample results.

    The additional samples were collected from RBA-4 to characterize what was believed to be a specific type of road base or fill material that was anecdotally observed in sanitary sewer and storm drain lines in this part of HPNS. The results from these samples (labeled with "FILL") are provided in Tables 5-31 through 5-34 and are summarized in Table 5-36.

    b) Bullet 3: This bullet discusses the acquisition and analysis of bedrock samples from RBA-4. However, in the previous bullet 2 it states, "The project team determined that samples from bedrock would not be representative of background for the site [RBA-2]." Please provide an explanation as to why bedrock samples from RBA-2 are not representative of background, whereas bedrock samples from RBA-4 are representative of background.

    Bullets 2 and 3 in Section 2.7 will be revised for clarification as follows:

    - **During subsurface sampling in RBA-2, bedrock was encountered at approximately 6 feet below the bottom of the road base. The material observed at this depth was identified by the professional geologist as potentially being serpentinite, which contains naturally occurring asbestos. Because of health and safety concerns, the material was sprayed with water and placed back into the hole from which it was collected. Additionally, a soil waste characterization sample was sent to the**

laboratory for asbestos analysis (see Section 2.6). Because of the health and safety concerns and concerns with damaging drilling equipment, no subsurface samples beyond 6 feet below the bottom of the road base were collected.

- **During subsurface sampling in RBA-4, bedrock was encountered at depths as shallow as 1.5 feet bgs. To preserve drilling equipment, drilling was only performed past approximately 5 feet bgs at one location. At another location, refusal was encountered at approximately 2.5 feet bgs. Therefore, samples were collected from depth intervals where there was sufficient volume/recovery for a sample, even if the sample consisted of crushed bedrock. Although the Parcel G Work Plan states that if bedrock is encountered during future resampling no samples will be collected from the bedrock, there is difficulty in determining the exact depth of bedrock during drilling. Therefore, drilling was performed to depths to collect a full boring or until the drilling subcontractor believed that bedrock was encountered. Several of the subsurface samples collected from RBA-4 contained crushed bedrock, identified as shale or sandstone on the soil boring logs in Appendix F.**

13. Section 3.1 "Onsite Geology", Page 3-1, Sentence 2: CDPH recommends adding the missing "t" in the last word of the sentence "foo".

    The typo will be corrected.

14. Section 4.1 "Gamma Walkover Survey Results", Page 4-1, Table 4-1, Figure 4-4, and Figure I-14: The gamma walkover survey result of RBA-4 is summarized in Table 4-1 and plotted in Figure 4-4, with a histogram presented in Figure I-4. According to the histogram (Figure I-4), the number of measurements below the mean is estimated to be approximately 50% of all measurements in RBA-4. However, in Figure 4-4, the area representing data points below the mean (in yellow) only occupies roughly 30% of the total area in Figure 4-4.

    A similar discrepancy exists for data points with gamma count rates between the mean and 1 standard deviation above the mean, which appear to cover more than 50% of the survey area (in light green) in Figure 4-4; this category only represents ~26% of all measurements in the histogram in Figure I-4.

    Please provide an explanation regarding the discrepancies between the plotted gamma walkover survey data provided in Figure 4-4 and the data provided in Table 4-1 and Figure I-4.

    The gamma walkover data was collected in two passes at roughly 90 degrees to each other (perpendicular). The two passes were combined into one data set, clipped to the perimeter of the survey area and then run through a spatial statistics program to plot the results. To create a contiguous results surface, the data was plotted by utilizing inverse weighted distancing to statistically interpolate the data. For Figure 4-4, the raw data shows that 723 data points of the 1,401 data points are less than 217 cps (mean). Of those 723 less than mean measurements, 322 fall on the east area of the RBA (light green shading). The same area also contains 345 of the 392 data points between the mean and 1 standard deviation. When the inverse weighted distance function is performed, the higher count rate measurements

influence the lower count rate measurements, resulting in the color shades shown in the figure.

15. Section 4.1 "Gamma Walkover Survey Results", Page 4-1, Figure 4-1 to 4.5: Please provide an explanation as to why data points with gamma count rates between 2 to 3 standard deviations above the mean are identified only in Figure 4-2 for RBA-2 and not for other RBAs.

    Figures 4-1, 4-3, and 4-4 will be revised to reflect data that falls between 2 and 3 standard deviations above the mean. Figure 4-5 does not contain any data that fall between 2 and 3 standard deviations above the mean.

16. Section 4.1.2 "Data evaluation Summary", Page 4-2, and Appendix I, Table I-1 and I-2: Please provide the detailed calculation of the Scan MDC, including complete modeling and all the parameters.

    The complete list of equations are provided in Appendix I, Section I.3 Gamma Surface Activity. This includes sample equations. The Microshield modeling output will also be added to Appendix I.

17. Section 4.2 "Soil Sample Scanning Results and Evaluation", Page 4-2, Paragraph 2, Sentence 3: "Comparison to the [investigation level] IL, derived using 1-second measurements, require multiplying the ILs by 4 to allow for accurate field comparisons." The description of IL acquisition provided in previous sections discusses varying thickness of asphalt caps per RBA. Please clarify if the IL used to evaluate soil was established by collecting gamma scan data over asphalt.

    The IL used for screening soil samples was determined from the surface scanning measurements obtained at each RBA. For the onsite RBAs, these scans were performed on asphalt. The text will be revised to clarify that the IL was established using the gamma scan data collected over the asphalt for the onsite RBAs.

18. Section 5.1.3 "Data Validation Findings", Page 5-3, Bullet 6: Please describe the detection limits achieved or targeted during laboratory analysis of soil samples, as well as how these detection limits compare with the current remedial goals as indicated in the ROD for Hunters Point. Please describe how these detection limits are consistent with the data quality objectives of this project. Furthermore, please clarify for future sampling and analysis efforts what detection limits will be achieved.

    The detection limits achieved are provided in Tables 5-10 through 5-44. The targeted detection limits were established to be below the RGs for HPNS (see Appendix B of the Parcel G Work Plan, Worksheets 15a through 15d of the SAP). Detection limits for future sampling and analysis efforts will be specified in site-specific work plans that will be provided to CDPH for review.

19. Section 5.4 "Review of Equilibrium Conditions", Page 5-6, Paragraph 4: This paragraph discusses correlation coefficients for the on-site RBAs (e.g., uranium-238 (^{238}U) and radium-226 (^{226}Ra) and thorium-230 (^{230}Th) and ^{226}Ra). However, there is no discussion as to observed secular equilibrium at the off-site location (RBA-San Bruno). Please provide a discussion regarding whether secular equilibrium was identified at the off-site location.

Please see the response to USEPA Comment 6. Additional discussion about the equilibrium evaluation will be added to Section 5.4 and Appendix L.

20. Section 6.1.2 "Managing Censored Data", Page 6-1, Paragraph 4, Sentence 3: "For this evaluation, the KM [Kaplan-Meier] product-limit estimator was used to compute descriptive statistics with the censoring limit set at the DL [detection level]." Please provide justification for the use of the DL as censoring limit rather than only incorporating results detected above the DL.

    All detected and nondetected values should be treated equally in the computation of various statistics of interest including BTV estimates. Excluding nondetects would result in artificially elevated estimates of the BTVs. For data sets consisting of nondetects with multiple censoring limits, several estimation methods are available, including maximum likelihood, the Kaplan-Meier (KM) product-limit estimator, bootstrap methods, and regression on order (ROS) statistics. The KM method is a nonparametric method designed to incorporate data with nondetects into statistical computations and does not require an assumed distribution. The USEPA (2009)[3] recommends the use of the KM method when evaluating datasets containing multiple censoring limits.

21. Section 6.2.2 "Evaluation of Outliers", Page 6-3, Paragraph 4, Sentence 2: Please define "high-magnitude outlier" and provide reasoning as to why the RBA4's 0.477 pCi/g is not considered a high-magnitude outlier.

    According to section 6.2.2 (Evaluation of Outliers), "the background soil data were evaluated for statistical outliers using Rosner's outlier test." The ^{137}Cs data for all results above the detection limit appear to fit a lognormal distribution via the Lilliefors Lognormal Goodness-of-Fit test (at a 5% significance level). According to section 6.2.2, Rosner's outlier test is applicable for this dataset (" ... statistical outliers were further evaluated by applying a logarithmic transformation of the data to improve adherence to normality").

    Rosner's outlier test clearly identifies 0.477 pCi/g as an outlier (to a 1 % significance). Furthermore, this result is "significantly outside the historical ranges of background data" and should therefore be excluded from the dataset when calculating the BTV for ^{137}Cs.

    High magnitude outlier is the term used by USEPA (2009)[3] to refer to observations "…with much higher concentration than other background observations…" Although a formal definition is not provided, an order-of-magnitude higher outlier is provided as an example by USEPA (2009)[3].

    Formal outlier testing was not conducted for Cs-137. The detection frequencies for Cs-137 at the five RBAs range from 0 to 37%. Rosner's outlier test assumes that the data values (aside from those being tested as potential outliers) are normally distributed. The best goodness-of-fit tests attempt to assess whether the sample data closely resemble the tails of the candidate distributional model. Because non-detects represent left-censored observations where the

[3] Reference: USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance. EPA 530/R-09-007. March.

exact concentrations are unknown for the lower tail of the sample distribution, results from standard normality tests on data containing greater than 60% non-detects would be highly uncertain. Because Rosner's outlier test assumes that the data without outliers are normally distributed, applying Rosner's test on a nonnormally distributed dataset, such as a right-skewed distribution, grossly inflates the false positive rate. This in turn increases the probability of identifying a result as an outlier when it is not an outlier. Several USEPA guidance documents point out that environmental data are often not normally distributed (USEPA, 1995, 2002, 2009, 2015).

The Cs-137 concentration of 0.477 pCi/g reported at RBA-4 is within the range of background (0.083 to 1.67 pCi/g) reported in literature. USEPA (2002, pp.4–6)[4] states: "…*background areas are not necessarily pristine areas. A data point should not be eliminated from the background dataset simply because it is the highest value that was observed*."

22. Section 6.2.4 "Development of Background Threshold Values", Page 6-4, Paragraph 7: Please clarify the use of the upper simultaneous limit (USL) as opposed to other comparable methods.

    At HPNS, thousands of onsite observations will be compared to the estimated BTVs. USEPA (2009, pp.102-103) states: "However, when a large number of observations coming from the target population (background, comparable to background) are compared with a UTL95-95, the number of exceedances (not the percentage of exceedances) of UTL95-95 by background observations can be quite large. This implies that a larger number (but not greater than 5%) of onsite locations comparable to background may be falsely declared as requiring additional investigation which may not be cost-effective." USEPA (2015)[5] recommends the use of USLs to control the false positive rate when many onsite values need to be compared with a BTV.

23. Section 7.1 "Hunters Point Naval Shipyard Soil Background Threshold Values", Page 7-1, Table 7-1 "BTVs for Combined Surface and Subsurface Soil": For this table and similar tables, please provide a column showing the current remediation goals (RGs) for comparison purposes.

    The RGs will be added to Section 7.

24. Section 7.2 "Other Background Data", Page 7-1, Table 7-2 "Background Soil Concentrations of Radionuclides Reported in Literature": Regarding literature cited for the Background Soil Concentration of ^{137}Cs

    a) The ^{137}Cs results cited from these sources may not applicable as presented in the report.

       For example, some of values provided in were obtained in areas outside of California (e.g., Litaor 1995, McArthur and Miller 1989, and Wallo et al 1994). Given the very significant variation of potential ^{137}Cs fallout concentration in each state, CDPH believes measurements originating from outside of California cannot be considered in developing a BTV for HPNS.

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4 Reference: USEPA. 2002. Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites, EPA 540-R-01-003, Washington, DC, Office of Emergency and Remedial Response.

5 Reference: USEPA. 2015. ProUCL Version 5.1 Technical Guide Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. EPA/600/R-07/041. Office of Research and Development. October.

b) The literature cited do not support the inclusion of 0.477 pCi/g ^{137}Cs concentration in RBA-4 as part of the BTV calculation for HPNS.

In Cabrera Service (2004), the reported maximum ^{137}Cs value, 0.346 pCi/g, was 4.42 times the standard deviation from the mean, or within the outermost 0.001% of a normal distribution. Meanwhile, the 0.477 pCi/g value obtained in RBA-4 at HPNS is 6.45 times the standard deviation from the mean of all soil samples from the same RBA, or within the outermost 0.000000001% of a normal distribution. In comparison, the 0.477 pCi/g obtained in RBA-4 is 100,000 times less likely to be part of the same distribution with the rest of the data in RBA-4 as the 0.346 pCi/g measurement provided in Cabrera Service (2004). Therefore, the literature does not justify the inclusion of 0.477 pCi/g for ^{137}Cs as part of the BTV calculation for HPNS.

In McArthur and Miller (1989), the highest ^{137}Cs concentration in California, 0.380 pCi/g from Furnace Creek, was only 1.74 standard deviations from the mean, which decay-corrected to the current year, is only 0.186 pCi/g. In term of statistical analysis or absolute value comparison, the maximum ^{137}Cs concentration in California mentioned in the McArthur and Miller (1989) reference does not support the inclusion of RBA-4's 0.477 pCi/g ^{137}Cs measurement as part of the BTV calculation for HPNS.

In USEPA (2011), the ^{137}Cs BTV established by EPA was 0.229 pCi/g, or 0.186 pCi/g decay-corrected for 2020. This 0.229 pCi/g value is much less 0.477 pCi/g. Therefore, CDPH believes the ^{137}Cs BTV in USEPA (2011) does not warrant the inclusion of 0.477 pCi/g ^{137}Cs from RBA-4 as part of the BTV calculation for HPNS.

c) CDPH finds the data and information in some of the cited references support the exclusion of RBA-4's 0.477 pCi/g ^{137}Cs measurement as part of the BTV calculation for HPNS.

In Wallo et al. (1994), most of the data were obtained outside of California, and CDPH believes those data obtained outside of California cannot be included in determining the BTV for HPNS.

For data originating from California in Wallo et al. (1994), CDPH does not find any support for the inclusion of the 0.477 pCi/g ^{137}Cs measurement from RBA-4 as part of the BTV calculation for HPNS.

For those data cited for California in Wallo et al.(1994), the ^{137}Cs soil concentration ranged from <0.03 to 0.6 pCi/g. These values were referenced by Wallo et al., from Multi-Media Sampling Report for the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy Volume 1, March 10, 1993, McLaren/Hart Environmental Engineering Corp. In this McLaren/Hart literature, it reported the ninety-fifth percentile of ^{137}Cs in the measured background soil samples was approximately 0.21 pCi/g, or decay-corrected 0.113 pCi/g for 2020.

In the same McLaren/Hart (1993) article, there were four soil samples, including a 0.6 pCi/g ^{137}Cs concentration, determined to be above the ninety-fifth percentile of the reference samples. These four values were gathered either from an area with historical spills/releases of radioactive materials, or from a ravine area where water tends to accumulate. The report did not include these four ^{137}Cs values to determine background values. Instead, the report

provided a narrative to explain these four exceedances on a case-by-case basis. Furthermore, the report recommended additional sampling in one of the four areas with these exceedances.

d) Please provide the specific reasoning or information regarding how the data in the following cited literature, LLNL (1999), Tykva and Sabol (1995), and Volkle et al. (1989), support the inclusion of the 0.477 pCi/g ^{137}Cs measurement from RBA-4 as part of the BTV calculation for HPNS.

Response to 24 a, b, c, and d: The calculation of the HPNS BTV for Cs-137 was independent of the literature review. The literature review was performed to determine if the observed background values at HPNS were consistent with values reported in literature. The references cited in this report include studies of Cs-137 background data collected in Ventura County, California (USEPA, 2011); Sacramento, California (Cabrera Services, 2004); San Francisco, California (McArthur and Miller, 1989); Santa Monica Mountains, California (Wallo et. al, 1994); as well as an estimate of potential Cs-137 concentrations in soils by latitude (Wallo et. al, 1994). The review of the data provides evidence of the variation of Cs-137 concentrations regionally across California and within the same general latitude as the data collected in this report.

The Cs-137 result of 0.477 pCi/g is a valid result from a non-impacted area and represents a concentration that is possible in areas where surface runoff may cause Cs-137 from fallout to accumulate over time. Additionally, as noted in response to CDPH Comments 7 and 21, the Cs-137 concentration of 0.477 pCi/g is generally consistent with the values reported in literature and is not considered an outlier within the context of the sampling performed during this work.

Furthermore, several of the references cited in this comment were provided in the report for the range of literature values for the other ROCs (i.e., Volkle et al., 1989; Litaor, 1995; Tykva and Sabol 1995; LLNL, 1999).

25. Section 7.3 "Hunters Point Naval Shipyard Background Threshold Values Comparison to Other Background Values",

a) Page 7-2, Paragraph 2, Sentence 2: "There were no detections of [Plutonium-239] ^{239}Pu or [Strontium-90] ^{90}Sr in samples collected during this investigation, and as described in Section 6.2, the BTVs were established using the highest DL for the respective radionuclide." There are significant technical issues associated with this approach:

I. Since detection limit can be varied by adjusting count time and other parameters, CDPH believes the detection limit can be arbitrarily controlled. Why was count time not adjusted or extended to the targeted DL to potentially yield more detectable results?

II. Please justify the selection of the highest DL of a particular ROC as opposed to the more conservative lowest value for the same ROC for determining the BTV.

I) The detection limit calculation used by the analytical lab is based on the Strom and Stansbury minimum detectable concentration calculation described in NUREG-1507. As

can be seen from that equation, a 50% reduction in MDC would require increasing the background and sample count times by a factor of four. In most cases, this is not feasible for a commercial laboratory to accomplish. Other factors such as yield from the chemical separation process and amount of activity in the sample also contribute to the actual detection limits independent of the count time. As noted in USEPA Comment 13, the BTVs calculated using a maximum detection limit for Pu-239 or Sr-90 are not expected to have any practical significance on site cleanup efforts, as these values are below the RGs for the two radionuclides.

II) This approach is consistent with the approach used by USEPA as documented in the *Final Radiological Background Study Report Santa Susana Field Laboratory Ventura County, California*, October 2011, which states that "*BTVs were estimated using maximum nondetect values for radionuclides with fewer than five detections*." In addition, the approach is consistent with the USEPA's ProUCL Technical Manual.

b) Page 7-2, Paragraph 3, Sentence 2: Sentence 3 states "The range of HPNS ^{137}Cs BTVs are generally consistent with typical concentrations reported in literature ... " Please describe how the literature cited in this report addresses regional variation in ^{137}Cs soil concentrations from different areas within the same general latitude.

See response to CDPH Specific Comment 24.

c) Page 7-3, Paragraph 11 Last Sentence: "Based on the uncertainty in the BTV estimates and the potential for false positives (e.g., with a 5 percent false positive rate; assuming 1,000 comparisons, 50 exceedances would be expected), an exceedance of a BTV for an ROC should not automatically be considered a site release; rather, an exceedance in this case warrants further consideration with respect to literature values and discussion with the project team." For radionuclides that are not readily transported and/or not NORM, please clarify how contractors will distinguish between radiological contamination and natural depositions. Please reference previous comment (General Comment #5).

As noted in Section 7 of the report and in the response to USEPA Comment 19, an iterative, lines of evidence based approach will be used to evaluate site data. The lines of evidence approach will include but not be limited to review of specific site history for spills or evidence of release, statistical evaluations of local or regional background data, graphical review and spatial analysis of data, and evaluation of equilibrium conditions for naturally occurring radionuclides.

d) Page 7-3, Paragraph 1, Last Sentence: "Based on the uncertainty in the BTV estimates and the potential for false positives (e.g., with a 5 percent false positive rate; assuming 1,000 comparisons, 50 exceedances would be expected), an exceedance of a BTV for an ROC should not automatically be considered a site release; rather, an exceedance in this case warrants further consideration with respect to literature values and discussion with the project team." Please clarify the term "site release" in the quoted sentence.

The phrase "site release" will be changed to "site-related contamination."

26. Section 7.4.1.4 "Evaluation of Equilibrium Conditions", Page 7-4, Paragraph 3: Section 5.4 "Review of Equilibrium Conditions" states, "The plots show little, if any, secular equilibrium

relationships between the ^{226}Ra and the parent radionuclides at the low activity levels observed at HPNS." Please clarify how secular equilibrium conditions will be utilized during the analysis of soil for radiological work at HPNS.

Please see the response to USEPA Comment 6. Additional discussion about the equilibrium evaluation will be added to Section 5.4, Section 7, and Appendix L.

27. Section 7.4.2 "Site Characterization and Assessment", Page 7-4, Paragraph 5, Sentence 2: "If a radionuclide is detected at a concentration below the relevant BTV and/or other background data, it may be removed from further consideration as an ROC." For some radionuclides of concern (ROCs) the BTVs exist beyond the release criteria. It is the understanding of CDPH, via this sentence, that a radionuclide concentration can exceed release criteria, but fall within the established BTV range and be "removed from further consideration as a ROC." This would not be acceptable without ample data and discussions with regulatory stakeholders. Please clarify the process of ROC removal and share with regulatory agencies.

This section is related to other future site investigations and is in-line with *Navy Policy on the Use of Background Chemical Levels* (Navy, 2004). The process for development of screening criteria and identification of ROCs for future investigations will be specified in site-specific work plans that will be provided to CDPH for review.

28. Appendix E "Daily Instrument Response Logs" 1 Page 683 (pdf): Please clarify what values are subtracted from the "Gross Count Rate [counts per second] (CPS)" to obtain the value displayed in the "Net Count Rate (CPS)" column.

The detector system was controlled by Ortec Maestro software. Maestro software automatically calculates the net value by evaluating data on either side of a specified region of interest (ROI). For the daily response check, an ROI was selected, centered on the Cs-137 661 keV peak aligned to channel 226. The net response is calculated by Maestro by drawing a line to the channels either side of the ROI. Counts below this line on the peak is what Maestro considers background. Maestro subtracts the counts below the line from the total counts within the ROI, resulting in net counts.

Note that net counts, determined by Maestro were utilized only during daily system response checks. Results of the gamma walkover survey data is presented in gross gamma counts.

29. Appendix K "Comparison of Analytical Methods" 1 Page 33821 and 33822 (pdf): The heading on both pages is "Thorium-232 Method Comparison", however, the data appear to show ^{226}Ra method comparisons. Please amend the title or the data being visualized.

The title will be corrected.

30. Appendix I, Section 1.3.2 "Example Gamma Scan Minimum Detectable Concentration" 1 Page 32224 (pdf): The calculation of MDCR is mathematically incorrect. 59.67 x 60 / 2.4 should be 1491.75 or 1492, not 1487 as listed in the report. Any subsequent calculations involving this incorrect value should be recalculated.

The value will be changed in the sample equation and Tables I-1 and I-2 will be updated.

CDPH Comments (June 1, 2020)

General Comments:

1. CDPH maintains that any sample results for future projects that exceed the remedial goals (RGs), as established in the Record of Decision (ROD) for the site or subsequently modified according to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, need to be identified and evaluated on a case-by-case basis. These evaluations will need to include a strong narrative that adequately explains why each specific exceedance is not the result of site contamination, and each narrative will need to include sufficient supporting evidence.

   Should the Navy wish to utilize any alternative release criteria (e.g., background threshold values calculated for onsite datasets as presented in this report, additional sample data collected at a future date, or background data cited from other sources, etc.), the Navy will first need to obtain Federal and State regulatory approval.

   The Navy will continue to work with Federal and State regulators for decision-making. The need for a ROD change will be evaluated after site-specific data are collected.

Specific Comments:

2. Navy RTC to EMB Specific Comment #24 (a, b, c, d): The data in the literature cited by Navy does not inform the background values at HPNS, CA. For example, when comparing to the location at the same latitude in Nevada, HPNS in California has lower predicted Cs-137 concentration from fallout. In addition, it is unreasonable to use the Cs-137 concentration value more than 200 miles away outside of California to determine the proper background value at HPNS, especially when HPNS background study (the current report) data is readily available.

   According to the McLaren/Hart (1993) study of 4 Cs-137 soil samples the concentration ranged from 0.23 to 0.6pCi/g. The explanation provided concluded that these samples were either from an area with a historical spill/releases of radioactive material or from a ravine area where water tends to accumulate. Given the geological evidence surrounding the location where the 0.477pCi/g Cs-137 value obtained in RBA-4, this 0.477pCi/g value may indeed represent a concentration that is possible in area where surface runoff may cause Cs-137 from fallout to accumulate over time. CDPH does not disagree with this possible hypothesis; however, this 0.477pCi/g Cs-137 result cannot be included in the BTV determination. Please make appropriate modifications in the document, such as titles of tables ES-1 and 7.1, to reflect this.

   Since the literature values are not being used to establish the BTVs, the literature values will be removed from Tables ES-1 and 7-1 and included in a separate table for reference.

   Because the 0.477 pCi/g value may represent a concentration that is possible in areas where surface runoff may cause Cs-137 from fallout to accumulate over time, it will be included in the BTV calculation for RBA-4 and a footnote will be added to clarify that the BTV for RBA-4 is primarily applicable to where topography and surface runoff may have caused Cs-137 from fallout to accumulate over time. Comparisons with the offsite BTVs will be used as the first line of evidence for site data exceeding the RGs collected during the removal site evaluation.