Naval Facilities Engineering Command Southwest
BRAC PMO West
San Diego, CA

Draft Final

Radiological Scoping Survey Report

Parcel F Structures—Submarine Pens

Hunters Point Naval Shipyard, CA

October 2020

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BRAC PMO West
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Acronyms and Abbreviations

α ..... sigma (variability)

^{90}Sr strontium-90

^{137}Cs cesium-137

^{226}Ra radium-226

^{239}Pu plutonium-239

AM ..... *Final Basewide Radiological Removal Action, Action Memorandum—Revision 2006, Hunters Point Shipyard, San Francisco, California*

APTIM ..... Aptim Federal Services, LLC

cm ..... centimeter

cm^2 ..... square centimeter

CSM ..... conceptual site model

CSO ..... Caretaker Site Office

dpm ..... disintegration per minute

dpm/100 cm^2 ..... disintegration per minute per 100 square centimeters

DQO ..... data quality objective

EPA ..... U.S. Environmental Protection Agency

FCR ..... field change request

GPS ..... global positioning system

HPNS ..... Hunters Point Naval Shipyard

HRA ..... *Final Historical Radiological Assessment Volume II, History and the Use of General Radioactive Materials, 1939-2003*

IL ..... investigation level

ISO ..... International Organization for Standardization

MARSAME *Multi-Agency Radiation Survey and Assessment of Materials and Equipment*

MARSSIM .... *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*

MDC ..... minimum detectable concentration

MeV ..... megaelectron volt

N ..... number

NaI ..... sodium iodide

NAVSEA ..... Naval Sea Systems Command

Acronyms and Abbreviations (continued)

Moved (insertion) [1]

Navy ..... U.S. Department of the Navy

NIST ..... National Institute of Standards and Technology

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NRC ..... U.S. Nuclear Regulatory Commission

pCi/g ..... picocurie per gram

PRSO ..... Project Radiation Safety Officer

QC ..... quality control

RBA ..... reference background area

RCT ..... radiological control technician

Report ..... radiological scoping surveys report

ROC ..... radionuclide of concern

ROICC ..... Resident Officer in Charge of Construction

RPM ..... Remedial Project Manager

SAP ..... sampling and analysis plan

SU ..... survey unit

Work Plan ..... *Final Revision 2, Radiological Scoping Surveys Work Plan, Parcel F Structures, Hunters Point Naval Shipyard, San Francisco, California*

1.0 Introduction

This radiological scoping survey report (Report) presents the activities implemented by Aptim Federal Services, LLC (APTIM) during the radiological scoping surveys of the submarine pens, located in Parcel F adjacent to Parcel B-1 at Hunters Point Naval Shipyard (HPNS), San Francisco, California (Figures 1 and 2). The scoping survey was performed for the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command Southwest, under Contract No. N62473-17-D-0006, Contract Task Order N6247317F4550. Base Realignment and Closure Program Management Office West managed the work elements under this contract task order.

Based on the radiological operational history described in the *Final Historical Radiological Assessment Volume II, History and the Use of General Radioactive Materials, 1939-2003* (HRA; Naval Sea Systems Command [NAVSEA], 2004), the Navy determined that low-level radioactive contamination is potentially present at the submarine pens. This decision was presented in the *Final Basewide Radiological Removal Action, Action Memorandum—Revision 2006, Hunters Point Shipyard, San Francisco, California* (AM; Navy, 2006). The purpose of the AM was to document the Navy's decision to perform time-critical removal actions at areas throughout HPNS that could contain localized radioactive contamination and substantially eliminate identified exposure pathways to surrounding populations and nearby ecosystems.

The Navy identified the applicable or relevant and appropriate requirements for the HPNS removal actions, which were presented in AM Appendix A (Navy, 2006). The cleanup goals for localized radioactive contamination at HPNS presented in the AM were derived in consultation with federal and state regulators to meet the most conservative requirements at the time the AM was being written.

The HRA (NAVSEA, 2004) lists cesium-137 (^{137}Cs), plutonium-239 (^{239}Pu), radium-226 (^{226}Ra), and strontium-90 (^{90}Sr) as the radionuclides of concern (ROCs) for the submarine pens (Table 1). Table 1 provides the radiological release criteria for each ROC. For alpha measurements, the most restrictive release criterion for alpha-emitting ROCs is 100 disintegrations per minute (dpm) per 100 square centimeters (cm^2) (dpm/100 cm^2) for ^{226}Ra and ^{239}Pu. For beta measurements, the most restrictive release criterion for beta-emitting ROCs is 1,000 dpm/100 cm^2 for ^{90}Sr.

1.1 Project Scope and Objective

The scope of the planned activities consisted of the following elements:

- Develop a work plan and associated appendices (APTIM, 2019)
- Conduct radiological scoping surveys of the submarine pens (Figure 2)
- Prepare a scoping survey report for the submarine pens (this Report)

The objective of these tasks was to provide radiological scoping survey data with sufficient quantity and quality to support future site decisions for the submarine pens (Drydocks 5, 6, and 7 and associated Ship Berths 61, 62, 63, and 64; Figure 2).

1.2 Deviations from Planning Documents

Three field change requests (FCRs) were submitted and approved. Appendix B includes the approved FCRs as follows:

- FCR-003—clarifies RS-700 procedures and revises to the Final Revision 2, Radiological Scoping Surveys Work Plan, Parcel F Structures, Hunters Point Naval Shipyard, San Francisco, California (Work Plan; APTIM, 2019) regarding investigation levels (ILs) for consistency throughout the document.
- FCR-004—provides additional methods to determine appropriate concrete reference background areas (RBAs).
- FCR-006—includes additional method to assess follow-up locations via gamma spectral analysis.

1.3 Report Organization

This Report consists of eight sections and provides descriptions of the specific activities involved in the implementation of the survey work, as follows:

- Section 1.0, “Introduction”—provides an introduction, project scope and objectives, and this Report organization.
- Section 2.0, “Site Conditions and History”—presents the site location, description and history, ROCs, previous investigations, and conceptual site model (CSM).
- Section 3.0, “Scoping Survey Design”—describes the process for survey design and data quality objectives (DQOs).

- Section 4.0, "Field Activities"—describes the pre-fieldwork activities, data collection activities, waste management, and demobilization activities.
- Section 5.0, "Survey Instrumentation"—describes the instrument calibration and calibration checks, as well as the types of instruments used.
- Section 6.0, "Radiological Scoping Survey Results"—describes the gamma survey, alpha and beta survey, and data quality review results.
- Section 7.0, "Conclusions and Recommendations"—provides an evaluation of the field activities, conclusions, and recommendations.
- Section 8.0, "References"—includes a list of documents used to compile this Report.
- Appendices A through J—Responses to Comments, Field Change Requests, Photograph Log, Reference Background Area Data, Radiological Instrument Quality Control Documents, Gamma Survey Data, Alpha Beta Survey Data, Laboratory Data Quality Assessment Summary Report, Data Validation Reports, and Analytical Laboratory Data Packages are included as Appendices A, B, C, D, E, F, G, H, I, and J, respectively.

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2.0 Site Conditions and History

This section presents the site location, site description and history, ROCs, previous investigations and removal actions, and CSM.

2.1 Site Location

HPNS is located in southeastern San Francisco on a peninsula that extends east into the San Francisco Bay (Figure 1). HPNS consists of 866 acres: 420 acres on land and 446 acres underwater in the San Francisco Bay. Parcel F comprises approximately 446 acres offshore of HPNS.

The submarine pens (Drydocks 5, 6, and 7 and associated Ship Berths 61, 62, 63, and 64) are located in Parcel F and extend from Parcel B-1 (Figure 2). The submarine pens extend a few feet inland from the water edge and include concrete structures, utility pads, vaults, and other infrastructure (e.g., open and closed manholes, other debris).

2.2 Submarine Pens Description and History

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Submarine pen Drydocks 5, 6, and 7 and associated Ship Berths 61, 62, 63, and 64 were built in 1944 for submarine repair, and were also capable of housing destroyers and other relatively small vessels. Drydocks 5 and 7 are each approximately 420 feet long by 60 feet wide and Drydock 6 is approximately 420 feet long by 75 feet wide. The drydocks were each equipped with a gate (caisson) that was hinged at the bottom that flapped down to allow the vessel to enter. Each drydock was dewatered by four 20,000-gallon per minute pumps. Two pumps were located at each side of the San Francisco Bay end of the dock (NAVSEA, 2004). Historical drawings show a suction tunnel running across the drydock between the two sets of pumps. Drydocks 5 and 7 could be dewatered in 1 hour with no ship in the dock using all pumps at full capacity. Drydock 6, due to its larger size, required approximately 1 hour and 20 minutes to dewater. The pumps are not currently visible at the site and are presumed to have been removed. The docks were flooded by two 3-foot hydraulically operated flooding valves located on each side of the San Francisco Bay end of the dock. Flooding times were 45 minutes for Drydocks 5 and 7 and 1 hour for Drydock 6. There are no utility drawings available for the submarine pens.

The following radiological operations were performed at Drydocks 5, 6, and 7 and associated Ship Berths 61, 62, 63, and 64:

- Decontamination of Operation Crossroads ships in Drydock 6,
- Potential decontamination of Operation Crossroads ships in Drydocks 5 and 7
- Ship repair (submarines)

Radiological operations generally performed at HPNS that may have radiologically impacted the submarine pens included the use of generally licensed radioactive material, including handling and refurbishment of radioluminescent devices. Other activities involving radioactive material included gamma radiography and calibration of radiation detection instruments.

2.3 Radionuclides of Concern

As determined in the HRA (NAVSEA, 2004), the ROCs for this scoping survey included ^{226}Ra, ^{90}Sr, ^{137}Cs, and ^{239}Pu.

2.4 Previous Investigations and Removal Actions

The HRA (NAVSEA, 2004) states that no previous investigations were performed in Drydock 5 or Drydock 7. In 1947 "slight contamination" was reported on cap blocks, ships brow, securing lines, fire hose, and electrical cables in Drydock 6. In 2002, a Class 3 survey performed during the Phase V investigation identified ^{226}Ra activity within the range of background concentrations, and no contamination was found in sediment samples collected from Drydock 6.

In 2012, the Navy performed a removal action that included Ship Berths 61 and 64 in the submarine pens. The objective of the removal action was to remove radiologically impacted over-water structures that were dilapidated and dropping debris into the San Francisco Bay, and to remove the debris that presented hazards to navigation in the San Francisco Bay (ERS Joint Venture, 2012). Radioactive material was not encountered during the course of the removal action and radioactive waste was not generated.

2.5 Conceptual Site Model

Based on the information on past radiological activities and the results from previous surveys conducted at HPNS, a CSM was developed to describe the radiological conditions. The project objectives were developed based on the CSM.

A history of Navy radiological operations at HPNS is provided in the HRA (NAVSEA, 2004). Radioluminescent devices were used on ships and in shipyards to provide markers that could be seen under low-light conditions. These radioluminescent devices included ^{226}Ra or ^{90}Sr as a source of radioactivity to generate light using these devices. There is a low probability that intact radioluminescent devices could still be present at the submarine pens. However, it is more likely traces of radioactivity from damaged, discarded, or lost devices could be present on surfaces associated with the Parcel F structures, although the probability of residual radioactivity from radioluminescent devices is still low.

Drydocks and ship berths were decontaminated and surveyed following maintenance and decontamination of radiologically impacted ships. Sandblast material was removed and disposed of, as described in HRA Section 6.4.1 (NAVSEA, 2004). After removal of the sand, the drydock floor was vigorously washed and the water was pumped into the harbor. The drydocks were surveyed and met the criteria for release. ROCs from nuclear and atomic weapons tests would include a mixture of fission products, activation products, and actinides. ^{137}Cs and ^{239}Pu were selected as ROCs most likely to be present and most likely to be detected as contamination at HPNS. Radioactivity from contaminated ships is most likely to occur where contaminated ship surfaces could come into contact with drydocks or piers. Surveys of the drydocks following decontamination operations failed to identify areas of elevated radioactivity, so the probability of residual radioactivity from contaminated ships at the submarine pens or finger piers is low.

Radioactive waste from Naval Radiological Defense Laboratory and ship decontamination activities was loaded on barges at HPNS and transported for disposal in the ocean. Radioactive waste included sandblasting residue from ship decontamination activities, as well as waste from Naval Radiological Defense Laboratory laboratories and experiments (NAVSEA, 2004). Expected radiological waste constituents include a mixture of fission products, activation products, and actinides. ^{137}Cs and ^{239}Pu were selected as representative ROCs. Radioactive waste was typically sealed in drums or other packages for transport and may have been staged on piers or alongside ship berths prior to loading the waste onto the barges. The potential for

residual radioactivity at the submarine pens and piers from leaking waste packages is low. The most likely location for residual radioactivity would be horizontal surfaces adjacent to ship berths where the waste packages could be staged prior to loading on the YGN-73 barge for disposal. Residual radioactivity also could have migrated from horizontal surfaces of the submarine pens to subsurface areas such as manholes, grates, and access ports.

3.0 Scoping Survey Design

The objective of the radiological scoping surveys was to characterize potential residual radioactivity of the submarine pens. A combination of scan surveys, static measurements at systematic and biased locations, and measurements of removable radioactivity at static measurement locations were performed.

3.1 Area Classification

In accordance with the HRA findings (NAVSEA, 2004), which state the current potential for contaminated media including soil, groundwater, structures, drainage systems and surrounding air are low or none, the submarine pens were classified as Class 2 areas in a *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* (MARSSIM; U.S. Environmental Protection Agency [EPA] et al., 2000) framework. Class 2 areas are limited to a size between 2,000 and 10,000 square meters and meet the following criteria: (1) impacted, (2) low potential for delivering a dose above the release criterion, and (3) little or no potential for small areas of elevated activity.

The Parcel F submarine pens consist of three Class 2 survey unit (SUs) (Figure 2). Table 2 includes SU locations, classifications, and descriptions. If radiological contamination was discovered during the survey, then the areas exceeding the release criteria listed in Table 1 were to be re-surveyed as Class 1 areas. If no radiological contamination was discovered, then the data would be presented in a report and used to support future site decisions.

3.2 Investigation Levels

The following subsections describe the ILs for the survey for each type of survey. Section 3.4 describes instrumentation used to collect gamma and alpha/beta measurements.

3.2.1 Gamma Scan Survey Investigation Level

The IL for gamma scan measurements was calculated as the average of gamma scan measurements in each SU plus three standard deviations. The survey design in the approved Work Plan (APTIM, 2019) required clarification on the development of ILs for gamma scan measurements, and FCR-003 (Appendix B) provides further details. If a gamma scan survey result exceeded the IL, then that location was included in the surface area covered by the alpha/beta scanning survey. In addition, a follow-up

gamma static measurement was conducted at locations that exceeded the gamma scan IL. The IL for gamma scan measurements was determined separately for the RS-700 and gamma scintillator handheld radiation detection instruments.

3.2.2 Gamma Static Measurement Investigation Level

The IL for gamma static measurements was calculated as the average of gamma static measurements for a similar material in an appropriate RBA plus three standard deviations. If a gamma static survey result exceeded the IL, then a follow-up in situ gamma spectroscopy measurement was conducted at that location. The IL for gamma static measurements was determined separately for the RS-700 and gamma scintillator handheld radiation detection instruments.

3.2.3 Alpha and Beta Scan Survey Investigation Levels

The ILs for alpha and beta scan measurements were the most conservative (i.e., lowest) of the release criteria provided in Table 1 for alpha- and beta-emitting radionuclides. The alpha scan IL was 100 dpm/100 cm^2 and the beta scan IL was 1,000 dpm/100 cm^2. As stated in the approved Work Plan (APTIM, 2019), alpha and beta static counts were performed as part of the investigation of scanning results exceeding their respective IL, as needed.

3.2.4 Alpha and Beta Static and Smear Investigation Levels

The ILs for both alpha and beta static measurements were 50 percent of the most conservative (i.e., lowest) of the release criteria provided in Table 1 for alpha- and beta-emitting radionuclides. The alpha static IL was 50 dpm/100 cm^2 and the beta static IL was 500 dpm/100 cm^2. If an alpha or beta static count result exceeded their corresponding IL, then a concrete sample was collected at that location.

The ILs for removable alpha and beta activity were the most conservative (i.e., lowest) of the release criteria provided in Table 1 for alpha- and beta-emitting radionuclides. The removable alpha activity IL was 20 dpm/100 cm^2 and the removable beta activity IL was 200 dpm/100 cm^2.

3.3 Review of Data Quality Objectives

DQOs are qualitative and quantitative statements developed to define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose,

and specify the performance requirements for the quality of information to be obtained from the data. These outputs are used to develop a data collection design that meets the performance criteria and other design requirements and constraints. EPA specified a seven-step process to develop DQOs (EPA, 2006), which was adapted for use in MARSSIM (EPA et al., 2000). The following subsections summarize the DQOs for this project.

3.3.1 Step One—State the Problem

The HRA (NAVSEA, 2004) identified the Parcel F submarine pens as radiologically impacted. Therefore, scoping surveys need to be completed.

3.3.2 Step Two—Identify the Decision

The decision to be made is as follows: "Are levels of residual radioactivity present at the Parcel F structures that would prevent unrestricted release?"

The following alternative actions will result from the resolution of the principle study question:

- If residual radioactivity is found during the radiological surveys at levels that would prevent unrestricted release of the site, then the Navy will be notified of the presence of residual radioactivity to determine the appropriate next steps for further investigation and the areas will be re-surveyed as Class 1 areas.
- If residual radioactivity is not found at levels that would prevent unrestricted release of the site during the radiological surveys, then no further investigation will be performed and the radiological survey data will be presented in reports and used to support future site decisions for the Parcel F structures.

3.3.3 Step Three—Identify Inputs into the Decision

Radiological surveys included the following:

- Surface gamma scanning surveys for 100 percent for accessible surfaces of the submarine pens
- Surface alpha/beta scanning surveys for 25 percent for accessible surfaces of the submarine pens
- Static measurements for alpha/beta at a statistically determined number of systematic locations to estimate the average level of residual radioactivity

- Static measurements of alpha/beta or gamma activity at biased locations (as appropriate) to investigate survey results exceeding project ILs
- Measurements of removable alpha/beta activity collected at locations based on the highest static measurements of alpha/beta activity

In addition, solid samples of specified materials were collected to investigate sources of elevated count rates, as required.

3.3.4 Step Four—Define the Study Boundaries

The spatial boundaries for this study are the Parcel F submarine pens (Figure 2). The vertical boundary of the project area extended from the top of the drydock, ship berth, or pier to the low tide line. The horizontal boundary was defined by the concrete surfaces forming the submarine pens.

3.3.5 Step Five—Develop a Decision Rule

If the results of the survey were consistent with the release criteria (Table 1), then the radiological survey data were presented in reports and used to support future decisions for the Parcel F structures.

If the results of the survey exceed the screening criteria, the site was to be further investigated as described in the decision rules.

- The IL for gamma scan measurements is the average of gamma scan measurements for a SU plus three standard deviations (FCR-003; Appendix B). If a gamma scan survey result exceeds the IL, then a gamma static measurement will be performed at that location, and that location will be included in the surface area covered by the alpha/beta scanning survey. The IL for gamma scan measurements will be determined separately for the RS-700 and gamma scintillator handheld radiation detection instruments.
- The IL for alpha/beta static measurements is 50 percent of the most conservative (i.e., lowest) release criteria provided in Table 1 for alpha- and beta-emitting radionuclides. If an alpha or beta static count result exceeds the corresponding IL, the static count will be repeated to confirm the result. If the confirmatory result exceeds the corresponding IL, the APTIM Project Manager and the Project Radiation Safety Officer (PRSO) will be notified that an area of elevated alpha or beta activity has been identified. The APTIM Project Manager and/or the PRSO will notify the Navy.

- The IL for removable alpha or beta activity is the most conservative (i.e., lowest) release criteria provided in Table 1 for alpha- and beta-emitting radionuclides. If a removable measurement result for alpha or beta exceeds the IL, a notification will be made to the APTIM PRSO. The APTIM Project Manager and/or the PRSO will notify the Navy.

3.3.6 Step Six—Specify Limits on Decision Errors

Limits on decision errors are set at 5 percent.

3.3.7 Step Seven—Optimize the Design for Obtaining Data

Operational details for the radiological survey process have been developed, as further discussed in Work Plan Section 7.0 (APTIM, 2019). The theoretical assumptions are based on guidelines contained in MARSSIM (EPA et al., 2000).

3.4 Types of Measurements, Instrument Selection, and Minimum Detectable Concentrations

The following subsections describe the types of measurements performed during the survey, the instruments used for the survey, and the minimum detectable concentrations (MDCs) for the chosen instruments (if applicable). Table 3 provides the types of instruments used in this survey.

3.4.1 Gamma Scan Surveys

The gamma scan surveys were performed for 100 percent of the accessible areas for SUs 1, 2, and 3 using the RS-700 or a Ludlum Model 44-20 3-inch by 3-inch sodium iodide (NaI) gamma scintillation detector coupled with a Ludlum Model 2221 ratemeter/scaler handheld instrument. The RS-700 survey was utilized for most of the horizontal surfaces, while the 3-inch by 3-inch NaI gamma scintillation detector was utilized for vertical surfaces and in areas inaccessible to the RS-700.

3.4.2 Gamma Static Measurements

One-minute gamma static measurements were performed at biased locations with the Ludlum Model 44-20 3-inch by 3-inch NaI gamma scintillation detector coupled with a Ludlum Model 2221 ratemeter/scaler handheld instrument.

3.4.3 In Situ Gamma Spectroscopy

In situ gamma spectroscopy measurements were collected using a Canberra InSpector 1000 NaI spectrometer at locations that exceeded the gamma static IL. The approved Work Plan (APTIM, 2019) stated these measurements may be performed using the RS-700. FCR-006 (Appendix B) provides further details about the use of an equivalent measurement system.

3.4.4 Alpha/Beta Scan Surveys

The alpha/beta scan measurements were performed using portable contamination survey instruments, specifically, the Ludlum Model 43-37 gas flow proportional "floor monitor" detector coupled with a Ludlum Model 2360 scaler/ratemeter. For this project, six-second static counts were performed to cover the necessary area (25 percent of accessible surfaces). In this report, these six-second static counts will be referred to as "scans" or "scan measurements" for consistency.

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Preference for scanning was given to potential contamination concentration areas such as ship berthing locations, concrete joints and cracks, and drainage locations. This survey area also included accessible edges of penetrations through the submarine pens (including manholes, grates, access ports, etc.). Locations that exceeded the gamma scan IL were included in these scans.

Since six-second static counts were performed instead of scans, the static MDC equation was used to calculate instrument MDCs for this survey. The static MDC is the level of radioactivity practically achievable by the overall measurement process. The following equation is used to calculate instrument MDC in units of dpm/100 cm^2 when the background and sample were counted using the different time intervals:

$$MDC = \frac{\frac{(z_{1-\alpha} + z_{1-\beta})}{4}\left(1 + \frac{t_S}{t_B}\right) + (z_{1-\alpha} + z_{1-\beta})\sqrt{N_B \frac{t_S}{t_B}\left(1 + \frac{t_S}{t_B}\right)}}{\varepsilon_i \varepsilon_s t_S \frac{W_A}{100}}$$

Where:

$z_{1-\alpha}$ = quantile of the standard normal distribution for α (1.645 for α=0.05)

$z_{1-\beta}$ = quantile of the standard normal distribution for β (1.645 for β=0.05)
t_S = sample counting time (0.1 minutes for scans)
t_B = background counting time (10 minutes)
N_B = number of background counts during background counting time
ε_i = instrument efficiency (counts per particle)
ε_s = surface efficiency (particles per disintegration, 0.25 for α, 0.5 for β)
W_A = active area of the detector window (cm^2; 584 cm^2 for the "floor monitor" detector)

In the above equation, W_A is the size of the "active" area of the detector window. If the area of the detector window does not equal 100 cm^2, it is necessary to convert the detector response to units of dpm/100 cm^2. Values for N_B are detector-specific and surface material-specific, and values were calculated for concrete and metal surfaces at the submarine pens. Values for ε_i are instrument-specific, and four different "floor monitor" detectors were used during the scoping surveys of the submarine pens.

MDCs during scan surveys for these detectors ranged from 180 to 200 dpm/100 cm^2 for alpha activity on concrete, and from 295 to 323 dpm/100 cm^2 for beta activity on concrete.

The scan MDC for alpha activity measured in the field exceeded the planned scan MDC for alpha (86 dpm/100 cm^2, Work Plan Table 5) by more than a factor of two, and exceeded the release criterion of 100 dpm/100 cm^2 for alpha activity by a factor of two. The alpha background on concrete ranged from 21.2 cpm to 34.5 cpm compared with the estimated background of 3.3 cpm used for planning. The actual total efficiency for alpha ranged from 0.066 to 0.077 compared with the planned value of 0.06. The actual count times were the same for planning and for field measurements. The increase in alpha background counts is the only significant difference between the planned scan MDC and the scan MDCs determined based on actual site data.

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The scan MDC for beta activity measured in the field was lower than the planned scan MDC. The beta background on concrete ranged from 871 cpm to 1087 cpm compared with the estimated background of 601 cpm used during planning. The total efficiency determined for the field instruments ranged from 0.192 to 0.207 compared with the planned value of 0.08. This difference resulted from using a surface efficiency of 0.5 to detect higher energy beta particles from ^{90}Sr and ^{137}Cs compared with the surface efficiency value of 0.25 for low-energy beta particles used during planning. The higher total efficiency used for beta scan measurements offset the higher beta background measured in the field.

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The "floor monitor" detectors used to perform scan measurements in the submarine pens were capable of detecting beta radiation at levels less than the release criteria. However, these detectors could not detect alpha radiation at levels below the release criteria. Table 4 provides calculated MDCs for each detector used for alpha and beta scan surveys.

3.4.5 Alpha/Beta Static Measurements

The alpha/beta static measurements were performed using the Ludlum Model 43-37 gas flow proportional "floor monitor" detector coupled with a Ludlum Model 2360 scaler/ratemeter. Fifty-four static measurements were collected at systematic locations within each SU. The static measurements were two minutes when using the Ludlum Model 43-37. The random-start triangular grid systematic locations were selected through the use of a map and a random starting point. Figures 3, 4, and 5 display the systematic locations for alpha and beta static measurements in SUs 1, 2, and 3, respectively.

In addition, follow-up bias alpha/beta static measurements were performed at the highest alpha/beta scan locations in each SU to investigate the locations with the highest potential for elevated radioactivity. A minimum of 20 bias alpha and beta measurement locations were identified in each SU. Figures 37, 38, and 39 show the bias alpha and beta static measurement locations in SUs 1, 2, and 3, respectively.

MDCs were calculated for each detector using the same equation and parameters listed in Section 3.4.4, except with sample count times increased to two minutes. Other parameters remained unchanged. MDCs for static measurements for these detectors ranged from 32 to 37 dpm/100 cm^2 for alpha activity on concrete, and from 68 to 74 dpm/100 cm^2 for beta activity on concrete. The MDCs for the "floor monitor" detector listed in the Work Plan (APTIM, 2019) were 21.5 dpm/100 cm^2 for alpha activity and 184 dpm/100 cm^2.

The alpha static MDC values were less than the IL of 50 percent of the release criterion of 100 dpm/100 cm^2. The increased site background compared with the expected background had the largest impact on the increased alpha static MDC similar to the increase in the alpha scan MDC.

The beta static MDC values were less than the IL of 50 percent of the release criterion of 1,000 dpm/100 cm^2. The increased total efficiency had the largest impact on the decreased beta static MDC similar to the beta scan MDC.

The "floor monitor" detectors used to perform static measurements in the submarine pens were capable of detecting radioactivity at levels less than the release criteria.

Table 4 provides calculated MDCs for each detector used for static measurements in the submarine pens.

3.4.6 Alpha/Beta Smear Measurements

Smears were collected at each location where a total alpha and total beta static measurement was collected. Smears were quantitatively counted with a Ludlum Model 2929 sample counter. MDCs for this instrument were 12 dpm/100 cm^2 for alpha activity and 70 dpm/100 cm^2 for beta activity for smear measurements. Table 4 provides calculated MDCs for the smear counter. A priori MDCs for removable radioactivity measurements were not available in the Work Plan (APTIM, 2019) for comparison.

The release criteria for removable radioactivity listed in Table 1 are 20 dpm/100 cm^2 for alpha and 200 dpm/100 cm^2 for beta. The alpha smear MDC is 60 percent of the release criterion, and the beta smear MDC is 35 percent of the release criterion. The Ludlum Model 2929 sample counter was capable of detecting removable radioactivity at levels less than the release criterion.

3.4.7 Solid Sample Collection and Laboratory Analysis

Concrete samples were collected to provide supplemental information to support the characterization of locations with identified elevated alpha activity based on the results from the alpha static measurements. Samples were analyzed for ^{137}Cs and ^{226}Ra by gamma spectroscopy analysis and ^{239}Pu by alpha spectroscopy in accordance with the sampling and analysis plan (SAP; Work Plan Appendix A [APTIM, 2019]) to identify the source of the elevated alpha activity and determine the extent of the area of elevated activity. The samples were also analyzed for total strontium.

4.0 Field Activities

The following subsections discuss fieldwork activities.

4.1 Pre-Fieldwork Activities

The following subsections discuss pre-fieldwork activities.

4.1.1 Permitting and Notification

APTIM obtained the necessary authorizations from the HPNS Caretaker Site Office (CSO) and the Resident Officer in Charge of Construction (ROICC) for performing the work at the Parcel F structures. Prior to initiation of field activities for the submarine pens, APTIM notified the Navy Remedial Project Manager (RPM), ROICC, CSO, appropriate fire department personnel, and HPNS security as to the nature of the anticipated work.

Notifications were made by APTIM to the California Department of Public Health and the U.S. Nuclear Regulatory Commission (NRC) at least 14 days prior to initiation of activities involving the radiological materials licenses.

4.1.2 Meetings

Prior to mobilization, a pre-construction and mutual understanding meeting was held on July 24, 2018. The meeting attendees included the Navy RPM, the ROICC, the CSO representative, and APTIM personnel. The purpose of the meeting was to develop a mutual understanding of the field activities and the contractor quality control (QC) details, including forms to be used, administration of on-site work, and coordination of the construction management and production.

Contractor QC meeting was held on a weekly basis throughout the course of fieldwork. Per *Unified Facilities Guide Specifications,* Section 01 45 00.00 20, "Quality Control," (Naval Facilities Engineering Command, 2017) at a minimum, the Project QC Manager conducted and attended these meetings with the project team, including subcontractor and vendor representatives, as appropriate. The Navy team, including the RPM, ROICC, and CSO attended, as appropriate.

Daily tailgate safety meetings were held each day on site before starting work. The Site Safety and Health Officer held the meetings, or his or her qualified designee, and

covered various safety issues. Field staff, including subcontractors, attended these meetings and signed a tailgate safety meeting form. A subcontractor, inspector, agency, or Navy personnel that visited the site during the course of the day was required to review and sign the tailgate form prior to entering the work site.

4.2 Mobilization and Site Preparation

Mobilization occurred on August 12, 2019, and included site preparation, movement of equipment and materials to the site, and orientation and training of field personnel. Site-specific training included radiological safety awareness. At least two weeks prior to mobilization, the appropriate Navy personnel, including the Navy RPM, ROICC, and CSO, were notified regarding the planned schedule for mobilization and site scoping activities. APTIM personnel and subcontractors acquired badges by the San Francisco Redevelopment Agency during mobilization.

Upon receipt of the appropriate records and authorizations, field personnel, temporary facilities, and required construction materials were mobilized to the jobsite. The temporary facilities included restroom(s), hand washing station(s), security fencing, and one secure storage (conex) boxes for short- and long-term storage of materials.

4.2.1 Field Observations and Photographic Documentation

Field observations were recorded in the project logbooks and daily reports. Photographs of the site were collected during field operations, and developed and kept in the electronic project file. Electronic versions of the photographs were sorted by date and accompanied by a "Project Photograph Log" (Appendix C) providing the date, the location, and a description of the activities shown in each photo.

4.2.2 Material Handling and Storage Areas

Radioactive waste was minimized by compliance with contamination control work practices combined with survey practices. Radiological areas and postings are further described in the *Radiation Protection Plan, Radiological Work Tasks, Remedial Action and Maintenance of Remedies at Hunters Point Naval Shipyard, San Francisco, California* (APTIM; 2017b). No radiologically controlled area was required for this work effort.

4.2.3 Site Preparation of Survey Areas

The submarine pens were partially covered with a small layer of dust and debris. The horizontal surfaces of the surfaces were swept to obtain a relatively smooth surface to facilitate alpha/beta surveys. Larger debris was moved as required to access survey areas. Appropriate personal protective equipment and engineering controls were used to perform the work safely as described in the *Accident Prevention Plan, Radiological Work Tasks, Remedial Action and Maintenance of Remedies at Hunters Point Naval Shipyard, San Francisco, California* (APTIM, 2017a) and included fall protection, personal flotation devices, and barriers.

4.3 Data Collection Activities

Radiological scoping survey activities took place from August 12 through November 22, 2019. Additional concrete samples were also collected on March 12, 2020.

Submarine pen horizontal and vertical surfaces were accessed by radiological control technicians (RCTs) with appropriate personal protective equipment and fall protection equipment. The vertical surfaces of each SU extended from the top of the drydock, ship berth, or pier to the low tide line. Vertical surfaces were accessed either by walking along concrete/wood platforms on the sides of the submarine pens, or from the deck of a pontoon boat.

Gamma scans were conducted of 100 percent of horizontal and vertical accessible surfaces using the instrumentation described in Section 3.4.1. Alpha/beta scans were conducted over at least 25 percent of surfaces in each SU using the instrumentation described in Section 3.4.4. Systematic alpha/beta static measurements and smears were collected at pre-determined systematic locations throughout each SU. Biased measurements were collected based on the results of the scans.

Ship Berths 62 and 63 are separated from the submarine pen drydocks as a separate manmade island. Ship Berths 62 and 63 were accessed using a pontoon boat and surveyed from the boat (Photographs 23 through 28 and 46 through 47 [Appendix C]). The steel sidewall surrounding the island, which supported large concrete structures above it, was rusted, and in some cases, corroded and unstable (Photograph 24 [Appendix C]). The middle of the island eroded over time and was not safely accessible to the RCTs to walk on and perform radiological surveys. The horizontal surfaces of Ship Berths 62 and 63 on the interior of the island were therefore identified as inaccessible for this scoping survey. Vertical surfaces were accessed by boat. Limited

access to the horizontal surfaces around the perimeter of the island was available to the RCTs from the boat.

4.3.1 Reference Background Areas

As stated in Section 3.4.4, the alpha activity on concrete in the RBA was significantly different from the alpha background activity used during planning. Differences between the proposed RBA and the beta and gamma activity in the Submarine Pens were also noted. The original RBA behind Building 810 was determined to not adequately represent background in the Submarine Pens, so multiple potential RBAs in non-impacted areas were investigated.

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A concrete pad in Parcel C was selected as the RBA for alpha/beta measurements with the approval of the Navy. This RBA was selected because the concrete was most similar in nature to the concrete on the submarine pens, and it was non-impacted because it was constructed after the radiological operations occurred.

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A small concrete pad adjacent to SU 3 was selected as the RBA for gamma measurements with the approval of the Navy. This RBA was selected because the concrete was similar in nature to the concrete in the submarine pens. This small pad was non-impacted because it was separate from the submarine pens and could not have been used for ship repair or other radiological operations due to its small size.

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The same survey methods and equipment that were used for conducting a survey were used for the RBA data collection. Gamma scanning and static measurements collected from the RBA were used for comparison to the survey data, as needed. Scan and static data were also collected with the RS-700 system and Canberra InSpector 1000 to establish background data for the spectral analysis process. Alpha/beta material-specific backgrounds were established for each instrument based on measurements performed in the RBA. Table 5 provides a summary of the RBA data and calculation of survey ILs.

4.3.2 Gamma Scan Surveys

Gamma scan surveys were performed to identify areas of elevated gamma radioactivity that could have resulted from residual radioactivity from radioluminescent devices or other sources of gamma radiation. Areas of elevated gamma activity were included in the areas covered by the alpha and beta scan surveys.

Gamma scan surveys were performed over 100 percent of the accessible areas for Sus 1, 2, and 3 using the RS-700 or a Ludlum Model 44-20 3-inch by 3-inch NaI gamma scintillation detector coupled with a Ludlum Model 2221 ratemeter/scaler handheld instrument. The RS-700 survey was used for most of the horizontal surfaces, while the 3-inch by 3-inch NaI gamma scintillation detector was used for vertical surfaces and in horizontal areas inaccessible to the RS-700.

Accessible horizontal surfaces were scanned using the RS-700 with the detector suspended 10 cm (4 inches) over the surface being investigated at a scan speed of 1 meter per second or less. For vertical surfaces of the drydocks and areas inaccessible to the RS-700, a Ludlum Model 44-20 3-inch by 3-inch NaI gamma scintillation detector coupled with a Ludlum Model 2221 ratemeter/scaler was used to perform the scan survey. The 3-inch by 3-inch NaI detector was suspended 15 cm (6 inches) over the surface being investigated, moving at a speed of 0.5 meter per second or less. Vertical surfaces were accessed either from existing walkways or from a boat. The RCT moved the detector at a rate of 0.5 meters per second or less along the submarine pen, maintaining the detector at a consistent height while also maintaining a distance of approximately 15 cm (6 inches) from the vertical surface. The gamma count rate and the global positioning system (GPS) position were recorded. Once the entire length of the vertical surface was surveyed, the detector was lowered approximately 30 cm (12 inches) to continue the gamma scan of the vertical surface at the new height. This process was repeated until the entire vertical surface was scanned.

4.3.3 Gamma Static Measurements

One-minute gamma static measurements were collected at gamma scan locations that exhibited a z-score greater than three. Static measurements were evaluated in comparison to the gamma static IL, as described in Section 3.2.2.

4.3.4 In Situ Gamma Spectroscopy

In situ gamma spectroscopy measurements were collected using a Canberra InSpector 1000 NaI spectrometer at locations that exceeded the gamma static IL. A five-minute or greater static count was collected, and the resulting net spectrum was plotted and the critical levels assessed for ROC-specific energy ranges to determine if there was activity present above background. Critical levels, as defined in the MARSSIM Section 6.7.1 (EPA et al., 2000), represent thresholds above which net counts are statistically greater than background.

The critical value of the net background count was calculated using Table 7.5, Equation 4, in the Multi-Agency Radiation Survey and Assessment of Materials and Equipment (MARSAME) supplement to MARSSIM:

$$S_C = 0.4 \times \left(\frac{t_S}{t_B} - 1\right) + \frac{z_{1-\alpha}^2}{4} \times \left(1 + \frac{t_S}{t_B}\right) + z_{1-\alpha}\sqrt{(N_B + 0.4)\left(\frac{t_S}{t_B}\right)\left(1 + \frac{t_S}{t_B}\right)}$$

Where:
S_C = critical value of the net count during the sample count time (counts)
t_S = sample count time
t_B = background count time
N_B = number of background counts
z = quantile of the standard normal distribution
α = Type I decision error rate (incorrectly deciding the count exceeds background when the count is actually part of background)
$z_{1-\alpha}$ = 1.645 for 5% error rate

4.3.5 Alpha/Beta Scan Surveys

Alpha and beta surveys included scans, static measurements, and smear measurements consistent with MARSSIM guidance (EPA et al., 2000) for Class 2 surveys. Alpha and beta scans were performed over 25 percent of the area of each SU. Figure 2 shows the boundary for the SUs. Alpha/beta scans were adjusted as needed to include locations where the gamma scan results exceeded the corresponding gamma scan IL.

Manholes, grates, and components of the suction and discharge system were investigated during the survey of Drydocks 5, 6, and 7. Each manhole was opened and alpha/beta measurements were collected to the extent practicable. Standing water was observed in the manholes at low tide, but this did not limit accessible surfaces. Alpha/beta scanning was performed (as practicable) in each accessible manhole. Accessible surfaces of discharge outlets located on the sidewalls of the drydocks were investigated and surveyed. Alpha/beta scanning was performed (as practicable) in each accessible outlet. Other components of the discharge system (i.e., metal plates and piping) were visually inspected in the field and surveyed as practicable. Scans were performed on accessible surfaces as practicable. Confined space entry and heavy lifts were not conducted; personnel did not enter manholes or other confined spaces.

As discussed in Section 3.2.3, the IL for alpha/beta scan measurements was the most conservative (i.e., lowest) release criteria provided in Table 1 for alpha- and

beta-emitting radionuclides. If an alpha or beta scan count result exceeded the corresponding IL, the Work Plan (APTIM, 2019) stated static measurements would be collected as part of investigations of scanning results exceeding the IL, as needed. A total of 2,148 locations exceeded the alpha scan IL. To confirm these results, static measurements were collected from at a minimum the 20 highest scan result locations in each SU (21 measurements were collected in SU 2, and 48 measurements were collected in SU 3). This investigation approach was selected because the scan MDC for alpha radiation exceeded the release criterion resulting in a large number of scan results that exceeded the IL in each SU. Section 7.1 recommends further investigation of the submarine pens.

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4.3.6 Alpha/Beta Static Measurements

The alpha/beta static measurements were performed using portable contamination survey instruments specifically, the Ludlum Model 43-37 gas flow proportional "floor monitor" detector coupled with a Ludlum Model 2360 scaler/ratemeter (Table 3). The scaler/ratemeter was set to a two-minute count time when using the Ludlum Model 43-37. At the start of each measurement, the RCT positioned the detector, and begin the two-minute count. At the completion of each two-minute count, the alpha and beta results were recorded and compared to the release criteria presented in Table 1.

Two-minute static measurements were collected at 54 systematic locations per SU, and at biased locations as part of investigations of scanning results exceeding the IL, as needed. A minimum of one static measurement was collected from each accessible manhole, discharge outlet, and other components of the discharge system (i.e., metal plates and piping).

4.3.7 Alpha/Beta Smear Measurements

Smears were collected over a 100 cm^2 area at each location where a total alpha and total beta static measurement was performed. One smear was also collected in each of the accessible manholes, discharge outlet, and other components of the discharge system (i.e., metal plates and piping) in each SU. Smears were quantitatively counted with a Ludlum Model 2929 or Ludlum Model 3030 sample counter.

4.3.8 Solid Sample Collection and Laboratory Analysis

Concrete chip samples were collected to support the characterization of locations with identified elevated activity, based on the elevated results from the alpha/beta survey.

Concrete samples were collected by outfitting the RCT in the proper personal protective equipment (e.g., safety goggles), surrounding the area to be sampled with plastic to prevent scattering of concrete chips, and using an electric hammer-drill on the surface to generate sufficient concrete chips to provide a sample for analysis. The sample areas were approximately four inches in diameter and extended to a depth of 1 to 2 inches to provide a minimum of 250 grams of concrete for analysis.

Samples were analyzed for ^{137}Cs and ^{226}Ra by gamma spectroscopy analysis, for ^{90}Sr by total strontium analysis, and ^{239}Pu by alpha spectroscopy in accordance with the SAP (Work Plan Appendix A [APTIM, 2019]). Gamma spectroscopy data were reported by the off-site laboratory following the 21-day ingrowth period. Table 12 provides concrete sample results and Appendices I and J provide the data validation and analytical laboratory data reports, respectively. Sample results are discussed in Section 6.3.

4.4 Waste Management

A waste management plan was prepared to allow for proper storage, characterization, and disposal of liquid and solid waste generated during the field activities. Investigation-derived waste was managed in accordance with the waste management plan (Appendix C of the Work Plan [APTIM, 2019]). Investigation-derived waste generated during survey activities that did not meet the project free-release criteria was compiled as low-level radioactive waste and included personal protective equipment. Investigation-derived waste was loaded into a roll-off container as low-level radioactive waste and characterized by the Navy's waste broker prior to being transported to an off-site disposal facility for final disposition.

4.5 Demobilization

Demobilization from the project site occurred on November 22, 2019, and consisted of surveying and removing the equipment and materials, cleaning the project site, and removing personnel from the site.

5.0 Survey Instrumentation

Commercially available radiation detection and measurement instrumentation was selected based on reliable operation, detection sensitivity, operating characteristics, and expected performance in the field. Radiological survey instruments suitable for the physical and environmental conditions at the site were selected. Table 3 provides details about the selected instruments. The instruments and measurement methods selected were suitable for detection of project ROCs (^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr) with sensitivity (i.e., detection limits) that were below applicable survey criteria based on initial site assumptions, except as noted in Section 3.4.4. The PRSO verified the instrument capabilities.

5.1 Instrument Calibration

At a minimum, calibrations of radiation detection instruments were performed annually and after major repairs. Calibrations were performed by a qualified vendor with National Institute of Standards and Technology (NIST) traceable sources.

5.2 Instrument Operational Checks

APTIM operational procedures included in the *Radiation Protection Plan, Radiological Work Tasks, Remedial Action and Maintenance of Remedies at Hunters Point Naval Shipyard, San Francisco, California* (APTIM, 2017b) or equivalent subcontractor procedures, reviewed and approved by APTIM, were used for field instruments to verify the equipment was operating properly and used correctly in the field to produce accurate and reliable data. Field instrument checks verified instrument response and were performed at the beginning and end of each day of use. If the field instrument checks revealed the instrument was outside established response tolerances, the instrument was marked "out of service." If necessary, the instrument was returned to the manufacturer for immediate repair and servicing. The APTIM PRSO evaluated surveys performed with an instrument that failed post-use operational (background and/or source response) checks and the data were re-collected with an equivalent instrument. At a minimum, calibration records contain the following information:

- Instrument name and identification number (e.g., model and serial number)
- Manufacturer
- Date of calibration

- Calibration due date
- Name of company and person performing the calibration
- Calibration points
- Results of the calibration
- Calibration source documentation (e.g., serial number, certification, radionuclides)

5.3 Instruments for the Measurement of Gamma Surface Activity

Gamma surface scans were performed using the RS-700 as a towed array. A 3-inch by 3-inch NaI detector was used for areas that were not accessible to the RS-700.

5.3.1 RS-700 Large Area Sodium Iodide

The RS-700 consists of an RSI RS-701 integrated controller and data acquisition system, a digital gamma ray spectrometer/multi-channel analyzer, a data controller, two RSX-1 4-liter (256 cubic inch) NaI gamma scintillation detectors, an internal GPS, and an external high-resolution Trimble Pro XH GPS receiver. The system is operated using the RS-700 RSI "RadAssist" software, which displays real-time data collection, both as a NaI spectrum and as count rates. Radiation and location information are collected by the system at a very high data transfer rate (nominally one data point per second), and stored in an uncorruptible data file for real-time feedback and data validation/post-processing. The system operator receives real-time feedback using waterfall plots of total response and geo-referenced mapping of relative radiation concentrations.

The field of view of any NaI detector without a shield or collimator is a sphere surrounding the detector, and the response to a radiation source is proportional to the inverse of the square of the distance from the detector. For the RS-700 detector, the detector response 50 centimeters from the end of the detector was modeled to be 82.6% of the response with the same source centered beneath the detector. The field of view for two RS-700 detectors arranged end to end was experimentally determined to be a distance slightly greater than one meter (1.065 meters). A point source located within one meter of the edge of either RS-700 detector would have a response greater than or equal to 80% of the response of a point source located directly under the center of the detector. Scanning parallel paths approximately one meter apart means the

outside edges of the detectors overlap by approximately 10 centimeters, so the field of view of the detectors overlaps to provide 100% coverage.

The RS-700 maintained scan speeds of 1 meter per second or less. This scan speed resulted in a minimum detectable concentration during scanning of a point source containing 83 pCi of Ra-226 activity, which corresponds with 0.00017% of an intact deck marker.

5.3.2 3-Inch by 3-Inch Sodium Iodide

The handheld gamma scan equipment consists of a Ludlum Model 44-20 3-inch by 3-inch NaI gamma scintillation detector coupled with a Ludlum Model 2221 ratemeter/scaler. Position correlation of the gamma scan results is provided by a high-resolution GPS receiver. Static measurements were collected using a Ludlum Model 44-20 3-inch by 3-inch NaI gamma scintillation detector coupled with a Ludlum Model 2221 ratemeter/scaler handheld instrument.

The field of view of the uncollimated and unshielded Ludlum Model 44-20 should be the same as the RS-700 since both detectors are NaI scintillation detectors. For conservatism the field of view of the Ludlum Model 44-20 is assumed to be 50 centimeters from the center of the detector, providing a field of view approximately one meter wide. Scanning along parallel paths approximately 0.5 meters apart provides overlap of the detector field of view and provides 100% coverage.

The Model 44-20 3-inch by 3-inch NaI gamma scintillation detector maintained scan speeds of 0.5 meter per second or less. This scan speed resulted in a minimum detectable concentration during scanning of a point source containing 71 pCi of Ra-226 activity, which corresponds with 0.00014 percent of an intact deck marker.

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5.3.3 Canberra InSpector 1000

The Canberra InSpector 1000 Nuclide Identifier was used to assess follow-up locations, using a five-minute or greater static count and spectral analysis to compare the activity at a specific point to background. In this case, the net spectrum was plotted and the critical levels assessed for ROC-specific energy ranges to determine if there was activity present above background. Critical levels, as defined in the MARSSIM Section 6.7.1 (EPA et al., 2000), represent thresholds above which net counts are statistically greater than background. The critical value of the net background count was

calculated as described in Section 4.3.4 and added to the background to compare individual results with background.

The InSpector 1000 was used to evaluate locations where previous investigations had identified elevated levels of gamma radiation, or locations where previous investigation had identified elevated levels of alpha radiation and sample collection was not possible. The InSpector 1000 was used as a nuclide identifier to associate the most prevalent photons with likely source radionuclides based on photon energy. The InSpector 1000 was set up to evaluate photons with energies between 50 and 2,000 kiloelectronvolts and was sensitive to photons emitted by all radionuclides of concern for this project. The InSpector 1000 was not used for quantitative measurements; therefore, no quantitative estimates of detectability were required.

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5.4 Instruments for the Measurement of Alpha/Beta Surface Activity

Measurements of total alpha and total beta radiation were performed over 25 percent of accessible surface area as part of this survey. Total alpha and total beta radiation was measured using scans and static measurements using a Ludlum Model 43-37 gas proportional detector connected to a Ludlum Model 2360 ratemeter/scaler, or equivalent.

5.4.1 Instrument Efficiency

The instrument efficiency (ε_i) is defined as the ratio between the net count rate (cpm) of the instrument and the surface emission rate of the calibration source for a specified geometry. The surface emission rate is the 2π particle fluence affected by both the attenuation and backscatter of the radiation emitted from the calibration source.

The following equation was used to calculate the instrument efficiency in counts per particle, although efficiency is typically reported unitless.

$$\varepsilon_i = \frac{R_{S+B} - R_B}{q_{2x}\left(\frac{W_A}{S_A}\right)}$$

Where:

ε_i = instrument efficiency (count per particle)

R_{S+B} = the gross count rate of the calibration measurement (cpm)

R_B = the background count rate (cpm)

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q_{2x}	=	surface emission rate of the calibration source (NIST-traceable) (particles per minute)
W_A	=	active area of the detector window (cm^2)
S_A	=	area of the source (cm^2)

The instrument efficiency was determined by obtaining static counts with the detector over a calibration source that has an NIST-traceable surface emission rate. The 2π particle fluence rate was corrected for decay, attenuation, and scatter. Then the surface emission rate of the source was corrected for the area subtended by the probe. For example, the beta efficiency based on a NIST-traceable ^{90}Sr plate source for Ludlum Model 2360 (serial No. 245779) equipped with a Ludlum Model 43-37 probe (serial No. PR190618) is provided as follows:

$$\varepsilon_i = \frac{(96{,}473\ \text{cpm}) - (648\ \text{cpm})}{(231{,}840\ \text{particles per minute})} = 0.413\ \text{counts per particle}$$

Factors that can also affect the instrument's efficiency are discussed below:

- **Efficiency Check Sources**—Efficiency check sources that emit alpha or beta radiation with energies similar to those expected from the contaminant were used in the field (^{230}Th and ^{90}Sr).
- **Source Geometry Factors**—Instrument efficiency was determined with an efficiency check source with an area smaller than the Ludlum Model 43-37 probe, so the source was placed at three different positions to cover the entire surface of the probe. A conversion factor was applied to account for the active region of the probe relative to the area of the check source.
- **Source-to-Detector Distance**—The detector efficiency was calculated at a source-to detector distance the same as the detector-to-surface distance used in the field. The probe was placed directly on the surface for scan and static measurements, so one efficiency was developed for both types of measurements.

5.4.2 Surface Efficiency (ε_s) for Surface Activity Measurements

The surface efficiency is defined as the ratio between the 2π surface emission rate of a source and the number of particles created or released within the source or the saturation layer thickness per unit time. International Organization for Standardization (ISO) (2016) Publication No. ISO-7503-1 and NRC (1998) Publication No. NUREG-1507 provide conservative recommendations for surface efficiencies.

ISO-7503-1 recommends a surface efficiency of 0.5 for maximum beta energies exceeding 0.4 megaelectron volts (MeV) and 0.25 for beta energies between 0.15 and 0.4 MeV and for alpha emitters. NUREG-1507 provides surface efficiencies based on studies performed for the NRC. In general, NUREG-1507 indicates that the ISO rule-of-thumb for surface efficiencies is conservative, particularly for beta-emitting radionuclides with endpoint energies between 0.25 and 0.4 MeV. ^{137}Cs has a beta endpoint energy of 0.514 MeV, ^{90}Sr has a beta endpoint energy of 0.546 MeV, and yttrium-90 has a beta endpoint energy of 2.28 MeV. Therefore, a surface efficiency of 0.5 was used for maximum beta energies exceeding 0.4 MeV and a surface efficiency of 0.25 was used for alpha emitters.

5.4.3 Calculation of Surface Activity

Calculations of surface activity (A) in units of dpm/100 cm^2, were performed according to the following equation provided in ISO-7503-1 (ISO, 2016):

$$A = \frac{R - B}{(\varepsilon_i)(\varepsilon_s)(W)}$$

Where:

R = detector count rate (cpm)
B = background count rate (cpm)
ε_i = instrument 2π efficiency (unitless)
ε_s = surface or source efficiency (unitless)
W = physical probe area (cm^2)

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Detector blank count rates were calculated using background reference area data. Table 3 provides the equipment used to perform surface activity measurements.

5.5 Instrument for Measurement of Smear Samples

Removable alpha and beta radiation were measured using smears counted using a Ludlum Model 2929 sample counter. Table 3 describes the sample counter uses a dual phosphor detector for the radiation detector.

Calculations of removable surface activity using smears was calculated using the following equation:

$$A = \frac{R - B}{\varepsilon_T(W)}$$

Where R, B, and W are the same variables used for calculating surface activity, and ε_T is the total efficiency determined for the smear counter using a NIST-traceable standard.

Count times for smears were set at 1 minute for surface smear measurements and 10 minutes for background measurements. Table 4 provide actual instrument parameters determined in the field.

6.0 Radiological Scoping Survey Results

The following subsections present the results of the radiological scoping survey.

6.1 Gamma Survey Results

Gamma surveys were performed, as discussed in Section 4.3. The following subsections describe the gamma survey results for each SU.

6.1.1 Gamma Scan Survey Results

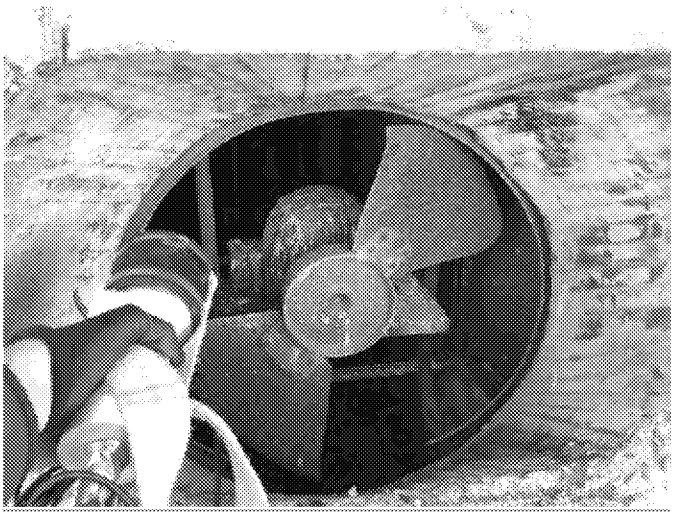
Gamma scans were performed in each SU, as described in Section 4.3.2. Gamma scans were performed over 100 percent of the accessible surfaces of each SU.

Scan data were processed as follows:

- The measurements were plotted as color-coded filled contours for visual review and evaluation.
- The mean and standard deviation of each SU was calculated.
- The location of the highest gamma count rate per SU was determined.
- The difference between each data point and the average of the data points was calculated and divided by the standard deviation of the SU measurement set. This converted the measurements to multiples of the standard deviation above or below the average count rate of the SU (z-scores). The z-scores were plotted as color-coded filled contours for visual review and evaluation, where the color-coding was based on multiples of SU standard deviation.
- Areas exhibiting a z-score greater than three were further investigated in comparison to the IL. The geospatial plot was visually inspected to identify anomalies in the distribution of measurement data.

6.1.1.1 Survey Unit 1

SU 1 consisted of horizontal and vertical surfaces in Drydock 1 and Ship Berth 61. SU 1 also contained manholes and grates (Figure 6). Impellers were also accessible for gamma scans. After the gamma scan data were collected and processed, 22 locations exceeded the gamma scan IL. Figures 7, 8, 9, and 10 present gamma scan results for horizontal, vertical, manholes/grates, and impellers, respectively. An example of an impeller is provided in Photograph 1.



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Photograph 1—Survey of Impeller

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6.1.1.2 *Survey Unit 2*

SU 2 consisted of horizontal and vertical surfaces in Drydock 6. SU 2 also contained manholes and grates (Figure 11). Impellers were also accessible for gamma scans. After the gamma scan data were collected and processed, a total of 16 locations exceeded the gamma scan IL. Figures 12, 13, 14, and 15 present gamma scan results for horizontal, vertical, manholes/grates, and impellers, respectively.

6.1.1.3 *Survey Unit 3*

SU 3 consisted of horizontal and vertical surfaces in Drydock 7 and Ship Berths 62, 63, and 64. SU 3 also contained manholes and grates (Figure 16). Impellers on Drydock 7 were also accessible for gamma scans. After the gamma scan data were collected and processed, a total of 37 locations exceeded the gamma scan IL. Figures 17, 18, 19, 20, and 21 present gamma scan results for Drydock 7 horizontal, Ship Berths 62 and 63 vertical, Drydock 7 and Ship Berth 64 vertical, manholes/grates, and impellers, respectively.

Gamma scans performed on horizontal surfaces in Ship Berths 62 and 63 were limited to accessible perimeter locations (Section 4.3.2) and are included with the Ship Berths 62 and 63 vertical scan data.

6.1.2 Gamma Bias Static Measurement Results

Gamma bias measurements were performed at each location where the gamma scan IL was exceeded. Table 6 summarizes gamma bias static measurement results.

6.1.2.1 Survey Unit 1

Gamma static measurements were performed at the 22 locations that exceeded the gamma scan IL. None of these static measurements exceeded the gamma static IL. Figure 22 presents results. Table 6 provides gamma static measurement statistics.

6.1.2.2 Survey Unit 2

Gamma static measurements were performed at the 16 locations that exceeded the gamma scan IL. One of these static measurements exceeded the gamma static IL (location SU2-GB1 was 14,742 cpm, which exceeded the gamma static IL of 14,421 cpm). Figure 23 presents results. Table 6 provides gamma static measurement statistics.

6.1.2.3 Survey Unit 3

Gamma static measurements were performed at the 37 locations that exceeded the gamma scan IL. Eight of these static measurements exceeded the gamma static IL (locations SU3-GB9 through -GB14 and locations SU3-GB16 and -GB17 ranged from 14,911 cpm to 18,183 cpm, which exceeded the gamma static IL of 14,421 cpm). Figure 24 presents results. Table 6 provides gamma static measurement statistics.

6.1.3 In Situ Gamma Spectroscopy Results

In situ gamma spectroscopy measurements were collected at the one location in SU 2 and eight locations in SU 3 that exceeded the gamma static IL with a Canberra InSpector 1000. An in situ gamma spectroscopy measurement was also collected at one location in a manhole in SU 2 that exceeded the alpha release criterion of 100 dpm/100 cm^2 and was inaccessible for sample collection. The net spectrums were plotted and the critical levels assessed for ROC-specific energy ranges to determine if there was ROC-specific activity present above background. The critical value of the net background count was calculated as described in Section 4.3.4 and added to the background to compare individual results with background. The spectral analysis did not identify elevated gamma activity indicating contamination associated with former Navy activities.

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In situ gamma spectroscopy locations SU2-GB1, SU3-GB16, and SU3-GB17 were located at the base of the concrete wall inside the submarine pens along the concrete walkways. Large blocks of concrete (approximately two feet by two feet by eight feet) were also located along the concrete walkways in SU2 and SU3 (see Photograph 2). Gamma scans, gamma statics, and in situ gamma spectroscopy measurements were performed by lowering the detector between the concrete block and the concrete wall (Photograph 3).

In situ gamma spectroscopy locations SU3-GB9 through -GB14 were located along the outside eastern edge of SU3 where the submarine pen attached to the shore. The vertical wall in this area is zero to two feet of concrete over an area of riprap installed to limit erosion and protect the shoreline. The gamma scan, gamma static, and in situ gamma spectroscopy measurements were performed by suspending the detector over the edge of the concrete just above the riprap (see Photograph 4). The highest gamma static result of 18,183 cpm was recorded at bias location SU3-GB14 (see Photograph 5). A gamma static measurement at a random location on the riprap recorded a result of 20,643 cpm (see Photograph 6).

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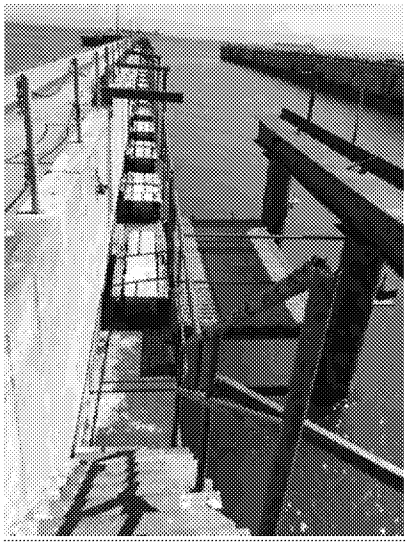

Photograph 2—Large Blocks of Concrete in SUs 2 and 3

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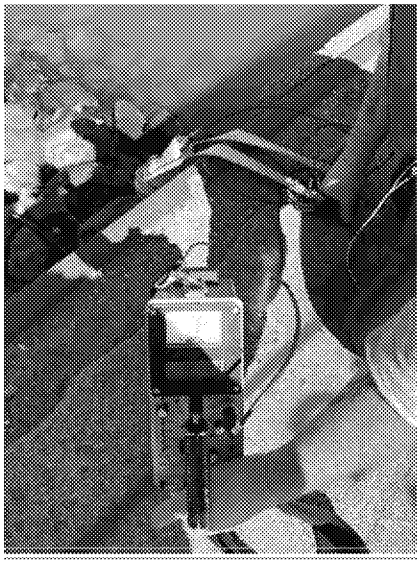
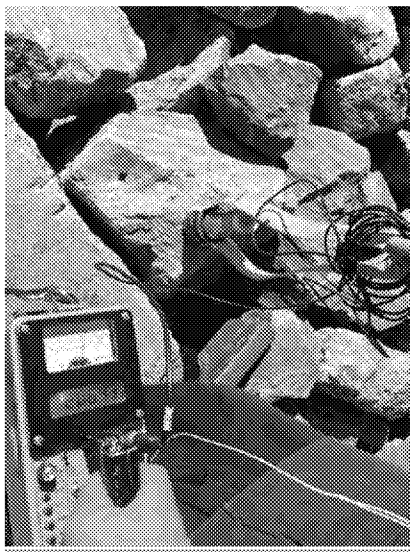
Photograph 3—Gamma Static Measurement Collected Behind Concrete Block

Photograph 4—Gamma Static Measurement Collected On Eastern Edge of SU 3



Photograph 5—Highest Gamma Static Result in SU 3



Photograph 6—Gamma Static Result on Rip Rap

The most likely reason that these measurements on vertical concrete walls exceeded the gamma static IL is due to geometry effects of natural radioactivity entering the NaI detector from multiple surfaces and materials simultaneously.

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The location in the manhole in SU2 that exceeded the alpha static IL is due to an increase in naturally occurring radiation and is not associated with naval operations. Appendix F presents the gamma spectral analysis results.

6.2 Alpha/Beta Survey Results

Alpha/beta surveys were performed, as described in Section 4.3. The following subsections provide alpha/beta survey results.

6.2.1 Alpha/Beta Scan Survey Results

Alpha/beta scans were performed over at least 25 percent of the accessible surfaces of each SU, as described in Section 4.3.5. The following subsections and Table 7 summarize the alpha/beta scan survey results.

6.2.1.1 Survey Unit 1

The approximate size of SU 1 was 1,318 m^2. A total of 7,589 alpha/beta scan measurements were performed over the accessible horizontal and vertical surfaces of SU 1 representing 34 percent of the SU. Of the measurements, a total of 798 measurements (11 percent) exceeded the alpha release criterion of 100 dpm/100 cm^2, and no measurements exceeded the beta release criterion of 1,000 dpm/100 cm^2. Alpha and beta two-minute bias static measurements were performed at the 20 most elevated scan locations (Section 6.2.3) and on surfaces in 11 manholes, grates, and impellers.

Table 7 summarizes SU 1 alpha/beta scan measurements. Appendix G provides raw data. Figures 25 and 26 visually present SU 1 alpha scan measurements collected on horizontal and vertical surfaces, respectively. Figures 27 and 28 visually present SU 1 beta scan measurements collected on horizontal and vertical surfaces, respectively.

6.2.1.2 Survey Unit 2

The approximate size of SU 2 was 1,247 m^2. A total of 6,677 alpha/beta scan measurements were performed over the accessible horizontal and vertical surfaces of SU 2 representing 26 percent of the SU. Of the measurements, a total of 353

measurements (5 percent) exceeded the alpha release criterion of 100 dpm/100 cm^2, and no measurements exceeded the beta release criterion of 1,000 dpm/100 cm^2. Alpha and beta two-minute bias static measurements were performed at the 20 most elevated scan locations (Section 6.2.3) and on surfaces in 12 manholes, grates, and impellers.

Table 7 summarizes SU 2 alpha/beta scan measurements. Appendix G provides raw data. Figure 29 and 30 visually present SU 2 alpha scan measurements collected on horizontal and vertical surfaces, respectively. Figures 31 and 32 visually present SU 2 beta scan measurements collected on horizontal and vertical surfaces, respectively.

6.2.1.3 Survey Unit 3

The approximate size of SU 3 was 1,932 m^2. A total of 9,360 alpha/beta scan measurements were performed over the accessible horizontal and vertical surfaces of SU 3 representing 28 percent of the SU. Of the measurements, a total of 997 measurements (11 percent) exceeded the alpha release criterion of 100 dpm/100 cm^2, and no measurements exceeded the beta release criterion of 1,000 dpm/100 cm^2. Alpha and beta two-minute bias static measurements were performed at the 20 most elevated scan locations (Section 6.2.3) and on surfaces in 10 manholes, grates, and impellers.

Table 7 summarizes SU 3 alpha/beta scan measurements. Appendix G provides raw data. Figures 33 and 34 visually present SU 3 alpha scan measurements collected on horizontal and vertical surfaces, respectively. Figures 35 and 36 visually present SU 3 beta scan measurements collected on horizontal and vertical surfaces, respectively.

6.2.2 Alpha/Beta Systematic Static Measurement Results

A total of 54 alpha/beta systematic samples were collected per SU, as described in Section 4.3.6. The following subsections discuss the results.

6.2.2.1 Survey Unit 1

A total of 54 two-minute systematic static measurements were collected in SU 1 (Figure 3). Thirteen of the 54 measurements exceeded the alpha release criterion of 100 dpm/100 cm^2. None of the measurements exceeded the beta release criterion of 1,000 dpm/100 cm^2. Table 8 summarizes these results. Concrete samples were

collected at the 13 locations where the SU 1 static measurement results exceeded the release criteria (Section 6.3) (Table 12).

6.2.2.2 Survey Unit 2

A total of 54 two-minute systematic static measurements were collected in SU 2 (Figure 4). Eight of the 54 measurements exceeded the alpha release criterion of 100 dpm/100 cm^2. None of the measurements exceeded the beta release criterion of 1,000 dpm/100 cm^2. Table 8 summarizes these results. Concrete samples were collected at the eight locations where the SU 2 static measurement results exceeded the release criteria (Section 6.3) (Table 12).

6.2.2.3 Survey Unit 3

A total of 54 two-minute systematic static measurements were collected in SU 3 (Figure 5). Four of the 54 measurements exceeded the alpha release criterion of 100 dpm/100 cm^2. None of the measurements exceeded the beta release criterion of 1,000 dpm/100 cm^2. Table 8 summarizes these results. Concrete samples were collected at the four locations where the SU 3 static measurement results exceeded the release criteria and at an additional nine locations that did not exceed the release criteria (Section 6.3) (Table 12).

6.2.3 Alpha/Beta Bias Static Measurement Results

Biased alpha/beta static measurements were collected in SUs 1, 2, and 3. One bias alpha/beta static measurement was also collected in each of the manholes, impellers, and other components (as applicable) in each SU. The following subsections discuss the results.

6.2.3.1 Survey Unit 1

A total of 20 two-minute biased static measurements were collected in SU 1 at the most elevated alpha scan measurement result locations (Figure 37). A total of 11 two-minute biased static measurements were collected in SU 1 on manhole, impeller, and other component surfaces. None of the bias static measurements exceeded either the alpha or beta release criterion. Table 9 summarizes these results.

6.2.3.2 Survey Unit 2

A total of 21 two-minute biased static measurements were collected in SU 2 at the most elevated alpha scan measurement result locations (Figure 38). A total of 12 two-minute biased static measurements were collected in SU 2 on manhole, impeller, and other component surfaces. One of the measurements in a manhole exceeded the alpha release criterion of 100 dpm/100 cm^2. Due to the location being inside the manhole, it was inaccessible for concrete sampling, and an in situ gamma spectroscopy measurement was collected at this location. In situ gamma spectroscopy results are discussed in Section 6.1.3. None of the bias static measurements exceeded either the alpha or beta release criterion. Table 9 summarizes these results.

6.2.3.3 Survey Unit 3

A total of 48 two-minute biased static measurements were collected in SU 3 at the most elevated alpha scan measurement result locations (Figure 39). Twenty-eight of the biased static measurements were located on horizontal surfaces, and 20 biased static measurements were located on vertical surfaces. A total of 11 two-minute biased static measurements were collected at 10 locations in SU 3 on manhole, impeller, and other component surfaces. None of the bias static measurements exceeded either the alpha or beta release criterion. Table 9 summarizes these results.

6.2.4 Alpha/Beta Smear Measurement Results

Smears were collected in SUs 1, 2, and 3 at systematic and biased locations where a two-minute static measurement was performed, as described in Section 4.3.7. One smear was also collected in each of the manholes, impellers, and other components (as applicable) in each SU. The following subsections provide smear results.

6.2.4.1 Survey Unit 1

No removable alpha/beta activity measurements exceeded the release criterion in SU 1. Table 10 summarizes survey results for smears collected at systematic locations and Table 11 summarizes survey results for smears collected at bias locations.

6.2.4.2 Survey Unit 2

No removable alpha/beta activity measurements exceeded the release criterion in SU 2. Table 10 summarizes survey results for smears collected at systematic locations and Table 11 summarizes survey results for smears collected at bias locations.

6.2.4.3 Survey Unit 3

No removable alpha/beta activity measurements exceeded the release criterion in SU 3. Table 10 summarizes survey results for smears collected at systematic locations and Table 11 summarizes survey results for smears collected at bias locations.

6.3 Solid Sample Laboratory Analysis Results

Concrete samples were collected at locations where the alpha static measurement results exceeded the alpha release criterion to determine the nature and extent of the increased alpha activity. Figure 40 shows concrete sample locations for SUs 1, 2, and 3. Concrete chip samples were collected from each location and sent to the off-site laboratory for analysis, as described in Section 14.2 of the SAP (Work Plan Appendix A [APTIM, 2019]). A total of 13 concrete samples were collected from SU 1, 8 samples from SU 2, and 13 samples from SU 3. release criterion. Final data evaluation of results confirmed four locations exceeding the alpha static release criterion in SU 3; however, all 13 samples were analyzed by the laboratory. The results of all 34 concrete samples are included in this report.

Figure 40 shows the locations where concrete samples were collected in SUs 1, 2, and 3. Table 12 summarizes the concrete sample results. Thirty-three of the 34 concrete sample results reported ^{226}Ra concentrations above the detection limit and the project quantitation limit goal of 0.2 picocurie per gram (pCi/g) listed in Worksheet #15.1 in the SAP (Work Plan Appendix A [APTIM, 2019]). Detected ^{226}Ra concentrations ranged from 0.111 to 0.675 pCi/g. Concrete is made up of aggregates, many of which contain naturally occurring ^{226}Ra. Naturally occurring ^{226}Ra has been reported in limestone (0.42 pCi/g), sandstone (0.71 pCi/g), and shale (1.1 pCi/g), and the mean concentration for ^{226}Ra in typical igneous rock is 1.3 pCi/g (California Environmental Protection Agency, 2006). Based on the natural concentrations in various rocks and stone, the ^{226}Ra concentrations detected in the project samples are consistent with natural background and not related to Navy historical activities.

Five concrete samples identified ^{239}Pu and plutonium-240 at concentrations above the detection limit, but all five results were below the project quantitation limit goal of 0.1 pCi/g. No other sources of alpha activity were identified by the concrete sample analyses.

6.4 Data Quality Review

The scoping survey results were reviewed and evaluated to determine if the data quality achieved in the field met the survey objectives and DQOs described in the SAP (Work Plan Appendix A [APTIM, 2019]) and determine data usability.

6.4.1 Data Quality Indicators

Precision measures the reproducibility of measurements under a given set of conditions. Accuracy measures the bias of an analytical system by comparing the difference of a measurement with a reference value. Precision and accuracy of field instruments was determined by performing daily checks to monitor instrument performance. Appendix E provides the results of the daily field instrument QC checks.

Representativeness is the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. It is a qualitative parameter that depends on proper survey design. Gamma scan surveys were representative because they covered 100 percent of the accessible surfaces. Alpha and beta scan surveys were representative because they covered at least 25 percent of the total area and included locations where gamma scan readings exceeded the IL. Alpha and beta static and smear locations were representative because they included systematic locations covering the entire surface, as well as bias locations to investigate locations where results exceeded an IL and judgment locations to investigate locations of interest (e.g., impellers, manholes, grates).

Completeness is a measure of whether the data necessary to meet the project have been collected. For the data to be considered complete, they must meet acceptance criteria including accuracy and precision and other criteria specified for an analytical method. The survey objectives for scanning 100 percent of accessible surfaces for gamma radiation and 25 percent of accessible surfaces for alpha and beta radiation were achieved. Alpha and beta static and smear measurements were performed at the required number of systematic measurement locations. Alpha and beta static and smear measurements were performed at the 20 locations with the highest alpha scan measurement results in each SU. Concrete samples were collected to complete the investigations of the submarine pens, and concrete samples collected were analyzed and the analytical results validated. Appendices I and J include data validation reports and analytical laboratory data packages, respectively.

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another, whether it was generated by a single laboratory or during inter-laboratory studies. Comparability is not compromised provided the survey design is unbiased and the survey design or analytical methods are not changed over time. The use of standardized field and analytical procedures ensures comparability of analytical data.

6.4.2 Gamma Scan Survey Results Data Quality Review

The objective of performing gamma scan surveys was to identify localized areas of elevated ^{226}Ra activity and to identify and support removal of discrete sources (e.g., deck markers). The objective of identifying areas of localized elevated gamma radiation was achieved and no discrete sources of gamma radiation were discovered.

The review of the gamma scan data identified some differences between individual data sets. The gamma scans on horizontal surfaces in SU 2 using the RS700 detectors were approximately 10 to 15 percent higher than the gamma scan data collected in SU 1 and SU 3. In addition, approximately 5 percent of the gamma scan data collected with the 3-inch by 3-inch NaI detector on horizontal surfaces in SU 2 were higher than expected from a normal distribution of data. This indicates a difference in gamma radiation levels on horizontal surfaces in open areas of SU 2. Sixteen gamma static measurements and one in situ gamma spectroscopy measurement were performed in SU 2 to investigate potentially elevated results.

The gamma scan data from Ship Berths 62 and 63 show multiple distributions. These results reflect the multiple materials present in Ship Berths 62 and 63, which include metal, concrete, and soil. The gamma scan data were divided into data collected from metal and concrete surfaces as much as practical. Seventeen gamma static measurements were performed to investigate elevated gamma scan readings on surfaces at Ship Berths 62 and 63.

The remaining gamma scan data sets appear similar and are comparable.

Gamma sensitivity was addressed during planning based on the probability of detecting discrete sources of gamma radiation (i.e., ^{226}Ra deck markers).

6.4.3 Gamma Static Measurement Results Data Quality Review

The objective of the gamma static measurements was to investigate gamma scan results above the IL to determine if the gamma scan results were anomalous readings

(false positives) or if the gamma scan readings identified areas with elevated gamma radiation. This objective was accomplished, and areas of elevated gamma radiation were identified for additional investigation using in situ gamma spectroscopy.

Gamma static data were collected using the same instrument used to perform a portion of the gamma scan surveys, therefore the gamma static data are comparable with gamma static data collected in other SUs. Gamma static measurements were performed in contact with the surface being investigated, but are still considered comparable with the gamma scan survey measurements performed with the detector suspended 15 cm (6 inches) above the surface because gamma rays are not significantly attenuated by air.

Gamma static measurements were performed at bias locations to evaluate gamma scan results exceeding the IL, so gamma static measurements are representative of the location where the measurement was performed. Gamma static measurement results exceeding the IL may not be representative of radiological conditions across the entire SU.

The sensitivity of gamma static measurements was improved relative to gamma scan measurements by using one-minute static counts in place of the one-second counts used for scanning.

6.4.4 In Situ Gamma Spectroscopy Measurement Results Data Quality Review

The objective of performing in situ gamma spectroscopy measurements was to determine if elevated gamma scan results confirmed by gamma static measurements were associated with historical naval operations or were associated with naturally occurring radioactive materials in the surface material. This objective was accomplished, and no areas of elevated gamma radiation were associated with project ROCs.

No differences in the in situ gamma spectroscopy results were identified. All in situ gamma spectroscopy measurement results are comparable.

The in situ gamma spectroscopy measurements were counted a sufficient amount of time to identify peaks in seven different regions of interest in the gamma spectrum. Appendix F includes details in the regions of interest and the radionuclides associated with each region of interest, as well as copies of the gamma spectra collected at bias locations. If counts in the regions of interest increased by approximately the same

amount and no additional peaks were observed, the increased gamma radiation resulted from variations in naturally occurring radionuclides and was not identified as contamination. The InSpector 1000 was set up to evaluate photons with energies between 50 and 2,000 kiloelectronvolts and was sensitive to photons emitted by all radionuclides of concern for this project. The InSpector 1000 was not used for quantitative measurements; therefore, no quantitative estimates of detectability were required.

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6.4.5 Alpha/Beta Scan Measurement Results Data Quality Review

The objective of performing alpha and beta scan surveys was to identify localized areas of elevated activity. Alpha scan sensitivity did not meet the survey objectives and did not agree with the scan MDC values developed during planning. Alpha scanning was capable of identifying areas of alpha activity potentially exceeding 300 dpm/100 cm^2 for additional investigation. Beta scanning was able to accomplish the objective of identifying areas potentially exceeding the release criterion of 1,000 dpm/100 cm^2.

No differences were observed in the alpha or beta scan measurements performed on horizontal or vertical surfaces, or on surfaces with different materials. No differences were observed between the different instruments used to perform the alpha and beta scan measurements in the submarine pens. The alpha and beta scan measurements are comparable.

Alpha scan sensitivity did not meet the survey objectives and did not agree with the scan MDC values developed during planning. One contribution to the difference was the higher RBA count rates encountered in the field. The distribution of alpha scan results also contributed to differences between the planned scan MDC and what was actually accomplished in the field. Scan MDC calculations assume a Poisson distribution. A Poisson distribution has the characteristic where the square root of the average value equals the standard deviation. The standard deviations measured for the alpha scan data were significantly higher than expected based on a Poisson distribution. The higher than expected variability in the alpha scan data resulted from a variety of factors, including environmental conditions. Variations in temperature, atmospheric pressure, humidity, and wind speed were contributing factors. The distributions of alpha scan data for SUs 1, 2, and 3 were consistent and resulted in bell-shaped curves with relatively few potential outliers but were not consistent with a normal distribution. An upper prediction limit for each alpha scan data set was calculated at the 95 percent confidence level to identify statistical outliers. Using the upper prediction limits identified, five, one, and eight potential outliers in SUs 1, 2, and 3, respectively, as elevated results requiring

investigation based on the observed distribution of data. Based on this observation, it was decided that performing bias alpha and beta static measurements at the locations with the 20 highest scan results would accomplish the survey objectives.

The alpha scan MDC calculations and upper prediction level calculations identified upper bounds on the alpha scan data in the 200 to 250 dpm/100 cm^2 range. MARSSIM (EPA et al., 2000) Section 5.5.2.4 provides for increasing the number of measurements performed in a survey unit to account for MDC values that do not achieve the survey objectives. The number of measurements in each survey unit was increased by a factor of 3 to allow for an alpha scan MDC as high as 300 dpm/100 cm^2. A minimum of 54 alpha and beta static measurements were performed in each SU to account for the scan MDC not achieving the survey objective of measuring concentration below the specified release criteria and ILs. While the scan MDC for alpha scan surveys does not meet the project objectives, it still provides a technically defensible approach to surveys based on MARSSIM guidance.

The beta scan MDC was sensitive enough to meet the project objectives.

6.4.6 Alpha/Beta Static Measurement Results Data Quality Review

There were multiple objectives for performing alpha and beta static measurements. Static measurements were performed at systematic locations distributed over 100 percent of accessible surfaces to determine the average activity in each SU. Static measurements were performed at bias locations identified by the scan surveys to investigate results exceeding the IL to determine if the scan results were anomalous or represented elevated activity.

A review of the alpha static measurements identified bimodal distributions for systematic measurements performed in SUs 1, 2, and 3, as well as bias measurements on horizontal surfaces in SU 3. Concrete samples were collected at the location of static measurements results exceeding the alpha static release criterion of 100 dpm/100 cm^2. Because there are differences in data distributions caused by different background levels of inherent natural radioactivity in construction materials used in the submarine pens, care should be taken when performing other comparisons using the alpha static data sets.

A review of the beta static measurements identified binomial distributions for SU 1 systematic measurements. The beta static measurements have higher results for horizontal surfaces compared with vertical surfaces in SU 3 for Drydock 7. All beta static

measurements are less than 50 percent of the release criterion of 1,000 dpm/100 cm^2 and are comparable. However, because there are differences in data distributions caused by different background levels of inherent natural radioactivity in construction materials used in the submarine pens, care should be taken when performing other comparisons using the beta static data sets.

Static MDC calculations (Section 3.4.5) show both alpha and beta static measurements meet the sensitivity requirements of the survey.

6.4.7 Alpha/Beta Smear Measurement Results Data Quality Review

The purpose of smear measurements was to determine if there was removable alpha or beta activity at locations where static measurements were performed. Smear measurements were performed at every location where a static measurement was performed, systematic or bias, and this objective was accomplished.

The alpha and beta smear data are below the release criteria and follow similar distributions, so the smear data are comparable.

Smear MDC calculations (Section 3.4.6) show both alpha and beta smear measurements meet the sensitivity requirements of the survey.

6.4.8 Solid Sample Laboratory Analysis Results Data Quality Review

Concrete samples were collected at locations where the alpha static measurement release criterion was exceeded to provide supplemental information on the nature and extent of the elevated alpha activity. A laboratory data quality assessment was performed and included reviews the sampling holding times and preservation, laboratory method blanks, gamma spectroscopy and alpha/beta calibration, tracer compound recoveries, laboratory control samples, sample duplicate, sample identification, sample quantitation, reporting limits, and analytical and technical completeness. The data quality review determined the data are of good technical quality and meet project objectives. The data are usable and available for project decisions. Additional qualifiers were added to the detected Pu-239 results in five samples and detected total beta strontium results in another five samples. These results were flagged as estimated (i.e., J-flag) as these analyses had reported uncertainty that exceeded the reported result. Appendix H provides the data quality assessment summary for off-site analytical laboratory sample results.

7.0 Conclusions and Recommendations

This section includes the summary of field activities, conclusions, and recommendations.

7.1 Evaluation of Field Activities

A scoping survey of the submarine pens at HPNS was performed and consisted of the following:

- Gamma scan surveys
- Gamma statics and in situ gamma spectroscopy measurements
- Alpha/beta scan surveys
- Alpha/beta static measurements
- Alpha/beta smear measurements
- Sample collection and laboratory analysis

The following subsections provide a summary of the scoping survey activities performed and their results.

7.1.1 Gamma Scan Surveys

Gamma scans were performed over 100 percent of the accessible surfaces of each SU. A total of 74 gamma scan locations exceeded the IL and gamma static measurements were performed at the 74 locations.

7.1.2 Gamma Static and In Situ Gamma Spectroscopy Measurements

Gamma bias measurements were performed at each location where the gamma scan IL was exceeded. Table 6 summarizes gamma bias static measurement results. A total of nine bias gamma static measurement results exceeded the IL.

In situ gamma spectroscopy measurements were collected with a Canberra InSpector 1000 at one location in SU 2 and eight locations in SU 3 that exceeded the gamma static IL. Areas of elevated activity identified by the in situ gamma spectroscopy measurements were not associated with gamma-emitting ROCs. Appendix F presents the gamma spectral analysis results.

7.1.3 Alpha/Beta Scan Surveys

Alpha and beta scan surveys were performed, as described in Section 3.4.4. Table 7 summarizes the results of the alpha and beta scan surveys. A total of 23,626 scan measurements were performed for alpha and beta activity. A total of 2,148 alpha scan measurements (9 percent) exceeded the alpha scan IL of 100 dpm/100 cm^2. No measurements exceeded the beta scan IL of 1,000 dpm/100 cm^2. The alpha scan MDC achieved in the field exceeded the planned alpha scan MDC by more than a factor of two and exceeded the alpha scan IL of 100 dpm/100 cm^2 by a factor of two.

7.1.4 Alpha/Beta Static Measurements

Alpha and beta two-minute static measurements were performed at 54 systematic locations on a random-start triangular grid in each SU. A total of 162 alpha and beta static measurements were performed at systematic locations. A total of 25 alpha systematic static results exceeded the release criterion. No beta systematic static results exceeded the release criterion. Table 8 summarizes alpha and beta systematic static measurement results.

Alpha and beta two-minute static measurements were performed at locations with the highest alpha scan results in each SU. A total of 89 alpha and beta measurements were performed at bias locations. No alpha or beta bias static measurement results exceeded the release criterion. Table 9 summarizes the alpha and beta bias static measurement results.

7.1.5 Alpha/Beta Smear Measurements

Alpha and beta smear samples were collected at every location where alpha and beta static measurements were performed to measure removable activity at systematic and bias measurement locations. No removable alpha or beta activity measurements exceeded the release criteria in SUs 1, 2, or 3. Table 10 summarizes survey results for smears collected at systematic locations and Table 11 summarizes survey results for smears collected at bias locations.

7.1.6 Solid Sample Collection and Laboratory Analysis

Solid (concrete) samples were collected at locations where the alpha static measurement results exceeded the alpha release criterion to determine the nature and extent of the increased alpha activity. Samples were collected at 25 locations where the

two-minute alpha/beta static measurement results exceeded the alpha release criterion of 100 dpm/100 cm^2. An additional nine samples were also collected at nine locations in SU 3 where two-minute alpha/beta static measurement results did not exceed the alpha or beta release criterion. Figure 40 displays sample locations for SUs 1, 2, and 3 and Table 12 summarizes the results.

^{226}Ra was detected in 33 of the 34 concrete samples. Detected ^{226}Ra concentrations ranged from 0.111 to 0.675 pCi/g. Based on the natural concentrations in various rocks and stone, which range from 0.42 to 1.3 pCi/g (California Environmental Protection Agency, 2006), the ^{226}Ra concentrations detected in the project samples are consistent with natural background and not related to Navy historical activities. No other potential sources of elevated alpha activity associated with naval operations were identified by the concrete sample analyses.

7.2 Conclusions

The radiological scoping survey of the submarine pens identified several areas of alpha exceedances above the release criterion in SUs 1, 2, and 3. Based on analytical data, the alpha exceedances do not appear to be the result of historical Navy operations.

Gamma scan survey results and subsequent follow-up investigations did not identify areas of gamma contamination. Of the 23,626 alpha/beta scan measurements, 9 percent of the measurements exceeded the release criterion for alpha and no measurements exceeded the release criterion for beta. Biased static measurements were collected at locations with the highest alpha scanning results. No biased locations identified by alpha scanning exceeded the alpha static release criterion.

A total of 162 systematic samples were collected from the three SUs (54 samples per SU). Twenty-five systematic static locations exceeded the alpha release criterion and no systematic locations exceeded the beta criterion. Concrete samples were collected at locations where the alpha static measurement results exceeded the alpha release criterion to determine the nature and extent of the increased alpha activity. Thirty-four concrete samples were collected at the systematic locations and analyzed for ROCs. ^{226}Ra was detected in 33 of the 34 concrete samples. Detected ^{226}Ra concentrations ranged from 0.111 to 0.675 pCi/g. Based on the natural concentrations in various rocks and stone, which range from 0.42 to 1.3 pCi/g (California Environmental Protection Agency, 2006), the ^{226}Ra concentrations detected in the project samples are consistent with natural background and not related to Navy historical activities. No other potential

sources of elevated alpha activity associated with naval operations were identified by the concrete sample analyses.

Manholes, grates, and components of the suction and discharge system were surveyed. Six alpha scan locations exceeded the alpha release criterion and no measurements exceeded the beta release criterion. One manhole alpha static location exceeded the alpha release criterion (in SU 2); there were no manhole beta static exceedances. The location was not sampled because it was inaccessible; however, an in situ gamma spectroscopy measurement was collected and the elevated activity was determined to be due to naturally occurring radiation and not associated with historical naval operations.

While exceedances above the alpha static release criterion of 100 dpm/100 cm^2 were observed, concrete samples collected at these locations demonstrate the alpha activity is not from alpha-emitting ROCs ^{226}Ra and ^{239}Pu. Therefore, the survey results do not conclude that exceedances are the result of historical Navy operations. Based on the DQOs included in the Work Plan (APTIM, 2019), further investigation of the submarine pens is recommended.

7.3 Recommendations

Based on the radiological scoping survey results and DQOs included in the Work Plan (APTIM, 2019), it is recommended further investigation of the submarine pens focus on investigating alpha activity on concrete surfaces. Additional surveys will be designed to determine if residual alpha radioactivity is related to historical Navy activities or is naturally occurring in the materials used to construct the submarine pens.

There are several practical challenges associated with alpha scanning in outdoor environments at levels consistent with the release criteria listed in Table 1. Practical constraints for this scoping survey can be divided into two categories: physical and environmental. Physical constraints include the San Francisco Bay and tides, accessibility issues (large objects and abandoned equipment), safety considerations (working at height and over water), surface conditions (weathered surfaces, corroded metal, surface coatings, bird droppings). Environmental constraints include temperature, humidity, precipitation, wind (direction and speed). All of these variables resulted in additional variability and uncertainty associated with all radiation measurements, but these were most noticeable with alpha measurements.

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Due to these practical constraints, the survey may be limited to additional material (concrete) sampling to supplement static and smear measurements.

8.0 References

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FIGURES

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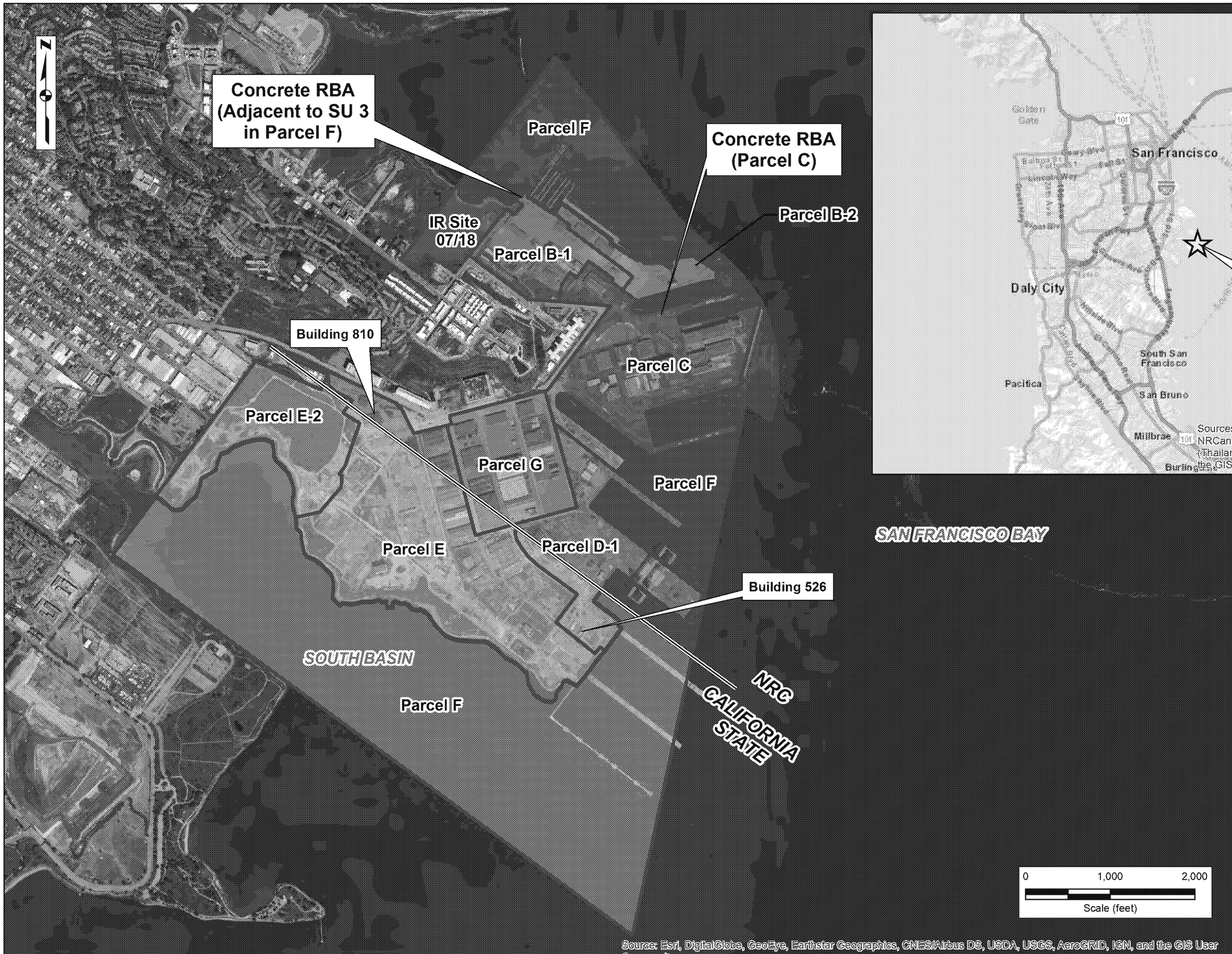
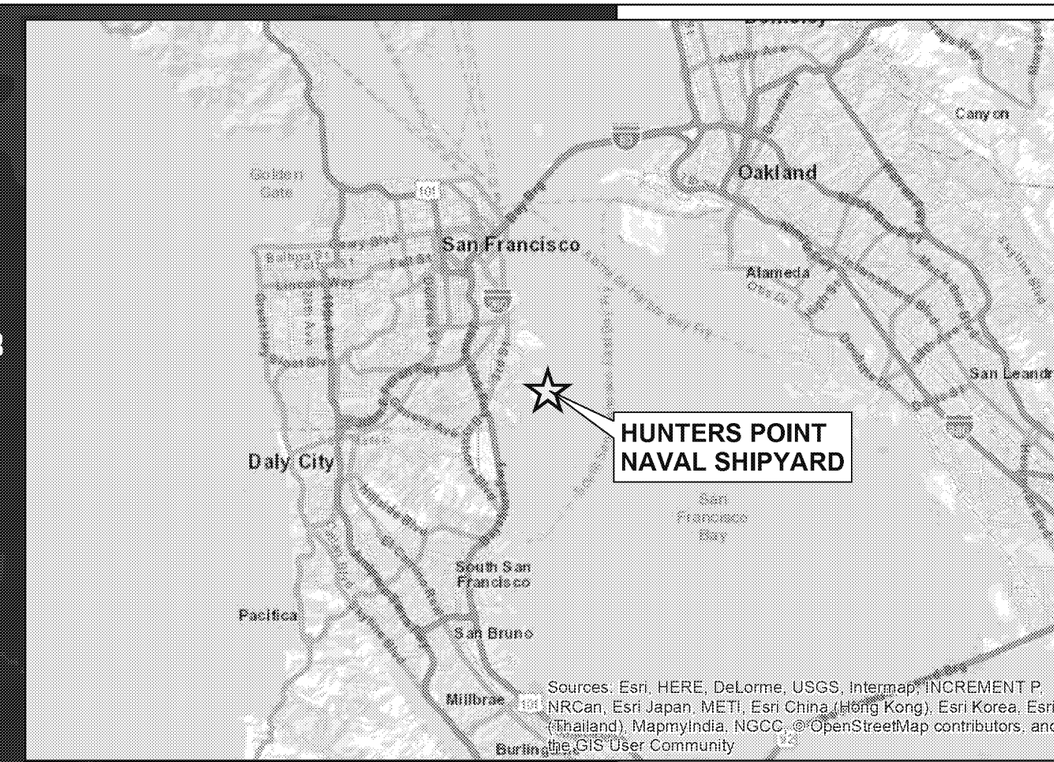
DCN: APTM-0006-4550-0099





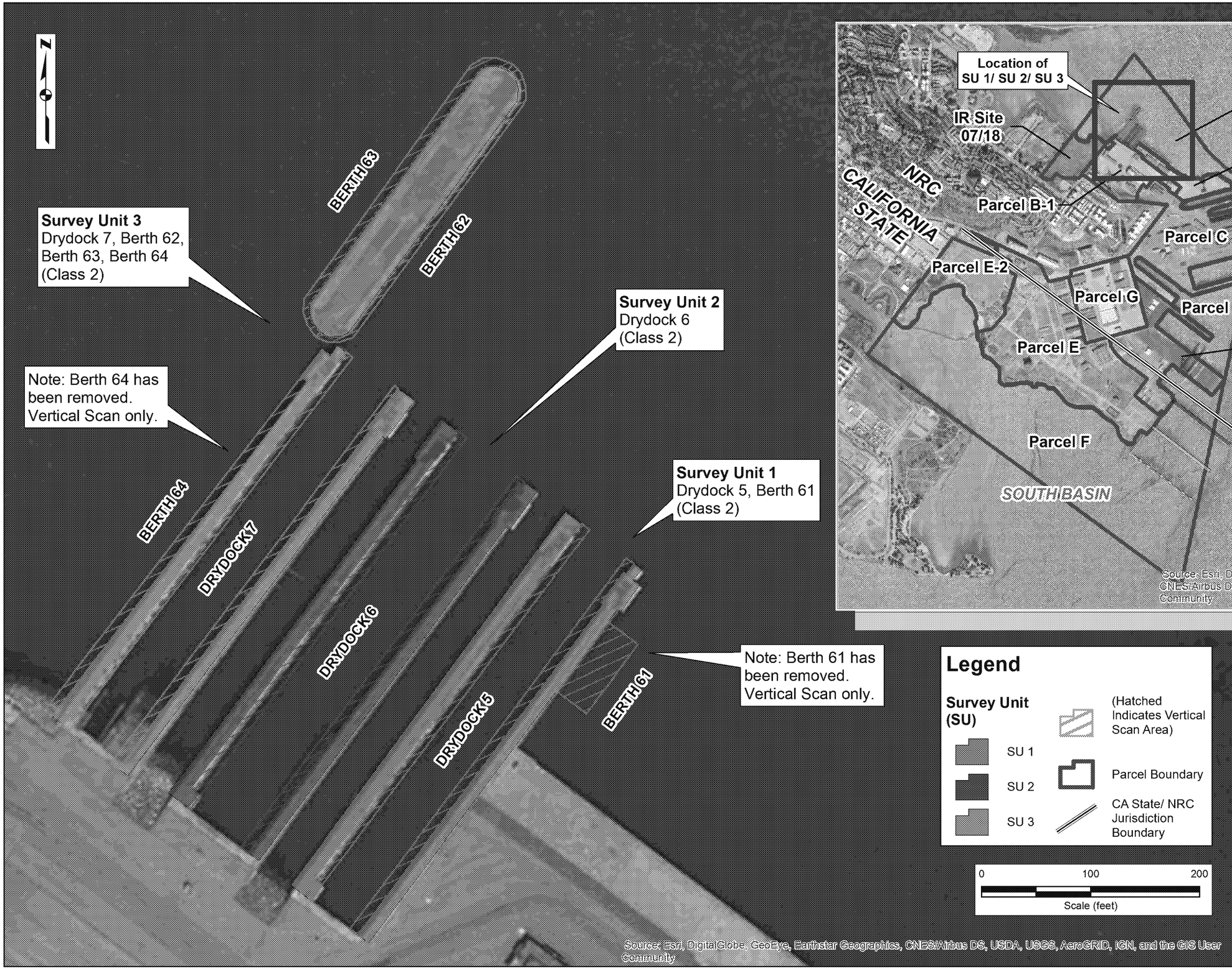
Legend

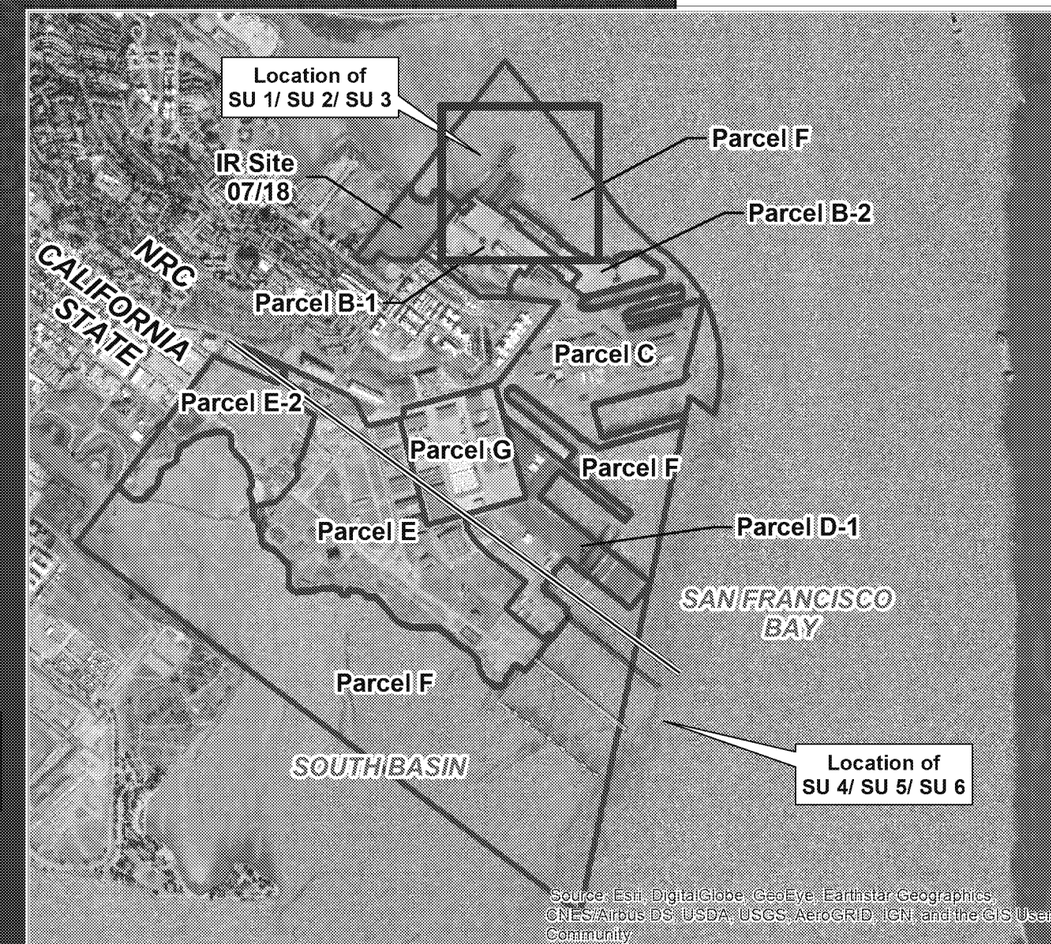
- Parcel Boundary
- CA State/ NRC Jurisdiction Boundary
- CA Jurisdiction
- NRC Jurisdiction

SITE LOCATION

HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA

10/2017	PROJECT No. R3-0016.01	FIGURE 1





Legend

Survey Unit (SU)

- SU 1
- SU 2
- SU 3

(Hatched Indicates Vertical Scan Area)

Parcel Boundary

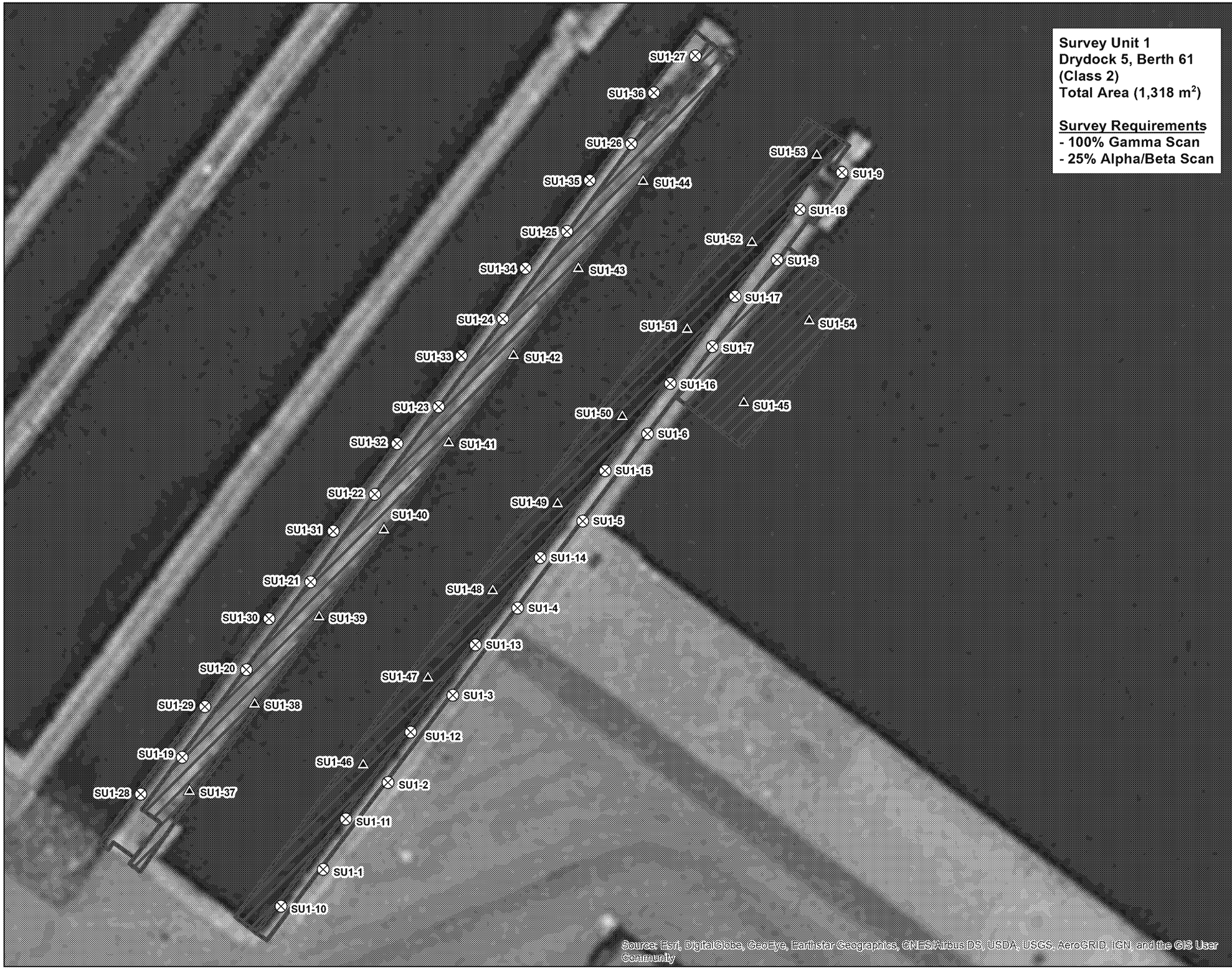
CA State/ NRC Jurisdiction Boundary

0 100 200
Scale (feet)

SURVEY UNITS (SU) 1, 2 & 3

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2019	PROJECT No. R3-0016.01	FIGURE 2



N

Legend

Systematic Measurements

- Horizontal Surface
- Vertical Surface

Survey Unit Boundary

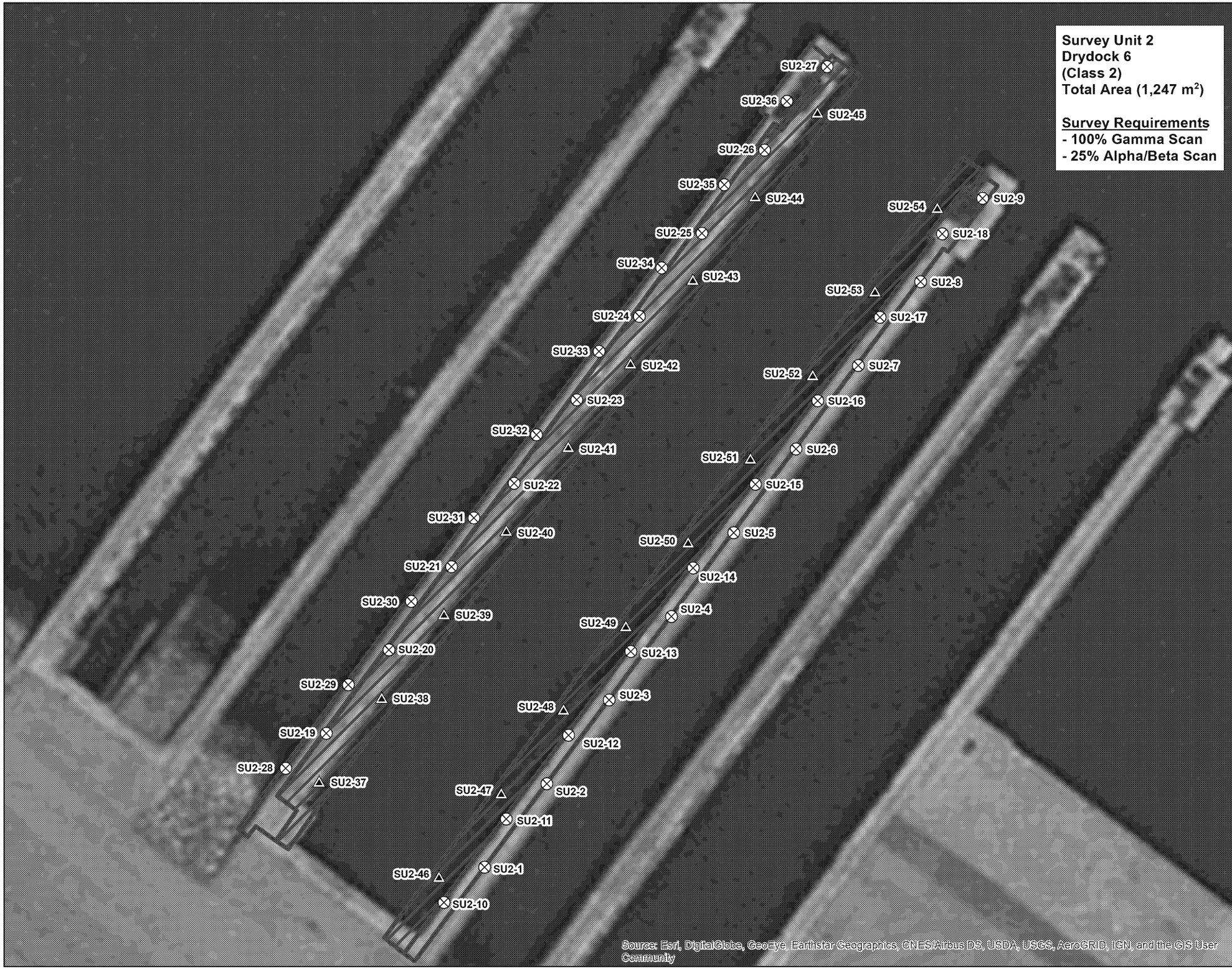
- Horizontal Surface
- Vertical Surface

0 40 80
Scale (feet)

SU 1 SYSTEMATIC MEASUREMENT LOCATIONS

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 3



N

Legend

Systematic Measurements

- Horizontal Surface
- Vertical Surface

Survey Unit Boundary

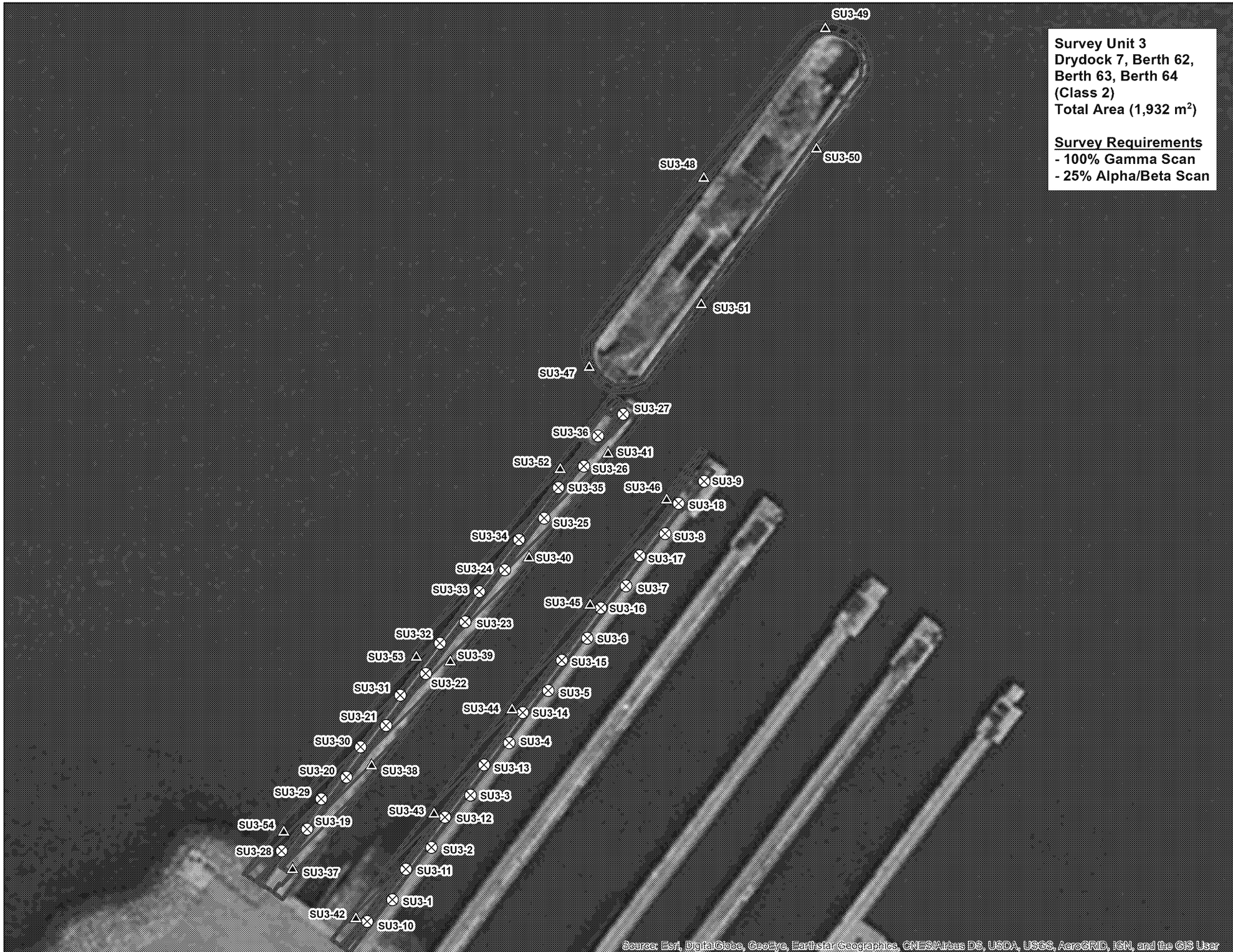
- Horizontal Surface
- Vertical Surface

0 40 80
Scale (feet)

SU 2 SYSTEMATIC MEASUREMENT LOCATIONS

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 4



N

Legend

Systematic Measurements

- Horizontal Surface
- Vertical Surface

Survey Unit Boundary

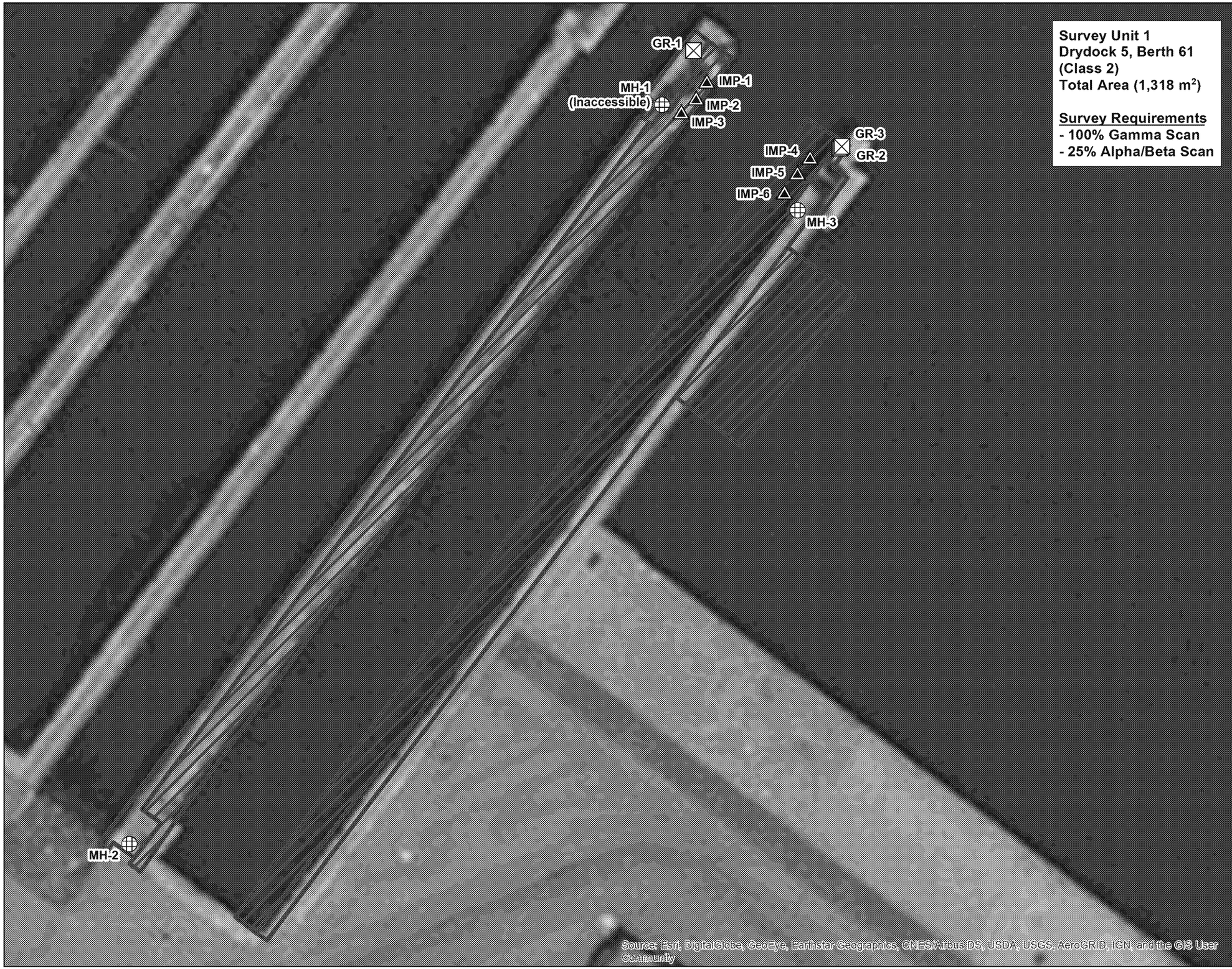
- Horizontal Surface
- Vertical Surface

0 80 160
Scale (feet)

SU 3 SYSTEMATIC MEASUREMENT LOCATIONS

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 5



N

Legend

Location Type

- Manhole
- Grate
- Impeller

Survey Unit Boundary

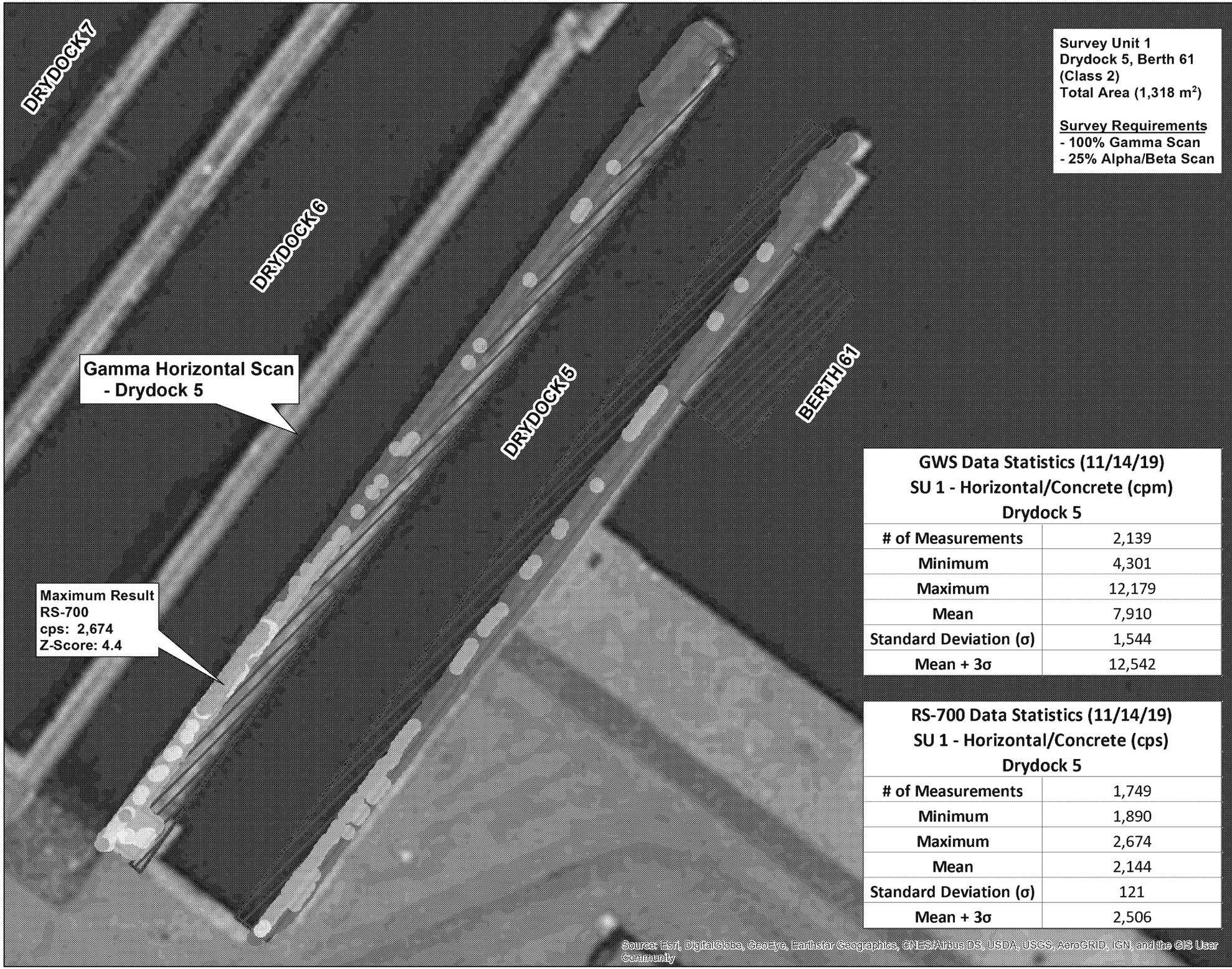
- Horizontal Surface
- Vertical Surface

0 40 80
Scale (feet)

SU 1 MANHOLE AND GRATE LOCATIONS

HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA

5/2020	PROJECT No. R3-0016.01	FIGURE 6



Survey Unit 1
Drydock 5, Berth 61
(Class 2)
Total Area (1,318 m^2)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

GWS Data Statistics (11/14/19)
SU 1 - Horizontal/Concrete (cpm)
Drydock 5

# of Measurements	2,139
Minimum	4,301
Maximum	12,179
Mean	7,910
Standard Deviation (σ)	1,544
Mean + 3σ	12,542

RS-700 Data Statistics (11/14/19)
SU 1 - Horizontal/Concrete (cps)
Drydock 5

# of Measurements	1,749
Minimum	1,890
Maximum	2,674
Mean	2,144
Standard Deviation (σ)	121
Mean + 3σ	2,506

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

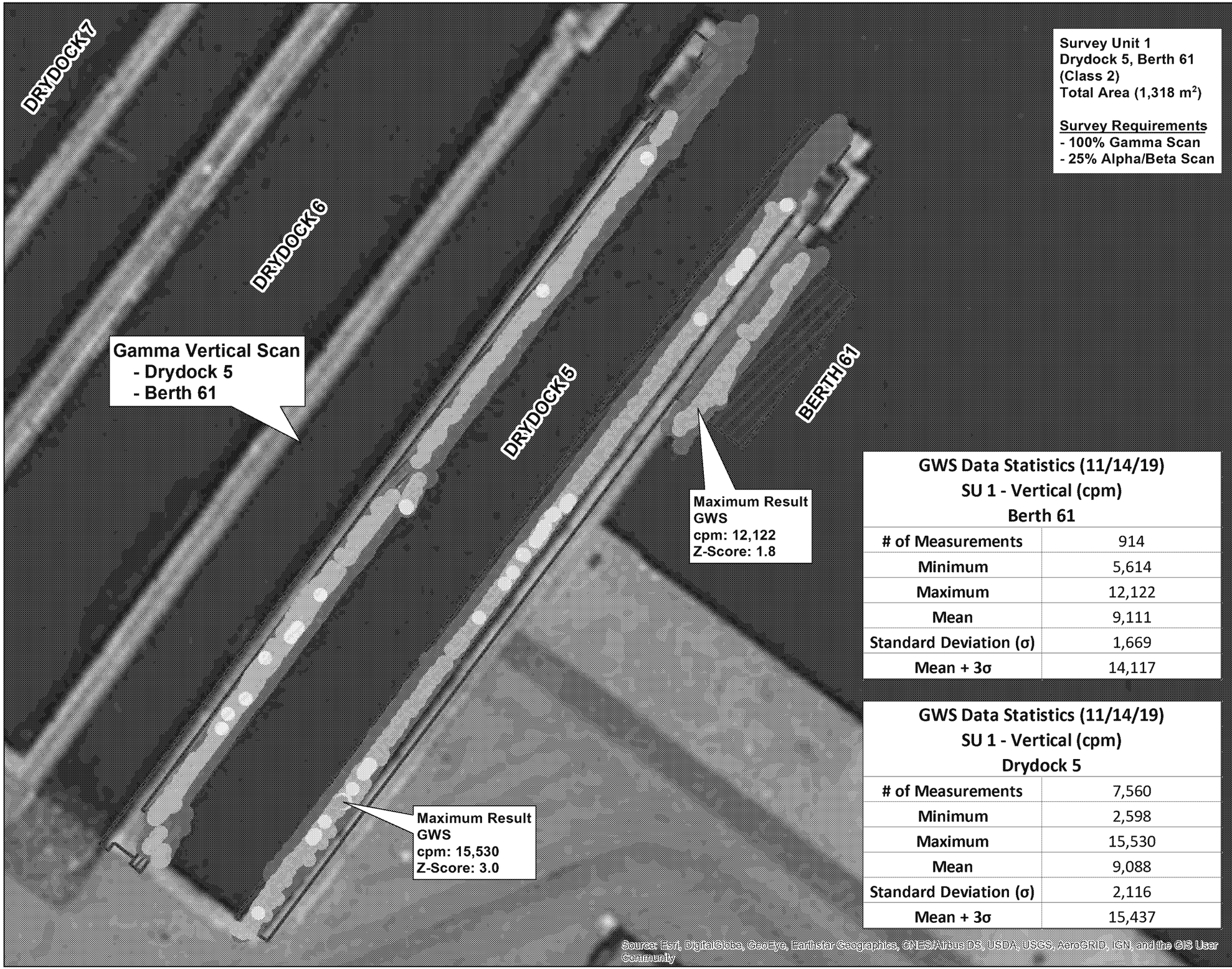
Note: Gamma Survey was performed with a Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU 1 GAMMA SCAN RESULTS - HORIZONTAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 7



Survey Unit 1
Drydock 5, Berth 61
(Class 2)
Total Area (1,318 m^2)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

GWS Data Statistics (11/14/19) SU 1 - Vertical (cpm) Berth 61	
# of Measurements	914
Minimum	5,614
Maximum	12,122
Mean	9,111
Standard Deviation (σ)	1,669
Mean + 3σ	14,117

GWS Data Statistics (11/14/19) SU 1 - Vertical (cpm) Drydock 5	
# of Measurements	7,560
Minimum	2,598
Maximum	15,530
Mean	9,088
Standard Deviation (σ)	2,116
Mean + 3σ	15,437

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

≤ 0.9

1.0 - 1.9

2.0 - 2.9

≥ 3.0

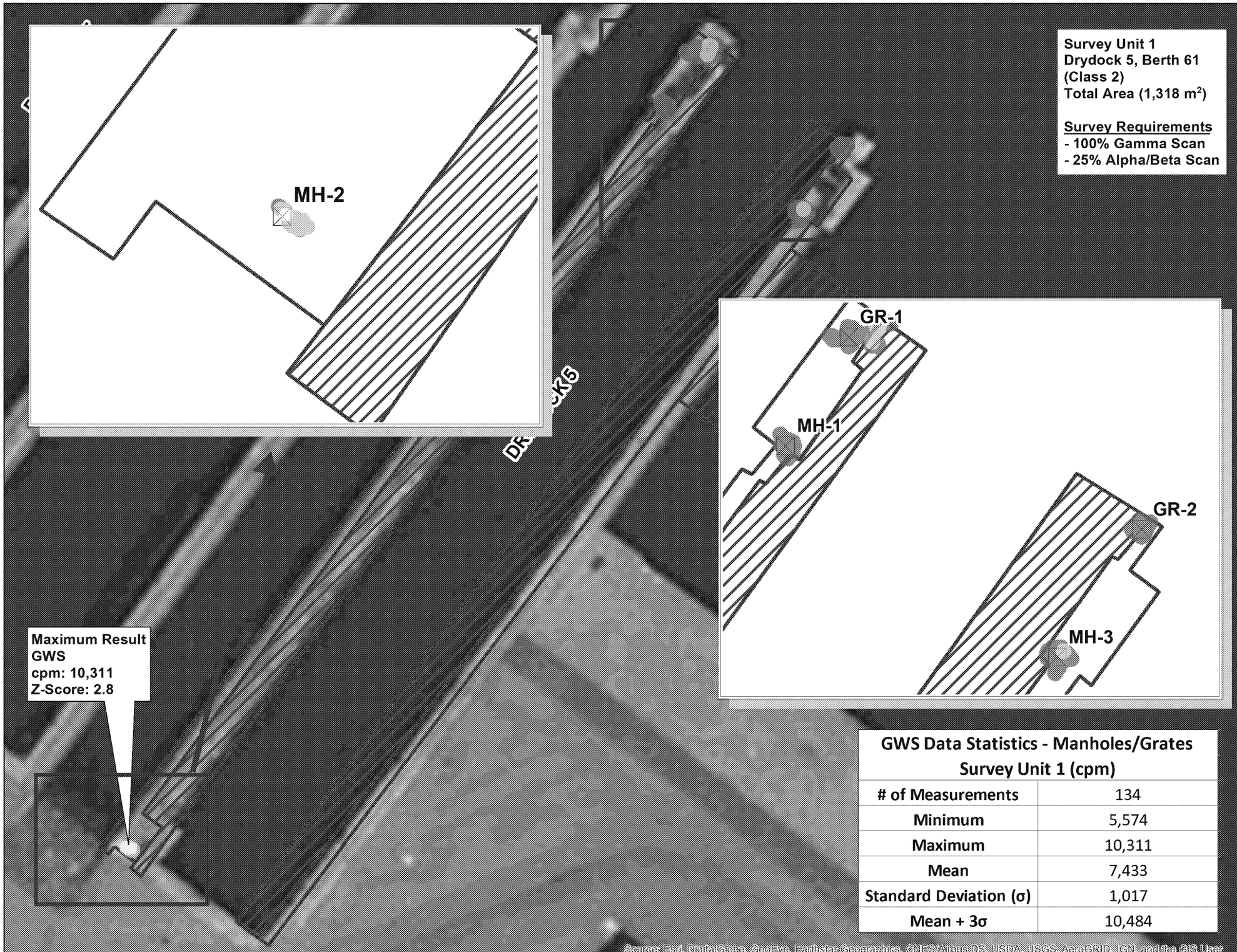
Note: Gamma Survey was performed with a Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU 1 GAMMA SCAN RESULTS - VERTICAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 8



Survey Unit 1
Drydock 5, Berth 61
(Class 2)
Total Area (1,318 m²)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

Legend

Manhole/ Grate Location

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

Note: Gamma Survey was performed with a Ludlum 2221/44-20 (3x3 NaI).

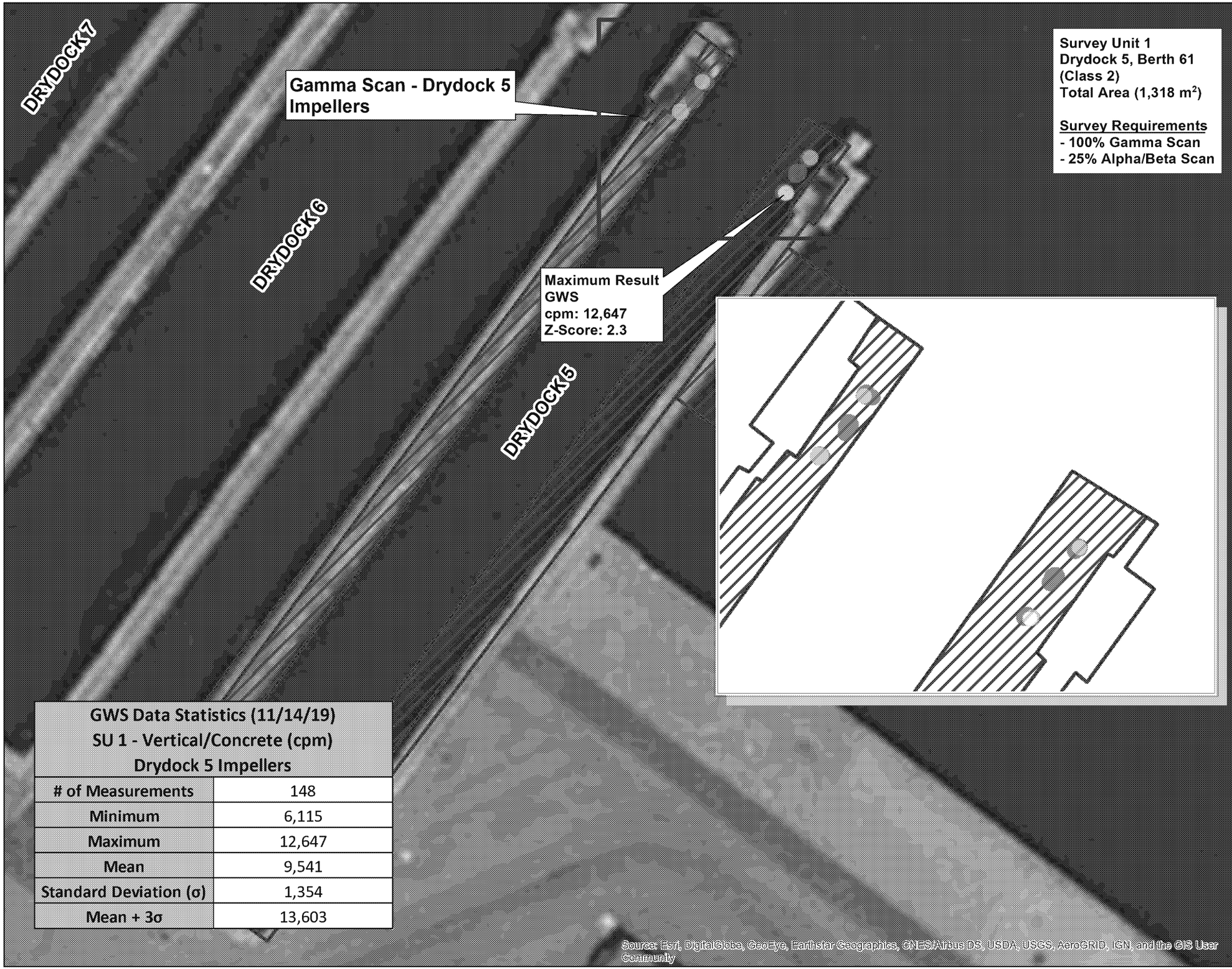
0 40 80
Scale (feet)

GWS Data Statistics - Manholes/Grates Survey Unit 1 (cpm)	
# of Measurements	134
Minimum	5,574
Maximum	10,311
Mean	7,433
Standard Deviation (σ)	1,017
Mean + 3σ	10,484

SU 1 GAMMA SCAN RESULTS - MANHOLE/ GRATE SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 9



GWS Data Statistics (11/14/19) SU 1 - Vertical/Concrete (cpm) Drydock 5 Impellers	
# of Measurements	148
Minimum	6,115
Maximum	12,647
Mean	9,541
Standard Deviation (σ)	1,354
Mean + 3σ	13,603

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

Note: Gamma Survey was performed with a Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU 1 GAMMA SCAN RESULTS - IMPELLER SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 10

N

Legend

Location Type

- Manhole
- Grate
- Impeller

Survey Unit Boundary

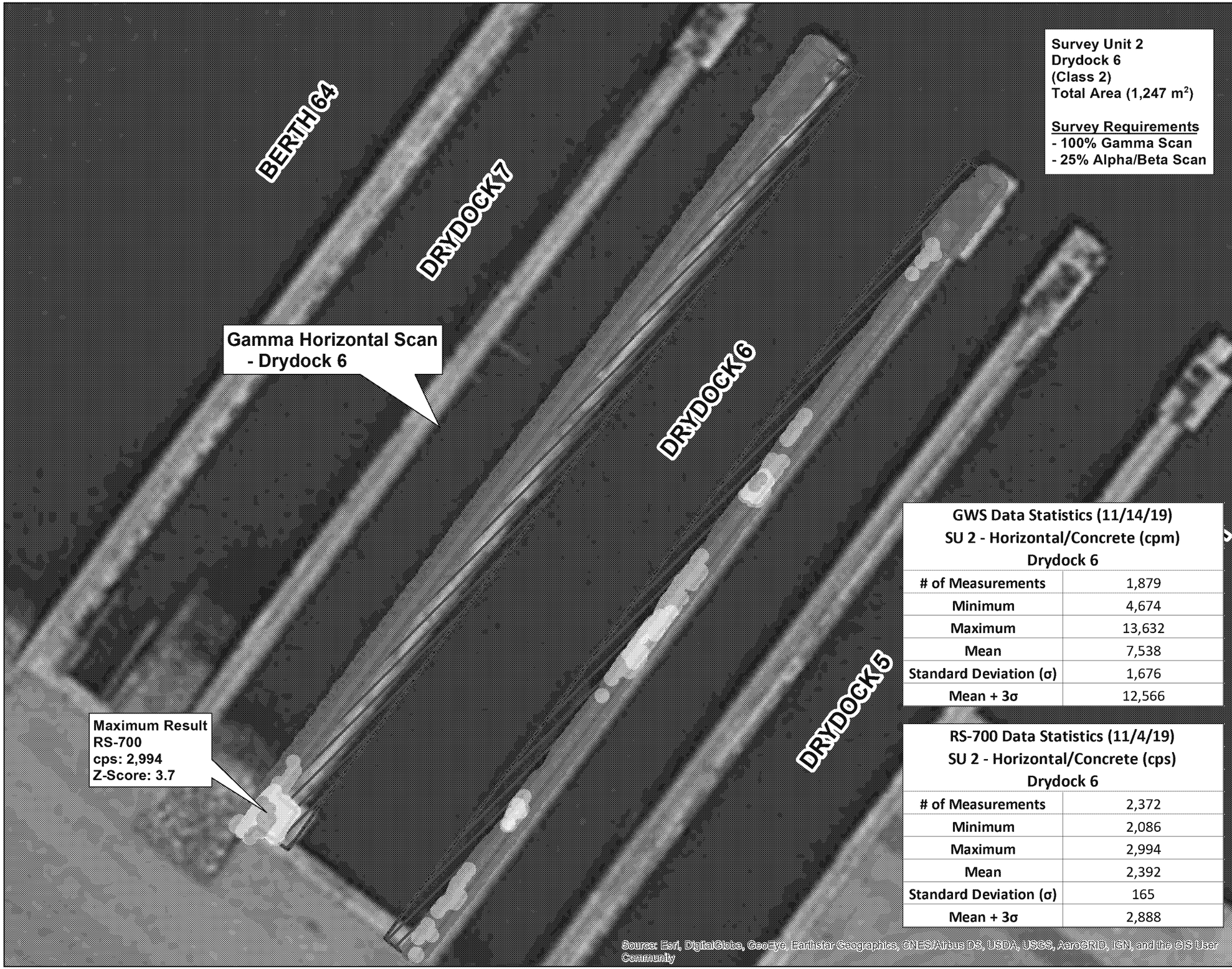
- Horizontal Surface
- Vertical Surface

0 40 80
Scale (feet)

SU 2 MANHOLE AND GRATE LOCATIONS

**HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA**

5/2020	PROJECT No. R3-0016.01	FIGURE 11



GWS Data Statistics (11/14/19) SU 2 - Horizontal/Concrete (cpm) Drydock 6	
# of Measurements	1,879
Minimum	4,674
Maximum	13,632
Mean	7,538
Standard Deviation (σ)	1,676
Mean + 3σ	12,566

RS-700 Data Statistics (11/4/19) SU 2 - Horizontal/Concrete (cps) Drydock 6	
# of Measurements	2,372
Minimum	2,086
Maximum	2,994
Mean	2,392
Standard Deviation (σ)	165
Mean + 3σ	2,888

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

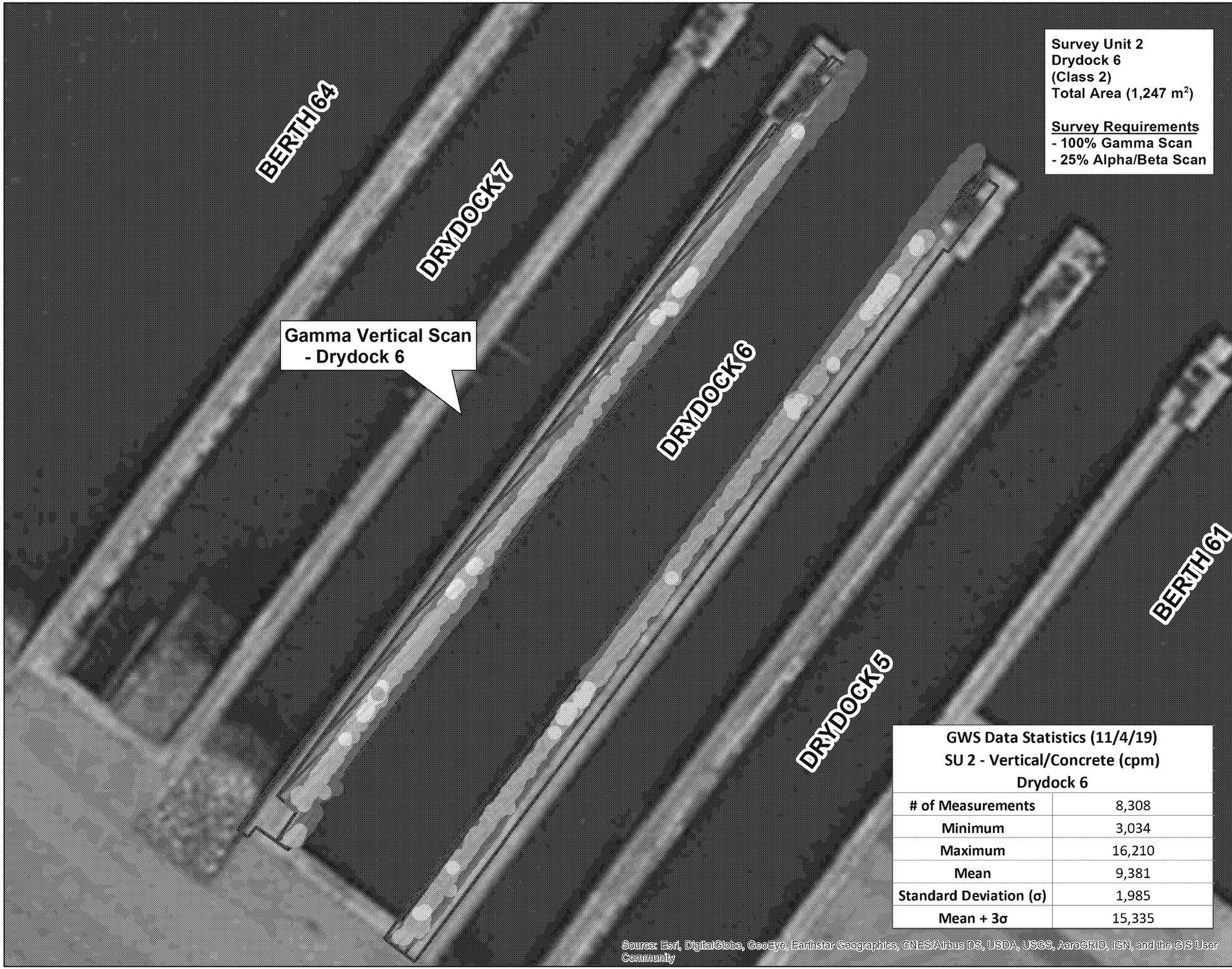
Note: Gamma Survey was performed with RS-700 and Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU 2 GAMMA SCAN RESULTS - HORIZONTAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 12



Survey Unit 2
Drydock 6
(Class 2)
Total Area (1,247 m^2)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

GWS Data Statistics (11/4/19) SU 2 - Vertical/Concrete (cpm) Drydock 6	
# of Measurements	8,308
Minimum	3,034
Maximum	16,210
Mean	9,381
Standard Deviation (σ)	1,985
Mean + 3σ	15,335

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

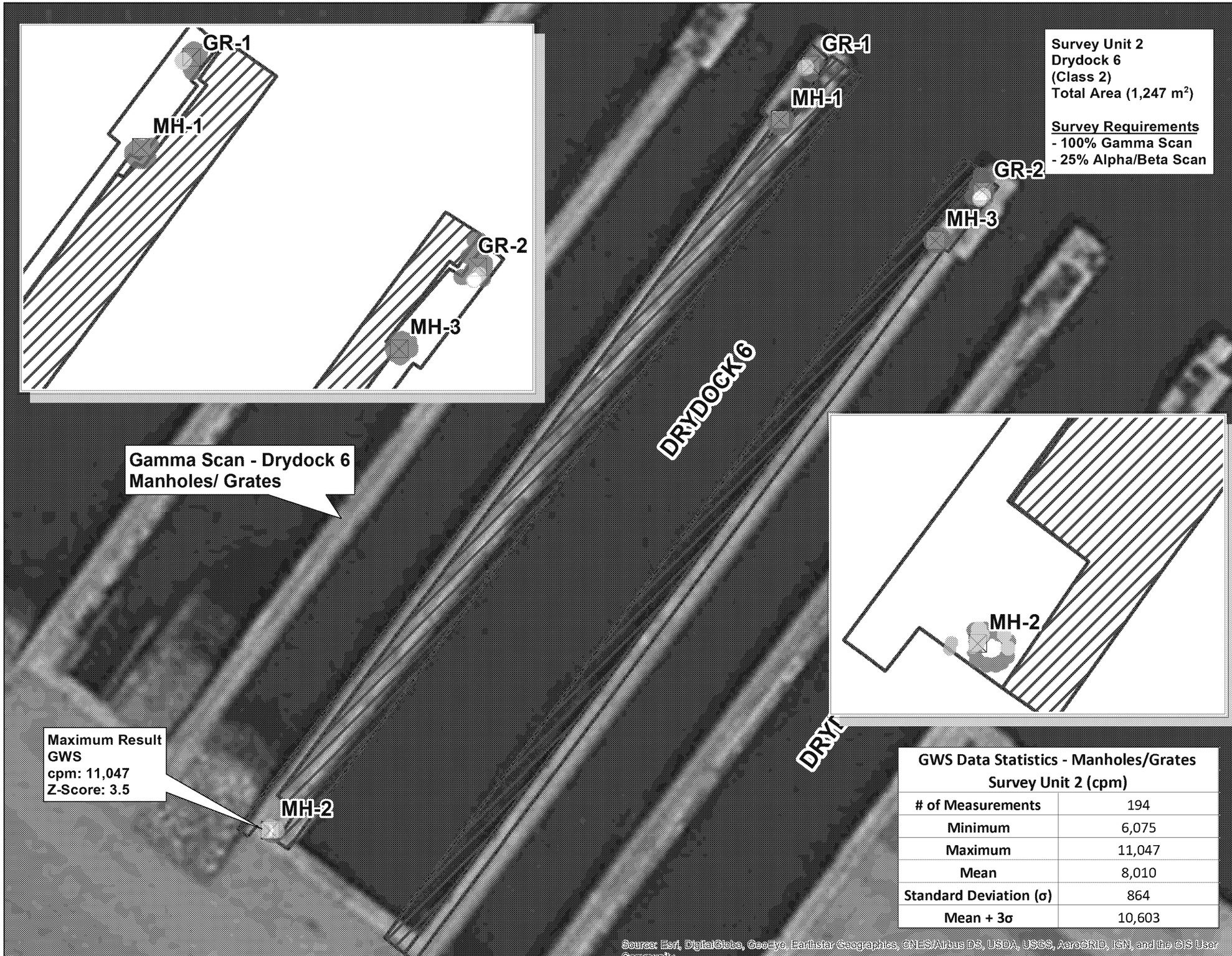
Note: Gamma Survey was performed with Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU 2 GAMMA SCAN RESULTS - VERTICAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 13



GWS Data Statistics - Manholes/Grates Survey Unit 2 (cpm)	
# of Measurements	194
Minimum	6,075
Maximum	11,047
Mean	8,010
Standard Deviation (σ)	864
Mean + 3σ	10,603

N

Legend

Manhole/ Grate Location

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

≤ 0.9

1.0 - 1.9

2.0 - 2.9

≥ 3.0

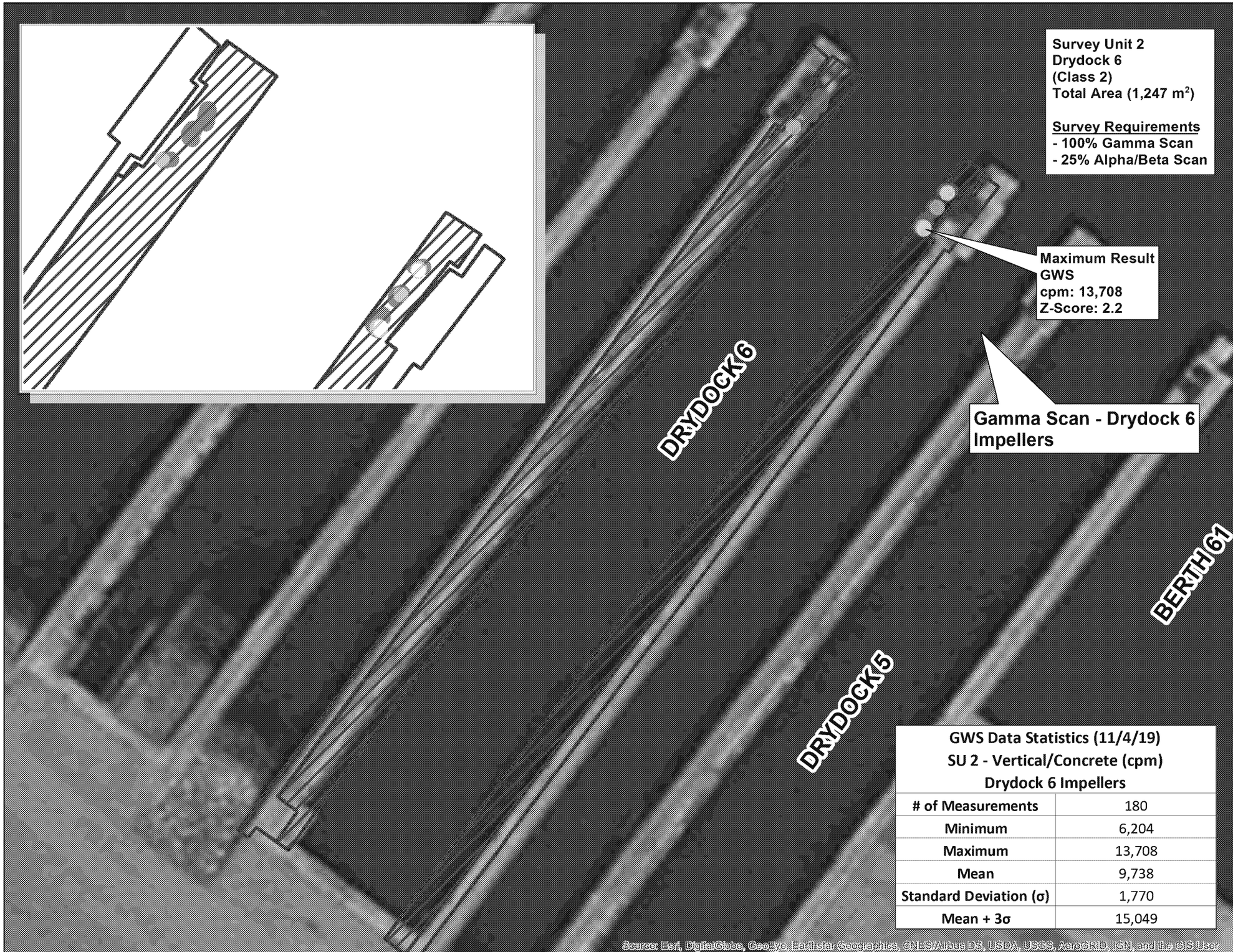
Note: Gamma Survey was performed with Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU 2 GAMMA SCAN RESULTS - MANHOLE/ GRATE SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 14



GWS Data Statistics (11/4/19) SU 2 - Vertical/Concrete (cpm) Drydock 6 Impellers	
# of Measurements	180
Minimum	6,204
Maximum	13,708
Mean	9,738
Standard Deviation (σ)	1,770
Mean + 3σ	15,049

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

≤ 0.9

1.0 - 1.9

2.0 - 2.9

≥ 3.0

Note: Gamma Survey was performed with Ludlum 2221/44-20 (3x3 NaI).

0 40 80

Scale (feet)

SU 2 GAMMA SCAN RESULTS - IMPELLER SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 15

N

Legend

Location Type

- Manhole
- Grate
- Impeller

Survey Unit Boundary

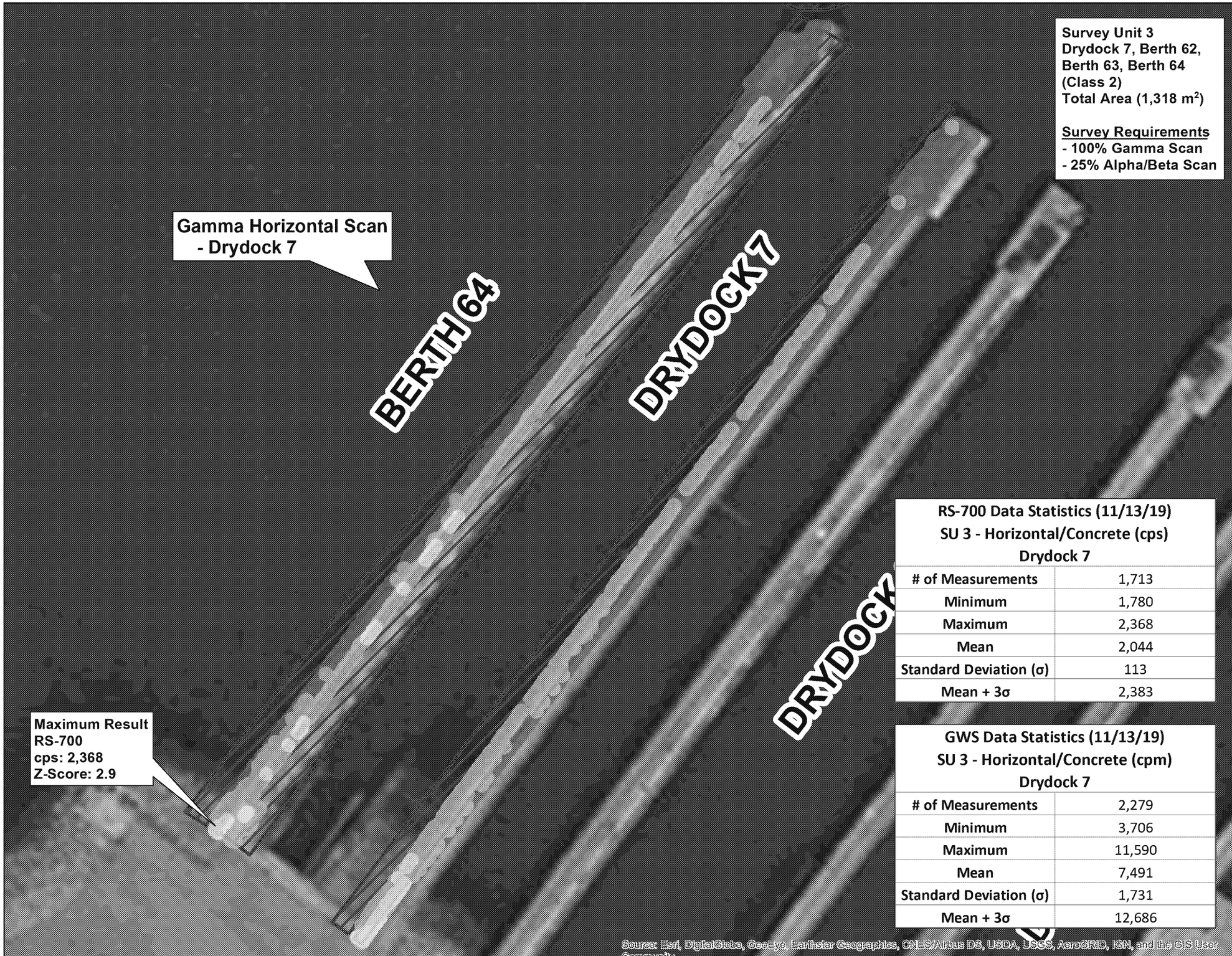
- Horizontal Surface
- Vertical Surface

0 40 80
Scale (feet)

SU 3 MANHOLE AND GRATE LOCATIONS

HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA

5/2020	PROJECT No. R3-0016.01	FIGURE 16



RS-700 Data Statistics (11/13/19) SU 3 - Horizontal/Concrete (cps) Drydock 7	
# of Measurements	1,713
Minimum	1,780
Maximum	2,368
Mean	2,044
Standard Deviation (σ)	113
Mean + 3σ	2,383

GWS Data Statistics (11/13/19) SU 3 - Horizontal/Concrete (cpm) Drydock 7	
# of Measurements	2,279
Minimum	3,706
Maximum	11,590
Mean	7,491
Standard Deviation (σ)	1,731
Mean + 3σ	12,686

N

Legend

Survey Unit Boundary

- Horizontal Surface
- Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

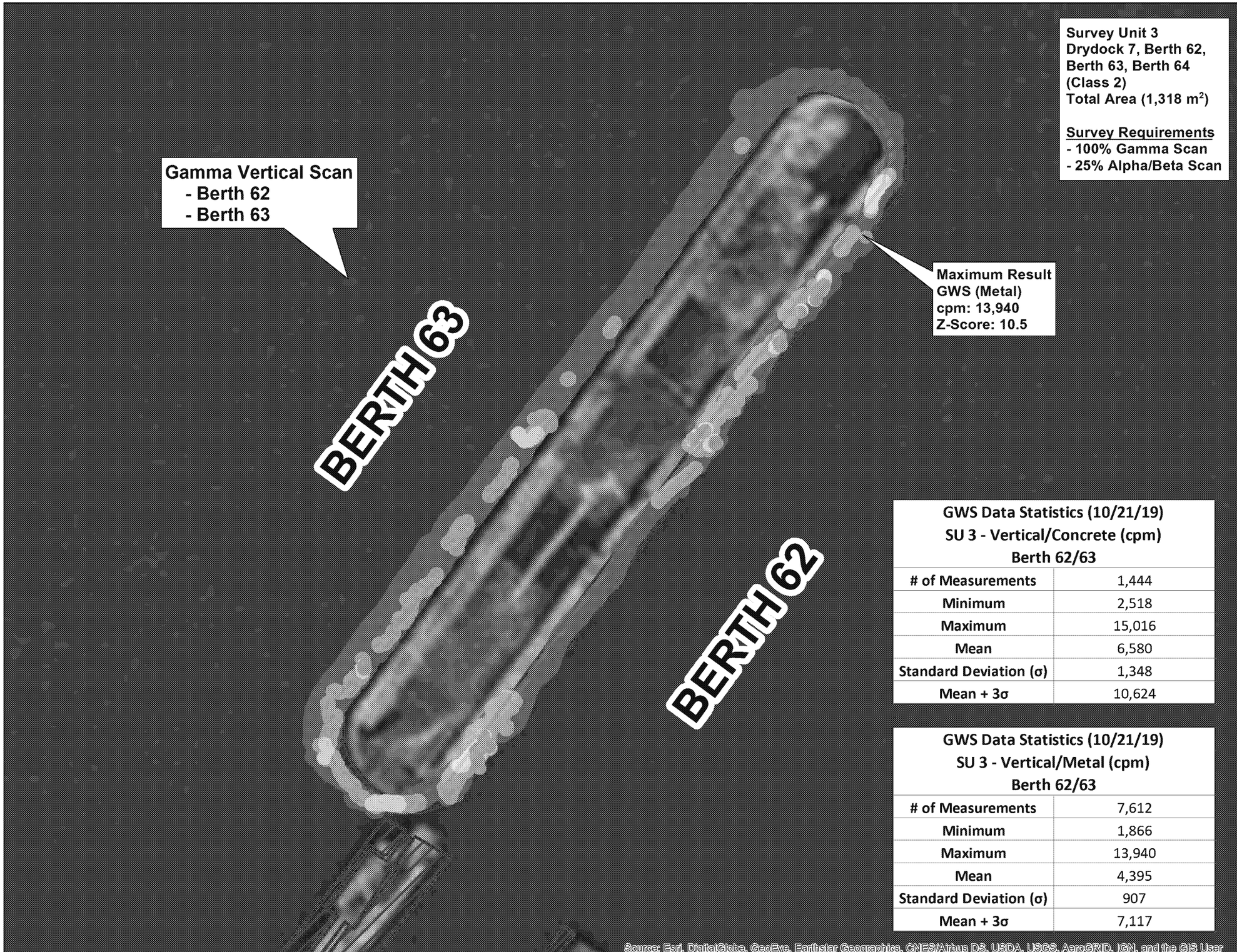
Note: Gamma Survey was performed with RS-700 and Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU3 GAMMA SCAN RESULTS - HORIZONTAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 17



Survey Unit 3
Drydock 7, Berth 62, Berth 63, Berth 64
(Class 2)
Total Area (1,318 m²)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

GWS Data Statistics (10/21/19) SU 3 - Vertical/Concrete (cpm) Berth 62/63	
# of Measurements	1,444
Minimum	2,518
Maximum	15,016
Mean	6,580
Standard Deviation (σ)	1,348
Mean + 3σ	10,624

GWS Data Statistics (10/21/19) SU 3 - Vertical/Metal (cpm) Berth 62/63	
# of Measurements	7,612
Minimum	1,866
Maximum	13,940
Mean	4,395
Standard Deviation (σ)	907
Mean + 3σ	7,117

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

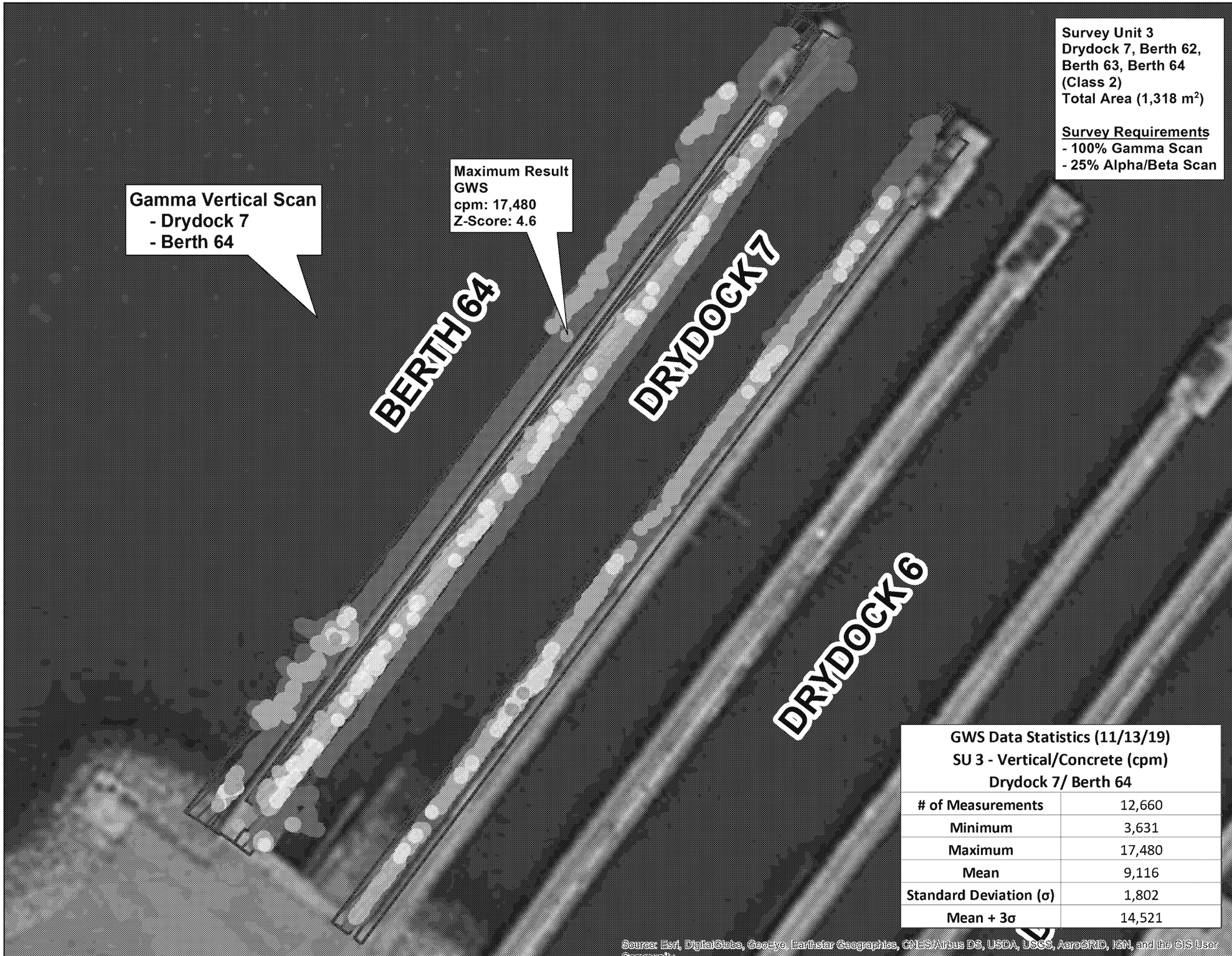
Note: Gamma Survey was performed with Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU3 GAMMA SCAN RESULTS - BERTH 62 & 63 VERTICAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 18



GWS Data Statistics (11/13/19) SU 3 - Vertical/Concrete (cpm) Drydock 7/ Berth 64	
# of Measurements	12,660
Minimum	3,631
Maximum	17,480
Mean	9,116
Standard Deviation (σ)	1,802
Mean + 3σ	14,521

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

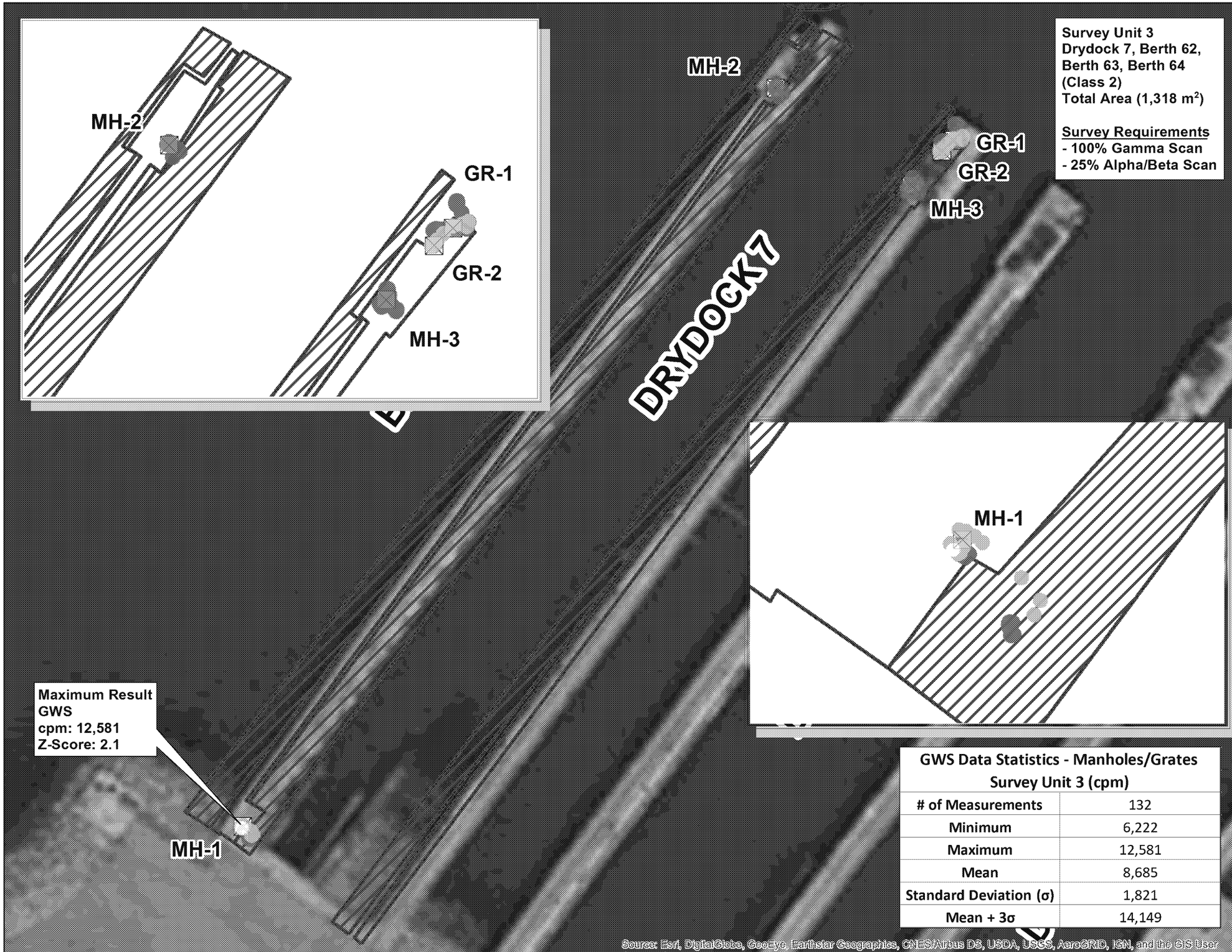
Note: Gamma Survey was performed with RS-700 and Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU3 GAMMA SCAN RESULTS - DRYDOCK 7 & BERTH 64 VERTICAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 19



Survey Unit 3
Drydock 7, Berth 62, Berth 63, Berth 64
(Class 2)
Total Area (1,318 m²)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

GWS Data Statistics - Manholes/Grates Survey Unit 3 (cpm)	
# of Measurements	132
Minimum	6,222
Maximum	12,581
Mean	8,685
Standard Deviation (σ)	1,821
Mean + 3σ	14,149

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

Note: Gamma Survey was performed with Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU3 GAMMA SCAN RESULTS - MANHOLE/ GRATE SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 20

GWS Data Statistics (10/21/19) SU 3 - Vertical/Concrete (cpm) Drydock 7 Impellers	
# of Measurements	123
Minimum	6,022
Maximum	12,386
Mean	9,318
Standard Deviation (σ)	1,368
Mean + 3σ	13,423

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

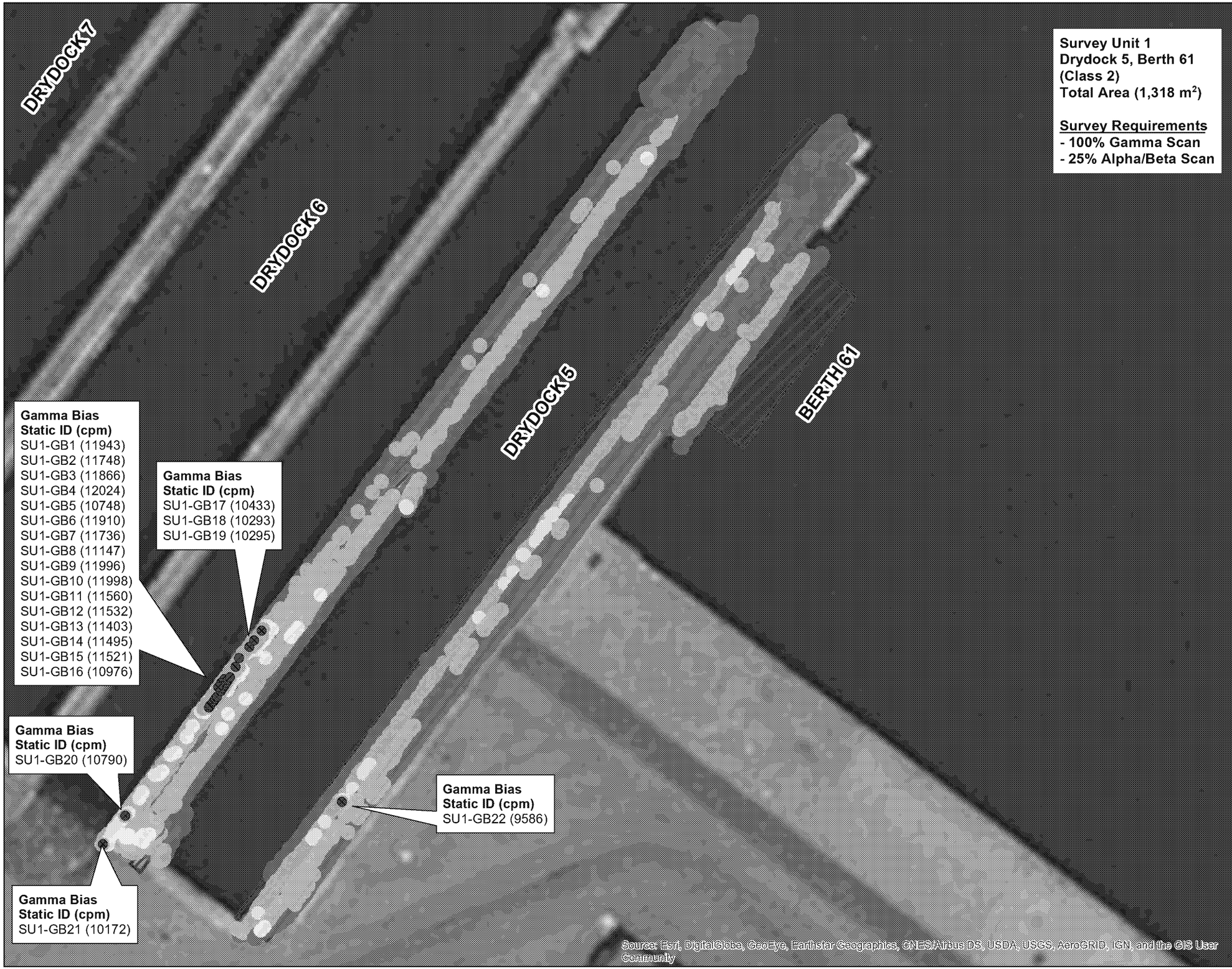
Note: Gamma Survey was performed with Ludlum 2221/44-20 (3x3 NaI).

0 40 80
Scale (feet)

SU3 GAMMA SCAN RESULTS - IMPELLER SURFACES

**HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA**

3/2020	PROJECT No. R3-0016.01	FIGURE 21



N

Legend

- Gamma Bias Static

Survey Unit Boundary

- Horizontal Surface
- Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

Note: Gamma Survey was performed with RS-700 and Ludlum 2221/44-20 (3x3 NaI). Static measurements collected with Ludlum 2221/44-20 (3x3 NaI).

Gamma Bias Static Measurement Investigation Level (IL)
Concrete = 14,501 cpm
Metal = 7,184 cpm

'RED' cpm result indicates that the static result exceeds the IL and an Inspector 1000 shot was collected.

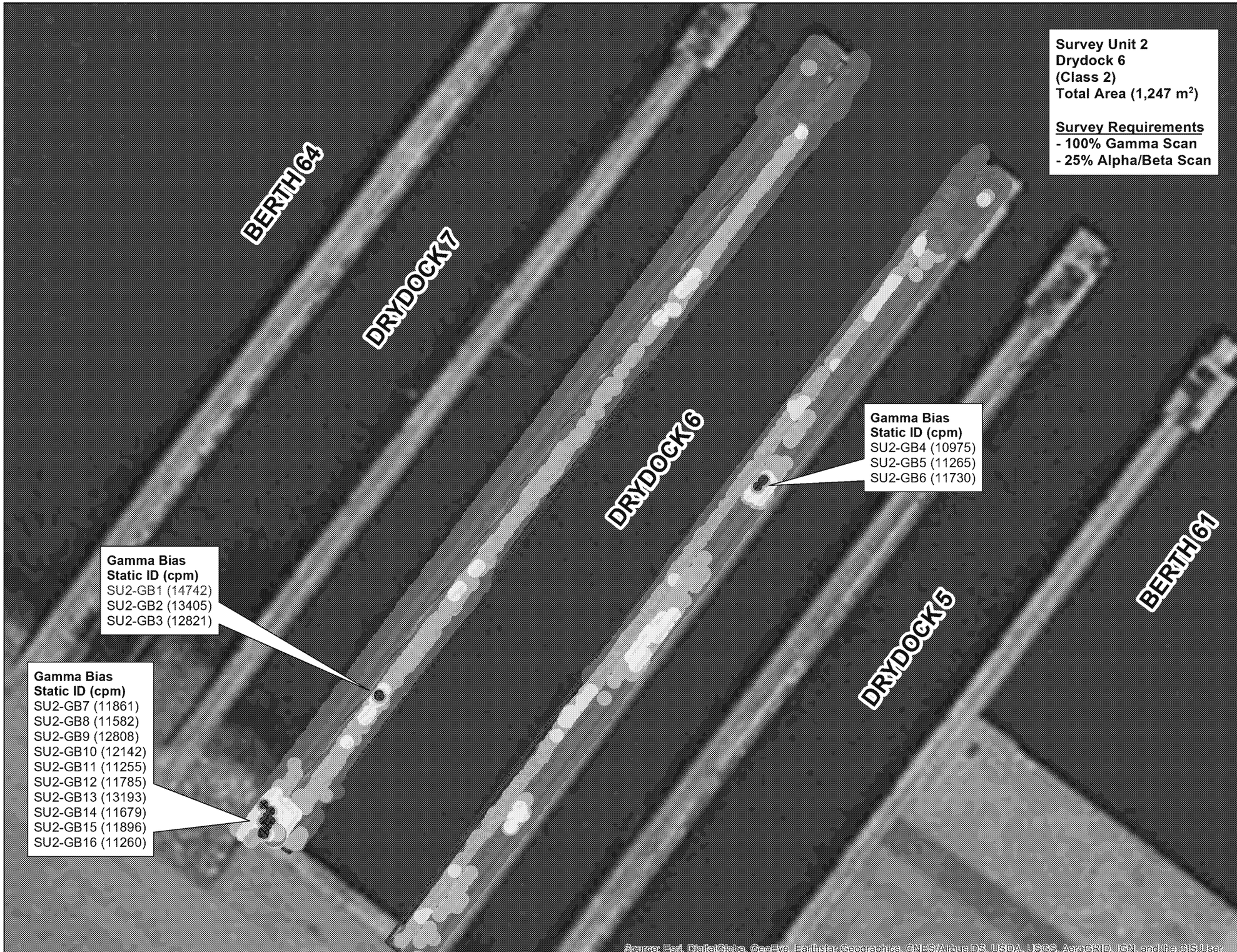
cpm = counts per minute

0 40 80
Scale (feet)

SU 1 GAMMA STATIC RESULTS

**HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA**

3/2020	PROJECT No. R3-0016.01	FIGURE 22



N

Legend

- Gamma Bias Static

Survey Unit Boundary

- Horizontal Surface
- Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

Note: Gamma Survey was performed with RS-700 and Ludlum 2221/44-20 (3x3 NaI). Static measurements collected with Ludlum 2221/44-20 (3x3 NaI).

Gamma Bias Static Measurement Investigation Level (IL)
Concrete = 14,501 cpm
Metal = 7,184 cpm

'RED' cpm result indicates that the static result exceeds the IL and an Inspector 1000 shot was collected.

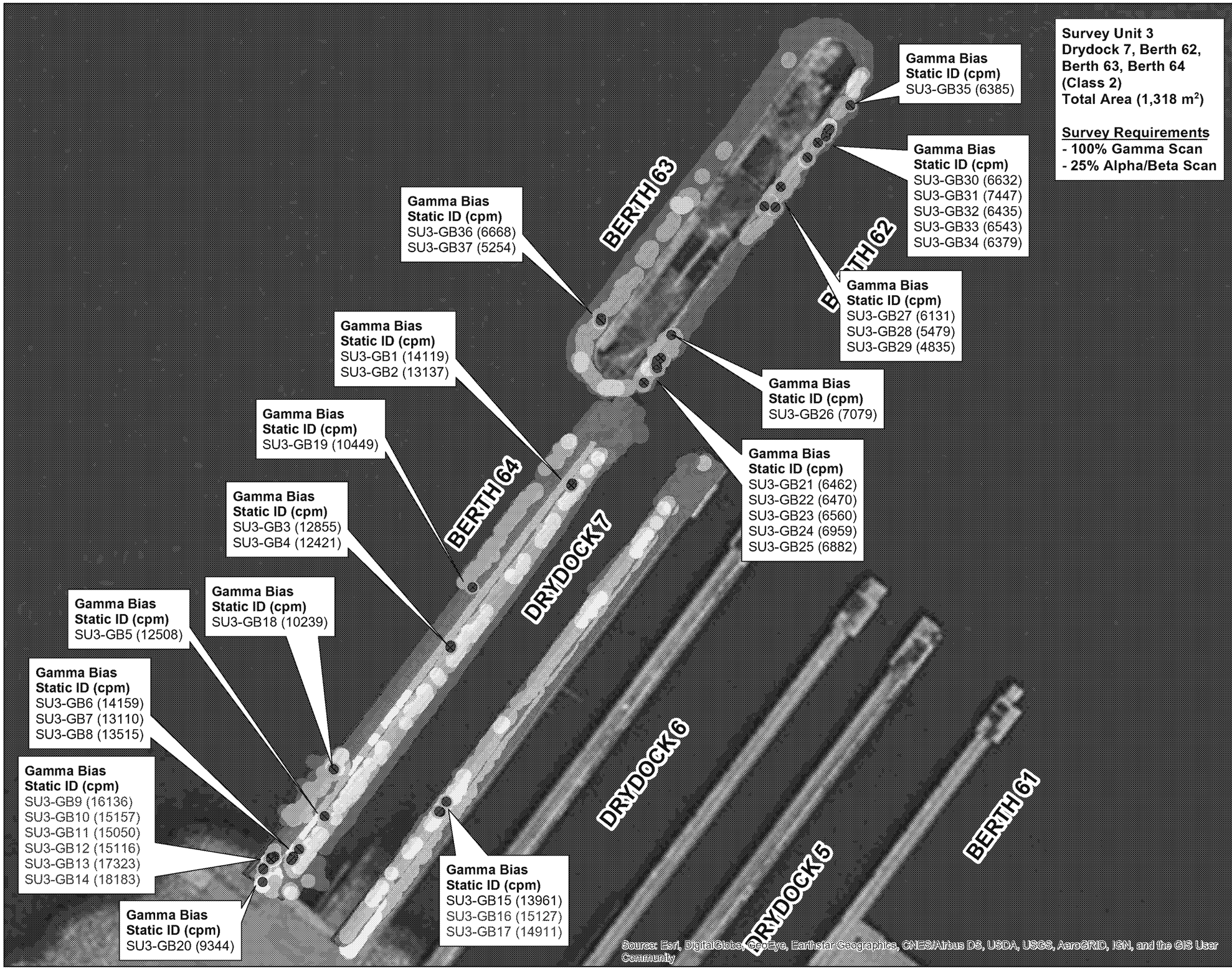
cpm = counts per minute

0 40 80
Scale (feet)

SU 2 GAMMA STATIC RESULTS

HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 23



N

Legend

- Gamma Bias Static

Survey Unit Boundary

- Horizontal Surface
- Vertical Surface

Gamma Survey Results (Z-Score)

- ≤ 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- ≥ 3.0

Note: Gamma Survey was performed with RS-700 and Ludlum 2221/44-20 (3x3 NaI). Static measurements collected with Ludlum 2221/44-20 (3x3 NaI).

Gamma Bias Static Measurement Investigation Level (IL)
Concrete = 14,501 cpm
Metal = 7,184 cpm

'RED' cpm result indicates that the static result exceeds the IL and an Inspector 1000 shot was collected.

cpm = counts per minute

0 80 160
Scale (feet)

SU 3 GAMMA STATIC RESULTS

HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 24

Survey Unit 1
Drydock 5, Berth 61
(Class 2)
Total Area (1,318 m^2)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

Alpha Data Statistics Survey Unit 1 (Horizontal Surface) (Alpha dpm/100 cm^2)	
# of Measurements	6,544
Minimum	-77.6
Maximum	353.1
Mean	30.1
Standard Deviation (σ)	55.8

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Alpha dpm/100 cm2)

- ≤19.9
- 20.0 - 49.9
- 50.0 - 99.9
- ≥100.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 1 ALPHA SCAN RESULTS - HORIZONTAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 25

Survey Unit 1
Drydock 5, Berth 61
(Class 2)
Total Area (1,318 m^2)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

Alpha Data Statistics Survey Unit 1 (Vertical Surface) (Alpha dpm/100 cm^2)	
# of Measurements	997
Minimum	-77.6
Maximum	305.4
Mean	-6.2
Standard Deviation (σ)	45.6

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Alpha dpm/100 cm2)

≤19.9

20.0 - 49.9

50.0 - 99.9

≥100.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 1 ALPHA SCAN RESULTS - VERTICAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 26

Survey Unit 1
Drydock 5, Berth 61
(Class 2)
Total Area (1,318 m^2)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

Beta Data Statistics Survey Unit 1 (Horizontal Surface) (Beta dpm/100 cm^2)	
# of Measurements	6,544
Minimum	-854.0
Maximum	667.1
Mean	154.4
Standard Deviation (σ)	208.5

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Beta dpm/100 cm2)

- ≤199.9
- 200.0 - 499.9
- 500.0 - 999.9
- ≥1000.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 1 BETA SCAN RESULTS - HORIZONTAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 27

Survey Unit 1
Drydock 5, Berth 61
(Class 2)
Total Area (1,318 m^2)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

Beta Data Statistics Survey Unit 1 (Vertical Surface) (Beta dpm/100 cm^2)	
# of Measurements	997
Minimum	-431.2
Maximum	236.2
Mean	-106.6
Standard Deviation (σ)	98.1

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Beta dpm/100 cm2)

- ≤199.9
- 200.0 - 499.9
- 500.0 - 999.9
- ≥1000.0

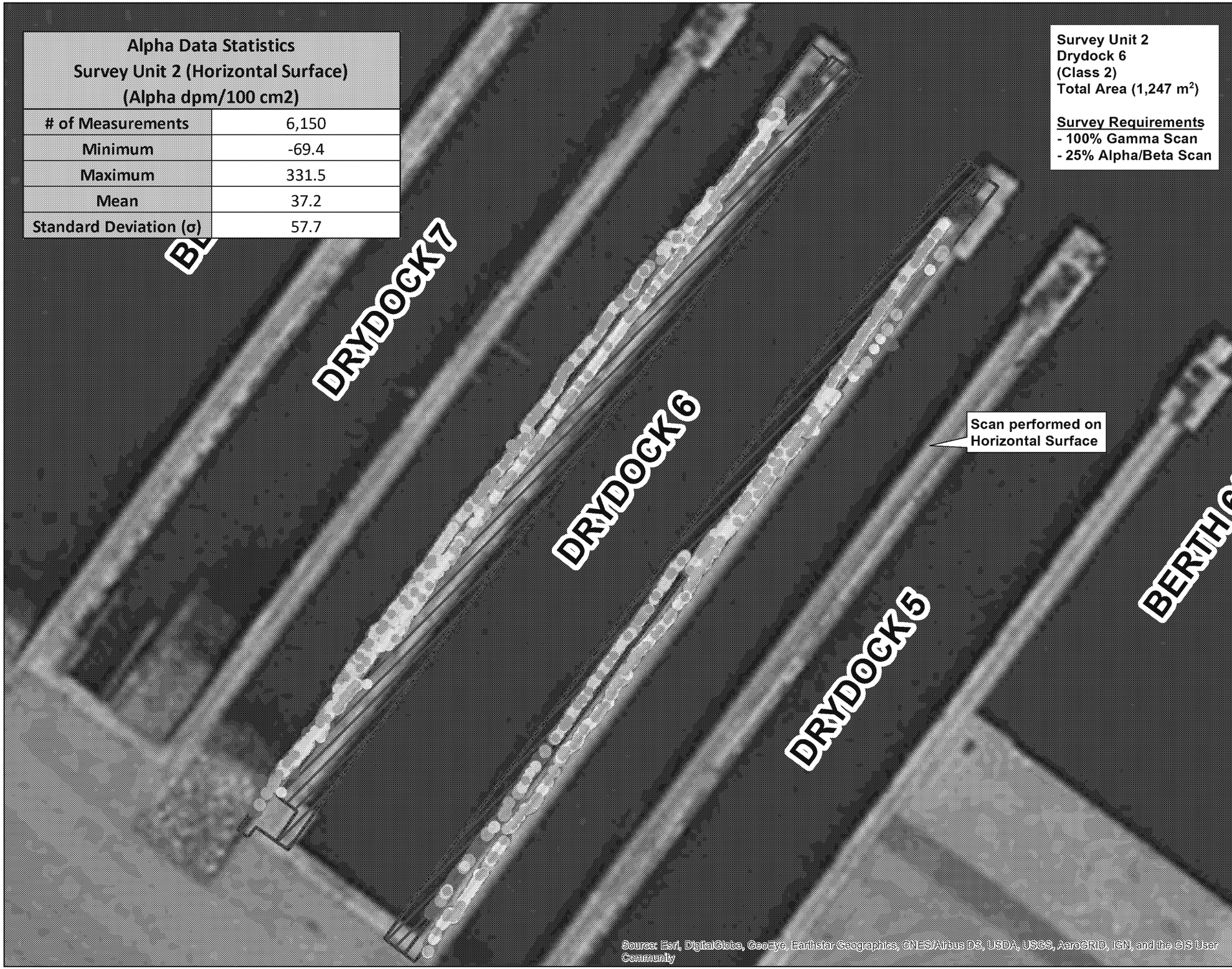
Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 1 BETA SCAN RESULTS - VERTICAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 28



Alpha Data Statistics Survey Unit 2 (Horizontal Surface) (Alpha dpm/100 cm2)	
# of Measurements	6,150
Minimum	-69.4
Maximum	331.5
Mean	37.2
Standard Deviation (σ)	57.7

Survey Unit 2
Drydock 6
(Class 2)
Total Area (1,247 m^2)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Alpha dpm/100 cm2)

≤19.9

20.0 - 49.9

50.0 - 99.9

≥100.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 2 ALPHA SCAN RESULTS - HORIZONTAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 29

Alpha Data Statistics Survey Unit 2 (Vertical Surface) (Alpha dpm/100 cm2)	
# of Measurements	3,110
Minimum	-69.4
Maximum	260.2
Mean	-17.2
Standard Deviation (σ)	37.6

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Alpha dpm/100 cm2)

- ≤19.9
- 20.0 - 49.9
- 50.0 - 99.9
- ≥100.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 2 ALPHA SCAN RESULTS - VERTICAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 30

Beta Data Statistics Survey Unit 2 (Horizontal Surface) (Beta dpm/100 cm2)	
# of Measurements	6,150
Minimum	-607.6
Maximum	588.9
Mean	109.6
Standard Deviation (σ)	165.7

Survey Unit 2
Drydock 6
(Class 2)
Total Area (1,247 m²)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Beta dpm/100 cm2)

≤199.9

200.0 - 499.9

500.0 - 999.9

≥1000.0

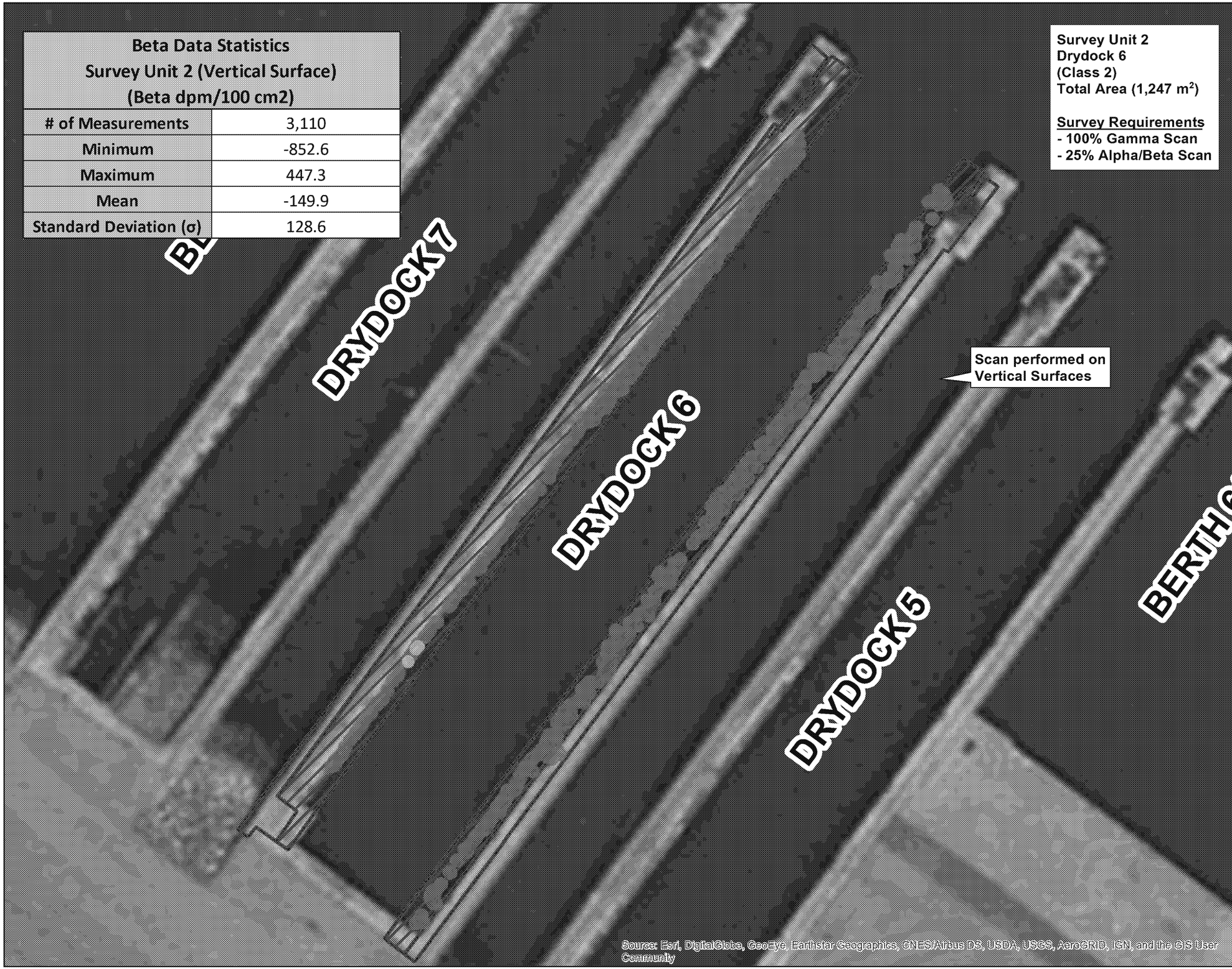
Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 2 BETA SCAN RESULTS - HORIZONTAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 31



Beta Data Statistics Survey Unit 2 (Vertical Surface) (Beta dpm/100 cm2)	
# of Measurements	3,110
Minimum	-852.6
Maximum	447.3
Mean	-149.9
Standard Deviation (σ)	128.6

Survey Unit 2
Drydock 6
(Class 2)
Total Area (1,247 m^2)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Beta dpm/100 cm2)

≤199.9

200.0 - 499.9

500.0 - 999.9

≥1000.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 2 BETA SCAN RESULTS - VERTICAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 32

Alpha Data Statistics Survey Unit 3 (Horizontal Surface) (Alpha dpm/100 cm2)	
# of Measurements	6,150
Minimum	-69.4
Maximum	331.5
Mean	37.2
Standard Deviation (σ)	57.7

Survey Unit 3
Drydock 7, Berth 62, Berth 63, Berth 64
(Class 2)
Total Area (1,318 m²)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Alpha dpm/100 cm2)

- ≤19.9
- 20.0 - 49.9
- 50.0 - 99.9
- ≥100.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

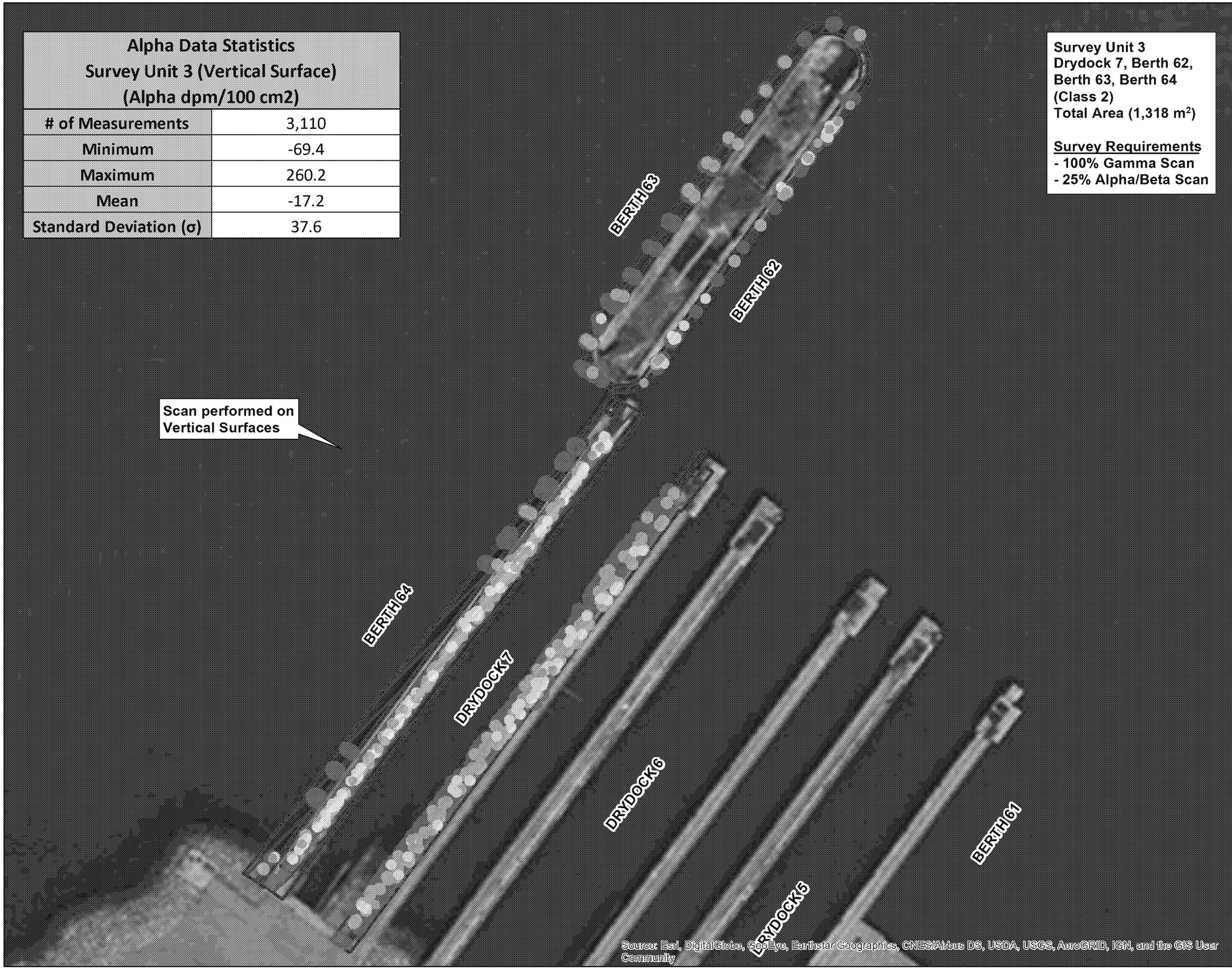
0 40 80
Scale (feet)

SU 3 ALPHA SCAN RESULTS - HORIZONTAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 33

Alpha Data Statistics Survey Unit 3 (Vertical Surface) (Alpha dpm/100 cm2)	
# of Measurements	3,110
Minimum	-69.4
Maximum	260.2
Mean	-17.2
Standard Deviation (σ)	37.6



Survey Unit 3
Drydock 7, Berth 62, Berth 63, Berth 64
(Class 2)
Total Area (1,318 m²)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

N

Legend

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Alpha dpm/100 cm2)

- ≤19.9
- 20.0 - 49.9
- 50.0 - 99.9
- ≥100.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 80 160
Scale (feet)

SU 3 ALPHA SCAN RESULTS - VERTICAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 34

Beta Data Statistics Survey Unit 3 (Horizontal Surface) (Beta dpm/100 cm2)	
# of Measurements	6,150
Minimum	-607.6
Maximum	588.9
Mean	109.6
Standard Deviation (σ)	165.7

Survey Unit 3
Drydock 7, Berth 62, Berth 63, Berth 64
(Class 2)
Total Area (1,318 m²)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

N

Legend

Horizontal Surface
Vertical Surface

Scan Data Results
(Beta dpm/100 cm2)

- ≤199.9
- 200.0 - 499.9
- 500.0 - 999.9
- ≥1000.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 3 BETA SCAN RESULTS - HORIZONTAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 35

Beta Data Statistics Survey Unit 3 (Vertical Surface) (Beta dpm/100 cm2)	
# of Measurements	3,110
Minimum	-852.6
Maximum	447.3
Mean	-149.9
Standard Deviation (σ)	128.6

Survey Unit 3
Drydock 7, Berth 62, Berth 63, Berth 64
(Class 2)
Total Area (1,318 m²)

Survey Requirements
- 100% Gamma Scan
- 25% Alpha/Beta Scan

N

Legend

Horizontal Surface
Vertical Surface

Scan Data Results
(Beta dpm/100 cm2)

- ≤199.9
- 200.0 - 499.9
- 500.0 - 999.9
- ≥1000.0

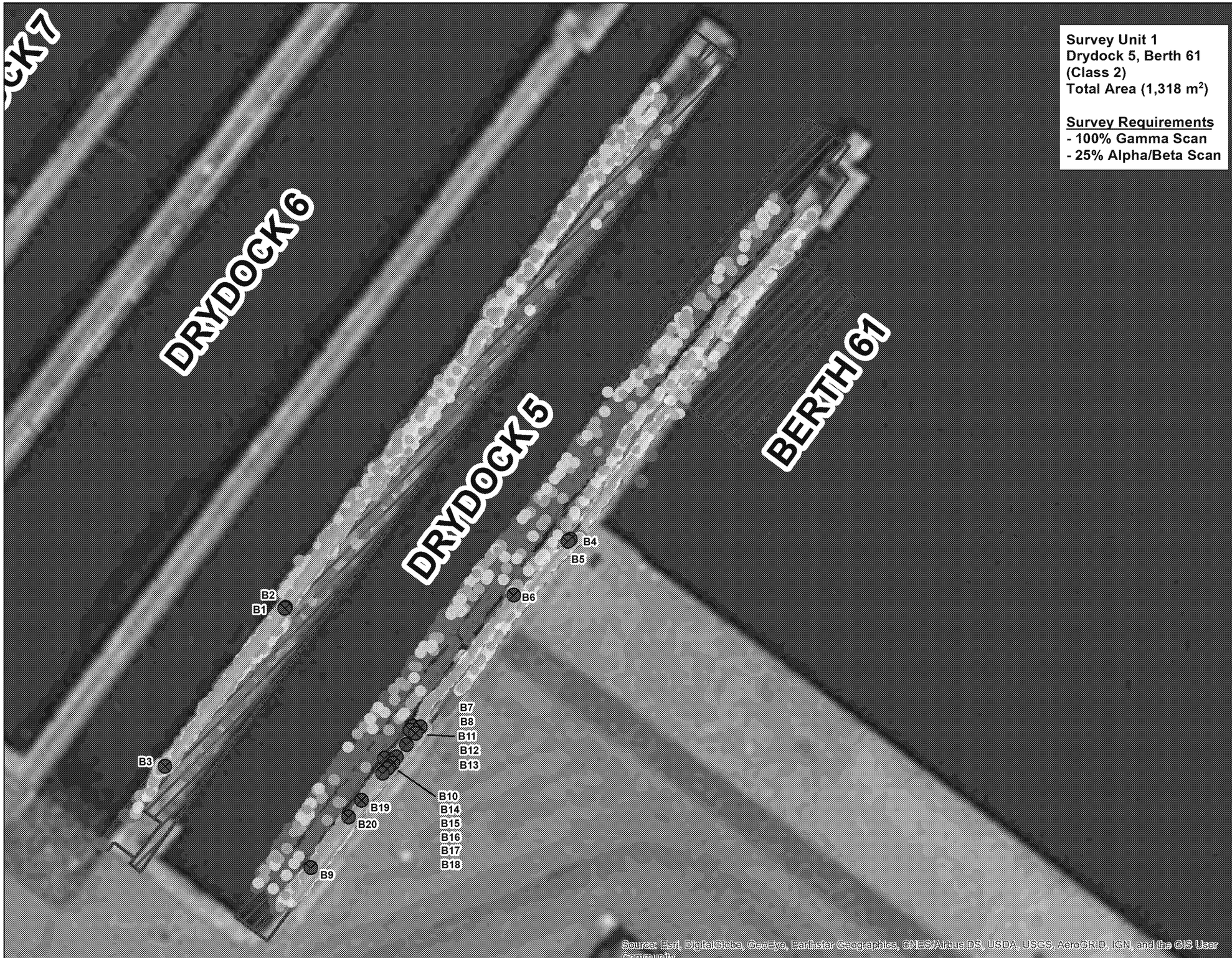
Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 80 160
Scale (feet)

SU 3 BETA SCAN RESULTS - VERTICAL SURFACES

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 36



N

Legend

Alpha-Beta Bias Measurement

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Alpha dpm/100 cm2)

≤19.9

20.0 - 49.9

50.0 - 99.9

≥100.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 1 ALPHA-BETA BIAS MEASUREMENT LOCATIONS

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 37

N

Legend

Alpha-Beta Bias Measurement

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Alpha dpm/100 cm2)

≤19.9

20.0 - 49.9

50.0 - 99.9

≥100.0

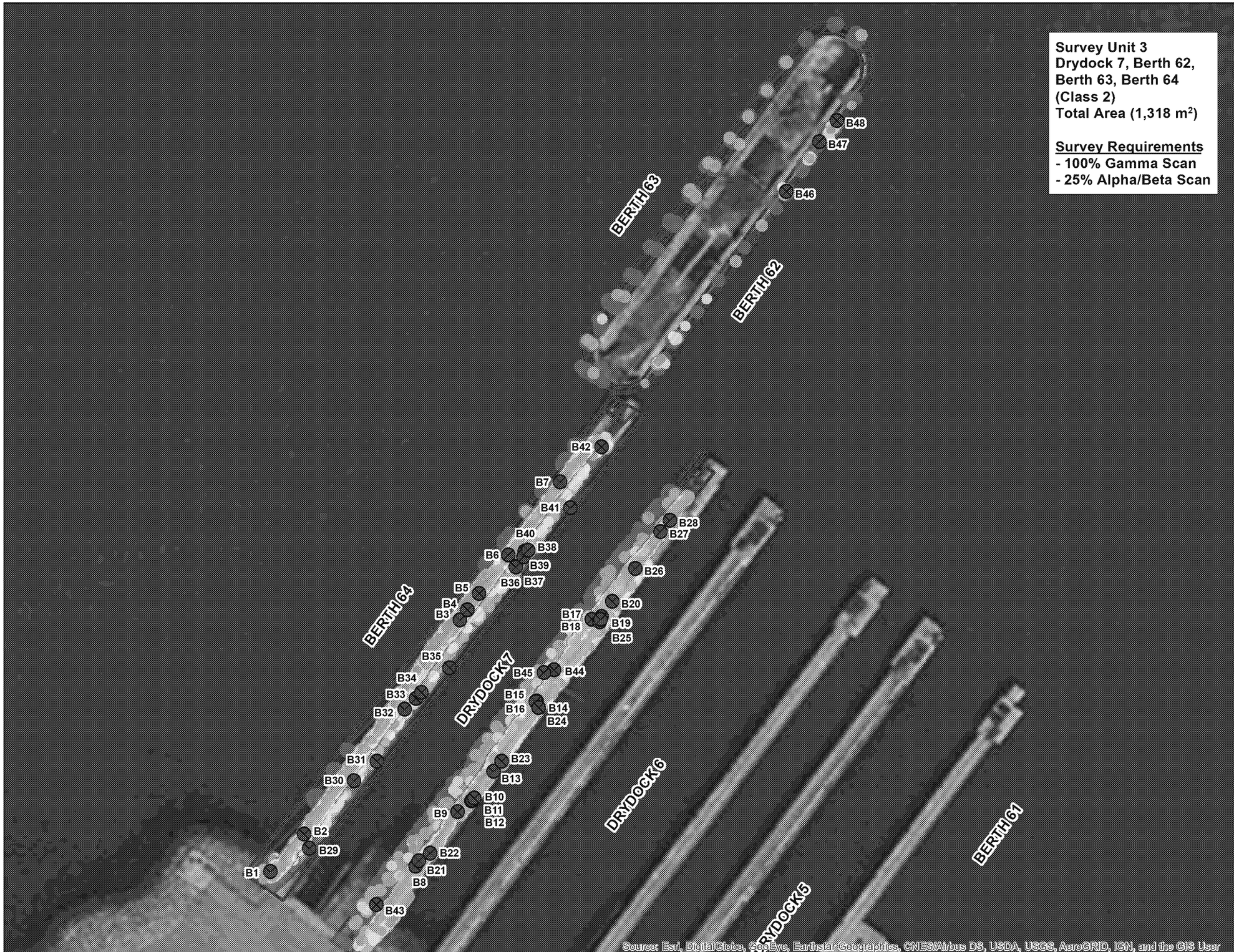
Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

0 40 80
Scale (feet)

SU 2 ALPHA-BETA BIAS MEASUREMENT LOCATIONS

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 38



N

Legend

Alpha-Beta Bias Measurement

Survey Unit Boundary

Horizontal Surface

Vertical Surface

Scan Data Results

(Alpha dpm/100 cm2)

≤19.9

20.0 - 49.9

50.0 - 99.9

≥100.0

Note: Alpha-Beta survey was performed with a Ludlum 2360/ 43-37 Floor Monitor

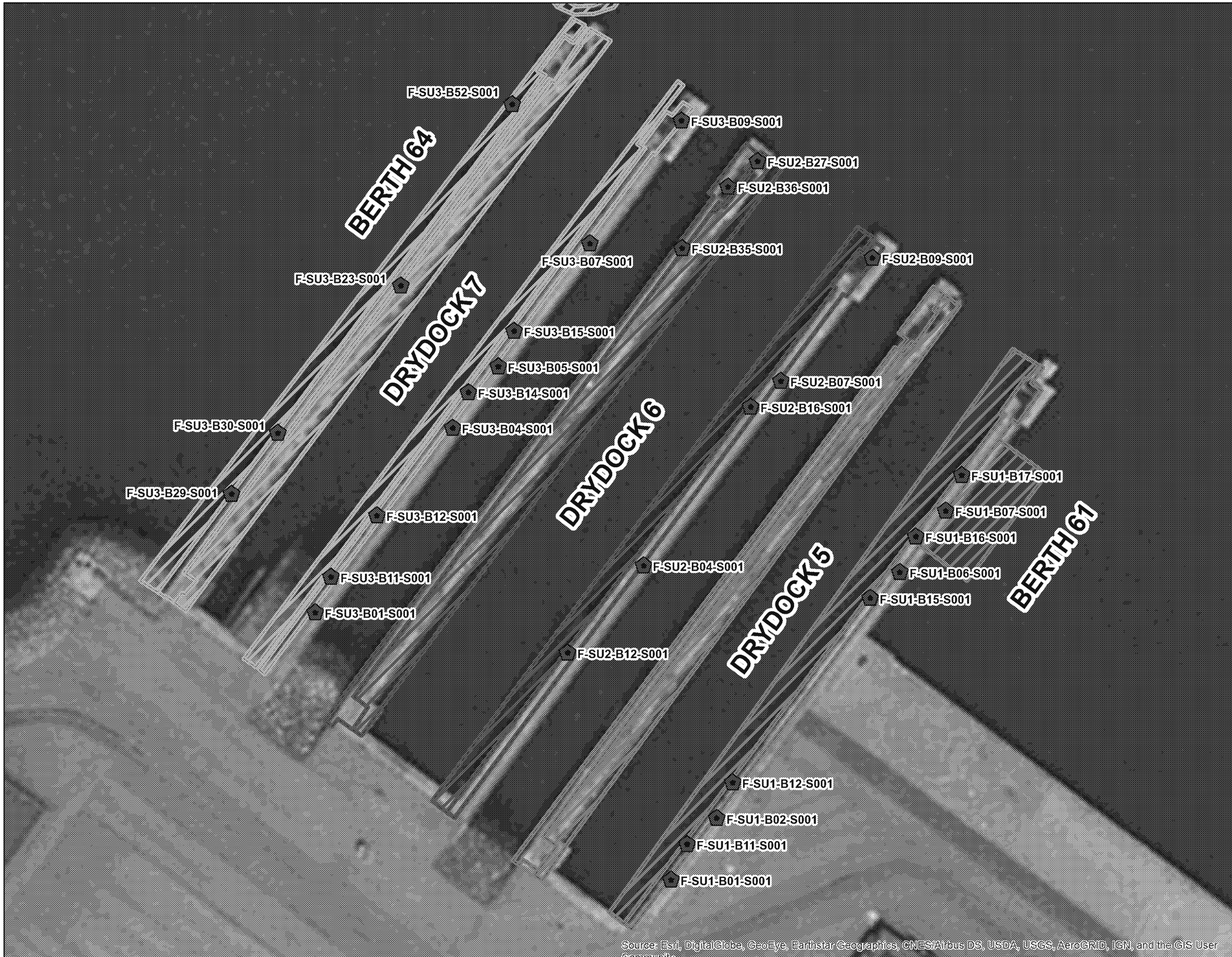
0 80 160

Scale (feet)

SU 3 ALPHA-BETA BIAS MEASUREMENT LOCATIONS

HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA

3/2020	PROJECT No. R3-0016.01	FIGURE 39



N

Legend

Sample Location

Survey Unit Boundary

SU 1 (Horizontal)

SU 1 (Vertical)

SU 2 (Horizontal)

SU 2 (Vertical)

SU 3 (Horizontal)

SU 3 (Vertical)

0 60 120
Scale (feet)

SUs 1, 2, & 3 SAMPLE LOCATIONS

**HUNTERS POINT NAVAL SHIPYARD
SAN FRANCISCO, CALIFORNIA**

3/2020	PROJECT No. R3-0016.01	FIGURE 40

TABLES

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Table 1: Radionuclides of Concern and Release Criteria

ROC	Half-Life	Radiations	Static Activity for Alpha and Beta (dpm/100 cm^2)	Removable Activity for Alpha and Beta (dpm/100 cm^2)
^{226}Ra	1,600 years	Alpha (α)/gamma (γ)	100	20
^{137}Cs	30.17 years	Beta (β-)/gamma (γ)	5,000	1,000
^{239}Pu	2.41 × 10^4 years	Alpha (α)/gamma (γ)	100	20
^{90}Sr	28.6 years	Beta (β-)	1,000	200

Notes:
Release criteria are to be applied according to *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* (U.S. Environmental Protection Agency et al., 2000) guidelines as established in the *Final Basewide Radiological Removal Action, Action Memorandum—Revision 2006, Hunters Point Shipyard, San Francisco, California* (U.S. Department of the Navy, 2006).

^{90}Sr	strontium-90
^{137}Cs	cesium-137
^{226}Ra	raduim-226
^{239}Pu	plutonium-239
dpm/100 cm^2	disintegration per minute per 100 square centimeters
ROC	radionuclide of concern

References:
U.S. Department of the Navy, 2006, *Final Basewide Radiological Removal Action, Action Memorandum—Revision 2006, Hunters Point Shipyard, San Francisco, California*.
U.S. Environmental Protection Agency, U.S. Nuclear Regulatory Commission, and U.S. Department of Energy, 2000, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, NUREG 1575, EPA 402 R 97 016, DOE/EH 0624, Revision 1, Washington, D.C.

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Table 2: Survey Unit Designations for Submarine Pens

Site Location	Survey Units	Site Location Detail	MARSSIM Classification	Gamma Scanning	Alpha/Beta Scanning	Survey Description
Submarine Pens	SU 1	Drydock 5/Ship Berth 61	Class 2	100 percent	25 percent	Survey of horizontal and vertical surfaces of Drydock 5 and vertical surfaces of Ship Berth 61 (Figure 4)
	SU 2	Drydock 6				Survey of horizontal and vertical surfaces of Drydock 6 (Figure 5)
	SU 3	Drydock 7/Ship Berths 62, 63, and 64				Survey of horizontal and vertical surfaces of Drydock 7 and Ship Berths 62 and 63, and vertical surfaces of Ship Berth 64 (Figure 6)

Notes:
HRA Section 8.3.7.2 (Naval Sea Systems Command, 2004) states the current potential for contaminated media as low or none. As defined in the HRA, a low potential categorization for media contamination indicates that the contamination potential is remote. The Parcel F submarine pens scoping survey was designed to meet the requirements of a MARSSIM (U.S. Environmental Protection Agency et al., 2000) Class 2 final status survey in the Final Revision 2, Radiological Scoping Surveys Work Plan, Parcel F Structures, Hunters Point Naval Shipyard, San Francisco, California (Aptim Federal Services, LLC, 2019).

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Table 2: Survey Unit Designations for Submarine Pens

Notes (continued):

HRA	*Final Historical Radiological Assessment Volume II, History of the Use of General Radioactive Materials, 1939–2003, Hunters Point Shipyard, San Francisco, California*
MARSSIM	*Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*
SU	survey unit

References:

Aptim Federal Services, LLC, 2019, *Final Revision 2, Radiological Scoping Surveys Work Plan, Parcel F Structures, Hunters Point Naval Shipyard, San Francisco, California*, May.

Naval Sea Systems Command, 2004, *Final Historical Radiological Assessment Volume II, History of the Use of General Radioactive Materials, 1939–2003, Hunters Point Shipyard, San Francisco, California*, August 31.

U.S. Environmental Protection Agency, U.S. Nuclear Regulatory Commission, and U.S. Department of Energy, 2000, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, NUREG 1575, EPA 402 R 97 016, DOE/EH 0624, Revision 1, Washington, D.C.

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Table 3: Field Survey Instrumentation

Measurement Type	Detector Type	Effective Detector Area and Window Density	Instrument Model	Detector Model
Dose Rate	NaI(Tl) Scintillation	1-inch diameter × 1-inch length N/A	Ludlum 19	N/A
Beta-Gamma	Geiger-Muller Survey Instrument	15 cm^2 0.3 mg/cm^2 mica	Ludlum 3	Ludlum 44-9
Gamma	NaI(Tl) Scintillation	3-inch × 3-inch length N/A	Ludlum 2221	Ludlum 44-20
Gamma	NaI(Tl) Scintillation	4-inch × 4-inch × 16-inch length N/A	RS-700	RSX-1
Gamma	NaI Spectrometer (Nuclide Identification)	N/A	Canberra InSpector 1000	N/A
Alpha/Beta Scan	Gas Flow Proportional	Floor Monitor Large Area (584 cm^2)	Ludlum 2360	Ludlum 43-37
Alpha/Beta Static	Gas Flow Proportional	Large Area (584 cm^2)	Ludlum 2360	Ludlum 43-37
Alpha/Beta Swipes	Dual Phosphor Scintillation	2-inch (5.1 cm) diameter 0.4 mg/cm^2	Ludlum 2929	Ludlum 43-10-1

Notes:

cm	centimeter
cm^2	square centimeter
mg/cm^2	milligram per square centimeter
N/A	not applicable
NaI	sodium iodide
NaI (Tl)	sodium iodide (thallium-doped)

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Table 4: Calculated Minimum Detectable Concentrations for Field Instrumentation

Model No. (ratemeter/ detector)	Serial Numbers (ratemeter/ detector)	Nuclide Type	Background Count Rate (cpm) [a]	Background Count Time (min)	Sample Count Time (min)	Total Efficiency [b]	Detector Active Area (cm^2)	MDC (dpm/100 cm^2)
Alpha and Beta Surface Scan—sequential six-second static counts (Section 3.4.4)								
2360/43-37	215271/PR216985	alpha	23.1	10	0.1	0.074	582	180
		beta	871.3	10	0.1	0.192	582	300
2360/43-37	220263/PR216985	alpha	31.2	10	0.1	0.077	582	191
		beta	1087.5	10	0.1	0.206	582	309
2360/43-37	245779/PR190618	alpha	21.2	10	0.1	0.066	582	196
		beta	995.2	10	0.1	0.207	582	295
2360/43-37	275739/PR302114	alpha	34.5	10	0.1	0.076	582	200
		beta	1061.1	10	0.1	0.195	582	323
Alpha and Beta Static Measurements (Section 3.4.5)								
2360/43-37	215271/PR216985	alpha	23.1	10	2	0.074	582	32
		beta	871.3	10	2	0.192	582	69
2360/43-37	220263/PR216985	alpha	31.2	10	2	0.077	582	35
		beta	1087.5	10	2	0.206	582	71
2360/43-37	245779/PR190618	alpha	21.2	10	2	0.066	582	35
		beta	995.2	10	2	0.207	582	68
2360/43-37	275739/PR302114	alpha	34.5	10	2	0.076	582	37
		beta	1061.1	10	2	0.195	582	74
Alpha and Beta Smears (Section 3.4.6)								
2929/43-10-1	155577/PR157789	alpha	0.1	10	1	0.33	100	12
		beta	47.1	10	1	0.38	100	70

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Table 4: Calculated Minimum Detectable Concentrations for Field Instrumentation

Notes:
[a] Background count rate based on actual field measurements on concrete.
[b] Total efficiency equals instrument efficiency times surface efficiency; the efficiencies provided were measured in the field.

cm^2	square centimeter
cpm	count per minute
dpm/100 cm^2	disintegration per minute per 100 square centimeters
MDC	minimum detectable concentration
min	minute

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Table 5: Reference Background Area Summary Statistics

Model No. (ratemeter/ detector)	Serial Numbers (ratemeter/ detector)	Nuclide Type	Matrix	Number of Measurements	Minimum (cpm)	Maximum (cpm)	Mean (cpm)	Standard Deviation	Investigation Level (Mean + 3-sigma)
Alpha Beta Field Instrumentation									
2360/43-37	215271/PR216985	alpha	Concrete	20	16.0	32.0	23.1	3.6	N/A
		beta		20	819.0	914.0	871.3	27.8	N/A
		alpha	Metal	20	2.5	8.5	5.3	1.5	N/A
		beta		20	388.5	457.0	416.5	14.4	N/A
2360/43-37	220263/PR216985	alpha	Concrete	20	25.0	40.5	31.2	4.0	N/A
		beta		20	1025.5	1131.0	1087.5	29.9	N/A
		alpha	Metal	20	7.5	19.5	13.0	3.3	N/A
		beta		20	675.5	758.5	721.9	20.8	N/A
2360/43-37	245779/PR190618	alpha	Concrete	20	16.0	30.0	21.2	3.3	N/A
		beta		20	921.5	1056.5	995.2	34.7	N/A
		alpha	Metal	20	2.0	8.0	4.1	1.3	N/A
		beta		20	562.0	644.0	605.3	21.1	N/A
2360/43-37	275739/PR302114	alpha	Concrete	20	21.5	44.5	34.5	5.4	N/A
		beta		20	1019.5	1103.0	1061.1	1052.0	N/A
		alpha	Metal	20	7.5	15.5	10.6	2.1	N/A
		beta		20	665.5	735.5	694.3	19.3	N/A
Gamma Instrumentation									
2221/44-20	176952/PR262403	gamma	Concrete in Parcel C[a]	20	8,569	11,241	9,788	780	12,129
		gamma	Metal	20	5,942	6,849	6,378	269	7,184
		gamma	Concrete Outside SU 3	20	10,522	13,976	11,739	894	14,421[a]

Notes:
[a] This was selected as the concrete reference background area for static gamma measurements due to its greater similarity to the concrete in SUs 1, 2, and 3.

cpm count per minute
N/A not applicable
SU survey unit

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Table 6: Gamma Static Summary Statistics

Model No. (ratemeter/ detector)	Serial Numbers (ratemeter/ detector)	Survey Unit	Number of Measurements	Minimum (cpm)	Maximum (cpm)	Mean (cpm)	Standard Deviation (cpm)	Exceedances of Gamma Static IL
2221/44-20	176952/PR262403	1	22	9,586	12,024	11,235	717	0
		2	16	10,975	14,742	11,998	1,001	1
		3—Drydock 7 Ship Berth 64	20	9,344	18,183	13,841	2,232	8
		3—Ship Berths 62 and 63	17	4,835	7,447	6,388	660	0

Notes:
cpm count per minute
IL investigation level

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Table 7: Alpha Beta Scan Summary Statistics

Survey Unit	Number of Measurements	Nuclide Type	Minimum	Maximum	Mean	Median	Standard Deviation	Exceedances of Release Criteria [a]
			(dpm/100 cm^2)					
Alpha and Beta Surface Scan—sequential six-second static counts (Section 3.4.4)								
1	7,589	Alpha	-77.6	353.1	24.8	19.6	55.9	798
	7,589	Beta	-854.0	667.1	117.8	160.1	216.3	0
2	6,677	Alpha	-69.4	247.3	14.6	15.9	49.0	353
	6,677	Beta	-685.6	603.1	-19.7	-47.8	201.3	0
3	9,360	Alpha	-77.6	331.5	18.4	14.0	57.8	997
	9,360	Beta	-852.6	588.9	20.2	21.0	198.0	0

Notes:
[a] Investigation level is defined as the most conservative (i.e., lowest) release criteria for alpha and beta activity provided in Table 1, which are 100 dpm/100 cm^2 and 1,000 dpm/100 cm^2, respectively.

dpm/100 cm^2 disintegration per minute per 100 square centimeters
IL investigation level

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Table 8: Alpha Beta Systematic Static Summary Statistics

Survey Unit	Number of Measurements	Nuclide Type	Minimum	Maximum	Mean	Median	Standard Deviation	Exceedances of IL [a]	Exceedances of Release Criteria [b]
			(dpm/100 cm^2)						
Alpha and Beta Systematic (two-minute) Static Measurements (Section 3.4.5)									
1	54	Alpha	-28.2	140	64.2	75.7	49.4	37	13
	54	Beta	-254	349	140	252	182	0	0
2	54	Alpha	-10.7	134	64.9	72.6	35.3	38	8
	54	Beta	-170	214	17.5	17.8	97.1	0	0
3	54	Alpha	-39.4	164	43.0	43.0	41.7	25	4
	54	Beta	-268	145	-13.7	21.8	103	0	0

Notes:
[a] Investigation level is defined as 50 percent of the release criteria for alpha and beta activity.
[b] Release criteria for alpha and beta activity are 100 dpm/100 cm^2 and 1,000 dpm/100 cm^2, respectively.

dpm/100 cm^2 disintegration per minute per 100 square centimeters
IL investigation level

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Table 9: Alpha Beta Bias Static Summary Statistics

Survey Unit	Number of Measurements	Nuclide Type	Minimum	Maximum	Mean	Median	Standard Deviation	Exceedances of IL [a]	Exceedances of Release Criteria [b]
			(dpm/100 cm^2)						
Alpha and Beta Bias (two-minute) Static Measurements (Section 3.4.5)									
1	31	Alpha	-41.6	26.0	-3.4	4.6	21.6	0	0
	31	Beta	-244	213	78.0	131	128	0	0
2	33	Alpha	-29.4	288	15.9	9.01	51.8	1	1
	33	Beta	-258	481	155	161	177	0	0
3	59	Alpha	-48.3	98.9	19.9	20.1	35.6	12	1
	59	Beta	-607	69.5	-123	-91.0	136	0	0

Notes:
[a] Investigation level is defined as 50 percent of the release criteria for alpha and beta activity.
[b] Release criteria for alpha and beta activity are 100 dpm/100 cm^2 and 1,000 dpm/100 cm^2, respectively.

dpm/100 cm^2 disintegration per minute per 100 square centimeters
IL investigation level

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DCN: APTM-0006-4550-0099

Table 10: Alpha Beta Systematic Smear Summary Statistics

Survey Unit	Number of Measurements	Nuclide Type	Minimum	Maximum	Mean	Median	Standard Deviation	Exceedances of Release Criteria [a]
			(dpm/100 cm^2)					
Alpha and Beta Systematic Smear Measurements (Section 3.4.6)								
1	54	Alpha	-0.30	11.8	4.1	5.7	3.3	0
	54	Beta	-42.2	41.7	2.4	3.7	19.2	0
2	54	Alpha	-0.30	3.0	0.4	0.0	1.1	0
	54	Beta	-38.8	43.3	1.5	2.6	18.7	0
3	54	Alpha	0.0	9.1	0.8	0.0	1.9	0
	54	Beta	-40.4	18.6	-8.8	-6.3	16.8	0

Notes:

[a] Release criteria for alpha and beta activity are 100 dpm/100 cm^2 and 1,000 dpm/100 cm^2, respectively.

dpm/100 cm^2 disintegration per minute per 100 square centimeters

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DCN: APTM-0006-4550-0099

Table 11: Alpha Beta Bias Smear Summary Statistics

Survey Unit	Number of Measurements	Nuclide Type	Minimum	Maximum	Mean	Median	Standard Deviation	Exceedances of Release Criteria [a]
			(dpm/100 cm^2)					
Alpha and Beta Bias Smear Measurements (Section 3.4.6)								
1	32	Alpha	-0.3	6.0	0.3	0.0	1.3	0
	32	Beta	-39.6	33.8	2.4	1.0	18.1	0
2	33	Alpha	-0.3	3.0	0.3	0.0	1.0	0
	33	Beta	-32.2	63.4	8.1	8.4	21.7	0
3	58	Alpha	-0.3	5.7	0.7	-0.3	1.7	0
	58	Beta	-41.4	29.4	-6.7	-7.3	16.9	0

Notes:

[a] Release criteria for alpha and beta activity are 100 dpm/100 cm^2 and 1,000 dpm/100 cm^2, respectively.

dpm/100 cm^2 disintegration per minute per 100 square centimeters

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DCN: APTM-0006-4550-0099

Table 12: Sample Summary Statistics

Sample ID	Survey Unit	Matrix	Sample Type [a]	^{137}Cs			^{226}Ra			$^{239}Pu/^{240}Pu$			^{90}Sr [b]		
				Result	Flag	DLC	Result	Flag	DLC	Result	Flag	DLC	Result	Flag	DLC
F-SU1-B01-S001	1	Concrete	Systematic	-0.017	U	0.076	0.396		0.055	-0.004	U	0.037	0.091		0.066
F-SU1-B02-S001	1	Concrete	Systematic	0.008	U	0.097	0.521		0.085	-0.022	U	0.044	0.081	J	0.068
F-SU1-B06-S001	1	Concrete	Systematic	-0.050	U	0.072	0.433		0.059	-0.016	U	0.021	0.040	U	0.055
F-SU1-B07-S001	1	Concrete	Systematic	0.003	U	0.057	0.436		0.055	-0.008	U	0.014	0.050	U	0.061
F-SU1-B11-S001	1	Concrete	Systematic	0.021	U	0.076	0.338		0.056	0.004	U	0.011	0.090		0.058
F-SU1-B12-S001	1	Concrete	Systematic	0.012	U	0.065	0.322		0.086	-0.002	U	0.016	0.058	U	0.063
F-SU1-B15-S001	1	Concrete	Systematic	-0.064	U	0.091	0.473		0.066	0.016	J	0.008	-0.003	U	0.074
F-SU1-B16-S001	1	Concrete	Systematic	0.032	U	0.055	0.569		0.088	-0.004	U	0.010	-0.028	U	0.061
F-SU1-B17-S001	1	Concrete	Systematic	-0.057	U	0.073	0.497		0.044	0.014	J	0.012	-0.031	U	0.066
F-SU1-B24-S001	1	Concrete	Systematic	-0.034	U	0.087	0.484		0.092	-0.006	U	0.013	0.023	U	0.065
F-SU1-B30-S001	1	Concrete	Systematic	0.046	U	0.059	0.675		0.073	0.009	U	0.016	0.064	J	0.056
F-SU1-B33-S001	1	Concrete	Systematic	0.000	U	0.042	0.638		0.056	0.017	J	0.016	-0.074	U	0.068
F-SU1-B36-S001	1	Concrete	Systematic	0.049	U	0.064	0.380		0.085	-0.008	U	0.015	0.174		0.069
F-SU2-B04-S001	2	Concrete	Systematic	-0.029	U	0.059	0.555		0.057	0.012	U	0.037	0.026	U	0.071
F-SU2-B07-S001	2	Concrete	Systematic	0.002	U	0.063	0.524		0.066	-0.018	U	0.052	0.083	J	0.065
F-SU2-B09-S001	2	Concrete	Systematic	0.009	U	0.090	0.547		0.106	-0.037	U	0.042	-0.109	U	0.114
F-SU2-B12-S001	2	Concrete	Systematic	-0.032	U	0.064	0.450		0.073	-0.009	U	0.022	0.151		0.065
F-SU2-B16-S001	2	Concrete	Systematic	0.226		0.036	0.410		0.118	-0.008	U	0.014	0.076	J	0.057
F-SU2-B27-S001	2	Concrete	Systematic	-0.047	U	0.062	0.501		0.064	-0.018	U	0.022	0.072	J	0.062
F-SU2-B35-S001	2	Concrete	Systematic	0.007	U	0.045	0.525		0.041	0.000	U	0.016	0.112		0.056
F-SU2-B36-S001	2	Concrete	Systematic	0.029	U	0.048	0.428		0.050	-0.006	U	0.012	0.053	U	0.092
F-SU3-B01-S001	3	Concrete	Systematic	-0.026	U	0.092	0.555		0.081	-0.008	U	0.014	0.046	U	0.062
F-SU3-B04-S001	3	Concrete	Systematic	0.024	U	0.042	0.623		0.055	-0.008	U	0.015	0.109		0.051
F-SU3-B05-S001	3	Concrete	Systematic	-0.026	U	0.049	0.413		0.061	0.006	U	0.008	0.014	U	0.065
F-SU3-B07-S001	3	Concrete	Systematic	0.015	U	0.063	0.617		0.043	0.006	U	0.007	0.077		0.053
F-SU3-B09-S001	3	Concrete	Systematic	-0.064	U	0.085	0.111	U	0.224	-0.007	U	0.013	-0.019	U	0.065
F-SU3-B11-S001	3	Concrete	Systematic	0.034	U	0.052	0.551		0.052	-0.006	U	0.013	-0.049	U	0.069
F-SU3-B12-S001	3	Concrete	Systematic	0.063	U	0.084	0.598		0.045	-0.006	U	0.013	-0.059	U	0.057
F-SU3-B14-S001	3	Concrete	Systematic	-0.002	U	0.084	0.396		0.055	0.004	U	0.018	-0.028	U	0.063
F-SU3-B15-S001	3	Concrete	Systematic	-0.017	U	0.067	0.388		0.050	0.027	J	0.010	-0.093	U	0.068
F-SU3-B23-S001	3	Concrete	Systematic	-0.034	U	0.072	0.503		0.052	-0.002	U	0.008	-0.021	U	0.064
F-SU3-B29-S001	3	Concrete	Systematic	-0.053	U	0.123	0.223		0.171	-0.070	U	0.053	-0.045	U	0.068
F-SU3-B30-S001	3	Concrete	Systematic	0.025	U	0.063	0.459		0.060	0.008	U	0.015	-0.059	U	0.064
F-SU3-B52-S001	3	Concrete	Systematic	0.013	U	0.060	0.394		0.016	0.008	J	0.007	-0.053	U	0.069
Average				0.002			0.469			-0.004			0.024		
Median				0.003			0.479			-0.005			0.033		
Standard Deviation				0.052			0.117			0.017			0.071		
Maximum				0.226			0.675			0.027			0.174		
Minimum				-0.064			0.111			-0.070			-0.109		

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Table 12: Sample Summary Statistics

Notes:
[a] Sample type refers to whether the sample was collected at a systematic location or bias location.
[b] In accordance with the sampling and analysis plan (Appendix A to the *Final Revision 2, Radiological Scoping Surveys Work Plan, Parcel F Structures, Hunters Point Naval Shipyard, San Francisco, California* [Aptim Federal Services, LLC, 2019]), samples were analyzed for total beta strontium.
Sample results are in units of picocurie per gram.

^{90}Sr	strontium-90
^{137}Cs	cesium-137
^{226}Ra	radium-226
^{239}Pu	plutonium-239
^{240}Pu	plutonium-240
DLC	decision limit concentration
J	reported result is considered to be estimated – refer to Appendix H
U	analyte not detected at or above the DLC

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References:
Aptim Federal Services, LLC, 2019, *Final Revision 2, Radiological Scoping Surveys Work Plan, Parcel F Structures, Hunters Point Naval Shipyard, San Francisco, California*, May.

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APPENDIX A
RESPONSES TO COMMENTS

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Response to Comments on the *Draft Radiological Scoping Survey Report, Parcel F Structures – Submarine Pens, Hunters Point Naval Shipyard, CA*, June 2020, DCN: APTM-0006-4550-0099	
Comments by: Wayne Praskins, EPA Project Manager, EPA, comments dated August 20, 2020	
Specific Comments	**Response**
1. **Section 2.4, Previous Investigations and Removal Actions, Page 2-2:** This section does not mention previous investigations of Drydock 6 described in the 2004 HPNS Historical Radiological Assessment (mentioned in Tables 6-6 and 6-7 and Sections 8.3.2.11 to 8.3.2.12 in the HRA). Please provide a brief summary of these previous investigations.	Agree with comment. The summary from the HRA was added to this section as follows: "The HRA (NAVSEA, 2004) states that no previous investigations were performed in Drydock 5 or Drydock 7. In 1947 "slight contamination" was reported on cap blocks, ships brow, securing lines, fire hose, and electrical cables in Drydock 6. In 2002 a Class 3 survey performed during the Phase V investigation identified 226Ra activity within the range of background concentrations, and no contamination was found in sediment samples collected from Drydock 6."
2. **Section 3.4.4 and Table 4:** The ranges of values for several parameters appear to differ between the text and table (e.g., alpha background count rates for surface scans, alpha scan total efficiency values, beta scan background values). For example, for the alpha background on concrete the text gives a range of 3.5 cpm to 10.5 cpm but the table shows 21.2 to 34.5 cpm. Please clarify and make any needed corrections.	Agree with comment. The ranges of values were reviewed and corrected as needed in Section 3.4.4.
3. **Section 3.3.5, Step Five—Develop a Decision Rule, Page 3-5:** Please clarify the consequences of exceeding a gamma scan Investigation Level (IL). Section 3.3.5 states that locations where a gamma scan survey result exceeds the IL will be included in the surface area covered by the alpha/beta scanning survey. Did exceedance of a gamma scan IL also result in a gamma static measurement, as suggested by Section 4.3.3?	Agree with comment. An exceedance of the gamma scan IL also results in a gamma static measurement. This text was added to Section 3.3.5, first bullet as follows: "If a gamma scan survey result exceeds the IL, then a gamma static measurement will be performed at that location, and that location will be included in the surface area covered by the alpha/beta scanning survey."
4. **Section 3.4.2, Gamma Static Measurements, Page 3-6:** This section states that one-minute gamma static measurements were performed with the Ludlum Model 44-20 3-inch by 3-inch Sodium Iodide (NaI) gamma scintillation detector. Why was the RS-700 not used for horizontal surfaces given its larger detector size and lower MDC capability, as was done for scans?	Final, Revision 2, Radiological Scoping Surveys Work Plan (Work Plan; APTIM, 2019), Sections 5.5.2 and 5.6 state that a Ludlum Model 44-20 3-inch by 3-inch Sodium Iodide (NaI) gamma scintillation detector will be used to collect gamma static measurements. Statics were performed in accordance with the agency reviewed and approved Work Plan.
5. **Section 4.3.1, Reference Background Areas, Page 4-4:** This section states that, "A small concrete pad adjacent to SU 3 was used as the RBA for gamma measurements." Section 5.3.2 of the May 2019 Work Plan states that, "The reference area behind Building 810 (Figure 1) will be used to	Preliminary measurements in the reference area behind Building 810 demonstrated the alpha, beta, and gamma measurements were different between the survey areas and the proposed reference area. The area behind Building 810 was determined to be inappropriate as an RBA for concrete

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collect gamma instrument-specific background levels." A footnote in Table 5 states that "concrete in Parcel C" was used as RBA for static gamma. Please explain the apparent change from the work plan and clarify which RBAs were used for which types of measurement. If a change was made from the work plan and is not described in one of the Field Change Requests included in Appendix B, please discuss in Section 1.2 ("Deviations from Planning Documents").	and metal in the Submarine Pens. Work Plan Section 5.3.2 states "If needed, additional reference areas may be established with the permission of the Navy." RBA measurements were collected both from a non-impacted concrete pad in Parcel C, and a non-impacted concrete pad adjacent to SU 3. The non-impacted concrete pad adjacent to SU 3 was more similar to the gamma results on concrete and metal in the Submarine Pens, so it was used as the RBA for gamma measurements. The non-impacted concrete pad in Parcel C was more similar to the alpha and beta results on concrete and metal in the Submarine Pens, so it was used as the RBA for alpha and beta measurements. Section 4.3.1 was revised as follows: "As stated in Section 3.4.4, the alpha activity on concrete in the RBA was significantly different from the alpha background activity used during planning. Differences between the proposed RBA and the beta and gamma activity in the Submarine Pens were also noted. The original RBA behind Building 810 was determined to not adequately represent background in the Submarine Pens, so multiple potential RBAs in non-impacted areas were investigated. A concrete pad in Parcel C was ~~used~~ selected as the RBA for alpha/beta measurements with the approval of the Navy. This RBA was selected because the concrete was most similar in nature to the concrete on the submarine pens, and it was non impacted because it was constructed after the radiological operations occurred. A small concrete pad adjacent to SU 3 was ~~used~~ selected as the RBA for gamma measurements with the approval of the Navy…"
6. **Section 3.3.5, Step Five—Develop a Decision Rule, Page 3-4:** This section says, "The IL for gamma scan measurements is the average of gamma scan measurements for a SU plus three standard deviations (FCR-003; Appendix B)." Section 5.4.5 of the May 2019 Work Plan says "The IL for gamma scan measurements is the average of gamma scan measurements for a similar material in an appropriate background area plus three standard deviations." Please explain this apparent change.	Work Plan Section 5.3.3 describes the gamma scan IL as the mean of the survey data plus 3 standard deviations. Work Plan Section 5.4.5 states "The IL for gamma scan measurements is the average of gamma scan measurements for a similar material in an appropriate background area plus three standard deviations." FCR-003 was prepared to clarify contradictory statements in the Work Plan, and state that the definition in Section 5.3.3 was correct.
7. **Section 6.1.1.1, Survey Unit 1, Page 6-1:** This section and others in the report present scanning results for impellers (also described as	Impellers are defined as the rotating part of a pump used to move fluid by rotation. The pumps that used the impellers had been removed and were no

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impeller units, impeller surfaces, and outlet impellers). In Section 2.2 it is stated that the pumps used to dewater the drydocks were not visible and presumed to have been removed. Please clarify the nature of the equipment or surface described as impellers and scanned as part of the study.	longer present. The intent of the impeller measurements was to provide an indication of any remaining surface contamination associated with the pumping system. A picture of an impeller was added to Section 6.1.1.1.
8. Section 6.1.3, In Situ Gamma Spectroscopy Results, Page 6-3: This section states that, "The net spectrums were plotted and the critical levels assessed for ROC-specific energy ranges to determine if there was ROC-specific activity present above background. The spectral analysis did not identify activity statistically above background." Please revise the Report to include the formula used to calculate the critical levels for gamma in situ measurements conducted using the Canberra InSpector 1000 detection system. The report also refers to the use of critical levels in Sections 4.3.4 and 5.3.3.	The generic equation for calculating critical value was added to Section 4.3.4 and referenced in Section 5.3.3 and Section 6.1.3.
9. Section 6.2.1.1, Survey Unit 1, Alpha/Beta Scan Survey Results, Page 6-3: The text in Section 6.2.1.1 and Table 7 indicate that 798 measurements (11 percent) exceeded the alpha release criterion of 100 disintegrations per 100 square centimeters (dpm/100 cm2) in Survey Unit 1, and alpha and beta two-minute bias static measurements were performed at the 20 most elevated scan locations. A statement in Section 5.4.3 of the May 2019 Work Plan calls for static measurements at biased locations to investigate survey results exceeding project ILs. Please clarify why the other 700+ locations that exceeded the alpha release criterion were not investigated, and the relationship between this fact and the recommendation for further investigation of the submarine pens. Similar circumstances occurred in Survey Units 2 and 3.	Given the prevalence of alpha scan measurements exceeding the release criterion, it was decided in the field to document that several areas with alpha activity exceeding the release criterion were identified during the scoping survey in the Submarine Pens. Section 7.3, Recommendations, states additional investigations of alpha activity on concrete surfaces in the Submarine Pens should be conducted. Section 7.1.2 of the approved Work Plan, last paragraph, states "…static measurements will be collected…as part of investigations of scanning results exceeding the IL, as needed." The work plan does not include an IL for alpha or beta scans, so bias static measurements were performed at the 20 locations with the highest alpha scan readings in each survey unit. None of the bias static measurement results exceeded the IL for alpha or beta static measurements and none of the alpha scan measurements exceeded the alpha scan MDC of 300 dpm/100 cm^2 listed in Section 5.7.3 of the approved Work Plan as the basis for the number of systematic static measurements per survey unit. Therefore, it was determined there was no requirement for additional bias static measurements at locations with results exceeding the alpha release criteria.

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10. Section 6.4.2, Gamma Scan Survey Results Data Quality Review, Page 6-9: The text states that the review of the gamma scan data identified some differences between individual data sets; gamma scans on horizontal surfaces in SU 2 using the RS700 detectors were approximately 10 to 15 percent higher than the gamma scan data collected in SU 1 and SU 3. In addition, it was noted that approximately 5 percent of the gamma scan data collected with the 3-inch by 3-inch NaI detector on horizontal surfaces in SU 2 were higher than expected from a normal distribution of data. This indicates a difference in gamma radiation levels on horizontal surfaces in open areas of SU 2. Sixteen gamma static measurements and one in situ gamma spectroscopy measurement were performed in SU 2 to investigate potentially elevated results. However, the text does not explain why the results were different. Please revise this section to explain what factors may have contributed to the differences in gamma scan data for SU 2 and whether any such factors may have adversely affected the data quality or usability of such data.	There are numerous reasons why natural radiation levels can vary from one material to another, or from one location to another. There are also numerous reasons why the response from a particular radiation detection system can vary over time or from location to location. Examples include, temperature, atmospheric pressure, relative humidity, wind speed, wind direction, battery charge, static electricity on detectors and meters, variations in natural radioactivity inherent in materials being measured, and variations in surface conditions (e.g., texture, thickness, smoothness, cracks, bumps, depressions). Additional information on the evaluation of gamma scan data has been included in Appendix F. The scoping survey report documents controls put in place to evaluate the quality of the data generated and evaluated the survey results to identify any issues that affected data quality or data usability. Section 6.4 documents that no issues with data quality or data usability were identified. No technically defensible explanations for the noted differences were identified during the implementation or assessment phases of the scoping survey. The scoping survey report documents unexplained differences to support development of data quality objectives for subsequent investigations of the Submarine Pens recommended in Section 7.3.
11. Section 6.4.2 (Gamma Scan Survey Results Data Quality Review): It is unclear how gamma sensitivity of the detectors used during this project was determined and whether the sensitivity was sufficient to meet project objectives. This section states that "Gamma sensitivity was addressed during planning based on the probability of detecting discrete sources of gamma radiation (i.e., 226Ra deck markers)." However, the Report does not address whether the gamma sensitivity for the Ludlum 44-20, RS-700, and Canberra InSpector 1000 used to collect the data for this project was determined to be sufficient for identifying discrete radiological sources on, in, or near cement or metal structures or how the sensitivity was determined. Please revise the Report to include all gamma instrumentation scanning and static Minimum Detectable Concentrations (MDCs) and/or to provide the	This information is provided in Appendix D of the approved Work Plan for the Ludlum 44-20 and RS-700. The following text from Appendix D was added into Section 5.3.1 of the report: "The field of view of any NaI detector without a shield or collimator is a sphere surrounding the detector, and the response to a radiation source is proportional to the inverse of the square of the distance from the detector. For the RS-700 detector, the detector response 50 centimeters from the end of the detector was modeled to be 82.6% of the response with the same source centered beneath the detector. The field of view for two RS-700 detectors arranged end to end was experimentally determined to be a distance slightly greater than one meter (1.065 meters). A point source located within one meter of the edge of either RS-700 detector would have a response greater than or equal to 80% of the response of a point source located directly under

calculations used to determine the probability of detecting discrete sources of radiation attributable to the identification of Radium-226 deck markers in cement or metal-based structures.	the center of the detector. Scanning parallel paths approximately one meter apart means the outside edges of the detectors overlap by approximately 10 centimeters, so the field of view of the detectors overlaps to provide 100% coverage. The RS-700 maintained scan speeds of 1 meter per second or less. This scan speed resulted in a minimum detectable concentration during scanning of a point source containing 83 pCi of Ra-226 activity, which corresponds with 0.00017% of an intact deck marker." The following text from Appendix D was added into Section 5.3.4 of the report: "The field of view of the uncollimated and unshielded Ludlum Model 44-20 should be the same as the RS-700 since both detectors are NaI scintillation detectors. For conservatism the field of view of the Ludlum Model 44-20 is assumed to be 50 centimeters from the center of the detector, providing a field of view approximately one meter wide. Scanning along parallel paths approximately 0.5 meters apart provides overlap of the detector field of view and provides 100% coverage. The Model 44 20 3 inch by 3 inch NaI gamma scintillation detector maintained scan speeds of 0.5 meter per second or less. This scan speed resulted in a minimum detectable concentration during scanning of a point source containing 71 pCi of Ra-226 activity, which corresponds with 0.00014 percent of an intact deck marker." The following text was added to end of Section 5.3.3 in the report: "The critical value of the net background count was calculated as described in Section 4.3.4 and added to the background to compare individual results with background. The InSpector 1000 was used to evaluate locations where previous investigations had identified elevated levels of gamma radiation, or locations where previous investigation had identified elevated levels of alpha radiation and sample collection was not possible. The InSpector 1000 was used as a nuclide identifier to associate the most

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	prevalent photons with likely source radionuclides based on photon energy. The InSpector 1000 was set up to evaluate photons with energies between 50 and 2,000 kiloelectronvolts and was sensitive to photons emitted by all radionuclides of concern for this project. The InSpector 1000 was not used for quantitative measurements; therefore, no quantitative estimates of detectability were required."
12. Section 6.4.4, In Situ Gamma Spectroscopy Measurement Results Data Quality Review, Page 6-11: The text does not state if one of the project objectives was to identify elevated Cesium-137 (Cs-137) that may be present due to historical operations at the site. For example, it is unclear if one of the seven regions of interest (ROIs) was set to detect Cs-137. Please revise the text to clarify whether an objective was to identify areas with elevated Cs-137 and, if not, explain why not.	The project objectives include locating residual radioactive sources (i.e., Ra-226 and Sr-90 radioluminescent devices) using gamma walkover surveys and performing alpha and beta surface measurements to evaluate the potential for residual radioactivity associated with historical Navy activities involving fallout from nuclear weapons testing. Because Cs-137 is a beta-gamma emitting radionuclide used as an indicator of fallout radioactivity and Sr-90 is a beta emitter with bremsstrahlung (gamma) emissions, areas exceeding the gamma scan investigation level were included in areas where alpha-beta scans were performed to determine if the increased gamma radiation resulted from fallout radiation as indicated by the presence of Cs-137 or radioluminescent sources of Sr-90 instead of radioluminescent sources of Ra-226. This means the potential presence of Cs-137 was further evaluated using alpha-beta scans, and the potential presence of Ra-226 and Sr-90 devices was further evaluated using in situ gamma spectroscopy. The InSpector 1000 was used to evaluate locations where previous investigations had identified elevated levels of gamma radiation. In situ gamma spectroscopy is a measurement technique that performs an assessment of the entire range of photon energies to identify and quantify photons at different energies. The ROIs are determined based on an evaluation of the entire spectrum, sometimes referred to as a "peak search." The spectrum is not evaluated based on predetermined ROIs to search for an individual radionuclide. The measurement technique was sensitive to the presence of Cs-137 and would have identified Cs-137 if it was present. No groups of photons, or "peaks," were identified in any of the in situ gamma spectroscopy analyses that were representative of Cs-

	137. If photons from Cs-137 with an energy of 661 keV were present, they would have been identified as Cs-137. As part of the assessment of in situ gamma spectroscopy results, an additional evaluation of naturally occurring radioactivity was performed. When no peaks were identified in a spectrum, the ROIs where photons from naturally occurring radionuclides were expected to appear were evaluated to determine if there was any indication the radioactivity in the measured spectrum indicated anything except naturally occurring radioactivity. These assessments determined that all of the radioactivity observed in the in situ gamma spectroscopy spectra were the result of naturally occurring radioactivity. The last paragraph of Section 6.4.4 was revised as follows: "The in situ gamma spectroscopy measurements were counted a sufficient amount of time to identify peaks in seven different regions of interest in the gamma spectrum. Appendix F includes details in the regions of interest and the radionuclides associated with each region of interest, as well as copies of the gamma spectra collected at bias locations. If counts in the regions of interest increased by approximately the same amount and no additional peaks were observed, the increased gamma radiation resulted from variations in naturally occurring radionuclides and was not identified as contamination. The InSpector 1000 was set up to evaluate photons with energies between 50 and 2,000 kiloelectronvolts and was sensitive to photons emitted by all radionuclides of concern for this project. The InSpector 1000 was not used for quantitative measurements; therefore, no quantitative estimates of detectability were required." ~~No sensitivity calculations were performed beyond the ability to identify peaks within the regions of interest. This process was sensitive enough to accomplish the survey objectives.~~
13. Section 6.4.4, In Situ Gamma Spectroscopy Measurement Results Data Quality Review, Page 6-11: The text states that no differences in the in situ gamma spectroscopy results were identified and that all in situ gamma spectroscopy measurement results are comparable; however, the criteria used to determine there were no differences in	The final paragraph in Section 6.4.4 identifies the criteria used to support the conclusion that the gamma radiation readings were all associated with natural radioactivity. No peaks were identified except peaks from naturally occurring radionuclides. When an increase in activity was observed in an ROI representative of Ra-226, a corresponding increase in activity was

the results are not discussed. For example, the text does not state if ranges of static measurements in total counts per minute (cpm) or if values for specific radionuclides between survey units were compared, or if the comparison was to background data. Furthermore, since the configurations of surveyed areas were different (e.g., some were collected on horizontal surfaces and others on vertical surfaces), it is not clear how it was determined that all of the in situ measurements are comparable. Finally, it is not clear what differences would be considered significant. Please revise this section to provide a more detailed discussion that explains how the data were evaluated and what criteria were used as the basis for the conclusion that all in situ gamma measurement results were comparable.	observed in ROIs representing other naturally occurring radionuclides (Th-232 and K-40). Since only Ra-226 was a radionuclide of concern indicating contamination from former Navy activities, increases in Ra-226, Th-232 and K-40 indicate a fluctuation in natural background and not the presence of contamination. Additional details on the physical conditions at the bias locations and geometry issues associated with these measurements were added to Section 6.1.3 to support the determination the source of the increased gamma radiation was naturally occurring radionuclides. See response to EPA Comment 12 listing the revisions to Section 6.4.4.
14. **Section 6.4.4, In Situ Gamma Spectroscopy Measurement Results Data Quality Review, Page 6-11:** This section states, "No sensitivity calculations were performed beyond the ability to identify peaks within the regions of interest. This process was sensitive enough to accomplish the survey objectives;" however, the text does not state what criteria were used to determine that the process was sensitive enough to accomplish the survey objectives, or to what survey objectives this statement is referring. For example, if the survey objective was to identify potential discreet radiological sources such as historical deck markers, then this section should be revised to state that was the basis for the sensitivity evaluation. Please revise this section to provide the criteria used to assess whether the sensitivity of the in situ measurements was sufficient, to provide a more detailed description that explains how the in situ measurements were determined to have met the sensitivity requirements, and provide a table comparing the assumed sensitivity in Table 5 in the May 2019 Work Plan with the actual sensitivity.	The following text was added to Section 5.3.3 and Section 6.4.4 of the report; "The InSpector 1000 was set up to evaluate photons with energies between 50 and 2,000 kiloelectronvolts and was sensitive to photons emitted by all radionuclides of concern for this project. The InSpector 1000 was not used for quantitative measurements; therefore, no quantitative estimates of detectability were required." Also see the response to EPA Comment 11 above. Work Plan Table 5 discusses alpha and beta measurements, not gamma measurements.
15. **Section 6.4.5, Alpha/Beta Scan Measurement Results Data Quality Review, Page 6-12:** As described in this section the number of measurements in each survey unit was increased from 18 to 54 to	The assumptions regarding the number of measurements were evaluated during the field effort. The calculated scan MDC values, which are provided in Table 4, ranged from 180 – 200 dpm/100 cm2 alpha, and did not approach or exceed the 300 dpm/100 cm2 limit identified in the

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reflect the calculated upper bounds on the alpha scan data (200 to 250 dpm/100 cm2) and allow for an alpha scan MDC as high as 300 dpm/100 cm2. The May 2019 Work Plan states, "The assumptions regarding the number of measurements will be evaluated during the field effort and additional static measurements will be collected as required," but it is unclear if that was done. Please revise this section to include the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)-based calculations to verify that 54 samples per survey unit was adequate.	approved Work Plan, therefore, no additional systematic static measurement locations were identified. Since the conclusions state there is activity present at levels exceeding the release criteria, and the recommendation is to perform additional investigations, there was no technical justification for increasing the number of systematic or bias measurements.
16. Section 7.3, Recommendations, Page 7-4: Please describe the practical challenges mentioned in the statement that "Due to practical challenges with alpha scanning in outdoor environments at levels consistent with the release criteria listed in Table 1, the survey may be limited to additional material (concrete) sampling to supplement static and smear measurements."	Agree with comment. Text in Section 7.3 was revised as follows: "Based on the radiological scoping survey results and DQOs included in the Work Plan (APTIM, 2019), it is recommended further investigation of the submarine pens focus on investigating alpha activity on concrete surfaces. Additional surveys will be designed to determine if residual alpha radioactivity is related to historical Navy activities or is naturally occurring in the materials used to construct the submarine pens. ~~Due to~~ There are several practical challenges associated with alpha scanning in outdoor environments at levels consistent with the release criteria listed in Table 1. Practical constraints for this scoping survey can be divided into two categories: physical and environmental. Physical constraints include the San Francisco Bay and tides, accessibility issues (large objects and abandoned equipment), safety considerations (working at height and over water), surface conditions (weathered surfaces, corroded metal, surface coatings, bird droppings). Environmental constraints include temperature, humidity, precipitation, wind (direction and speed). All of these variables resulted in additional variability and uncertainty associated with all radiation measurements, but these were most noticeable with alpha measurements. Due to these practical constraints, the survey may be limited to additional material (concrete) sampling to supplement static and smear measurements."

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17. Table 5, Reference Background Area Summary Statistics: Table 5 appears to be missing summary statistics for some of the instruments used, like the Canberra InSpector 1000 and the RSL-700. Please revise Table 5 to include summary statistics for all instruments used.	Table 5 includes the RBA statistics, and the RBA data required to evaluate the survey results as described in the approved Work Plan. No RBA data are required to evaluate the gamma scan data collected with the RS-700. The RS-700 gamma scan data have an Investigation Level developed based on the survey data (see Response to Comment 6 above), not RBA data. Since gamma scan surveys are used to identify localized area of elevated activity, only the highest scan results get investigated. No RBA data are required to evaluate the in situ gamma spectroscopy measurement results. A single background spectrum was collected in the gamma concrete RBA and the results of the background measurement are provided in Appendix F with the other spectra.
18. Table 12, Sample Summary Statistics and Section 6.3, Solid Sample Laboratory Analysis Results, Pages 6-7 and 6-8: Table 12 does not list the total propagated uncertainty (TPU) associated with the radionuclide results. TPU is important because a reported value above the DLC would not be considered a definitive detection if the associated TPU is larger than the reported value, or if the results would fall below the MDC if the absolute value of the uncertainty is subtracted from the result. In addition, it is unclear whether the data were qualified as a result of the data validation. In order to support the presentation of the results of the investigation and conclusions thereof, please revise Table 12 to include the associated TPUs for all results, and revise the text and Table 12 to state whether any data qualifiers were required as a result of the data validation.	The count uncertainty and total uncertainty are provided in the analytical data packages, Appendix J to the report. Section 6.4.8, Solid Sample Laboratory Analysis Results Data Quality Review, was revised as follows to address EPA Comment 19: "Concrete samples were collected at locations where the alpha static measurement release criterion was exceeded to provide supplemental information on the nature and extent of the elevated alpha activity. A laboratory data quality assessment was performed and included reviews the sampling holding times and preservation, laboratory method blanks, gamma spectroscopy and alpha/beta calibration, tracer compound recoveries, laboratory control samples, sample duplicate, sample identification, sample quantitation, reporting limits, and analytical and technical completeness. The data quality review determined the data are of good technical quality and meet project objectives. The data are usable and available for project decisions. Additional qualifiers were added to the detected Pu-239 results in five samples and detected total beta strontium results in another five samples. These results were flagged as estimated (i.e., J-flag) as these samples had reported uncertainty that exceeded the reported result. Appendix H provides the data quality assessment summary for off-site analytical laboratory sample results."
19. Table 12, Sample Summary Statistics and Section 6.3, Solid Sample Laboratory Analysis Results, Pages 6-7 and 6-8: Five	The Pu-239 results were re-evaluated by the data validator. Detections with total uncertainty exceeding the reported result were qualified as

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concrete samples were reported to have low-levels of Plutonium-239 (Pu-239). Section 6.3 states that the values were detected above the MDC and below the project quantitation limit goal but does not discuss the results further. We request that the Navy first consider the total propagated uncertainty associated with the five samples and the data validation results to determine if the detections are definitive. If they are, please discuss possible sources of the Pu-239 and whether any change in the conclusions about the status of the submarine pens is appropriate.	estimated (J-flag). Based on the qualification of the data and low reported levels (which consisted of only one to four counts within the Pu-239 region of interest during the four-hour counting interval), these results do not represent true contamination. Note that the reported DLCs for Pu-239 were significantly below the project quantitation limit goal of 0.10 pCi/g specified in the project Sampling and Analysis Plan Future investigation of this area may include additional evaluation to determine if Pu-239 should be considered as a radionuclide of concern.
20. Table 12, Sample Summary Statistics: Table 12 includes a column with Method Detection Limits (MDLs). The May 2019 Work Plan calls for the use and reporting of the Decision Limit Concentration (DLC), not the MDL. Please revise Table 12 to replace the MDLs with DLCs.	Agree with comment. References to MDL were replaced with DLC in Table 12. Laboratory data reports included DLCs.
21. Appendix D, Reference Background Area Data: Appendix D does not include background data for gamma scanning surveys for concrete or metal or background data for the Canberra InSpector 1000 static measurements for concrete and metal. It is also unclear if the procedure for scabbling an area near the Finger Piers as described in Field Change Request (FCR) 004 was implemented as this is not discussed in the text and if the background statics included in Appendix D are the "before" or "after" scabbling gamma scan and gamma static data. Please revise the Report to include the missing background data for gamma scans using the Ludlum Model 44-20 3-inch by 3-inch NaI gamma scintillation detector and the RS-700. In addition, please revise the Report to include a list of the background data for the InSpector 1000 used for the static measurements. Finally, please revise the text to discuss whether the procedure for scabbling an area near the Figure Piers as described in FCR 004 was implemented and provide the "before" and "after" scabbling gamma scan and gamma static data.	The RBA dataset as presented in the draft report is complete. The RBA data for the 3x3 NaI are provided in Appendix F and summarized in Table 5. There are no RBA data required for the RS-700 (see response to Comment 6 and Comment 17). The in situ gamma spectrometry background spectrum collected in the concrete RBA is included in Appendix F (see response to Comment 17). FCR 004 describes one of several attempts to identify an appropriate RBA representing concrete at Hunters Point Naval Shipyard. FCR 004 was specifically designed to look at concrete on the Finger Piers and is not relevant to discussions of the scoping survey performed in the Submarine Pens. The investigation of concrete described in FCR 004 did not identify appropriate RBA data that were used during the survey.

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22. Apparent Typos/Minor Editorial Comments: - **Section 2.2:** Section 2.2 is titled "Site History" but describes only the Drydocks and Ship Berths rather than the entire HPNS site. We suggest changing the section title to better match the text. - **Section 4.3.1**. This section refers to Section 2.2 for additional description of the RBA for alpha/beta measurements. We were unable to locate any information on the RBA in Section 2.2. - **Section 4.3.5:** There appears to be a typo in the following sentence: "A total 2,148 locations that exceeded the alpha scan IL" - **Section 5.4.1, Instrument Efficiency, Page 5.3:** The formula listed in this section indicates the background count rate is denoted by 'Rs'. Since 'RS+B' is stated to represent the gross rate (sample plus background) perhaps the background count rate should be defined as 'RB.' - **Section 5.4.3, Calculation of Surface Activity, Page 5-5:** The definition of 'B' for the formula for calculating surface activity appears to be erroneous as 'B' is defined as the background efficiency rather than background count rate. - **Section 4.3.5, Page 4-6:** The text indicates that static measurements were collected from the 20 or 21 highest scan result locations in each SU but Section 6.2.3.3 states that 48 static measurements were collected at SU3.	-Section 2.2 – text was revised to "Submarine Pens Description and History" -Section 4.3.1 - Agree with comment, the text "…as described in Section 2.2" was removed. -Section 4.3.5 – Agree with comment, text was revised as follows: "A total <u>of</u> 2,148 locations ~~that~~ exceeded the alpha scan IL." -Section 5.4.1 – Agree with comment, the text was revised. -Section 5.4.3 - Agree with comment, the text was revised. -Section 4.3.5 – Agree with comment, text was revised as follows: "To confirm these results, static measurements were collected from <u>at a minimum</u> the 20 highest scan result locations in each SU (21 measurements were collected in SU 2<u>, and 48 measurements were collected in SU 3</u>)."

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Comments by: Sheetal Singh, Environmental Project Manager, CDPH, comments dated August 21, 2020	
General Comments	**Response**
1. Please note that CDPH-EMB uses the following criteria in Title 17 of the California Code of Regulations, Section 30256(k) [17 CCR § 20256(k)] to base its evaluation for issuing a Radiological Unrestricted Release Recommendation (RURR): (1) Radioactive material has been properly disposed; (2) Reasonable effort has been made to eliminate residual radioactive contamination, if present, and; (3) A radiation survey has been performed which demonstrates that the premises are suitable to release for unrestricted use; or other information submitted by the licensee is sufficient that the premises are suitable for release for unrestricted use. In practice this means employing the decision making process outlined in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM, NRC et al, 1997), which includes establishing a reference background area for each of the materials to remain in situ. These reference background measurements are then compared to survey units (SUs).	The Navy is familiar with the requirements of 17 CCR § 20256(k) and the guidance in MARSSIM. The Navy is not requesting unrestricted release of the submarine pens at this time. This report documents a MARSSIM-compliant scoping survey with recommendations for additional investigation. The Navy agrees that reference background measurements are compared with survey results as described in MARSSIM guidance. MARSSIM guidance states that survey unit (SU) data sets are compared with a representative reference background area data set using the Wilcoxon Rank Sum statistical test as part of a final status survey. The Navy notes performance of the statistical test is not always necessary if the maximum SU measurement exceeds the minimum reference background area measurement by less than the release criterion as defined by the $DCGL_W$. MARSSIM does not require every measurement to be below the release criterion as defined by the $DCGL_W$, only that the SU data set pass the statistical test comparing the survey unit with the reference background area.
2. CDPH-EMB will not consider the alpha scan survey data presented in this scoping report for evaluating any unrestricted release request from Navy due to the following reasons: a. The minimum detection concentration (MDC) of alpha scan survey instruments exceeds the release criteria (Table 4). b. The alpha scan was limited (25% of the accessible surface in survey units); hence the additional alpha/beta statics measurements did not provide sufficient statistical support, in either radiation counts or data points, to supplement the alpha scan surveys.	The Navy is not requesting unrestricted release of the submarine pens at this time. Please consider the scoping scan and static data as support for the decision to perform additional investigations of the submarine pens and as input to the design of future investigations as recommended in MARSSIM guidance. It should be noted that MARSSIM guidance is specific to final status surveys and may not always be applicable to scoping surveys. For Class 1 final status surveys, MARSSIM Table 5.8 recommends the scan MDC be below the $DCGL_{EMC}$, and for Class 2 and Class 3 final status surveys, there is no requirement for the scan MDC in MARSSIM. MARSSIM makes no recommendations for the scan MDC relative to release criteria for scoping surveys.

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	Please note that the 25 percent scan coverage for alpha-beta scans was developed in cooperation with project stakeholders to meet the project objectives, and the project objective for scan coverage was achieved.
Specific Comments	**Response**
3. Section 3.4.4 "Alpha/Beta Scan Surveys", Page 3-6, Paragraph 1, Sentence 5: "This measurement achieved the same level of detection as slow scanning". Please provide explanation or calculation on why the six-second static counts achieved the same level of detection as the design survey scan speed of 0.25 centimeters per second.	The intent of Section 5.5.5 of the Work Plan was to establish that scanning at a speed of 0.25 cm/sec is not logistically practical, and present the 6-second static technique as an alternate method to evaluate site conditions. Table 5 of the Work Plan lists the expected alpha scan MDC using this technique as 86 dpm/100cm^2, which is below the remedial goal for total surface contamination. This value was calculated using parameters associated with the 6-second static technique and not from a scan at a set speed. As noted in the discussion of scan MDC in Section 3.4.4 and listed in Table 4 of this report, the observed alpha scan MDCs for the 6-second static technique ranged from 180 to 200 dpm/100cm2 on concrete. The higher observed alpha scan MDCs were attributable to the higher background count rates, which were an order of magnitude higher than what was assumed in the planning phase. The discussion on alpha/beta scan measurement data quality in Section 6.4.5 of the report correctly notes that the observed alpha scan MDC values did not agree with the expected scan MDC established during planning, and therefore the alpha scan sensitivity did not meet the survey objectives. Note that the Navy is not requesting unrestricted release of the submarine pens at this time. For clarity, the first paragraph in Section 3.4.4 has been revised to read as follows: "The alpha/beta scan measurements were performed using portable contamination survey instruments, specifically, the Ludlum Model 43 37 gas flow proportional "floor monitor" detector coupled with a Ludlum Model 2360 scaler/ratemeter. ~~As discussed in the Work Plan (APTIM, 2019), the design survey scan speed was 0.25 centimeters per second. Scanning at a speed slow enough to meet the calculated scan speed of 0.25 centimeter per second is difficult and not practical to perform in the field.~~ For this project, six second static counts were performed to cover the necessary area (25 percent of accessible surfaces). ~~This measurement~~

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	~~achieved the same level of detection as slow scanning.~~ In this report, these six-second static counts will be referred to as "scans" or "scan measurements" for consistency." In addition, the planned alpha scan MDC was referenced in Section 3.4.4 as follows: "The scan MDC for alpha activity measured in the field exceeded the planned scan MDC for alpha (86 dpm/100 cm2, Work Plan Table 5) by more than a factor of two, and exceeded the release criterion of 100 dpm/100 cm2 for alpha activity by a factor of two. The alpha background on concrete…"
4. Section 3.4.4 "Alpha/Beta Scan Surveys", Page 3-8, Paragraph 2, Sentence 2: "However, these detectors could not detect alpha radiation at levels below the release criteria." Please see general comment #2. For any future scan or static measurement, CDPH strongly recommends adjusting parameters so the MDC value of the field instruments does not exceed the release criteria.	The information in the scoping report documents the adjustments made in attempts to achieve the project objectives to support identification of areas for future investigations and selection of measurement techniques that may be successful in meeting the objectives of future investigations.
5. Section 4.3.1 "Reference Background Areas", Page 4-4, Paragraph 1, Sentences 1: "A concrete pad in Parcel C was used as the RBA for alpha/beta measurements." Please provide the reference data for alpha/beta scan measurement (i.e. 6- second static counts). CDPH strongly recommends Navy to obtain reference background data with the same input parameters (for example, but not limited to, the count time of measurement) as the measurements planned in a survey unit. This practice would ensure a relevant comparison can be made between the survey and reference area data.	Six-second alpha/beta static counts were not performed in the reference background area. The 2-minute static counts collected in the RBAs and presented in Appendix D are representative of the alpha and beta count rates in the RBAs. The original MDC discussion by Currie assumed "paired blanks" and is usually interpreted to mean sample and count times are the same as mentioned in this comment. More recent discussions of MDC are summarized in MARSAME Chapter 7 and MARLAP Chapter 19 and Attachment 19D and include calculations accounting for different count times for samples and background. The equations used to calculate critical value and detection limit during this scoping survey provide for different count times for survey unit measurements and reference background area measurements.
6. Section 4.3.2 "Gamma Scan Surveys", Page 4-5, Paragraph 1, Last Two Sentences: "Once the entire length of the vertical surface was surveyed, the detector [3x3 NaI detector] was lowered approximately 30 cm (12 inches) to continue the gamma scan of the vertical surface at the new height. This process was repeated until the entire vertical surface was scanned." Please explain how	The field of view of a detector is larger than the physical dimensions of the detector, especially for photons (e.g., gamma rays) that are minimally attenuated by solids and gases compared with alpha and beta particles. Information on the field of view of the RS-700 and achieving 100% coverage for gamma scans was added to Section 5.3.1. Information on the

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the whole vertical wall surface can be properly scanned if the distance (9 inches) between each pass of Gamma scan on the vertical wall is 3 times greater than the width of the detector (3 inches).	field of view of the Ludlum 44-20 and achieving 100% coverage for gamma scans was added to Section 5.3.2.
7. **Section 6.1.3 "In Situ Gamma Spectroscopy Results", Page 6-3, Paragraph 1, Sentence 4:** "The spectral analysis did not identify activity statistically above background." Please explain how this conclusion was reached, as most of the counts in Ra- 226 region of interests (ROIs) in these spectral analyses (sample SU3-GB9 to SU3-GB13) are 10% to 77% higher than the reference background area critical value.	The response to EPA Comment 12 discusses the project objectives, including the objectives for in situ gamma spectroscopy. The objective of the in situ gamma spectroscopy measurements was to determine if gamma measurement results exceeding the gamma static investigation level resulted from the potential presence of Ra-226 from radioluminescent sources. While multiple in situ measurement results identified peaks associated with Ra-226 greater than the reference area in situ result, Ra-226 is naturally occurring as well as a radionuclide of concern. The in situ gamma spectroscopy results also looked at photons emitted by naturally occurring K-40 and Th-232, which are not radionuclides of concern for the submarine pens. Since Ra-226, K-40, and Th-232 were all present at activities that exceeded the reference area in situ result by approximately the same amount, the increase in gamma activity was determined to result from an increase in naturally occurring radioactivity, or background, and not contamination from a radionuclide of concern. Additional details on the physical conditions at the bias locations and geometry issues associated with these measurements were added to Section 6.1.3 to support the determination the source of the increased gamma radiation was naturally occurring radionuclides. The statement in Section 6.1.3 was also revised to state "The spectral analysis did not identify elevated gamma activity indicating contamination associated with former Navy activities."
8. **Section 6.1.3 "In Situ Gamma Spectroscopy Results", Page 6-3, Paragraph 1, Sentence 5:** "The most likely reason that these measurements exceeded the gamma static IL is due to geometry effects of natural radioactivity entering the NaI detector from the two perpendicular surfaces simultaneously." Please provide explanation on how this conclusion of geometry effect was reached for these gamma static, measurements on a vertical wall. Please provide pictures of the measurement locations or any other supporting material for the conclusion of this geometry effect.	Additional details and photographs describing the in situ gamma spectroscopy locations were added to Section 6.1.3 to support the conclusion that geometry effects and physical location contributed to the increased gamma radiation at these locations. Section 7.1.3 of the approved Work Plan states "Samples may be collected as required to support characterization…". The objective of in situ gamma spectroscopy measurements was to evaluate the potential presence of residual Ra-226 from radioluminescent sources. It was determined that collecting samples of concrete at these locations would not address the

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Furthermore, please explain why there were no concrete samples taken from the locations with elevated gamma measurements, for laboratory analysis.	project objective of evaluating the source of Ra-226 (i.e., natural radioactivity or former Navy activities) as effectively as in situ gamma spectroscopy. Future work at the submarine pens may include additional materials samples to support alpha/beta release surveys performed for the structure surfaces.
9. Section 6.4.5 "Alpha/Beta Scan Measurement Results Data Quality Review", Page 6-12, Paragraph 2: "The alpha scan MDC calculations and upper prediction level calculations identified upper bounds on the alpha scan data in the 200 to 250 dpm/100 cm2 range. MARSSIM (EPA et al., 2000) Section 5.5.2.4 provides for increasing the number of measurements performed in a survey unit to account for MDC values that do not achieve the survey objectives. The number of measurements in each survey unit was increased by a factor of 3 to allow for an alpha scan MDC as high as 300 dpm/100 cm2. A minimum of 54 alpha and beta static measurements were performed in each SU to account for the scan MDC not achieving the survey objective of measuring concentration below the specified release criteria and lls. While the scan MDC for alpha scan surveys does not meet the project objectives, it still provides a technically defensible approach to surveys based on MARSSIM guidance." The special case mentioned in MARSSIM Section 5.5.2.4 (EPA et al., 2000) does not apply to the survey results reported in this document because the scanning survey covered only ~25% of the accessible area. The area factor and additional statics measurement discussed in MARSSIM Section 5.5.2.4 can only be applied to a Class 1 area that is fully scanned (100%). This Class 1 requirement is mentioned in MARSSIM multiple times. Only in the case of the scan survey covering the entire available surface, like in a Class 1 site, the additional static data points may supplement necessary statistics for the scan MDC not achieving the survey objective. As mentioned in General Comment #2, CDPH-EMB will not consider the alpha scan survey data presented in this scoping report for evaluating any unrestricted release request from Navy.	The Navy is not requesting unrestricted release of the submarine pens at this time. This report documents the results of a scoping survey that will be used to support development of design for additional investigations. Information that an alpha scan MDC equal to the release criterion of 100 dpm/100 cm^2 cannot be achieved using traditional equipment but may be achievable for a Class 1 final status survey design incorporating area factors and increased scan coverage to allow a higher scan MDC is important information for future investigations.

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10. Appendix E "Radiological Instrument Quality Control Documents": To provide proper documentation and accountability, please include the name or signature of the technician and person of validation for those instrument quality control documents on pages, not limited to, E-41 to E-50, E-58, E-61, E-63, E-66, E-68, E-71, E-74, E-76, E-78 to E-88 in Appendix E.	The documentation was reviewed, and the instrument quality control was documented and reviewed in accordance with the approved SOPs. The technician and supervisor that completed instrument QC spreadsheets were identified in the spreadsheet printouts included in the Draft Report. The forms have been signed by the lead technician and the person of validation.

APPENDIX B
APPROVED FIELD CHANGE REQUESTS
(NO CHANGES FROM DRAFT REPORT)

Deleted: DCN: APTM-0006-4550-0099

DCN: APTM-0006-4550-0099

APPENDIX C
PHOTOGRAPH LOG
(NO CHANGES FROM DRAFT REPORT)

Deleted: DCN: APTM-0006-4550-0099

DCN: APTM-0006-4550-0099

APPENDIX D
REFERENCE BACKGROUND AREA DATA
(NO CHANGES FROM DRAFT REPORT)

Deleted: DCN: APTM-0006-4550-0099

DCN: APTM-0006-4550-0099

APPENDIX E
RADIOLOGICAL INSTRUMENT QUALITY CONTROL DOCUMENTS

Deleted: DCN: APTM-0006-4550-0099

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CERTIFICATE OF CALIBRATION

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ilac-MRA ACCREDITED CERT # 4084.01

Customer CABRERA SERVICES ORDER NO. 20349840/474802

Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 155527

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. 82157289

Cal. Date 20-Feb-19 Cal Due Date 20-Feb-20 Cal. Interval 1 Year Meterface 202-014

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 48 % Alt 688.0 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

☑ Calibrated in accordance with LMI SOP 14.8 ☐ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set 750 V = 3.05 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 500 / 502 V Ref./Inst. 2000 / 2002 V

COMMENTS:

Tc99 SN:5280,Size:93200dpm, Counts:35624cpm, Background:63cpm, 4pi Eff:38 15%
Th230 SNE121495 Size:19800dpm, Counts:6554cpm, Background:1cpm, 4pi Eff:33.09%

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	39962 (0)	39962 (0)
	40K cpm	3996	3996
	4K cpm	399	399
	400 cpm	40	40
	40 cpm	4	4

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	39958 (0)	39958 (0)
	40K cpm	3996	3996
	4K cpm	399	399
	400 cpm	40	40
	40 cpm	4	4

*Uncertainty within ± 10% C.F. within ± 20%

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. ISO/IE 17025:2005(E) State of Texas Calibration License No. LO-1963

Reference instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521 ☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Nautron Am-241 Be ☐ T-304 Ra-226 ☐ Y982

☑ Alpha S/N Pu239 SN:7053 ☑ Beta S/N Tc99 SN:5280,C14 SN:1476 ☐ Other

☑ m 500 S/N 190566 ☐ Oscilloscope S/N ☑ Multimeter S/N 86250390

Calibrator Jason Flores Title Calibrator Date 20-Feb-19

QC'd By Title Final QC Date 20 Feb 19

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

FORM C25 10/03/2017 Page 1 of 2

AC Inst. Only ☑ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

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Bench Test Data For Detector

Customer: CABRERA SERVICES — ORDER NO. 20349840/474802

Detector: 43-10-1 — Serial No. PR157789

Counter: 2929 — Serial No. 155577

Count Time: 1Minute

Other:

Alpha Input Sensitivity: 125 mV

Beta Input Sensitivity: 4 mV

Beta Window: 50 mV

Distance Source to Detector: TRAY

High Voltage	Background Alpha	Background Beta	Isotope Po239 Size 24000dpm Alpha	Isotope Po239 Size 24000dpm Beta	Isotope Tc99 Size 93200dpm Alpha	Isotope Tc99 Size 93200dpm Beta	Isotope C14 Size 229762dpm Alpha	Isotope C14 Size 229762dpm Beta
675	0	49	9212	347	24	29491	1	12300
700	0	43	9612	401	31	32032	0	14588
725	1	47	9877	457	32	33788	0	16941
750	1	63	10136	494	43	35824	0	18775
775	1	64	10168	652	36	37173	0	20784
800	1	70	10400	1137	40	37465	0	23209
825	3	69	10479	2273	36	36630	0	25507

☐ Gas Proportional detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

☐ Gas proportional detector count rate decreased ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature: Jason Flores — Date: 20-Feb-19

FORM C4B 09/15/2017 — Page 2 of 2

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Certificate of Calibration

Calibration and Voltage Plateau

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Meter: Manufacturer: Ludlum Model Number: 2360 Serial Number: 276977

Detector: Manufacturer: Ludlum Model Number: 43-37 Serial Number: PR216984

- [x] Mechanical Check
- [x] THR/WIN Operation
- [ ] F/S Response Check
- [x] Reset Check
- [x] Geotropism
- [x] Audio Check
- [x] Meter Zeroed
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [ ] 39-inch [ ] 72-inch [x] Other: 60"

Source Distance: [x] Contact [ ] 6 inches [ ] Other:

Source Geometry: [ ] Side [x] Below [ ] Other:

Alpha Threshold: 100 mV Barometric Pressure: 24.36 inches Hg

Beta Threshold: 4 Temperature: 75 °F

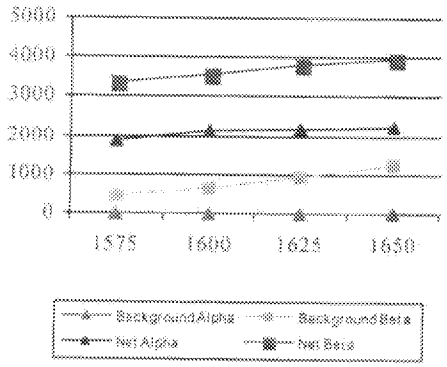
Beta Window: 40 mV Relative Humidity 20 %

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count α	Integrated 1-Min. Count β
x 1000	400 Kcpm	400	400	399974	400462
x 1000	100 Kcpm	100	100		
x 100	40 Kcpm	400	400	39961	39999
x 100	10 Kcpm	100	100		
x 10	4 Kcpm	400	400	4002	4002
x 10	1 Kcpm	100	100		
x 1	400 cpm	400	400	400	400
x 1	100 cpm	100	100		

High Voltage	Alpha Source α	Alpha Source β	Beta Source α	Beta Source β	Background α	Background β
1575	1897	1462	3	3828	3	448
1600	2121	1489	8	4242	7	663
1625	2207	1757	7	4727	7	939
1650	2224	2168	7	5200	4	1215

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1 min. Recommended HV = 1625 @ 5200'
PER THE LUDLUM REPORT – DECEMBER 1999 HV TO BE ADJUSTED 25 VOLTS FOR EACH 1000' DECREASE IN ELEVATION. FOR NORM SCALER USE RECOMMENDED HV WOULD BE 1750 V.
— MBD 4/4/19 [illegible]

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number [x] 87490128

- [x] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12)
- [x] Beta Source: Tl-204 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)
- [ ] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03
- [ ] Other Source:

Calibrated By: [signature] Calibration Date: 3/4/19 Calibration Due: 3/4/20

Reviewed By: [signature] Date: 6 [illegible]

ERG Form ITC 101C

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A-1997

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter: Manufacturer: Ludlum Model Number: 2360 Serial Number: 215271

Detector: Manufacturer: Ludlum Model Number: 43-37 Serial Number: PR216985

- [x] Mechanical Check
- [ ] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed
- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [ ] 39-inch [ ] 72-inch [x] Other: 60"

Source Distance: [x] Contact [ ] 6 inches [ ] Other:

Source Geometry: [ ] Side [x] Below [ ] Other:

Alpha Threshold: 100 mV Barometric Pressure: 24.39 inches Hg

Beta Threshold: 4 Temperature: 72 °F

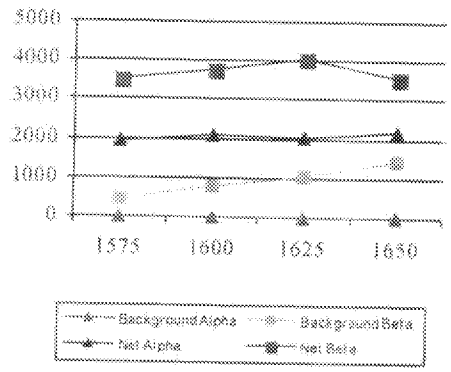
Beta Window: 40 mV Relative Humidity 20 %

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count α	Integrated 1-Min. Count β
x 1000	400 Kcpm	400	400	398989	398993
x 1000	100 Kcpm	100	100		
x 100	40 Kcpm	400	400	39912	39913
x 100	10 Kcpm	100	100		
x 10	4 Kcpm	400	400	3993	3993
x 10	1 Kcpm	100	100		
x 1	400 cpm	400	400	400	399
x 1	100 cpm	100	100		

High Voltage	Alpha Source α	Alpha Source β	Beta Source α	Beta Source β	Background α	Background β
1575	1919	1440	8	3989	6	470
1600	2069	1610	13	4545	13	795
1625	2047	1924	21	5114	13	1060
1650	2185	2154	39	4987	17	1444

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1 min. Recommended HV = 1600 @ 5200'

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number [x] 87490128

[x] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12)

[x] Beta Source: [illegible]09 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)

[ ] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

[ ] Other Source:

Calibrated By: [signature] Calibration Date: 3/4/19 Calibration Due: 3/4/20

Reviewed By: [signature] Date: 6 March 2019

ERG Form ITC 101.C

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1996

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter: Manufacturer: Ludlum Model Number: 2360 Serial Number: 276975

Detector: Manufacturer: Ludlum Model Number: 43-68 Serial Number: PR190487

- [x] Mechanical Check
- [ ] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed
- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [ ] 39-inch [ ] 72-inch [x] Other: 60"

Source Distance: [x] Contact [ ] 6 inches [ ] Other:

Source Geometry: [ ] Side [x] Below [ ] Other:

Alpha Threshold: 120 mV Barometric Pressure: 24.57 inches Hg

Beta Threshold: 4 Temperature: 76 °F

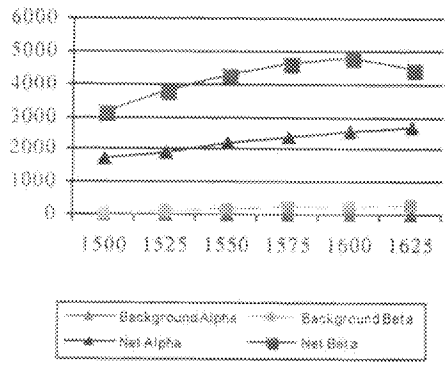
Beta Window: 46 mV Relative Humidity 20 %

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count α	Integrated 1-Min. Count β
x 1000	400 Kcpm	400	400	399366	399957
x 1000	100 Kcpm	100	100		
x 100	40 Kcpm	400	400	39998	40001
x 100	10 Kcpm	100	100		
x 10	4 Kcpm	400	400	4000	4000
x 10	1 Kcpm	100	100		
x 1	400 cpm	400	400	400	400
x 1	100 cpm	100	100		

High Voltage	Alpha Source α	Alpha Source β	Beta Source α	Beta Source β	Background α	Background β
1500	1720	1041	1	3256	2	85
1525	1923	1043	3	3911	2	125
1550	2174	1101	5	4436	1	175
1575	2360	1165	3	4839	1	219
1600	2529	1216	3	5086	0	257
1625	2657	1155	14	4766	5	297

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1 min. Recommended HV = 1575 @5200'

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number [x] 87490128

- [x] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12)
- [x] Beta Source: Tc-99 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)
- [ ] Gamma Source: Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03
- [ ] Other Source:

Calibrated By: [signature] Calibration Date: 3/5/19 Calibration Due: 3/5/20

Reviewed By: [signature] Date: 6 March 2019

ERG Form ITC. 101.C

This calibration conforms to the requirements and acceptable calibration continues of ANSI N323A - 1997

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter:	Manufacturer:	Ludlum	Model Number:	2360	Serial Number:	184909
Detector:	Manufacturer:	Ludlum	Model Number:	43-93	Serial Number:	PR19984J

- [x] Mechanical Check
- [ ] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed
- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [x] 39-inch [ ] 72-inch [ ] Other:

Source Distance: [x] Contact [ ] 6 inches [ ] Other:

Source Geometry: [ ] Side [x] Below [ ] Other:

Alpha Threshold: 120 mV
Beta Threshold: 4
Beta Window: 30 mV

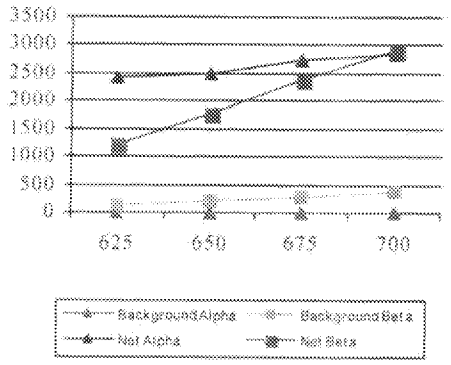
Barometric Pressure: 24.19 inches Hg
Temperature: 75 °F
Relative Humidity 20 %

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count α	Integrated 1-Min. Count β
x 1000	400 Kcpm	400	400	399665	399829
x 1000	100 Kcpm	100	100		
x 100	40 Kcpm	400	400	40018	39894
x 100	10 Kcpm	100	100		
x 10	4 Kcpm	400	400	3991	3992
x 10	1 Kcpm	100	100		
x 1	400 cpm	400	400	399	399
x 1	100 cpm	100	100		

High Voltage	Alpha Source α	Alpha Source β	Beta Source α	Beta Source β	Background α	Background β
625	2418	356	15	1341	2	122
650	2512	431	18	1952	11	199
675	2733	534	34	2651	1	277
700	2838	742	19	3276	7	364

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1 min. Recommended HV = 675

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number [x] 87490128

[x] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12)

[x] Beta Source: Tc-99 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)

[ ] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

[ ] Other Source:

Calibrated By: [signature] Calibration Date: 2/19/19 Calibration Due: 2/19/20

Reviewed By: [signature] Date: 2/20/19

ERG Form ITC. 101.C

This calibration conforms to the requirements and acceptable calibration constants of ANSI N323A - 1997

Certificate of Calibration

Calibration Form

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter: Manufacturer: Ludlum Model Number: 12 Serial Number: 130346

Detector: Manufacturer: Ludlum Model Number: 44-9 Serial Number: PR306438

- [x] Mechanical Check
- [x] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed
- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [x] 39-inch [ ] 72-inch [ ] Other:

Barometric Pressure: 24.51 inches Hg

Source Distance: [x] Contact [ ] 6 inches [ ] Other:

Threshold: 40 mV

Temperature: 75 °F

Source Geometry: [ ] Side [x] Below [ ] Other:

Window:

Relative Humidity: 20 %

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"		Meter Reading		Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	kcpm	400	kcpm		kcpm
x 1000	100	100	kcpm	100	kcpm		kcpm
x 100	400	400	kcpm	400	kcpm		kcpm
x 100	100	100	kcpm	100	kcpm		kcpm
x 10	400	400	kcpm	400	kcpm		kcpm
x 10	100	100	kcpm	100	kcpm		kcpm
x 1	400	400	cpm	400	cpm		cpm
x 1	100	100	cpm	100	cpm		cpm

Gross Tc-99 counts (cpm): 2000

Background counts (cpm): 60

Net Tc-99 Counts (cpm): 1940

Gross Sr/Y-90 counts (cpm):

Background counts (cpm):

Net Sr/Y-90 counts (cpm):

Comments:

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number: [ ] 87490128

[ ] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12)

[ ] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

[x] Beta Source: Tc-99 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)

[ ] Other Source:

Calibrated By: [signature] Calibration Date: 3/11/19 Calibration Due: 3/11/20

Reviewed By: T. [signature] Date: 3/26/19

ERG Form ITC. 101.B

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter: Manufacturer: Ludlum Model Number: 2221r Serial Number: 176952

Detector: Manufacturer: Ludlum Model Number: 44-20 Serial Number: PR262403

- [x] Mechanical Check
- [x] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed
- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [ ] 39-inch [ ] 72-inch [x] Other: 25'

Source Distance: [ ] Contact [x] 6 inches [ ] Other:

Source Geometry: [x] Side [ ] Below [ ] Other:

Threshold: 10 mV

Window:

Barometric Pressure: 24.16 inches Hg

Temperature: 71 °F

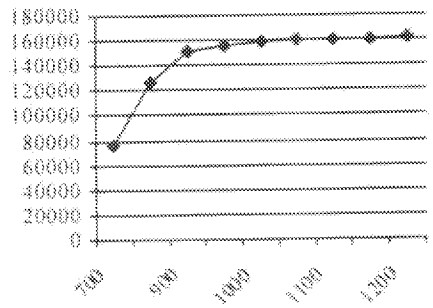
Relative Humidity: 20 %

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	400413	400
x 1000	100	100	100		100
x 100	400	400	400	40042	400
x 100	100	100	100		100
x 10	400	400	400	4003	400
x 10	100	100	100		100
x 1	400	400	400	400	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	75750	
800	127084	
900	151436	
950	155815	
1000	157932	
1050	159456	
1100	159758	22738
1150	160733	
1200	160969	

Voltage Plateau



Comments: Scaler count time 1min. Recommended HV = 1100

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number: [ ] 87490128

[ ] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520 cpm (1/4/12)

[x] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

[ ] Beta Source: Tc-99 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)

[ ] Other Source:

Calibrated By: [signature] Calibration Date: 5/21/19 Calibration Due: 5/21/20

Reviewed By: [signature] Date: 05/21/19

ERG Form ITC.101A

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997

Designer and Manufacturer of Scientific and Industrial Instruments

www.ludlums.com

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

ACCREDITED
CERT # 4084.01

Customer: ERG — ORDER NO: 20344602/471403

Mfg: Ludlum Measurements, Inc. — Model: 19 — Serial No: 104596

Mfg: — Model: — Serial No:

Cal. Date: 21-Nov-18 — Cal Due Date: 21-Nov-19 — Cal. Interval: 1 Year — Meterface: 202-016

Check mark ✓ applies to applicable instr. and/or detector IAW mfg. spec. — T: 73 °F — RH: 24 % — Alt: 712.0 mm Hg

☐ New Instrument — Instrument Received: ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☑ F/S Resp. ck. ☑ Reset ck. ☐ Window Operation ☑ Geotropism
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck.
☐ Calibrated in accordance with LMI SOP 14.8 ☑ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set: 700 V — Input Sens.: 32 mV — Det. Oper.: V at mV — Threshold Dial Ratio: ≈ mV

☐ HV Readout (2 points) — Ref./Inst.: / V — Ref./Inst.: / V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
5000	4000 µR/hr	4000	4000
5000	1000 µR/hr	1000	1000
500	400 µR/hr = 71200 cpm	400	400
500	100 µR/hr	100	100
250	200 µR/hr = 35600 cpm	200	200
250	100 µR/hr	100	100
50	7120 cpm	40	40
50	1780 cpm	10	10
25	3560 cpm	20	20
25	890 cpm	5	5

*Uncertainty within ± 10% C.F. within ± 20%

50, 25 Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout				Log Scale			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. ISO/IE 17025:2005(E) State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 21710P ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1615 ☐ 1896 ☐ 1909 ☐ 1918CP ☐ 2324/2521
☐ 5711CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E553 ☐ G112 ☑ 21660P ☐ S-394 ☐ S-1024 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y983

☐ Alpha S/N: ☐ Beta S/N: ☐ Other:

☑ m 500 S/N: 251106 ☐ Oscilloscope S/N: ☑ Multimeter S/N: 16060230

Calibrator: James McBeth — Title: Calibrator — Date: 21NOV18

QC'd By: Dennis Mickas — Title: Final QC — Date: 21 Nov 18

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

FORM C22A 10/03/2017 Page 1 of 1

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter:	Manufacturer:	Ludlum	Model Number:	2360	Serial Number:	278586
Detector:	Manufacturer:	Ludlum	Model Number:	43-37	Serial Number:	PR178371

- [x] Mechanical Check
- [ ] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed
- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [ ] 39-inch [ ] 72-inch [x] Other: 60"

Source Distance: [x] Contact [ ] 6 inches [ ] Other:

Source Geometry: [ ] Side [x] Below [ ] Other:

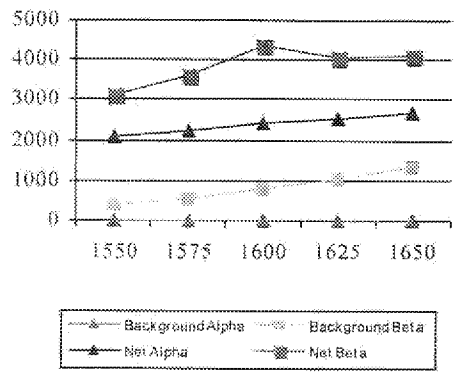
Alpha Threshold:	100 mV	Barometric Pressure:	24.75	inches Hg
Beta Threshold:	4	Temperature:	72	°F
Beta Window:	40 mV	Relative Humidity	20	%

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count α	Integrated 1-Min. Count β
x 1000	400 Kcpm	400	400	400116	400139
x 1000	100 Kcpm	100	100		
x 100	40 Kcpm	400	400	39993	40026
x 100	10 Kcpm	100	100		
x 10	4 Kcpm	400	400	4003	4003
x 10	1 Kcpm	100	100		
x 1	400 cpm	400	400	401	400
x 1	100 cpm	100	100		

High Voltage	Alpha Source α	Alpha Source β	Beta Source α	Beta Source β	Background α	Background β
1550	2092	1242	14	3512	10	399
1575	2257	1460	21	4141	12	524
1600	2448	1715	13	5141	16	806
1625	2533	1937	19	5108	16	1024
1650	2702	2099	29	5434	13	1312

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1 min. Recommended HV = 1600 @5200'. Per "the Ludlum report 1999" (-) 25 volts per (+) 1000' in altitude over 2160' (ERG is @ 5200' so (+)25 volts per (-) 1000' in altitude)

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number [x] 87490128

[x] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12)

[x] Beta Source: Tc-99 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)

[ ] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

[ ] Other Source:

Calibrated By: [signature]

Calibration Date: 8/15/19

Calibration Due: 8/15/20

Reviewed By: T. [signature]

Date: 8/15/19

ERG Form ITC. 101.C

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter: Manufacturer: Ludlum Model Number: 2360 Serial Number: 184920

Detector: Manufacturer: Ludlum Model Number: 43-37 Serial Number: PR216983

- [x] Mechanical Check
- [ ] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed

- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [ ] 39-inch [ ] 72-inch [x] Other: 60"

Source Distance: [x] Contact [ ] 6 inches [ ] Other:

Source Geometry: [ ] Side [x] Below [ ] Other:

Alpha Threshold: 100 mV
Beta Threshold: 4
Beta Window: 40 mV

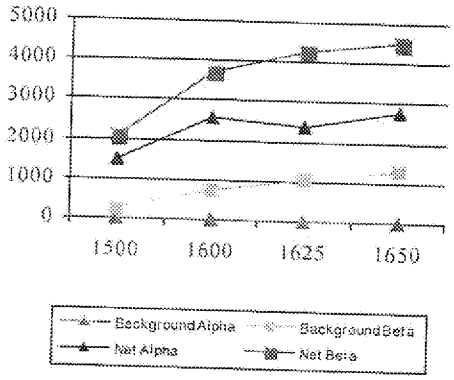
Barometric Pressure: 24.6 inches Hg
Temperature: 71 °F
Relative Humidity 33 %

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count α	Integrated 1-Min. Count β
x 1000	400 Kcpm	400	400	399242	399250
x 1000	100 Kcpm	100	100		
x 100	40 Kcpm	400	400	39928	39929
x 100	10 Kcpm	100	100		
x 10	4 Kcpm	400	400	3993	3993
x 10	1 Kcpm	100	100		
x 1	400 cpm	400	400	400	399
x 1	100 cpm	100	100		

High Voltage	Alpha Source α	Alpha Source β	Beta Source α	Beta Source β	Background α	Background β
1500	1504	1008	9	2311	15	247
1600	2593	1649	13	4465	18	764
1625	2386	1872	15	5279	19	1026
1650	2801	2267	26	5828	8	1302

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1 min. Recommended HV = 1625 @5200'. Per "the Ludlum report 1999" (-) 25 volts per (+) 1000' in altitude over 2160' (ERG is @ 5200' so (+)25 volts per (-) 1000' in altitude)

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

[x] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12)

[x] Beta Source: Sr-90 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)

Fluke multimeter serial number [x] 87490128

[ ] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

[ ] Other Source:

Calibrated By: [signature]

Calibration Date: 6/22/19 Calibration Due: 6/22/20

Reviewed By: [signature]

Date: 6/22/19

ERG Form ITC. 101.C

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter:	Manufacturer:	Ludlum	Model Number:	2360	Serial Number:	220263
Detector:	Manufacturer:	Ludlum	Model Number:	43-37	Serial Number:	PR216985

- [x] Mechanical Check
- [ ] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed
- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [ ] 39-inch [ ] 72-inch [/] Other: 60"

Source Distance: [x] Contact [ ] 6 inches [ ] Other:

Source Geometry: [ ] Side [x] Below [ ] Other:

Alpha Threshold: 120 mV
Beta Threshold: 4
Beta Window: 30 mV

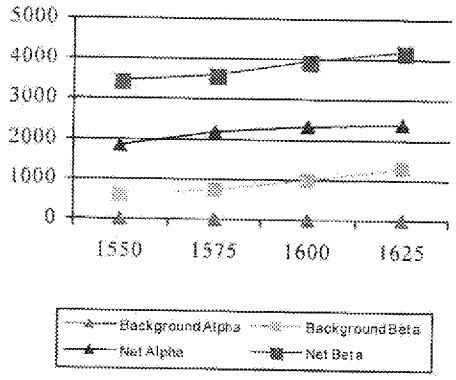
Barometric Pressure: inches Hg
Temperature: °F
Relative Humidity %

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count α	Integrated 1-Min. Count β
x 1000	400 Kcpm	400	400	400056	400229
x 1000	100 Kcpm	100	100		
x 100	40 Kcpm	400	400	40045	40058
x 100	10 Kcpm	100	100		
x 10	4 Kcpm	400	400	4007	4008
x 10	1 Kcpm	100	100		
x 1	400 cpm	400	400	401	401
x 1	100 cpm	100	100		

High Voltage	Alpha Source α	Alpha Source β	Beta Source α	Beta Source β	Background α	Background β
1550	1824	1329	13	4042	7	575
1575	2184	1577	9	4360	10	736
1600	2355	1880	25	4978	10	997
1625	2386	2074	25	5484	15	1270

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1 min. Recommended HV = 1600 Per "the Ludlum report 1999" (-) 25 volts per (+) 1000' in altitude over 2160' (ERG is @ 5200' so (+)25 volts per (-) 1000' in altitude) 1625=4200', 1650=3200', 1675=2200, 1700=1200, 1725=200

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number [x] 87490128

[x] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12)

[x] Beta Source: Tc-99 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)

[ ] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

[ ] Other Source:

Calibrated By: [signature]

Calibration Date: 9/3/19

Calibration Due: 9/3/20

Reviewed By: [signature]

Date: 9/3/19

ERG Form ITC. 101.C

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 2360 SERIAL# 245779

Owner: GI

DATE: 09/11/19 LOCATION: Griffin Inst

TECH: Joanne Glenn DATE LAST CAL EXPIRES: 10/26/16

Reason For Calibration: (●) Due For Calibration ( ) Repair (See Remarks) ( ) Other (See Remarks) ( ) Due and Repair (See Remarks)

NIST TRACEABLE EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 SERIAL #: 341331 CAL. DUE: 09/03/20

☑ Audio Response ☑ Geotropism CABLE LENGTH: 6'

CONDITION: Sat AF MECHANICAL ZERO: 0 AL MECHANICAL ZERO: 0

NEW BATTERIES: (●) Yes ( ) No BATTERY CHECK: Sat

HV (+/-10%)	AS FOUND HV	AS LEFT HV	WINDOW SETTINGS:	A.F.	A.L.
500 V:	510	500	BT (3.5 mV +/- 1 mV):	3.5	A.F.
1000 V:	1010	1000	BW (30 mV +/-3 mV):	30	A.F.
1500 V:	1510	1500	AT (120 mV +/-10 mV):	120	A.F.

		RATE METER				SCALER			
SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.0%	A.F.					
	250	250	0.0%	A.F.		249	0.4%	A.F.	
	400	400	0.0%	A.F.					
x1 or x10	1000	1000	0.0%	A.F.					
	2500	2500	0.0%	A.F.					
	4000	4000	0.0%	A.F.					
x10 or x100	10K	10 K	0.0%	A.F.					
	25K	25 K	0.0%	A.F.					
	40K	40 K	0.0%	A.F.					
x100 or x1000	100K	100 K	0.0%	A.F.					
	250K	250 K	0.0%	A.F.					
	400K	400 K	0.0%	A.F.					

Is the As Found Data Within 20% of the Set Point?: (●) Yes ( ) No

Overload Light: ( ) Adjusted / Verified (●) Not Adj.

REMARKS:

Does Instrument Meet Final Acceptance Criteria?: (●) Yes ( ) No

Calibration Sticker Attached?: (●) Yes ( ) No

Date Instrument is Due For Next Calibration: 09/11/20

INSTRUMENT MARRIED WITH 43-37 #PR190618

Performed/Reviewed by: Joanne Glenn Date: 9/11/2019 Entered by: ____ Initials

Calibrations performed to ANSI N323A-1997 standards.

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 43-37 PROBE # PR190618

Owner: GI

DATE: 09/11/19
TECH: Joanne Glenn

LOCATION: Griffin Inst
DATE LAST CAL EXPIRES: 10/26/16

REASON FOR CALIBRATION:

(●) Due For Calibration ( ) Repair (See Remarks) ( ) Other (See Remarks) ( ) Due and Repair

CABLE LENGTH: 6'

INPUT SENSITIVITY: dual

NIST TRACEABLE EQUIPMENT AND STANDARDS USED DURING CALIBRATION

MODEL: 2360 SERIAL #: 245779 CAL. DUE: 09/11/20

NIST TRACEABLE SOURCES USED

Source Number	Isotope	4 pi Activity	Assay Date	2 pi Activity
P2-149	Tc99 SS	21,949 dpm	02/01/17	12,070 cpm
P2-152	Th230	22,166 dpm	02/01/17	11,190 cpm
2696-00	Pu239	18,500 dpm	12/02/09	9,370 cpm
2697-00	Sr90	12,200 dpm	03/01/00	8,530 cpm
PX-726	C14	48,780 dpm	01/21/08	18,660 cpm

Condition: (●) Sat ( ) Unsat

Efficiencies from last cal.:

Pu:	16.23%	Th:	13.51%	Sr:	27.89%
Tc ss:	22.02%	C14:	13.28%	Tc Ni:	

As Found (AF) Efficiencies:

HV / Vernier:	Tc-99 Source Response Nickel (CPM):			Pu-239 Source Response (CPM):			Background (CPM):		Tc-99 Source Response Stainless Steel (CPM):		
	A ch.	B ch.	Net Eff.	A ch.	B ch.	Net Eff.	A ch.	B ch.	A ch.	B ch.	Net Eff.
1725 / N/A				3183	928	17.20%	1	715	3	5236	20.60%

Net A to B Xtalk: <10%	B to A Xtalk: <1%
6.3%	<1%

	Pu239	Tc99 Ni	Tc99 ss	Th-230	Sr90	C-14
AF CPM:	3183		5236	3609	2981	6848
AF 4 pi eff:	17.20%		20.60%	16.28%	29.70%	12.57%
AF 2 pi eff:	*33.96%*		*37.46%*	*32.24%*	*42.48%*	*32.87%*

Is as found efficiency within 20% of the efficiency from the last cal? (●) Yes ( ) No (See Remarks)

Note: If the as found data is within 10% of the last calibration and the B-A Xtalk is <1% and the A-B Xtalk is <10%, then the technician may N/A the plateau section and go directly to remarks.

GRIFFIN INSTRUMENTS

PROBE #: **PR190618**
Date: 09/11/19

PLATEAU AND SET POINT DATA

HV / Vernier:	Tc-99 Source Response SS (CPM):			Pu-239 Source Response (CPM):			Background (CPM):		Net A to B Xtalk: <10%	B to A Xtalk: <1%
	A ch.	B ch.	Net Eff.	A ch.	B ch.	Net Eff.	A ch.	B ch.		
1550	0	2311	10.1%	522	357	2.8%	1	103	32.7%	<1%
1600	1	3376	14.5%	1559	419	8.4%	1	204	12.1%	<1%
1650	3	4179	17.8%	2161	494	11.7%	4	280	9.0%	<1%
1700	1	5272	21.5%	2767	694	15.0%	1	543	5.2%	<1%
1725	2	5199								<1%
1750	2	5007	19.0%	3244	995	17.5%	3	834	4.7%	<1%

Alpha / Beta Bkg (cpm) 3 582

HV / Vernier		Pu-239	Tc-99 Ni	Tc-99 SS	Th-230	C-14	Sr-90
1700 / N/A	**CPM:**	2841		5231	3220	7190	2757
	4 pi AL Efficiencies:	**15.34%**		**21.18%**	**14.51%**	**13.55%**	**28.51%**
	2 pi AL Efficiencies:	***30.29%***		***38.52%***	***28.75%***	***35.41%***	***40.78%***

REMARKS:

Does Instrument Meet Final Acceptance Criteria?: (●) Yes ( ) No

Calibration Sticker Attached?: (●) Yes ( ) No

Date Instrument is Due For Next Calibration: **09/11/20**

INSTRUMENT MARRIED WITH **2360** **#245779**

Performed/Reviewed by: Joanne Glenn **Date:** 9/11/2019 **Entered by:** JP **Initials**

2 pi efficiencies denoted in italics.

Calibrations performed to ANSI N323A-1997 standards.

Header 1: Griffin
Header 2: 2360 SN:245779
Header 3: 43-93 PR190618
Header 4:
Header 5:
Header 6:
Location:

Calibration Due Date: 09/11/2020
Model 2360 Date: 09/11/2019
Model 2360 Time: 01:47:01 PM

Logged Samples: 0

User PC Scaler Count Time: 0.1 minutes

Alpha Ratemeter Alarm Setpoint: 999999
Beta Ratemeter Alarm Setpoint: 999999
Alpha + Beta Ratemeter Alarm Setpoint: 999999

Alpha Scaler Alarm Setpoint: 999999
Beta Scaler Alarm Setpoint: 999999
Alpha + Beta Scaler Alarm Setpoint: 999999

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 2360 SERIAL# 278604

Owner: GI

DATE: 09/11/19 LOCATION: Griffin Inst

TECH: Joanne Glenn DATE LAST CAL EXPIRES: 03/29/19

Reason For Calibration: (●) Due For Calibration ( ) Repair (See Remarks) ( ) Other (See Remarks) ( ) Due and Repair (See Remarks)

NIST TRACEABLE EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2 SERIAL #: 341331 CAL. DUE: 09/03/20

☑ Audio Response ☑ Geotropism CABLE LENGTH: 6'

CONDITION: Sat AF MECHANICAL ZERO: 0 AL MECHANICAL ZERO: 0

NEW BATTERIES: (●) Yes ( ) No BATTERY CHECK: Sat

HV (+/-10%)	AS FOUND HV	AS LEFT HV	WINDOW SETTINGS:	A.F.	A.L.
500 V:	500	A.F.	BT (3.5 mV +/- 1 mV):	3.5	A.F.
1000 V:	1000	A.F.	BW (30 mV +/-3 mV):	30	A.F.
1500 V:	1490	A.F.	AT (120 mV +/-10 mV):	120	A.F.

	RATE METER					SCALER			
SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.0%	A.F.					
	250	250	0.0%	A.F.		250	0.0%	A.F.	
	400	400	0.0%	A.F.					
x1 or x10	1000	1000	0.0%	A.F.					
	2500	2500	0.0%	A.F.					
	4000	4000	0.0%	A.F.					
x10 or x100	10K	10 K	0.0%	A.F.					
	25K	25 K	0.0%	A.F.					
	40K	40 K	0.0%	A.F.					
x100 or x1000	100K	100 K	0.0%	A.F.					
	250K	250 K	0.0%	A.F.					
	400K	400 K	0.0%	A.F.					

Is the As Found Data Within 20% of the Set Point?: (●) Yes ( ) No

Overload Light: ( ) Adjusted / Verified (●) Not Adj.

REMARKS:

Does Instrument Meet Final Acceptance Criteria?: (●) Yes ( ) No

Calibration Sticker Attached?: (●) Yes ( ) No

Date Instrument is Due For Next Calibration: 09/11/20

INSTRUMENT MARRIED WITH 43-37 #PR190617

Performed/Reviewed by: Joanne Glenn Date: 9/11/2019 Entered by: _____ Initials

Calibrations performed to ANSI N323A-1997 standards.

GRIFFIN INSTRUMENTS

CALIBRATION CERTIFICATE FOR 43-37 PROBE # PR190617

Owner: GI

DATE: 09/11/19
TECH: Joanne Glenn

LOCATION: Griffin Inst
DATE LAST CAL EXPIRES: 08/21/19

REASON FOR CALIBRATION:

(●) Due For Calibration ( ) Repair (See Remarks) ( ) Other (See Remarks) ( ) Due and Repair

CABLE LENGTH: 6'

INPUT SENSITIVITY: dual

NIST TRACEABLE EQUIPMENT AND STANDARDS USED DURING CALIBRATION

MODEL: 2360 SERIAL #: 278604 CAL. DUE: 09/11/20

NIST TRACEABLE SOURCES USED

Source Number	Isotope	4 pi Activity	Assay Date	2 pi Activity
P2-149	Tc99 SS	22,166 dpm	02/01/17	12,070 cpm
P2-152	Th230	22,166 dpm	02/01/17	11,190 cpm
2696-00	Pu239	18,500 dpm	12/02/09	9,370 cpm
2697-00	Sr90	12,200 dpm	03/01/00	8,530 cpm
PX-726	C14	48,780 dpm	01/21/08	18,660 cpm

Condition: (●) Sat ( ) Unsat

Efficiencies from last cal.:

Pu: 16.74% Th: 14.69% Sr: 27.62%

Tc ss: 19.47% C14: 12.26% Tc Ni:

As Found (AF) Efficiencies:

HV / Vernier:	Tc-99 Source Response Nickel (CPM):			Pu-239 Source Response (CPM):			Background (CPM):		Tc-99 Source Response Stainless Steel (CPM):		
	A ch.	B ch.	Net Eff.	A ch.	B ch.	Net Eff.	A ch.	B ch.	A ch.	B ch.	Net Eff.
1675 / N/A				2752	705	14.88%	0	434	1	4905	20.37%

Net A to B Xtalk: <10%	B to A Xtalk: <1%
9.0%	<1%

	Pu239	Tc99 Ni	Tc99 ss	Th-230	Sr90	C-14
AF CPM:	2752		4905	3143	2328	7109
AF 4 pi eff:	14.88%		20.37%	14.18%	24.83%	13.68%
AF 2 pi eff:	*29.37%*		*37.04%*	*28.09%*	*35.51%*	*35.77%*

Is as found efficiency within 20% of the efficiency from the last cal? (●) Yes ( ) No (See Remarks)

Note: If the as found data is within 10% of the last calibration and the B-A Xtalk is <1% and the A-B Xtalk is <10%, then the technician may N/A the plateau section and go directly to remarks.

GRIFFIN INSTRUMENTS

PROBE #: **PR190617**
Date: 09/11/19

PLATEAU AND SET POINT DATA

HV / Vernier:	Tc-99 Source Response SS (CPM):			Pu-239 Source Response (CPM):			Background (CPM):		Net A to B Xtalk: <10%	B to A Xtalk: <1%
	A ch.	B ch.	Net Eff.	A ch.	B ch.	Net Eff.	A ch.	B ch.		
1600	2	3633	15.6%	1839	369	9.9%	2	214	7.8%	<1%
1650	0	4532	19.1%	2531	567	13.7%	3	345	8.1%	<1%
1700	2	5123	20.3%	3190	871	17.2%	3	668	6.0%	<1%
1725	2	4790								<1%
1750	8	4385								<1%

Alpha / Beta Bkg (cpm) 1 690

HV / Vernier		Pu-239	Tc-99 Ni	Tc-99 SS	Th-230	C-14	Sr-90
1700 / N/A	CPM:	3306		5087	3612	6967	2776
	4 pi AL Efficiencies:	**17.86%**		**20.03%**	**16.29%**	**12.87%**	**27.34%**
	2 pi AL Efficiencies:	***35.27%***		***36.43%***	***32.27%***	***33.64%***	***39.11%***

REMARKS:

Does Instrument Meet Final Acceptance Criteria?: (●) Yes ( ) No

Calibration Sticker Attached?: (●) Yes ( ) No

Date Instrument is Due For Next Calibration: **09/11/20**

INSTRUMENT MARRIED WITH **2360** **#278604**

Performed/Reviewed by: Joanne Glenn **Date:** 9/11/2019 **Entered by:** JP **Initials**

2 pi efficiencies denoted in italics.

Calibrations performed to ANSI N323A-1997 standards.

Header 1: Griffin Inst.
Header 2: SN: 278604
Header 3: SN:PR190617
Header 4:
Header 5:
Header 6: Comment
Location: Table 007

Calibration Due Date: 09/11/2020
Model 2360 Date: 09/11/2019
Model 2360 Time: 03:50:02 PM

Logged Samples: 0

User PC Scaler Count Time: 0.1 minutes

Alpha Ratemeter Alarm Setpoint: 999999
Beta Ratemeter Alarm Setpoint: 999999
Alpha + Beta Ratemeter Alarm Setpoint: 999999

Alpha Scaler Alarm Setpoint: 999999
Beta Scaler Alarm Setpoint: 999999
Alpha + Beta Scaler Alarm Setpoint: 999999

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter:	Manufacturer:	Ludlum	Model Number:	2360	Serial Number:	275739
Detector:	Manufacturer:	Ludlum	Model Number:	43-37	Serial Number:	PR302114

- [x] Mechanical Check
- [ ] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed
- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [ ] 39-inch [ ] 72-inch [x] Other: 60-inch

Source Distance: [x] Contact [ ] 6 inches [ ] Other:

Source Geometry: [ ] Side [x] Below [ ] Other:

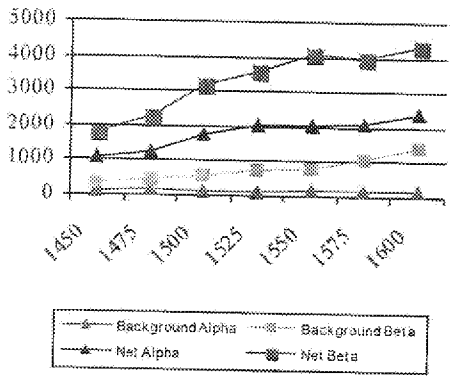
Alpha Threshold:	120 mV	Barometric Pressure:	24.7	inches Hg
Beta Threshold:	4	Temperature:	71	°F
Beta Window:	30 mV	Relative Humidity	20	%

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count α	Integrated 1-Min. Count β
x 1000	400 Kcpm	400	400	400420	400493
x 1000	100 Kcpm	100	100		
x 100	40 Kcpm	400	400	40008	40050
x 100	10 Kcpm	100	100		
x 10	4 Kcpm	400	400	4003	4005
x 10	1 Kcpm	100	100		
x 1	400 cpm	400	400	400	400
x 1	100 cpm	100	100		

High Voltage	Alpha Source α	Alpha Source β	Beta Source α	Beta Source β	Background α	Background β
1450	1216	393	239	2146	114	356
1475	1398	1097	176	2741	156	453
1500	1895	1518	436	3742	136	585
1525	2182	2083	410	4296	120	737
1550	2174	2271	490	4894	151	789
1575	2282	2542	524	5055	152	1073
1600	2551	2939	408	5728	158	1433

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1 min. Recommended HV =1575 volts. Per the Ludlum Report 1999 a 25 volt increase in recommended HV is needed for each 1000-foot decrease in elevation from calibration location; ERG is at 5200-feet. Recommended HV at 200 feet is 125 volt increase to 1700 volts. Higher beta to alpha crosstalk than expected, but confirmed on other detectors here.

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number [ ] 87490128

[x] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12)

[x] Beta Source: Tc-99 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)

[ ] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

[ ] Other Source:

Calibrated By: [signature]

Calibration Date: 11/11/19

Calibration Due: 11/11/20

Reviewed By: [signature]

Date: 11 Nov 19

ERG Form ITC. 101.C

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter: Manufacturer: Ludlum Model Number: 2221R Serial Number: 176941

Detector: Manufacturer: Ludlum Model Number: 44-20 Serial Number: BSH 05151701 ~~02261001~~

- [x] Mechanical Check
- [x] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed
- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [ ] 39-inch [ ] 72-inch [x] Other: 60"

Barometric Pressure: 24.36 inches Hg

Source Distance: [ ] Contact [x] 6 inches [ ] Other:

Threshold: 10 mV

Temperature: 72 °F

Source Geometry: [x] Side [ ] Below [ ] Other:

Window:

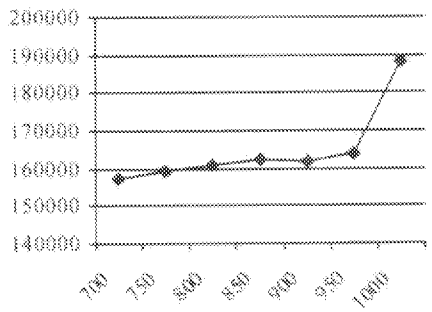
Relative Humidity: 20 %

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	399868	400
x 1000	100	100	100		100
x 100	400	400	400	40000	400
x 100	100	100	100		100
x 10	400	400	400	3993	400
x 10	100	100	100		100
x 1	400	400	400	399	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	157269	
750	159394	
800	160681	
850	162219	23924
900	162061	
950	164138	
1000	188196	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1-min. Recommended HV = 850

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number: [ ] 87490128

[ ] Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520 cpm (1/4/12)

[x] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

[ ] Beta Source: Tc-99 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)

[ ] Other Source:

Calibrated By: [signature]

Calibration Date: 3/2/20

Calibration Due: 3/2/21

Reviewed By: [signature]

Date: 03/02/20

ERG Form ITC 101.A

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A-1997

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter: Manufacturer: Ludlum Model Number: 2360 Serial Number: 220242

Detector: Manufacturer: Ludlum Model Number: 43-37 Serial Number: PR124946

✔ Mechanical Check ✔ HHR WIN Operation HV Check (+/- 2.5%): ✔ 500 V ✔ 1000 V ✔ 1500 V

___ F/S Response Check ✔ Reset Check Cable Length: 39-inch 72-inch ✔ Other: 60"

✔ Geotropism ✔ Audit Check

✔ Meter Zeroed ✔ Battery Check (Min 4.4 VDC)

Alpha Threshold: 100 mV Barometric Pressure: 20 inches Hg

Source Distance: ✔ Contact 6 inches Other:

Beta Threshold: 4 Temperature: 72 °F

Source Geometry: Side ✔ Below Other:

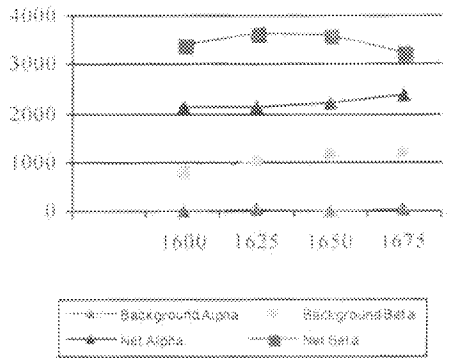
Beta Window: 40 mV Relative Humidity 25 %

Instrument found within tolerance: ✔ Yes No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count α	Integrated 1-Min. Count β
x 1000	400 Kcpm	400	400	399624	399722
x 1000	100 Kcpm	100	100		
x 100	40 Kcpm	400	400	39977	39984
x 100	10 Kcpm	100	100		
x 10	4 Kcpm	400	400	3998	3999
x 10	1 Kcpm	100	100		
x 1	400 cpm	400	400	400	400
x 1	100 cpm	100	100		

High Voltage	Alpha Source α	Alpha Source β	Beta Source α	Beta Source β	Background α	Background β
1600	2129	1572	25	4189	19	790
1625	2179	1816	29	4670	29	1029
1650	2227	1993	39	4803	19	1190
1675	2388	2058	135	4486	31	1222

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1 min. Recommended HV = 1650. Per the Ludlum Report 1999 a 25 volt increase in HV is recommended for each 1000-foot decrease in elevation from calibration location: ERG is at 5200-feet HV ADJ TO 1775 FOR ELEVATION CHANGE.

Reference Instruments and/or Sources:

Ludlum pulser serial number: 97743 ✔ 201932 Fluke multimeter serial number ✔ 87490128

✔ Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12) Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

✔ Beta Source: Sr-90 sn: 4099-03@17,700dpm/11,100cpm(1/4/12) Other Source:

Calibrated By: Calibration Date: 2/28/20 Calibration Due: 2/28/21

Reviewed By: Date: 2/28/2020

ERG Form HC-101A

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter:	Manufacturer:	Ludlum	Model Number:	2360	Serial Number:	276943
Detector:	Manufacturer:	Ludlum	Model Number:	43-93	Serial Number:	PR199841

- ✔ Mechanical Check
- ☐ F/S Response Check
- ✔ Geotropism
- ✔ Meter Zeroed
- ✔ THR/WIN Operation
- ✔ Reset Check
- ✔ Audio Check
- ✔ Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): ✔ 500 V ✔ 1000 V ✔ 1500 V

Cable Length: ✔ 39-inch ☐ 72-inch ☐ Other:

Source Distance: ✔ Contact ☐ 6 inches ☐ Other:

Source Geometry: ☐ Side ✔ Below ☐ Other:

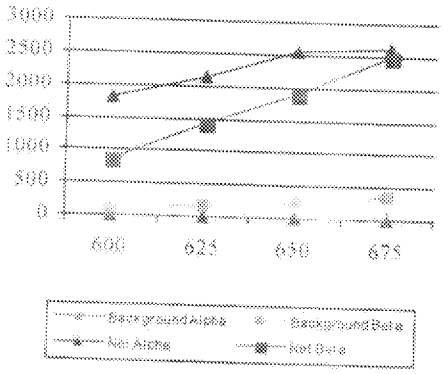
Alpha Threshold:	120 mV	Barometric Pressure:	24.33	inches Hg
Beta Threshold:	4	Temperature:	72	°F
Beta Window:	30 mV	Relative Humidity	20	%

Instrument found within tolerance: ✔ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count α	Integrated 1-Min. Count β
x 1000	400 Kcpm	400	400	399565	399581
x 1000	100 Kcpm	100	100		
x 100	40 Kcpm	400	400	39934	39963
x 100	10 Kcpm	100	100		
x 10	4 Kcpm	400	400	3995	3995
x 10	1 Kcpm	100	100		
x 1	400 cpm	400	400	399	399
x 1	100 cpm	100	100		

High Voltage	Alpha Source α	Alpha Source β	Beta Source α	Beta Source β	Background α	Background β
600	1818	318	1	956	1	109
625	2134	352	8	1587	4	176
650	2543	404	5	2135	3	240
675	2628	620	3	2850	3	348

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1 min. Recommended HV =650

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ✔ 201932

Fluke multimeter serial number ✔ 87490128

✔ Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12)

✔ Beta Source: Tc-99 sn: 4099-03@17,700dpm/11,100cpm(1/4/12)

Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

Other Source:

Calibrated By: [signature]

Calibration Date: 2/12/20

Calibration Due: 2/12/21

Reviewed By: [signature]

Date: 2/12/2020

ERG Form ITC-1013

This calibration conforms to the requirements and [illegible]

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter/Detector: Manufacturer: Ludlum Model Number: 2929 & 43-10-1 Serial Number: 142654 & PR145340

✔ Mechanical Check ✔ HHR/WIN Operation HV Check (+/- 2.5%): ✔ 500 V ✔ 1000 V ✔ 1500 V
FS Response Check Reset Check Cable Length: ✔ 39-inch 72-inch Other:
Geotropism ✔ Audio Check
_ Meter Zeroed Battery Check (Min 4.4 VDC)

Alpha Threshold: 170 mV Barometric Pressure: 24.54 inches Hg
Source Distance: Contact 6 inches ✔ Other: In Planchett Beta Threshold: 4 mV Temperature: 72 °F
Source Geometry: Side Below ✔ Other: In Planchett Beta Window: 46 mV Relative Humidity: 20 %

Instrument found within tolerance: ✔ Yes _ No

Range Multiplier	Reference Setting	Integrated 1-Min. Count "As Found" α	β	Integrated 1-Min. Count "Reading" α	β
x 1000	400 Kcpm	399768	399749	399768	399749
x 100	40 Kcpm	39986	39991	39986	39991
x 10	4 Kcpm	3998	3999	3998	3999
x 1	400 cpm	400	400	400	400

High Voltage	Pot. Setting	Alpha Source α	β	Beta Source α	β	Background α	β
600	2.5	3624	315	2	1509	1	30
650	2.7	4394	326	7	2257	1	53
700	2.9	4509	386	6	3059	2	69
750	3.1	3628	521	2	3843	0	67

Comments: Comments: HV Plateau Scaler Count Time = 1-min. Recommended HV = 700, Pot. setting = 2.9

Reference Instruments and/or Sources:

Ludlum pulser serial number: 97743 ✔ 201932 Fluke multimeter serial number 87490128

✔ Alpha Source: Th-230 sn: 4098-03@12,800dpm/6,520cpm(1/4/12) Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03
✔ Beta Source: [illegible] 4099-03@17,700dpm/11,100cpm(1/4/12) Other Source:

Calibrated By: [signature] Calibration Date: 2/26/20 Calibration Due: 2/26/21

Reviewed By: [signature] Date: 2/28/2020

CABRERA # 1365

Eckert & Ziegler
Isotope Products

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOURCE

Radionuclide:	Th-230	**Customer:**	CABRERA SERVICES INC.
Half-life:	(7.54 ± 0.03)E+04 years	**P.O. No.:**	PO-00892
Catalog No.:	EAB-230-47U	**Reference Date:**	1-Jul-15 12:00 PST
Source No.:	M6-837	**Contained Radioactivity:**	2.487 nCi 92.02 Bq

Physical Description:

A. Capsule type:	Disk (47 mm OD x 0.76 mm THK)
B. Nature of active deposit:	Electrodeposited and diffusion bonded oxide
C. Active diameter/volume:	45 mm
D. Backing:	Stainless steel
E. Cover:	None

Radioimpurities:

None detected

Method of Calibration:

This source was assayed using a windowless internal gas flow proportional counter.

Uncertainty of Measurement:

A. Type A (random) uncertainty:	± 0.6 %
B. Type B (systematic) uncertainty:	± 3.0 %
C. Uncertainty in aliquot weighing:	± 0.0 %
D. Total uncertainty at the 99% confidence level:	± 3.1 %

Notes:

- See reverse side for leak test(s) performed on this source.
- EZIP participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (as in NRC Regulatory Guide 4.15).
- Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
- This source has a working life of 2 years.
- This source had a surface emission rate of 2788 α/min in 2π on 15-Jun-15.

Daniel James Van Dalsem
Quality Control

16-Jun-15
Date

EZIP Ref. No.: 1821-37

Eckert & Ziegler
Isotope Products

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

CABRERA # 1364

CERTIFICATE OF CALIBRATION
BETA STANDARD SOURCE

Radionuclide:	Tc-99	**Customer:**	CABRERA SERVICES INC.
Half-life:	(2.13 ± 0.05)E+05 years	**P.O. No.:**	PO-00892
Catalog No.:	EAB-099-47U	**Reference Date:**	1-Jul-15 12:00 PST
Source No.:	M6-836	**Contained Radioactivity:**	2.692 nCi 99.60 Bq

Physical Description:

A. Capsule type:	Disk (47 mm OD x 0.76 mm THK)
B. Nature of active deposit:	Electrodeposited and diffusion bonded Technetium metal
C. Active diameter/volume:	45 mm
D. Backing:	Stainless steel
E. Cover:	None

Radioimpurities:

None detected

Method of Calibration:

This source was assayed using a windowless internal gas flow proportional counter.

Uncertainty of Measurement:

A. Type A (random) uncertainty:	± 1.1 %
B. Type B (systematic) uncertainty:	± 3.0 %
C. Uncertainty in aliquot weighing:	± 0.0 %
D. Total uncertainty at the 99% confidence level:	± 3.2 %

Notes:

- See reverse side for leak test(s) performed on this source.
- EZIP participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (as in NRC Regulatory Guide 4.15).
- Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
- This source has a working life of 2 years.
- This source had a surface emission rate of 3287 β/min in 2π on 15-Jun-15.

Quality Control

16-Jun-15
Date

EZIP Ref. No.: 1821-37

Eckert & Ziegler
Isotope Products

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

CERTIFICATE OF CALIBRATION
GAMMA STANDARD SOURCE

Radionuclide:	Co-60	**Customer:**	CABRERA SERVICES, INC.
Half-life:	5.272 ± 0.001 years	**P.O. No.:**	12-0217
Catalog No.:	GF-060-D	**Reference Date:**	15-May-12 12:00 PST
Source No.:	1592-30-1	**Contained Radioactivity:**	1.042 µCi 38.55 kBq

Physical Description:

A. Capsule type:	D (25.4 mm OD x 6.35 mm THK)
B. Nature of active deposit:	Evaporated metallic salt
C. Active diameter/volume:	5 mm
D. Backing:	Epoxy
E. Cover:	Acrylic

Radioimpurities:

None detected

Method of Calibration:

This source was assayed using gamma ray spectrometry.

Peak energy used for integration:	1173, 1333 keV
Branching ratio used:	0.9986, 0.9998 gammas per decay

Uncertainty of Measurement:

A. Type A (random) uncertainty:	± 0.5 %
B. Type B (systematic) uncertainty:	± 3.0 %
C. Uncertainty in aliquot weighing:	± 0.0 %
D. Total uncertainty at the 99% confidence level:	± 3.0 %

Notes:

- See reverse side for leak test(s) performed on this source.
- EZIP participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (as in NRC Regulatory Guide 4.15).
- Nuclear data was taken from IAEA-TECDOC-619, 1991.
- This source has a working life of 5 years.

Daniel James Van Delden
Quality Control

16-Apr-12
Date

EZIP Ref. No.: 1592-30

EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Alpha Standard

S.O.# 7261
P.O.# 13-0038

Description of Standard:

Model No. DNS-11 Serial No. 3973-02 Isotope Th-230

Electroplated on polished SS disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2pi alpha emission rate was measured using an internal gas flow proportional chamber. Absolute counting of alpha particles emitted in the hemisphere above the active surface was verified by counting above, below, and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated alpha source S/N 75322-201

Measurement Result:

The observed alpha particles emitted from the surface of the disc per minute (cpm) on the calibration date was:

7,950 ± 318

The total disintegration rate (dpm) assuming 1.5% backscatter of alpha particles from the surface of the disc, was:

15,700 ± 626 (0.00706 μCi)

The uncertainty of the measurement is 4 %, which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: ART REUST Reviewed by: [signature]

Calibration Technician: [signature] Q.A. Manager: [signature]

Calibration Date: 8-21-2012 Reviewed Date: 08/21/2012

Analytical Services
7021 Pan American Freeway NE
Albuquerque, New Mexico 87109-4238
(505) 345-3461 Fax (505) 761-5416
Toll Free (866) RAD-LABS (723-5227)
www.eberlineservices.com

EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Beta Standard

S.O.# 7261
P.O.# 13-0038

Description of Standard:

Model No. DNS-12 Serial No. 3975-02 Isotope Tc-99

Electroplated on polished SS disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2pi beta emission rate was measured using an internal gas flow proportional chamber. Absolute counting of beta particles emitted in the hemisphere above the active surface was verified by counting above, below, and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated beta source S/N 75323-201.

Measurement Result:

The observed beta count rate from the surface of the disc per minute (cpm) on the calibration date was:

11,100 ± 442

The total disintegration rate (dpm) assuming 25 % backscatter of beta particles from the surface of the disc, was:

17,700 ± 707 (0.00797 μCi)

The uncertainty of the measurement is 4 %, which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: ART REUST Reviewed by: [signature]

Calibration Technician: [signature] Q.A. Manager: [signature]

Calibration Date: 8-21-2012 Reviewed Date: 08/21/2012

Source Manufacturing Lab
7021 Pan American Freeway NE
Albuquerque, New Mexico 87109-4230
(505) 761-5413 Fax (505) 761-5416
art.reust@eberlineservices.com

Eckert & Ziegler Nuclitec GmbH
Gieselweg 1
38110 Braunschweig
Tel +49 5307 932-0
Fax +49 5307 932-293

Eckert & Ziegler

akkreditiert durch die / *accredited by the*

Deutsche Akkreditierungsstelle GmbH

als Kalibrierlaboratorium im / *as calibration laboratory in the*

Deutschen Kalibrierdienst DKD

DAkkS Deutsche Akkreditierungsstelle D-K-15203-01-00

Kalibrierschein
Calibration certificate

Kalibrierzeichen
Calibration mark

026031
D-K-15203-01-00
2013-05

Strahler Nr. / Source number AC-2448

Gegenstand *Object*	Beta Wide Area Reference Source
Hersteller *Manufacturer*	Eckert & Ziegler Nuclitec GmbH
Typ *Type*	TCR07032
Strahler-Nr. *Source number*	AC-2448
Auftraggeber *Customer*	Eckert & Ziegler Analytics USA-Atlanta, GA 30318
Auftragsnummer *Order No.*	CO00155161
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	2
Datum der Kalibrierung *Date of calibration*	25 April 2013

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.
This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).
The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.
The user is obliged to have the object recalibrated at appropriate intervals.

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Deutschen Akkreditierungsstelle GmbH als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.
This calibration certificate may not be reproduced other than in full except with the permission of both the Deutsche Akkreditierungsstelle GmbH and the issuing laboratory. Calibration certificates without signature are not valid.

Datum *Date*	Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory*	Bearbeiter *Person in charge*
13 May 2013	Dr. Thieme i.A. E. Hoid	i.A. T. Schell Schueler

026031
D-K-15203-01-00
2013-05

Beta Wide Area Reference Source

Source no.	AC-2448
Drawing	VZ-628-001
Nuclide	Technetium-99
Activity	3.79 kBq
Beta surface emission rate	1.83E03 s^{-1} in 2 π steradian
Reference date	25 April 2013 at 12:00 UTC
Dimensions of active surface	150 mm x 100 mm
Overall dimensions	170 mm x 120 mm x 3 mm
Leakage and contamination test	The amount of the removable activity does not exceed 10 Bq. (Wipe test according to ISO 9978, no. 5.3.1)
Wipe test passed on	13 May 2013
Construction	Tc-99 is incorporated into the surface of an anodized aluminium foil of 0.3 mm thickness. The thickness of the activated layer is approximately 6 µm. The activated foil is mounted into a holder.
Measuring method	The activity was determined by comparison with a reference source of the same construction. The beta surface emission rate was measured using a windowless proportional counter.
Traceability	Additional to the direct traceability to the PTB through the DAkkS this product complies with the requirements for traceability to NIST specified in the American National Standard "Traceability of Radioactive Sources to the NIST and Associated Instrument Quality Control (ANSI N42.22-1995)". As a requirement of the ANSI N42.22-1995 Eckert & Ziegler Nuclitec GmbH participates in the NRMAP/NIST Measurements Assurance Program of the Nuclear Power Industry.
Uncertainty	The relative uncertainty of the activity is 5 %, the relative uncertainty of the beta surface emission rate is 3 %. The reported uncertainty, determined according to the DAkkS-DKD-3 report is based on the standard uncertainty multiplied by a coverage factor of k = 2, providing a level of confidence of 95 %. (Ref. NIST Technical Note 1297/"Guide to the Expression of Uncertainty in Measurement" ISO Guide, 1995)
Radioactive impurities	Related to Tc-99 (equal 100 %) the following radioactive impurities were detected: none
Quality assurance system	The quality assurance system of Eckert & Ziegler Nuclitec GmbH was certified by Lloyd's Register Quality Assurance (LRQA) according to ISO 9001, issue 2008. Isotrak products meet the requirements of 10CFR50 Appendix B in the USA.
Uniformity	The uniformity of the surface emission rate is better than 10 %.
Remark	This is an EZN Class 2 reference source. Ref: PO#3950/SO#32561, End User Ref: PO#13-0185

Eckert & Ziegler Nuclitec GmbH
Gieselweg 1
38110 Braunschweig
Tel +49 5307 932-0
Fax +49 5307 932-293

Eckert & Ziegler

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Deutsche Akkreditierungsstelle GmbH

DAkkS Deutsche Akkreditierungsstelle D-K-15203-01-00

als Kalibrierlaboratorium im / *as calibration laboratory in the*

Deutschen Kalibrierdienst DKD

026288
D-K-15203-01-00
2013-07

Kalibrierzeichen
Calibration mark

Kalibrierschein
Calibration certificate

Strahler Nr. / *Source number* AC-2446

Gegenstand *Object*	**Alpha Wide Area Reference Source**
Hersteller *Manufacturer*	**Eckert & Ziegler Nuclitec GmbH**
Typ *Type*	**TZR86470**
Strahler-Nr. *Source number*	**AC-2446**
Auftraggeber *Customer*	**Eckert & Ziegler Analytics** **Atlanta, GA 30318** **United States of America**
Auftragsnummer *Order No.*	**CO00155161**
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	**2**
Datum der Kalibrierung *Date of calibration*	**25 July 2013**

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).
The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.
The user is obliged to have the object recalibrated at appropriate intervals.

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Deutschen Akkreditierungsstelle GmbH als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.

This calibration certificate may not be reproduced other than in full except with the permission of both the Deutsche Akkreditierungsstelle GmbH and the issuing laboratory. Calibration certificates without signature are not valid.

Datum *Date*	Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory*	Bearbeiter *Person in charge*
30 July 2013	i. A. Dr. Thieme	i. A. Schueler

026288
D-K-15203-01-00
2013-07

Alpha Wide Area Reference Source

Source no.	AC-2446
Drawing	VZ-628-001
Nuclide	Thorium-230
Activity	2.21 kBq
Alpha surface emission rate	1.08E03 s^{-1} in 2 π steradian
Reference date	25 July 2013 at 12:00 UTC
Dimensions of active surface	150 mm x 100 mm
Overall dimensions	150 mm x 120 mm x 3 mm
Leakage and contamination test	The amount of the removable activity does not exceed 10 Bq. (Wipe test according to ISO 9978, no. 5.3.1)
Wipe test passed on	30 July 2013
Construction	Th-230 is incorporated into the surface of an anodized aluminium foil of 0.3 mm thickness. The thickness of the activated layer is approximately 6 µm. The activated foil is mounted into a holder.
Measuring method	The activity was determined by comparison with a reference source of the same construction. The alpha surface emission rate was measured using a windowless proportional counter.
Traceability	Additional to the direct traceability to the PTB through the DAkkS this product complies with the requirements for traceability to NIST specified in the American National Standard "Traceability of Radioactive Sources to the NIST and Associated Instrument Quality Control (ANSI N42.22-1995)". As a requirement of the ANSI N42.22-1995 Eckert & Ziegler Nuclitec GmbH participates in the NRMAP/NIST Measurements Assurance Program of the Nuclear Power Industry.
Uncertainty	The relative uncertainty of the activity is 3 %, the relative uncertainty of the alpha surface emission rate is 3 %. The reported uncertainty, determined according to the DAkkS-DKD-3 report is based on the standard uncertainty multiplied by a coverage factor of k = 2, providing a level of confidence of 95 %. (Ref. NIST Technical Note 1297/"Guide to the Expression of Uncertainty in Measurement" ISO Guide, 1995)
Radioactive impurities	Related to Th-230 (equal 100 %) the following radioactive impurities were detected: none
Quality assurance system	The quality assurance system of Eckert & Ziegler Nuclitec GmbH was certified by Lloyd's Register Quality Assurance (LRQA) according to ISO 9001, issue 2008. Isotrak products meet the requirements of 10CFR50 Appendix B in the USA.
Uniformity	The uniformity of the surface emission rate is better than 10 %.
Remark	This is an EZN Class 2 reference source. Ref: PO#3950/SO#32561, End User Ref: PO#13-0185

Eckert & Ziegler Nuclitec GmbH
Gieselweg 1
38110 Braunschweig
Tel +49 5307 932-0
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Eckert & Ziegler

akkreditiert durch die / *accredited by the*

Deutsche Akkreditierungsstelle GmbH

DAkkS Deutsche Akkreditierungsstelle D-K-15203-01-00

als Kalibrierlaboratorium im / *as calibration laboratory in the*

Deutschen Kalibrierdienst DKD

026055
D-K-15203-01-00
2013-05

Kalibrierzeichen
Calibration mark

Kalibrierschein
Calibration certificate

Strahler Nr. / *Source number* AC-2450

Gegenstand *Object*	Beta Wide Area Reference Source
Hersteller *Manufacturer*	Eckert & Ziegler Nuclitec GmbH
Typ *Type*	SIR07032
Strahler-Nr. *Source number*	AC-2450
Auftraggeber *Customer*	Eckert & Ziegler Analytics Atlanta, GA 30318 United States of America
Auftragsnummer *Order No.*	CO00155161
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	2
Datum der Kalibrierung *Date of calibration*	22 May 2013

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).
The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.
The user is obliged to have the object recalibrated at appropriate intervals.

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Deutschen Akkreditierungsstelle GmbH als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.

This calibration certificate may not be reproduced other than in full except with the permission of both the Deutsche Akkreditierungsstelle GmbH and the issuing laboratory. Calibration certificates without signature are not valid.

Datum *Date*	Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory*	Bearbeiter *Person in charge*
28 May 2013	Dr. Thieme i.A. E. Hoid	Schueler E. Schueler

026055
D-K-15203-01-00
2013-05

Beta Wide Area Reference Source

Source no.	AC-2450
Drawing	VZ-628-001
Nuclide	Strontium-90
Activity	3.49 kBq
Beta surface emission rate	4.50E03 s^{-1} in 2 π steradian
Reference date	22 May 2013 at 12:00 UTC
Dimensions of active surface	150 mm x 100 mm
Overall dimensions	170 mm x 120 mm x 3 mm
Leakage and contamination test	The amount of the removable activity does not exceed 10 Bq. (Wipe test according to ISO 9978, no. 5.3.1)
Wipe test passed on	27 May 2013
Construction	Sr-90 is incorporated into the surface of an anodized aluminium foil of 0.3 mm thickness. The thickness of the activated layer is approximately 6 µm. The activated foil is mounted into a holder.
Measuring method	The activity was determined by comparison with a reference source of the same construction. The beta surface emission rate was measured using a windowless proportional counter.
Traceability	Additional to the direct traceability to the PTB through the DAkkS this product complies with the requirements for traceability to NIST specified in the American National Standard "Traceability of Radioactive Sources to the NIST and Associated Instrument Quality Control (ANSI N42.22-1995)". As a requirement of the ANSI N42.22-1995 Eckert & Ziegler Nuclitec GmbH participates in the NRMAP/NIST Measurements Assurance Program of the Nuclear Power Industry.
Uncertainty	The relative uncertainty of the activity is 5 %, the relative uncertainty of the beta surface emission rate is 3 %. The reported uncertainty, determined according to the DAkkS-DKD-3 report is based on the standard uncertainty multiplied by a coverage factor of k = 2, providing a level of confidence of 95 %. (Ref. NIST Technical Note 1297/"Guide to the Expression of Uncertainty in Measurement" ISO Guide, 1995)
Radioactive impurities	Related to Sr-90 (equal 100 %) the following radioactive impurities were detected: none
Quality assurance system	The quality assurance system of Eckert & Ziegler Nuclitec GmbH was certified by Lloyd's Register Quality Assurance (LRQA) according to ISO 9001, issue 2008. Isotrak products meet the requirements of 10CFR50 Appendix B in the USA.
Uniformity	The uniformity of the surface emission rate is better than 10 %.
Remark	This is an EZN Class 2 reference source. Ref: PO#3950/SO#32561 End user Reference PO#13-0185

Eckert & Ziegler Nuclitec GmbH
Gieselweg 1
38110 Braunschweig
Tel +49 5307 932-0
Fax +49 5307 932-293

Eckert & Ziegler

akkreditiert durch die / *accredited by the*

Deutsche Akkreditierungsstelle GmbH

als Kalibrierlaboratorium im / *as calibration laboratory in the*

Deutschen Kalibrierdienst DKD

DAkkS Deutsche Akkreditierungsstelle D-K-15203-01-00

026045
D-K-15203-01-00
2013-05

Kalibrierzeichen
Calibration mark

Kalibrierschein
Calibration certificate

Strahler Nr. / *Source number* AC-2449

Gegenstand *Object*	Beta Wide Area Reference Source
Hersteller *Manufacturer*	Eckert & Ziegler Nuclitec GmbH
Typ *Type*	CIR07032
Strahler-Nr. *Source number*	AC-2449
Auftraggeber *Customer*	Eckert & Ziegler Analytics Atlanta, GA 30318, USA
Auftragsnummer *Order No.*	CO00155161
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	2
Datum der Kalibrierung *Date of calibration*	25 April 2013

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem internationalen Einheitensystem (SI).
Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).
The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.
The user is obliged to have the object recalibrated at appropriate intervals.

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Deutschen Akkreditierungsstelle GmbH als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.

This calibration certificate may not be reproduced other than in full except with the permission of both the Deutsche Akkreditierungsstelle GmbH and the issuing laboratory. Calibration certificates without signature are not valid.

Datum *Date*	Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory*	Bearbeiter *Person in charge*
22 May 2013	Dr. Thieme	Schueler

02604S
D-K-15203-01-00
2013-05

Beta Wide Area Reference Source

Source no.	AC-2449
Drawing	VZ-628-001
Nuclide	Chlorine-36
Activity	3.90 kBq
Beta surface emission rate	2.48E03 s^{-1} in 2 π steradian
Reference date	25 April 2013 at 12:00 UTC
Dimensions of active surface	150 mm x 100 mm
Overall dimensions	170 mm x 120 mm x 3 mm
Leakage and contamination test	The amount of the removable activity does not exceed 10 Bq. (Wipe test according to ISO 9978, no. 5.3.1)
Wipe test passed on	22 May 2013
Construction	Cl-36 is incorporated into the surface of an anodized aluminium foil of 0.3 mm thickness. The thickness of the activated layer is approximately 6 µm. The activated foil is mounted into a holder.
Measuring method	The activity was determined by comparison with a reference source of the same construction. The beta surface emission rate was measured using a windowless proportional counter.
Traceability	Additional to the direct traceability to the PTB through the DAkkS this product complies with the requirements for traceability to NIST specified in the American National Standard "Traceability of Radioactive Sources to the NIST and Associated Instrument Quality Control (ANSI N42.22-1995)". As a requirement of the ANSI N42.22-1995 Eckert & Ziegler Nuclitec GmbH participates in the NRMAP/NIST Measurements Assurance Program of the Nuclear Power Industry.
Uncertainty	The relative uncertainty of the activity is 5 %, the relative uncertainty of the beta surface emission rate is 3 %. The reported uncertainty, determined according to the DAkkS-DKD-3 report is based on the standard uncertainty multiplied by a coverage factor of k = 2, providing a level of confidence of 95 %. (Ref. NIST Technical Note 1297/"Guide to the Expression of Uncertainty in Measurement" ISO Guide, 1995)
Radioactive impurities	Related to Cl-36 (equal 100 %) the following radioactive impurities were detected: none
Quality assurance system	The quality assurance system of Eckert & Ziegler Nuclitec GmbH was certified by Lloyd's Register Quality Assurance (LRQA) according to ISO 9001, issue 2008. Isotrak products meet the requirements of 10CFR50 Appendix B in the USA.
Uniformity	The uniformity of the surface emission rate is better than 10 %.
Remark	This is an EZN Class 2 reference source. Ref: PO#3950/SO#32561, End User Ref: PO#13-0185

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	1646	126.15	15913.82
2	1803	-30.85	951.7225
3	1815	-42.85	1836.122
4	1742	30.15	909.0225
5	1807	-34.85	1214.522
6	1742	30.15	909.0225
7	1804	-31.85	1014.422
8	1731	41.15	1693.323
9	1793	-20.85	434.7225
10	1798	-25.85	668.2225
11	1809	-36.85	1357.922
12	1747	25.15	632.5225
13	1783	-10.85	117.7225
14	1745	27.15	737.1225
15	1810	-37.85	1432.622
16	1764	8.15	66.4225
17	1824	-51.85	2688.422
18	1768	4.15	17.2225
19	1810	-37.85	1432.622
20	1702	70.15	4921.023
Sum total	35443		38948.55
X_m	1772.15		

Instrument/Detector	2929 / 43-10-1
Serial # / Serial#	155577/PR157789
Date Performed	13-Aug-19
Count time interval (minutes)	1
Source Used	Th-230

X^2 = 21.98

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	1593	-83.25	6930.563
2	1473	36.75	1350.563
3	1535	-25.25	637.5625
4	1505	4.75	22.5625
5	1584	-74.25	5513.063
6	1458	51.75	2678.063
7	1546	-36.25	1314.063
8	1521	-11.25	126.5625
9	1454	55.75	3108.063
10	1507	2.75	7.5625
11	1455	54.75	2997.563
12	1514	-4.25	18.0625
13	1459	50.75	2575.563
14	1557	-47.25	2232.563
15	1558	-48.25	2328.063
16	1489	20.75	430.5625
17	1500	9.75	95.0625
18	1572	-62.25	3875.063
19	1466	43.75	1914.063
20	1449	60.75	3690.563
Sum total	30195		41845.75
X_m	1509.75		

Instrument/Detector	2929 / 43-10-1
Serial # / Serial#	155577/PR157789
Date Performed	13-Aug-19
Count time interval (minutes)	1
Source Used	Tc-99

X^2 = 27.72

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	1683	-42.55	1810.503
2	1646	-5.55	30.8025
3	1632	8.45	71.4025
4	1668	-27.55	759.0025
5	1640	0.45	0.2025
6	1693	-52.55	2761.503
7	1664	-23.55	554.6025
8	1563	77.45	5998.503
9	1639	1.45	2.1025
10	1710	-69.55	4837.202
11	1639	1.45	2.1025
12	1558	82.45	6798.003
13	1600	40.45	1636.203
14	1646	-5.55	30.8025
15	1658	-17.55	308.0025
16	1608	32.45	1053.003
17	1675	-34.55	1193.703
18	1671	-30.55	933.3025
19	1639	1.45	2.1025
20	1577	63.45	4025.903
Sum total	32809		32808.95
X_m	1640.45		

Instrument/Detector	2360/43-37
Serial # / Serial#	215271/PR216985
Date Performed	13-Aug-19
Count time interval (minutes)	2
Source Used	Th-230

X^2 = 20.00

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	3059	34.7	1204.09
2	3150	-56.3	3169.69
3	3089	4.7	22.09
4	3004	89.7	8046.09
5	3089	4.7	22.09
6	3219	-125.3	15700.09
7	3139	-45.3	2052.09
8	3037	56.7	3214.89
9	3125	-31.3	979.69
10	3026	67.7	4583.29
11	3032	61.7	3806.89
12	3142	-48.3	2332.89
13	3177	-83.3	6938.89
14	3113	-19.3	372.49
15	3030	63.7	4057.69
16	3072	21.7	470.89
17	3112	-18.3	334.89
18	3085	8.7	75.69
19	3166	-72.3	5227.29
20	3008	85.7	7344.49
Sum total	61874		69956.2
X_m	3093.7		

Instrument/Detector	2360/43-37
Serial # / Serial#	215271/PR216985
Date Performed	13-Aug-19
Count time interval (minutes)	2
Source Used	Tc-99

X^2 = 22.61

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	1699	24.6	605.16
2	1630	93.6	8760.96
3	1651	72.6	5270.76
4	1647	76.6	5867.56
5	1786	-62.4	3893.76
6	1681	42.6	1814.76
7	1779	-55.4	3069.16
8	1765	-41.4	1713.96
9	1745	-21.4	457.96
10	1821	-97.4	9486.76
11	1739	-15.4	237.16
12	1754	-30.4	924.16
13	1657	66.6	4435.56
14	1714	9.6	92.16
15	1705	18.6	345.96
16	1740	-16.4	268.96
17	1715	8.6	73.96
18	1765	-41.4	1713.96
19	1792	-68.4	4678.56
20	1687	36.6	1339.56
Sum total	34472		55050.8
X_m	1723.6		

Instrument/Detector	2360/43-37
Serial # / Serial#	220263/PR216985
Date Performed	5-Sep-19
Count time interval (minutes)	2
Source Used	Th-230

X^2 = 31.94

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	3444	-11.65	135.7225
2	3361	71.35	5090.822
3	3374	58.35	3404.722
4	3342	90.35	8163.122
5	3533	-100.65	10130.42
6	3402	30.35	921.1225
7	3465	-32.65	1066.023
8	3420	12.35	152.5225
9	3502	-69.65	4851.123
10	3441	-8.65	74.8225
11	3380	52.35	2740.522
12	3468	-35.65	1270.923
13	3455	-22.65	513.0225
14	3511	-78.65	6185.823
15	3437	-4.65	21.6225
16	3431	1.35	1.8225
17	3436	-3.65	13.3225
18	3366	66.35	4402.322
19	3409	23.35	545.2225
20	3470	-37.65	1417.523
Sum total	68647		51102.55
X_m	3432.35		

Instrument/Detector	2360/43-37
Serial # / Serial#	220263/PR216985
Date Performed	5-Sep-19
Count time interval (minutes)	2
Source Used	Tc-99

X^2 = 14.89

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	1428	-1.65	2.7225
2	1438	-11.65	135.7225
3	1494	-67.65	4576.523
4	1409	17.35	301.0225
5	1439	-12.65	160.0225
6	1340	86.35	7456.322
7	1395	31.35	982.8225
8	1391	35.35	1249.622
9	1502	-75.65	5722.923
10	1449	-22.65	513.0225
11	1367	59.35	3522.422
12	1465	-38.65	1493.823
13	1443	-16.65	277.2225
14	1465	-38.65	1493.823
15	1369	57.35	3289.022
16	1395	31.35	982.8225
17	1400	26.35	694.3225
18	1458	-31.65	1001.723
19	1447	-20.65	426.4225
20	1433	-6.65	44.2225
Sum total	28527		34326.55
X_m	1426.35		

Instrument/Detector	2360/43-37
Serial # / Serial#	245779/PR190618
Date Performed	17-Sep-19
Count time interval (minutes)	2
Source Used	Th-230

X^2 = 24.07

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	3272	22.35	499.5225
2	3166	128.35	16473.72
3	3339	-44.65	1993.623
4	3281	13.35	178.2225
5	3229	65.35	4270.622
6	3365	-70.65	4991.423
7	3253	41.35	1709.822
8	3269	25.35	642.6225
9	3429	-134.65	18130.62
10	3178	116.35	13537.32
11	3256	38.35	1470.722
12	3343	-48.65	2366.823
13	3364	-69.65	4851.123
14	3344	-49.65	2465.123
15	3306	-11.65	135.7225
16	3345	-50.65	2565.423
17	3211	83.35	6947.222
18	3389	-94.65	8958.623
19	3309	-14.65	214.6225
20	3239	55.35	3063.622
Sum total	65887		95466.55
X_m	3294.35		

Instrument/Detector	2360/43-37
Serial # / Serial#	245779/PR190618
Date Performed	17-Sep-19
Count time interval (minutes)	2
Source Used	Tc-99

X^2 = 28.98

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	1633	27.65	764.5225
2	1674	-13.35	178.2225
3	1597	63.65	4051.323
4	1701	-40.35	1628.122
5	1733	-72.35	5234.522
6	1676	-15.35	235.6225
7	1643	17.65	311.5225
8	1744	-83.35	6947.222
9	1651	9.65	93.1225
10	1641	19.65	386.1225
11	1663	-2.35	5.5225
12	1710	-49.35	2435.422
13	1571	89.65	8037.123
14	1639	21.65	468.7225
15	1656	4.65	21.6225
16	1682	-21.35	455.8225
17	1626	34.65	1200.623
18	1649	11.65	135.7225
19	1669	-8.35	69.7225
20	1655	5.65	31.9225
Sum total			32692.55
X_m	1660.65		

Instrument/Detector	2360/43-37
Serial # / Serial#	275739/PR302114
Date Performed	13-Nov-19
Count time interval (minutes)	2
Source Used	Th-230

X^2 = 19.69

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	3073	66.25	4389.063
2	3131	8.25	68.0625
3	3079	60.25	3630.063
4	3152	-12.75	162.5625
5	3134	5.25	27.5625
6	3183	-43.75	1914.063
7	3148	-8.75	76.5625
8	3203	-63.75	4064.063
9	3131	8.25	68.0625
10	3135	4.25	18.0625
11	3093	46.25	2139.063
12	3168	-28.75	826.5625
13	3135	4.25	18.0625
14	3085	54.25	2943.063
15	3172	-32.75	1072.563
16	3188	-48.75	2376.563
17	3139	0.25	0.0625
18	3186	-46.75	2185.563
19	3180	-40.75	1660.563
20	3070	69.25	4795.563
Sum total	62785		32435.75
X_m	3139.25		

Instrument/Detector	2360/43-37
Serial # / Serial#	275739/PR302114
Date Performed	13-Nov-19
Count time interval (minutes)	2
Source Used	Tc-99

X^2 = 10.33

Note: Accept χ^2 if between 8.91 and 32.8

CABRERA SERVICES
RADIOLOGICAL · ENGINEERING · REMEDIATION

ISO-7503 EFFICIENCY (ε) WORKSHEET (Rev. 0)

INSTRUMENT/TECHNICIAN DETAILS

	Instrument	Detector
Make	Ludlum	Ludlum
Model	2360	43-37
Unique ID#	215271	PR216985
Cal. Due, YYYY-MM-DD	2020-03-04	
t_b - Bkgd. Count Time, min	2.0	
Bkgd. Total Counts (beta)	930	
Detector Active Area, cm^2		584
Window Areal Density, mg/cm^2		1.2

2pi efficiency data

Technician (First, Last)	B.Badaoui
Validation (First, Last)	Scott Hay
2 Pi Test Date, YYYY-MM-DD	2019-08-14
Test Site	Hunters Point Naval Shipyard

SOURCE DETAILS

Source	Th-230	H-3	C-14	Tc-99	Cl-36	Sr-90
Emission Type	α	β^-	β^-	β^-	β^-	β^-
Unique ID#	AC-2446	OR-256	AC-2447	AC-2448	AC-2449	AC-2450
Cert. Date, YYYY-MM-DD	2013-07-25	2006-11-01	2013-04-25	2013-04-25	2013-04-25	2013-05-22
Source Active Area, cm^2	150	100	150	150	150	150
Radioactive Half-life, yrs	75380	12.3	5700	211100	301000	28.8
Cert. Surface Emission Rate (SER), sec^{-1}	1080	1110	1260	1830	2480	4500
Decay Corrected (SER), sec^{-1}	1080	541	1259	1830	2480	3873
Mean Emission Energy, keV	4667	5.7	49	85	252	565
End-Point Emission Energy, keV	4684	18.6	156	294	710	2280
ε_s - Source Efficiency	0.25	0.25	0.25	0.25	0.50	0.50
t_s - Source Count Time, min	5	5	5	2	1	1

TEST DATA (enter gross counts - target >30000, required>10000 counts)

Contact	95,377			89,488	59,394	89,597
+1 cm						
+2 cm						

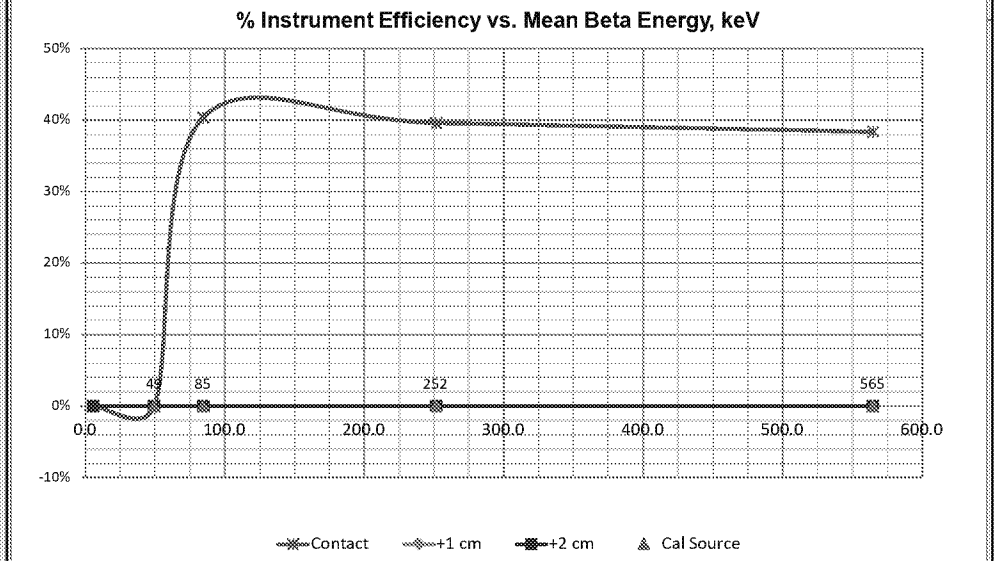
INSTRUMENT EFFICIENCY (ε_i)

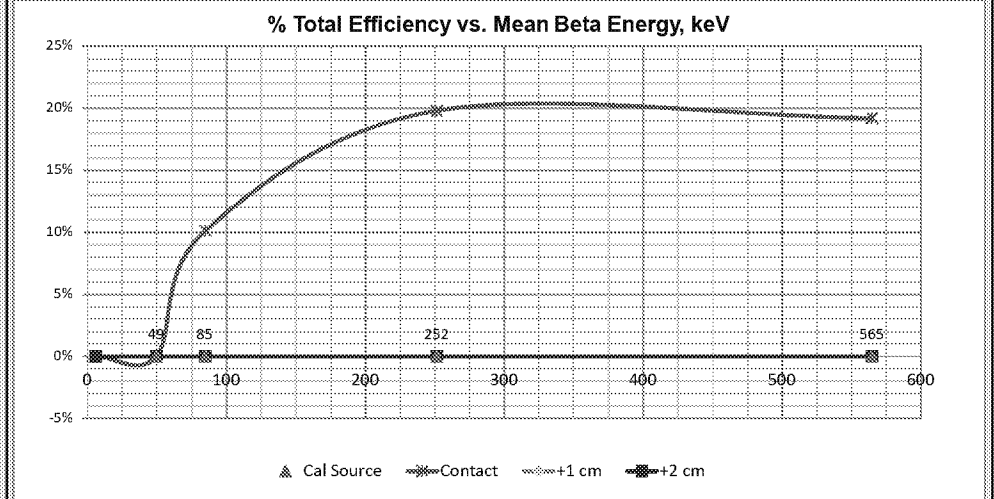
Contact	0.294			0.403	0.396	0.384
+1 cm						
+2 cm						

TOTAL EFFICIENCY (ε_T)

Contact	0.074			0.1008	0.198	0.192
+1 cm						
+2 cm						

ISO-7503 EFFICIENCY (ε) WORKSHEET





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RADIOLOGICAL · ENGINEERING · REMEDIATION

ISO-7503 EFFICIENCY (ε) WORKSHEET (Rev. 0)

INSTRUMENT/TECHNICIAN DETAILS

	Instrument	Detector
Make	Ludlum	Ludlum
Model	2360	43-37
Unique ID#	220263	PR216985
Cal. Due, YYYY-MM-DD	2020-09-03	
t_b - Bkgd. Count Time, min	2.0	
Bkgd. Total Counts (beta)	1594	
Detector Active Area, cm^2		584
Window Areal Density, mg/cm^2		1.2

2pi efficiency data

Technician (First, Last)	B.Badaoui
Validation (First, Last)	Scott Hay
2 Pi Test Date, YYYY-MM-DD	2019-09-05
Test Site	Hunters Point Naval Shipyard

SOURCE DETAILS

Source	Th-230	H-3	C-14	Tc-99	Cl-36	Sr-90
Emission Type	α	β^-	β^-	β^-	β^-	β^-
Unique ID#	AC-2446	OR-256	AC-2447	AC-2448	AC-2449	AC-2450
Cert. Date, YYYY-MM-DD	2013-07-25	2006-11-01	2013-04-25	2013-04-25	2013-04-25	2013-05-22
Source Active Area, cm^2	150	100	150	150	150	150
Radioactive Half-life, yrs	75380	12.3	5700	211100	301000	28.8
Cert. Surface Emission Rate (SER), sec^{-1}	1080	1110	1260	1830	2480	4500
Decay Corrected (SER), sec^{-1}	1080	539	1259	1830	2480	3867
Mean Emission Energy, keV	4667	5.7	49	85	252	565
End-Point Emission Energy, keV	4684	18.6	156	294	710	2280
ε_s - Source Efficiency	0.25	0.25	0.25	0.25	0.50	0.50
t_s - Source Count Time, min	5	5	5	2	1	1

TEST DATA (enter gross counts - target >30000, required>10000 counts)

Contact	99,845			84,426	62,900	96,573
+1 cm						
+2 cm						

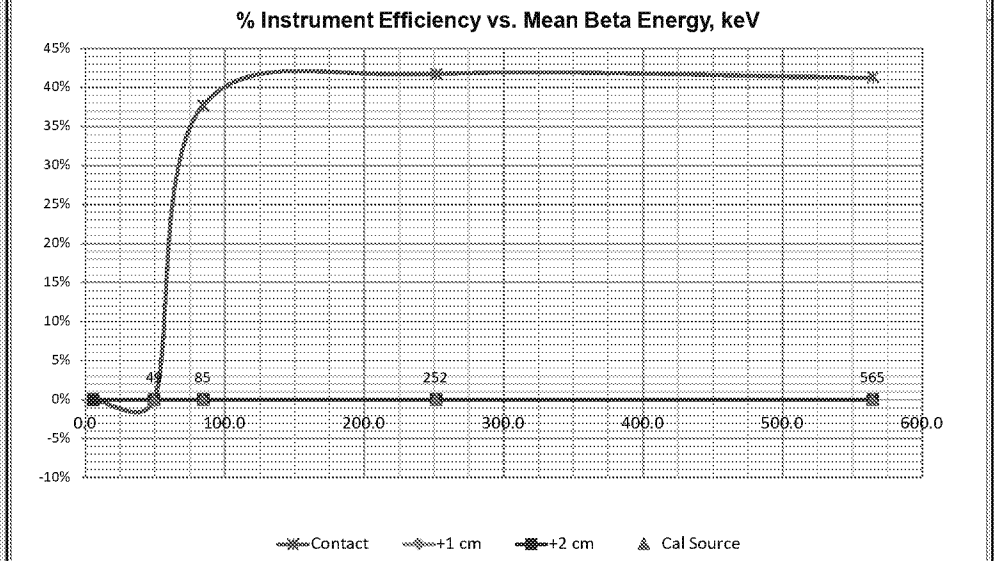
INSTRUMENT EFFICIENCY (ε_i)

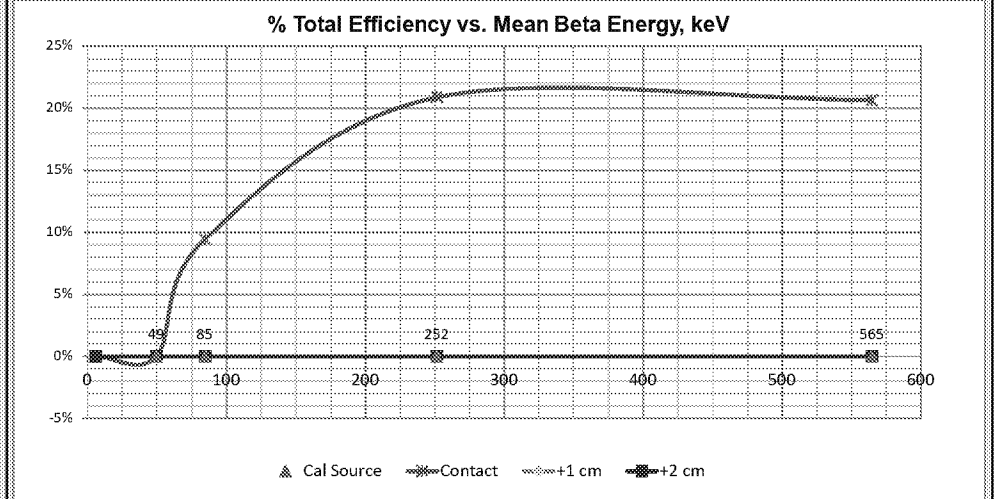
Contact	0.308			0.377	0.417	0.413
+1 cm						
+2 cm						

TOTAL EFFICIENCY (ε_T)

Contact	0.077			0.0943	0.209	0.206
+1 cm						
+2 cm						

ISO-7503 EFFICIENCY (ε) WORKSHEET





CABRERA SERVICES
RADIOLOGICAL · ENGINEERING · REMEDIATION

ISO-7503 EFFICIENCY (ε) WORKSHEET (Rev. 0)

INSTRUMENT/TECHNICIAN DETAILS

	Instrument	Detector
Make	Ludlum	Ludlum
Model	2360	43-37
Unique ID#	245779	PR190618
Cal. Due, YYYY-MM-DD	2020-09-11	
t_b - Bkgd. Count Time, min	2.0	
Bkgd. Total Counts (beta)	1296	
Detector Active Area, cm^2		584
Window Areal Density, mg/cm^2		1.2

2pi efficiency data

Technician (First, Last)	B.Badaoui
Validation (First, Last)	Scott Hay
2 Pi Test Date, YYYY-MM-DD	2019-09-17
Test Site	Hunters Point Naval Shipyard

SOURCE DETAILS

Source	Th-230	H-3	C-14	Tc-99	Cl-36	Sr-90
Emission Type	α	β^-	β^-	β^-	β^-	β^-
Unique ID#	AC-2446	OR-256	AC-2447	AC-2448	AC-2449	AC-2450
Cert. Date, YYYY-MM-DD	2013-07-25	2006-11-01	2013-04-25	2013-04-25	2013-04-25	2013-05-22
Source Active Area, cm^2	150	100	150	150	150	150
Radioactive Half-life, yrs	75380	12.3	5700	211100	301000	28.8
Cert. Surface Emission Rate (SER), sec^{-1}	1080	1110	1260	1830	2480	4500
Decay Corrected (SER), sec^{-1}	1080	538	1259	1830	2480	3864
Mean Emission Energy, keV	4667	5.7	49	85	252	565
End-Point Emission Energy, keV	4684	18.6	156	294	710	2280
ε_s - Source Efficiency	0.25	0.25	0.25	0.25	0.50	0.50
t_s - Source Count Time, min	5	5	5	2	1	1

TEST DATA (enter gross counts - target >30000, required>10000 counts)

Contact	85,657			79,670	62,233	96,473
+1 cm						
+2 cm						

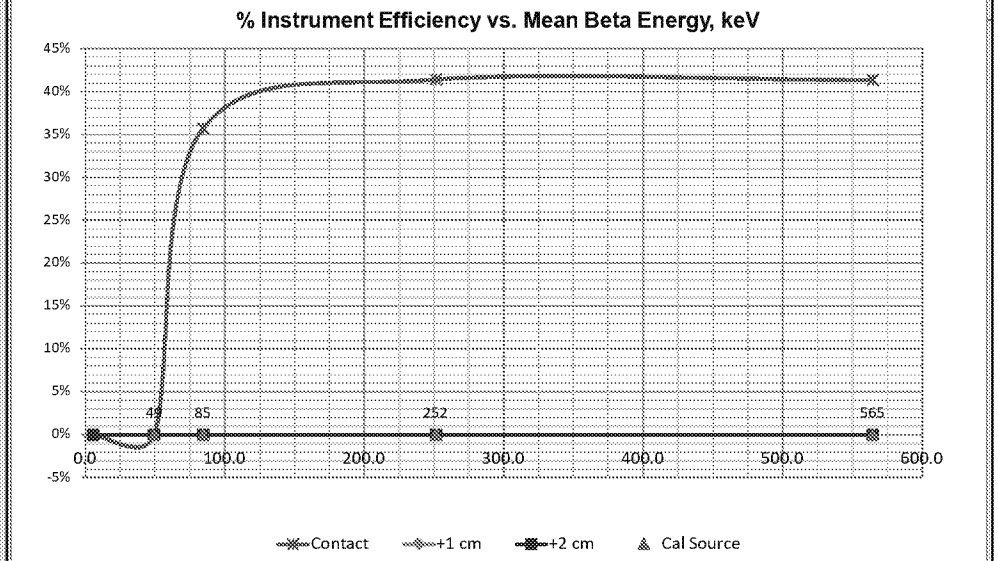
INSTRUMENT EFFICIENCY (ε_i)

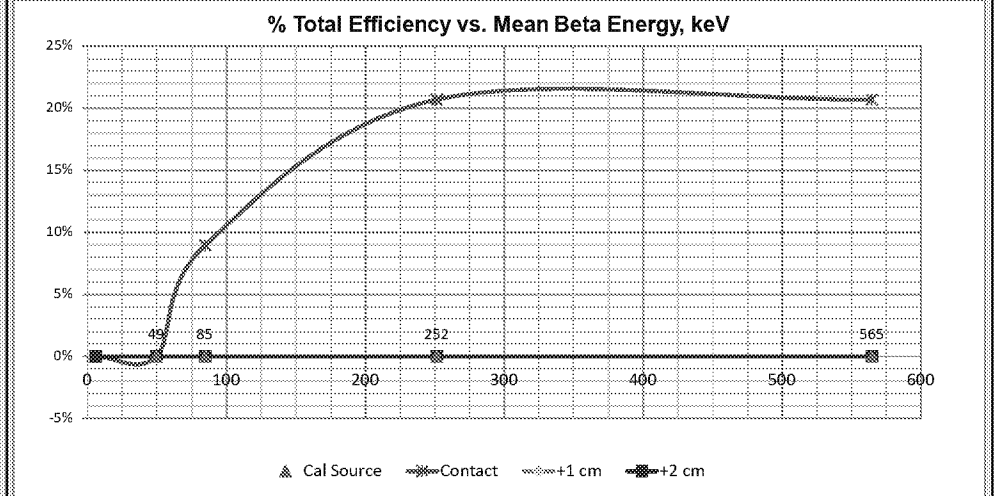
Contact	0.264			0.357	0.414	0.413
+1 cm						
+2 cm						

TOTAL EFFICIENCY (ε_T)

Contact	0.066			0.0892	0.207	0.207
+1 cm						
+2 cm						

ISO-7503 EFFICIENCY (ε) WORKSHEET





CABRERA SERVICES
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ISO-7503 EFFICIENCY (ε) WORKSHEET (Rev. 0)

INSTRUMENT/TECHNICIAN DETAILS

	Instrument	Detector
Make	Ludlum	Ludlum
Model	2360	43-37
Unique ID#	275739	PR302114
Cal. Due, YYYY-MM-DD	2020-11-11	
t_b - Bkgd. Count Time, min	2.0	
Bkgd. Total Counts (beta)	1569	
Detector Active Area, cm^2		584
Window Areal Density, mg/cm^2		1.2

2pi efficiency data

Technician (First, Last)	B.Badaoui
Validation (First, Last)	Scott Hay
2 Pi Test Date, YYYY-MM-DD	2019-11-13
Test Site	Hunters Point Naval Shipyard

SOURCE DETAILS

Source	Th-230	H-3	C-14	Tc-99	Cl-36	Sr-90
Emission Type	α	β^-	β^-	β^-	β^-	β^-
Unique ID#	AC-2446	OR-256	AC-2447	AC-2448	AC-2449	AC-2450
Cert. Date, YYYY-MM-DD	2013-07-25	2006-11-01	2013-04-25	2013-04-25	2013-04-25	2013-05-22
Source Active Area, cm^2	150	100	150	150	150	150
Radioactive Half-life, yrs	75380	12.3	5700	211100	301000	28.8
Cert. Surface Emission Rate (SER), sec^{-1}	1080	1110	1260	1830	2480	4500
Decay Corrected (SER), sec^{-1}	1080	533	1259	1830	2480	3850
Mean Emission Energy, keV	4667	5.7	49	85	252	565
End-Point Emission Energy, keV	4684	18.6	156	294	710	2280
ε_s - Source Efficiency	0.25	0.25	0.25	0.25	0.50	0.50
t_s - Source Count Time, min	5	5	5	2	1	1

TEST DATA (enter gross counts - target >30000, required>10000 counts)

Contact	98,732			76,051	59,944	91,097
+1 cm						
+2 cm						

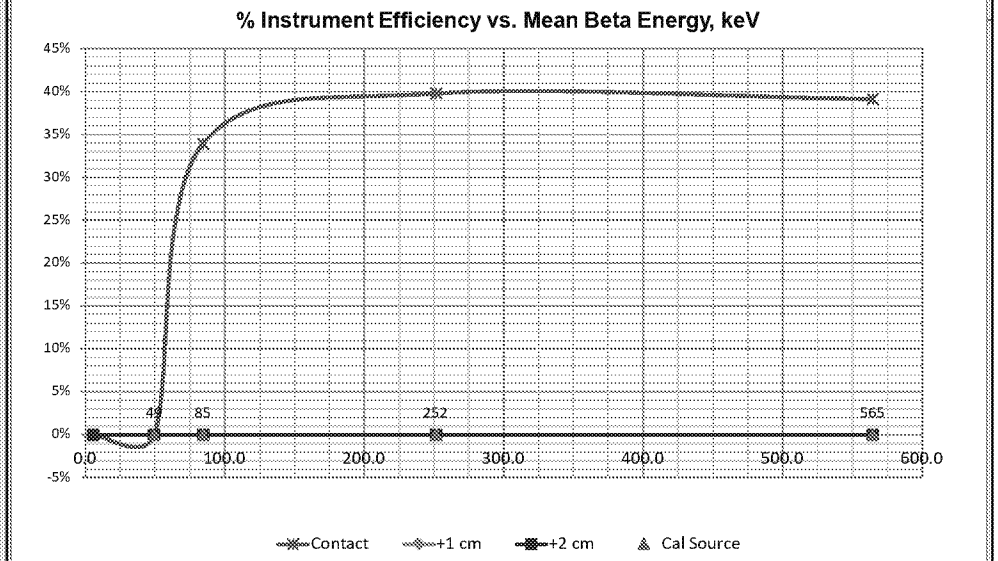
INSTRUMENT EFFICIENCY (ε_i)

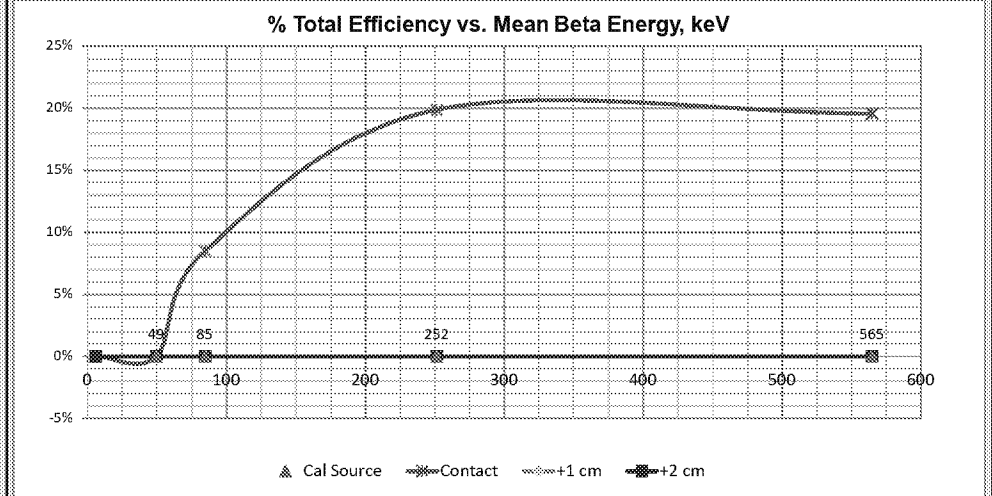
Contact	0.305			0.339	0.398	0.391
+1 cm						
+2 cm						

TOTAL EFFICIENCY (ε_T)

Contact	0.076			0.0848	0.199	0.195
+1 cm						
+2 cm						

ISO-7503 EFFICIENCY (ε) WORKSHEET





CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:		2929		Detector:	43-10-1			Calibration Date:		2/20/2019								
Serial #:		155577		Serial #:	PR157789			12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm^2):					100													
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.3309	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	20	10	1	0.19	0.13	1767.9	53.07				
Beta	0.3815	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	200	10	1	44.30	3.05	1473.3	49.29				

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
8/13/2019	2	399	1801	1513	0.2	39.9	1800.8	1473.1	PASS	PASS	PASS	PASS	13.73	65	Yes	Yes		BB
8/13/2019	0	416	1765	1476	0.0	41.6	1765.0	1434.4	PASS	PASS	PASS	PASS	9.07	66	Yes	Yes		BB
8/14/2019	0	439	1773	1551	0.0	43.9	1773.0	1507.1	PASS	PASS	PASS	PASS	9.07	68	Yes	Yes		BB
8/14/2019	2	466	1754	1568	0.2	46.6	1753.8	1521.4	PASS	PASS	PASS	PASS	13.73	70	Yes	Yes		BB
8/15/2019	1	454	1743	1463	0.1	45.4	1742.9	1417.6	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		BB
8/15/2019	0	451	1755	1552	0.0	45.1	1755.0	1506.9	PASS	PASS	PASS	PASS	9.07	69	Yes	Yes		BB
8/16/2019	0	433	1733	1501	0.0	43.3	1733.0	1457.7	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
8/16/2019	0	399	1813	1453	0.0	39.9	1813.0	1413.1	PASS	PASS	PASS	PASS	9.07	65	Yes	Yes		BB
8/19/2019	1	462	1738	1562	0.1	46.2	1737.9	1515.8	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		BB
8/19/2019	2	420	1788	1490	0.2	42.0	1787.8	1448.0	PASS	PASS	PASS	PASS	13.73	66	Yes	Yes		BB
8/20/2019	3	451	1752	1596	0.3	45.1	1751.7	1550.9	PASS	PASS	PASS	PASS	14.78	69	Yes	Yes		BB
8/20/2019	0	477	1822	1623	0.0	47.7	1822.0	1575.3	PASS	PASS	PASS	QUESTION	9.07	70	Yes	Yes		BB
8/20/2019	0	477	1822	1549	0.0	47.7	1822.0	1501.3	PASS	PASS	PASS	PASS	9.07	70	Yes	Yes		BB
8/21/2019	0	433	1759	1557	0.0	43.3	1759.0	1513.7	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
8/21/2019	0	441	1812	1588	0.0	44.1	1812.0	1543.9	PASS	PASS	PASS	PASS	9.07	68	Yes	Yes		BB
8/22/2019	1	453	1843	1584	0.1	45.3	1842.9	1538.7	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		BB
8/22/2019	0	424	1811	1489	0.0	42.4	1811.0	1446.6	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
8/23/2019	0	472	1766	1454	0.0	47.2	1766.0	1406.8	PASS	PASS	PASS	PASS	9.07	70	Yes	Yes		BB
8/23/2019	3	462	1732	1504	0.3	46.2	1731.7	1457.8	PASS	PASS	PASS	PASS	14.78	69	Yes	Yes		BB
8/26/2019	0	444	1743	1480	0.0	44.4	1743.0	1435.6	PASS	PASS	PASS	PASS	9.07	68	Yes	Yes		BB
8/26/2019	1	390	1807	1550	0.1	39.0	1806.9	1511.0	PASS	PASS	PASS	PASS	12.36	64	Yes	Yes		BB
8/27/2019	0	426	1741	1552	0.0	42.6	1741.0	1509.4	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
8/27/2019	3	411	1760	1493	0.3	41.1	1759.7	1451.9	PASS	PASS	PASS	PASS	14.78	66	Yes	Yes		BB
8/28/2019	0	454	1684	1524	0.0	45.4	1684.0	1478.6	PASS	PASS	PASS	PASS	9.07	69	Yes	Yes		BB
8/28/2019	0	454	1791	1524	0.0	45.4	1791.0	1478.6	PASS	PASS	PASS	PASS	9.07	69	Yes	Yes		BB
8/28/2019	0	431	1719	1543	0.0	43.1	1719.0	1499.9	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
8/29/2019	1	425	1770	1533	0.1	42.5	1769.9	1490.5	PASS	PASS	PASS	PASS	12.36	67	Yes	Yes		BB
8/29/2019	0	423	1783	1495	0.0	42.3	1783.0	1452.7	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
8/30/2019	1	408	1788	1536	0.1	40.8	1787.9	1495.2	PASS	PASS	PASS	PASS	12.36	66	Yes	Yes		BB
8/30/2019	0	393	1767	1451	0.0	39.3	1767.0	1411.7	PASS	PASS	PASS	PASS	9.07	65	Yes	Yes		BB
9/3/2019	0	425	1774	1493	0.0	42.5	1774.0	1450.5	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
9/3/2019	1	422	1611	1454	0.1	42.2	1610.9	1411.8	PASS	PASS	QUESTION	PASS	12.36	67	Yes	Yes		BB
9/3/2019	1	422	1704	1454	0.1	42.2	1703.9	1411.8	PASS	PASS	PASS	PASS	12.36	67	Yes	Yes		BB
9/4/2019	2	449	1764	1502	0.2	44.9	1763.8	1457.1	PASS	PASS	PASS	PASS	13.73	68	Yes	Yes		BB
9/4/2019	0	420	1770	1481	0.0	42.0	1770.0	1439.0	PASS	PASS	PASS	PASS	9.07	66	Yes	Yes		BB
9/5/2019	1	436	1686	1456	0.1	43.6	1685.9	1412.4	PASS	PASS	PASS	PASS	12.36	68	Yes	Yes		BB
9/5/2019	0	402	1759	1522	0.0	40.2	1759.0	1481.8	PASS	PASS	PASS	PASS	9.07	65	Yes	Yes		BB
9/9/2019	2	418	1764	1568	0.2	41.8	1763.8	1526.2	PASS	PASS	PASS	PASS	13.73	66	Yes	Yes		BB
9/9/2019	3	481	1770	1549	0.3	48.1	1769.7	1500.9	PASS	PASS	PASS	PASS	14.78	71	Yes	Yes		BB
9/10/2019	0	506	1686	1507	0.0	50.6	1686.0	1456.4	PASS	QUESTION	PASS	PASS	9.07	72	Yes	Yes		BB
9/10/2019	0	490	1686	1507	0.0	49.0	1686.0	1458.0	PASS	PASS	PASS	PASS	9.07	71	Yes	Yes		BB
9/10/2019	1	435	1739	1496	0.1	43.5	1738.9	1452.5	PASS	PASS	PASS	PASS	12.36	68	Yes	Yes		BB
9/11/2019	0	479	1733	1537	0.0	47.9	1733.0	1489.1	PASS	PASS	PASS	PASS	9.07	70	Yes	Yes		BB
9/11/2019	4	489	1719	1580	0.4	48.9	1718.6	1531.1	PASS	PASS	PASS	PASS	15.66	71	Yes	Yes		BB
9/13/2019	0	480	1680	1480	0.0	48.0	1680.0	1432.0	PASS	PASS	PASS	PASS	9.07	71	Yes	Yes		BB

HP Technician Signature:

Supervisor Signature:

2929 SN 155577

43-10-1 SN PR157789

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA (DPM/100cm^2)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.3309	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	20	10	1	0.19	0.13	1767.9	53.07				
Beta	0.3815	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	200	10	1	44.30	3.05	1473.3	49.29				

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
9/13/2019	3	490	1682	1387	0.3	49.0	1681.7	1338.0	PASS	PASS	PASS	QUESTION	14.78	71	Yes	Yes		BB
9/13/2019	3	490	1682	1435	0.3	49.0	1681.7	1386.0	PASS	PASS	PASS	PASS	14.78	71	Yes	Yes		BB
9/16/2019	1	485	1730	1471	0.1	48.5	1729.9	1422.5	PASS	PASS	PASS	PASS	12.36	71	Yes	Yes		BB
9/16/2019	0	414	1671	1512	0.0	41.4	1671.0	1470.6	PASS	PASS	PASS	PASS	9.07	66	Yes	Yes		BB
9/17/2019	1	479	1722	1449	0.1	47.9	1721.9	1401.1	PASS	PASS	PASS	PASS	12.36	70	Yes	Yes		BB
9/17/2019	3	532	1784	1560	0.3	53.2	1783.7	1506.8	PASS	QUESTION	PASS	PASS	14.78	74	Yes	Yes		BB
9/17/2019	3	479	1784	1560	0.3	47.9	1783.7	1512.1	PASS	PASS	PASS	PASS	14.78	70	Yes	Yes		BB
9/18/2019	1	471	1687	1435	0.1	47.1	1686.9	1387.9	PASS	PASS	PASS	PASS	12.36	70	Yes	Yes		BB
9/18/2019	1	464	1723	1516	0.1	46.4	1722.9	1469.6	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		BB
9/19/2019	0	477	1682	1432	0.0	47.7	1682.0	1384.3	PASS	PASS	PASS	PASS	9.07	70	Yes	Yes		BB
9/19/2019	2	472	1717	1513	0.2	47.2	1716.8	1465.8	PASS	PASS	PASS	PASS	13.73	70	Yes	Yes		BB
9/20/2019	0	442	1729	1507	0.0	44.2	1729.0	1462.8	PASS	PASS	PASS	PASS	9.07	68	Yes	Yes		LKC
9/20/2019	2	472	1698	1465	0.2	47.2	1697.8	1417.8	PASS	PASS	PASS	PASS	13.73	70	Yes	Yes		LKC
9/24/2019	0	451	1707	1496	0.0	45.1	1707.0	1450.9	PASS	PASS	PASS	PASS	9.07	69	Yes	Yes		LKC
9/24/2019	2	481	1644	1541	0.2	48.1	1643.8	1492.9	PASS	PASS	QUESTION	PASS	13.73	71	Yes	Yes		SH
9/24/2019	2	481	1755	1541	0.2	48.1	1754.8	1492.9	PASS	PASS	PASS	PASS	13.73	71	Yes	Yes		SH
9/26/2019	0	442	1690	1511	0.0	44.2	1690.0	1466.8	PASS	PASS	PASS	PASS	9.07	68	Yes	Yes		BB
9/26/2019	1	488	1743	1609	0.1	48.8	1742.9	1560.2	PASS	PASS	PASS	PASS	12.36	71	Yes	Yes		BB
9/27/2019	3	510	1821	1550	0.3	51.0	1820.7	1499.0	PASS	QUESTION	PASS	PASS	14.78	72	Yes	Yes		BB
9/27/2019	0	489	1770	1609	0.0	48.9	1770.0	1560.1	PASS	PASS	PASS	PASS	9.07	71	Yes	Yes		BB
10/1/2019	0	451	1741	1558	0.0	45.1	1741.0	1512.9	PASS	PASS	PASS	PASS	9.07	69	Yes	Yes		BB
10/1/2019	1	397	1693	1591	0.1	39.7	1692.9	1551.3	PASS	PASS	PASS	PASS	12.36	65	Yes	Yes		BB
10/2/2019	0	433	1671	1555	0.0	43.3	1671.0	1511.7	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
10/2/2019	0	488	1788	1612	0.0	48.8	1788.0	1563.2	PASS	PASS	PASS	PASS	9.07	71	Yes	Yes		BB
10/3/2019	0	494	1733	1469	0.0	49.4	1733.0	1419.6	PASS	PASS	PASS	PASS	9.07	71	Yes	Yes		BB
10/3/2019	1	445	1781	1541	0.1	44.5	1780.9	1496.5	PASS	PASS	PASS	PASS	12.36	68	Yes	Yes		BB
10/4/2019	0	417	1732	1524	0.0	41.7	1732.0	1482.3	PASS	PASS	PASS	PASS	9.07	66	Yes	Yes		BB
10/4/2019	2	432	1761	1613	0.2	43.2	1760.8	1569.8	PASS	PASS	PASS	PASS	13.73	67	Yes	Yes		BB
10/7/2019	1	482	1727	1430	0.1	48.2	1726.9	1381.8	PASS	PASS	PASS	PASS	12.36	71	Yes	Yes		BB
10/7/2019	2	460	1751	1560	0.2	46.0	1750.8	1514.0	PASS	PASS	PASS	PASS	13.73	69	Yes	Yes		BB
10/8/2019	0	454	1745	1501	0.0	45.4	1745.0	1455.6	PASS	PASS	PASS	PASS	9.07	69	Yes	Yes		BB
10/8/2019	1	470	1678	1567	0.1	47.0	1677.9	1520.0	PASS	PASS	PASS	PASS	12.36	70	Yes	Yes		BB
10/9/2019	1	452	1693	1469	0.1	45.2	1692.9	1423.8	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		BB
10/9/2019	0	488	1741	1551	0.0	48.8	1741.0	1502.2	PASS	PASS	PASS	PASS	9.07	71	Yes	Yes		BB
10/10/2019	0	428	1706	1529	0.0	42.8	1706.0	1486.2	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
10/10/2019	0	450	1680	1497	0.0	45.0	1680.0	1452.0	PASS	PASS	PASS	PASS	9.07	69	Yes	Yes		BB
10/11/2019	1	483	1723	1559	0.1	48.3	1722.9	1510.7	PASS	PASS	PASS	PASS	12.36	71	Yes	Yes		BB
10/11/2019	2	490	1761	1492	0.2	49.0	1760.8	1443.0	PASS	PASS	PASS	PASS	13.73	71	Yes	Yes		BB
10/15/2019	0	449	1701	1518	0.0	44.9	1701.0	1473.1	PASS	PASS	PASS	PASS	9.07	68	Yes	Yes		BB
10/15/2019	3	420	1781	1593	0.3	42.0	1780.7	1551.0	PASS	PASS	PASS	PASS	14.78	66	Yes	Yes		BB
10/16/2019	0	427	1775	1525	0.0	42.7	1775.0	1482.3	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
10/16/2019	1	464	1692	1488	0.1	46.4	1691.9	1441.6	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		BB
10/17/2019	0	425	1760	1559	0.0	42.5	1760.0	1516.5	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
10/17/2019	1	430	1748	1541	0.1	43.0	1747.9	1498.0	PASS	PASS	PASS	PASS	12.36	67	Yes	Yes		BB
10/18/2019	1	448	1686	1459	0.1	44.8	1685.9	1414.2	PASS	PASS	PASS	PASS	12.36	68	Yes	Yes		BB
10/18/2019	0	401	1712	1496	0.0	40.1	1712.0	1455.9	PASS	PASS	PASS	PASS	9.07	65	Yes	Yes		BB
10/21/2019	0	445	1737	1413	0.0	44.5	1737.0	1368.5	PASS	PASS	PASS	QUESTION	9.07	68	Yes	Yes		BB
10/21/2019	0	445	1737	1442	0.0	44.5	1737.0	1397.5	PASS	PASS	PASS	PASS	9.07	68	Yes	Yes		BB
10/21/2019	2	472	1831	1521	0.2	47.2	1830.8	1473.8	PASS	PASS	PASS	PASS	13.73	70	Yes	Yes		BB
10/22/2019	1	471	1691	1510	0.1	47.1	1690.9	1462.9	PASS	PASS	PASS	PASS	12.36	70	Yes	Yes		BB

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2929 SN 155577

43-10-1 SN PR157789

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA (DPM/100cm^2)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.3309	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	20	10	1	0.19	0.13	1767.9	53.07				
Beta	0.3815	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	200	10	1	44.30	3.05	1473.3	49.29				

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
10/22/2019	0	412	1708	1545	0.0	41.2	1708.0	1503.8	PASS	PASS	PASS	PASS	9.07	66	Yes	Yes		BB
10/24/2019	0	434	1721	1501	0.0	43.4	1721.0	1457.6	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
10/24/2019	0	433	1669	1541	0.0	43.3	1669.0	1497.7	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		BB
10/25/2019	0	469	1698	1477	0.0	46.9	1698.0	1430.1	PASS	PASS	PASS	PASS	9.07	70	Yes	Yes		BB
10/25/2019	0	436	1765	1543	0.0	43.6	1765.0	1499.4	PASS	PASS	PASS	PASS	9.07	68	Yes	Yes		BB
10/28/2019	1	417	1698	1506	0.1	41.7	1697.9	1464.3	PASS	PASS	PASS	PASS	12.36	66	Yes	Yes		BB
10/28/2019	0	413	1770	1508	0.0	41.3	1770.0	1466.7	PASS	PASS	PASS	PASS	9.07	66	Yes	Yes		BB
10/30/2019	1	458	1686	1491	0.1	45.8	1685.9	1445.2	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		BB
10/30/2019	1	456	1708	1601	0.1	45.6	1707.9	1555.4	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		BB
11/1/2019	2	478	1711	1582	0.2	47.8	1710.8	1534.2	PASS	PASS	PASS	PASS	13.73	70	Yes	Yes		BB
11/1/2019	1	461	1781	1549	0.1	46.1	1780.9	1502.9	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		BB
11/12/2019	0	408	1728	1460	0.0	40.8	1728.0	1419.2	PASS	PASS	PASS	PASS	9.07	66	Yes	Yes		BB
11/12/2019	1	451	1762	1439	0.1	45.1	1761.9	1393.9	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		BB
11/19/2019	0	431	1768	1435	0.0	43.1	1768.0	1391.9	PASS	PASS	PASS	PASS	9.07	67	Yes	Yes		DL
11/19/2019	1	422	1710	1470	0.1	42.2	1709.9	1427.8	PASS	PASS	PASS	PASS	12.36	67	Yes	Yes		DA
11/20/2019	2	458	1716	1474	0.2	45.8	1715.8	1428.2	PASS	PASS	PASS	PASS	13.73	69	Yes	Yes		DA
11/20/2019	0	447	1688	1468	0.0	44.7	1688.0	1423.3	PASS	PASS	PASS	PASS	9.07	68	Yes	Yes		DA
11/21/2019	1	472	1701	1483	0.1	47.2	1700.9	1435.8	PASS	PASS	PASS	PASS	12.36	70	Yes	Yes		DA
11/21/2019	1	461	1699	1471	0.1	46.1	1698.9	1424.9	PASS	PASS	PASS	PASS	12.36	69	Yes	Yes		DA

HP Technician Signature:

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CABRERA ALPHA-BETA COUNTING INSTRUMENT

(Rev 6)

2929 SN 155577

43-10-1 SN PR157789

Initial Background and Source Counts for Control Chart								
	Initial bkg counts				Initial source plus bkg counts			
#	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm
1	0	0	432	43.2	1646	1646	1593	1593
2	2	0.2	446	44.6	1803	1803	1473	1473
3	3	0.3	455	45.5	1815	1815	1535	1535
4	2	0.2	486	48.6	1742	1742	1505	1505
5	3	0.3	408	40.8	1807	1807	1584	1584
6	2	0.2	410	41	1742	1742	1458	1458
7	1	0.1	470	47	1804	1804	1546	1546
8	4	0.4	414	41.4	1731	1731	1521	1521
9	0	0	487	48.7	1793	1793	1454	1454
10	2	0.2	422	42.2	1798	1798	1507	1507
Mean		0.19		44.3		1768.1		1517.6
$S_{(n-1)}$		0.13		3.05		53.10		48.39
-3 sigma		-0.20		35.14		1608.79		1372.44
+3 sigma		0.58		53.46		1927.41		1662.76
-2 sigma		-0.07		38.20		1661.89		1420.82
+2 sigma		0.45		50.40		1874.31		1614.38
					Mean-bkg	1767.9		1473.3
					$S_{(n-1)}$	53.07		49.29
				Mean-bkg	-3 sigma	1608.70		1325.42
				Mean-bkg	+3 sigma	1927.12		1621.18
				Mean-bkg	-2 sigma	1661.77		1374.71
				Mean-bkg	+2 sigma	1874.05		1571.89

HP Technician Signature:

Supervisor Signature:

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:	Ludlum 2360	Detector:	43-93	Calibration Date:	2/19/2019
Serial #:	184909	Serial #:	PR199841	12 month calibration:	OK
Detector Active Area or Area Covered by Smear (cm^2):	100				

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.1110	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	100	2	2	1.20	0.86	974.2	27.60
Beta	0.0681	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	1000	2	2	146.55	12.26	711.6	23.10

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
8/12/2019	2	287	1949	1711	1.0	143.5	973.5	712.0	PASS	PASS	PASS	PASS	43.15	601	Yes	Yes		BB
8/12/2019	1	293	1922	1772	0.5	146.5	960.5	739.5	PASS	PASS	PASS	PASS	34.47	607	Yes	Yes		BB
8/13/2019	0	303	1913	1786	0.0	151.5	956.5	741.5	PASS	PASS	PASS	PASS	13.51	617	Yes	Yes		BB
8/13/2019	3	297	1995	1717	1.5	148.5	996.0	710.0	PASS	PASS	PASS	PASS	49.81	611	Yes	Yes		BB
8/14/2019	3	331	1973	1740	1.5	165.5	985.0	704.5	PASS	PASS	PASS	PASS	49.81	644	Yes	Yes		BB
8/14/2019	1	299	1955	1732	0.5	149.5	977.0	716.5	PASS	PASS	PASS	PASS	34.47	613	Yes	Yes		BB
8/15/2019	5	322	1907	1789	2.5	161.0	951.0	733.5	PASS	PASS	PASS	PASS	60.38	635	Yes	Yes		BB
8/15/2019	3	278	1895	1754	1.5	139.0	946.0	738.0	PASS	PASS	PASS	PASS	49.81	592	Yes	Yes		BB
8/16/2019	2	298	1922	1789	1.0	149.0	960.0	745.5	PASS	PASS	PASS	PASS	43.15	612	Yes	Yes		BB
8/16/2019	1	311	1890	1823	0.5	155.5	944.5	756.0	PASS	PASS	PASS	PASS	34.47	624	Yes	Yes		BB
8/19/2019	2	283	1871	1691	1.0	141.5	934.5	704.0	PASS	PASS	PASS	PASS	43.15	597	Yes	Yes		BB
8/19/2019	3	266	1854	1690	1.5	133.0	925.5	712.0	PASS	PASS	PASS	PASS	49.81	579	Yes	Yes		BB
8/20/2019	2	252	2003	1691	1.0	126.0	1000.5	719.5	PASS	PASS	PASS	PASS	43.15	564	Yes	Yes		BB
8/20/2019	5	268	1990	1732	2.5	134.0	992.5	732.0	PASS	PASS	PASS	PASS	60.38	581	Yes	Yes		BB
8/21/2019	2	301	1882	1647	1.0	150.5	940.0	673.0	PASS	PASS	PASS	PASS	43.15	615	Yes	Yes		BB
8/21/2019	2	288	1900	1709	1.0	144.0	949.0	710.5	PASS	PASS	PASS	PASS	43.15	602	Yes	Yes		BB
8/22/2019	4	286	1910	1690	2.0	143.0	953.0	702.0	PASS	PASS	PASS	PASS	55.43	600	Yes	Yes		BB
8/22/2019	2	310	1890	1771	1.0	155.0	944.0	730.5	PASS	PASS	PASS	PASS	43.15	623	Yes	Yes		BB
8/26/2019	1	301	1892	1717	0.5	150.5	945.5	708.0	PASS	PASS	PASS	PASS	34.47	615	Yes	Yes		BB
8/26/2019	2	295	1935	1785	1.0	147.5	966.5	745.0	PASS	PASS	PASS	PASS	43.15	609	Yes	Yes		BB
8/27/2019	2	300	1888	1733	1.0	150.0	943.0	716.5	PASS	PASS	PASS	PASS	43.15	614	Yes	Yes		BB
8/27/2019	3	285	1871	1693	1.5	142.5	934.0	704.0	PASS	PASS	PASS	PASS	49.81	599	Yes	Yes		BB
8/28/2019	2	301	1855	1738	1.0	150.5	926.5	718.5	PASS	PASS	PASS	PASS	43.15	615	Yes	Yes		BB
8/28/2019	0	321	1909	1733	0.0	160.5	954.5	706.0	PASS	PASS	PASS	PASS	13.51	634	Yes	Yes		BB
8/29/2019	4	242	1902	1703	2.0	121.0	949.0	730.5	PASS	*QUESTION*	PASS	PASS	55.43	553	Yes	Yes		BB
8/29/2019	4	288	1902	1703	2.0	144.0	949.0	707.5	PASS	PASS	PASS	PASS	55.43	602	Yes	Yes		BB
8/29/2019	2	273	1891	1680	1.0	136.5	944.5	703.5	PASS	PASS	PASS	PASS	43.15	586	Yes	Yes		BB
8/30/2019	2	250	1911	1758	1.0	125.0	954.5	754.0	PASS	PASS	PASS	PASS	43.15	562	Yes	Yes		BB
8/30/2019	1	297	1888	1805	0.5	148.5	943.5	754.0	PASS	PASS	PASS	PASS	34.47	611	Yes	Yes		BB
9/3/2019	4	232	1954	1791	2.0	116.0	975.0	779.5	PASS	*QUESTION*	PASS	*QUESTION*	55.43	542	Yes	Yes		BB
9/3/2019	2	258	1954	1678	1.0	129.0	976.0	710.0	PASS	PASS	PASS	PASS	43.15	571	Yes	Yes		BB
9/3/2019	2	278	1977	1779	1.0	139.0	987.5	750.5	PASS	PASS	PASS	PASS	43.15	592	Yes	Yes		BB
9/4/2019	2	309	1877	1762	1.0	154.5	937.5	726.5	PASS	PASS	PASS	PASS	43.15	623	Yes	Yes		BB
9/4/2019	1	280	1903	1694	0.5	140.0	951.0	707.0	PASS	PASS	PASS	PASS	34.47	594	Yes	Yes		BB
9/9/2019	3	304	1937	1744	1.5	152.0	967.0	720.0	PASS	PASS	PASS	PASS	49.81	618	Yes	Yes		BB
9/9/2019	2	311	2011	1788	1.0	155.5	1004.5	738.5	PASS	PASS	PASS	PASS	43.15	624	Yes	Yes		BB
9/16/2019	2	280	1886	1689	1.0	140.0	942.0	704.5	PASS	PASS	PASS	PASS	43.15	594	Yes	Yes		BB
9/16/2019	2	271	1909	1711	1.0	135.5	953.5	720.0	PASS	PASS	PASS	PASS	43.15	584	Yes	Yes		BB

HP Technician Signature:

Supervisor Signature:

2360 SN 184909

43-93 SN PR199841

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA (DPM/100cm^2)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.1110	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	100	2	2	1.20	0.86	974.2	27.60
Beta	0.0681	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	1000	2	2	146.55	12.26	711.6	23.10

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA α (dpm)	MDA β (dpm)	α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta						
9/18/2019	3	245	1932	1727	1.5	122.5	964.5	741.0	PASS	PASS	PASS	PASS	49.81	557	Yes	Yes		BB
9/18/2019	2	292	1958	1792	1.0	146.0	978.0	750.0	PASS	PASS	PASS	PASS	43.15	606	Yes	Yes		BB
9/19/2019	2	298	1927	1771	1.0	149.0	962.5	736.5	PASS	PASS	PASS	PASS	43.15	612	Yes	Yes		BB
9/19/2019	1	283	1921	1784	0.5	141.5	960.0	750.5	PASS	PASS	PASS	PASS	34.47	597	Yes	Yes		BB
9/27/2019	2	310	1942	1804	1.0	155.0	970.0	747.0	PASS	PASS	PASS	PASS	43.15	623	Yes	Yes		BB
9/27/2019	4	299	1971	1759	2.0	149.5	983.5	730.0	PASS	PASS	PASS	PASS	55.43	613	Yes	Yes		BB
10/1/2019	4	302	1875	1743	2.0	151.0	935.5	720.5	PASS	PASS	PASS	PASS	55.43	616	Yes	Yes		BB
10/1/2019	2	281	1972	1730	1.0	140.5	985.0	724.5	PASS	PASS	PASS	PASS	43.15	595	Yes	Yes		BB
10/2/2019	1	257	1891	1765	0.5	128.5	945.0	754.0	PASS	PASS	PASS	PASS	34.47	570	Yes	Yes		BB
10/2/2019	2	279	1872	1785	1.0	139.5	935.0	753.0	PASS	PASS	PASS	PASS	43.15	593	Yes	Yes		BB
10/7/2019	4	285	1920	1674	2.0	142.5	958.0	694.5	PASS	PASS	PASS	PASS	55.43	599	Yes	Yes		BB
10/7/2019	2	301	1862	1781	1.0	150.5	930.0	740.0	PASS	PASS	PASS	PASS	43.15	615	Yes	Yes		BB
10/8/2019	4	288	1893	1753	2.0	144.0	944.5	732.5	PASS	PASS	PASS	PASS	55.43	602	Yes	Yes		BB
10/8/2019	2	271	1880	1720	1.0	135.5	939.0	724.5	PASS	PASS	PASS	PASS	43.15	584	Yes	Yes		BB
10/24/2019	2	280	1971	1710	1.0	140.0	984.5	715.0	PASS	PASS	PASS	PASS	43.15	594	Yes	Yes		BB
10/24/2019	3	258	1860	1748	1.5	129.0	928.5	745.0	PASS	PASS	PASS	PASS	49.81	571	Yes	Yes		BB
10/25/2019	4	248	1914	1674	2.0	124.0	955.0	713.0	PASS	PASS	PASS	PASS	55.43	560	Yes	Yes		BB
10/25/2019	4	317	1872	1740	2.0	158.5	934.0	711.5	PASS	PASS	PASS	PASS	55.43	630	Yes	Yes		BB
10/30/2019	3	284	1867	1703	1.5	142.0	932.0	709.5	PASS	PASS	PASS	PASS	49.81	598	Yes	Yes		BB
10/30/2019	2	301	1923	1720	1.0	150.5	960.5	709.5	PASS	PASS	PASS	PASS	43.15	615	Yes	Yes		BB
11/19/2019	3	287	1865	1758	1.5	143.5	931.0	735.5	PASS	PASS	PASS	PASS	49.81	601	Yes	Yes		DL
11/19/2019	4	293	1910	1695	2.0	146.5	953.0	701.0	PASS	PASS	PASS	PASS	55.43	607	Yes	Yes		DL
11/20/2019	3	313	1911	1711	1.5	156.5	954.0	699.0	PASS	PASS	PASS	PASS	49.81	626	Yes	Yes		DA
11/20/2019	4	291	1861	1652	2.0	145.5	928.5	680.5	PASS	PASS	PASS	PASS	55.43	605	Yes	Yes		DA
11/21/2019	0	329	1892	1832	0.0	164.5	946.0	751.5	PASS	PASS	PASS	PASS	13.51	642	Yes	Yes		DA
11/21/2019	1	315	1881	1809	0.5	157.5	940.0	747.0	PASS	PASS	PASS	PASS	34.47	628	Yes	Yes		DA

HP Technician Signature:

Supervisor Signature:

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

2360 SN 184909
43-93 SN PR199841

Initial Background and Source Counts for Control Chart								
	Initial bkg counts				Initial source plus bkg counts			
#	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm
1	0	0	279	139.5	1953	976.5	1712	856
2	4	2	266	133	1862	931	1667	833.5
3	3	1.5	339	169.5	1985	992.5	1779	889.5
4	2	1	336	168	1902	951	1668	834
5	1	0.5	293	146.5	1980	990	1719	859.5
6	4	2	277	138.5	2036	1018	1721	860.5
7	3	1.5	285	142.5	1937	968.5	1802	901
8	0	0	287	143.5	1985	992.5	1717	858.5
9	5	2.5	281	140.5	1882	941	1690	845
10	2	1	288	144	1985	992.5	1688	844
Mean		1.20		146.6		975.4		858.2
$S_{(n-1)}$		0.86		12.26		27.29		22.10
-3 sigma		-1.37		109.76		893.47		791.86
+3 sigma		3.77		183.34		1057.23		924.44
-2 sigma		-0.51		122.02		920.76		813.95
+2 sigma		2.91		171.08		1029.94		902.35
					Mean-bkg	974.2		711.6
					$S_{(n-1)}$	27.60		23.10
				Mean-bkg	-3 sigma	891.34		642.29
				Mean-bkg	+3 sigma	1056.96		780.91
				Mean-bkg	-2 sigma	918.94		665.40
				Mean-bkg	+2 sigma	1029.36		757.80

HP Technician Signature:
Supervisor Signature:

Counting Instrument:	Ludlum 2360	Detector:	43-37	Calibration Date:	8/15/2019
Serial #:	278586	Serial #:	PR178371	12 month calibration:	OK

Detector Active Area or Area Covered by Smear (cm^2): 582

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.2690	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	100	2	2	2.80	1.38	678.9	38.84
Beta	0.1903	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	1000	2	2	589.30	27.44	1076.6	47.77

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
8/16/2019	4	1155	1381	3301	2.0	577.5	688.5	1073.0	PASS	PASS	PASS	PASS	3.93	73	Yes	Yes		BB
8/19/2019	6	1095	1330	3296	3.0	547.5	662.0	1100.5	PASS	PASS	PASS	PASS	4.60	71	Yes	Yes		BB
8/19/2019	5	1162	1369	3263	2.5	581.0	682.0	1050.5	PASS	PASS	PASS	PASS	4.28	73	Yes	Yes		BB
8/20/2019	4	1001	1396	3216	2.0	500.5	696.0	1107.5	PASS	PASS	PASS	PASS	3.93	68	Yes	Yes		BB
8/20/2019	4	1129	1396	3216	2.0	564.5	696.0	1043.5	PASS	PASS	PASS	PASS	3.93	72	Yes	Yes		BB
8/20/2019	8	1092	1406	3319	4.0	546.0	699.0	1113.5	PASS	PASS	PASS	PASS	5.16	71	Yes	Yes		BB
8/21/2019	3	1095	1555	3309	1.5	547.5	776.0	1107.0	PASS	PASS	PASS	PASS	3.53	71	Yes	Yes		BB
8/21/2019	8	1155	1490	3300	4.0	577.5	741.0	1072.5	PASS	PASS	PASS	PASS	5.16	73	Yes	Yes		BB
8/22/2019	3	1085	1357	3294	1.5	542.5	677.0	1104.5	PASS	PASS	PASS	PASS	3.53	71	Yes	Yes		BB
8/22/2019	10	1263	1542	3378	5.0	631.5	766.0	1057.5	PASS	PASS	PASS	PASS	5.66	76	Yes	Yes		BB
8/23/2019	7	1193	1511	3391	3.5	596.5	752.0	1099.0	PASS	PASS	PASS	PASS	4.89	74	Yes	Yes		BB
8/23/2019	12	1263	1539	3379	6.0	631.5	763.5	1058.0	PASS	PASS	PASS	PASS	6.11	76	Yes	Yes		BB
8/23/2019	8	1263	1539	3379	4.0	631.5	765.5	1058.0	PASS	PASS	PASS	PASS	5.16	76	Yes	Yes		BB
8/26/2019	4	1124	1495	3325	2.0	562.0	745.5	1100.5	PASS	PASS	PASS	PASS	3.93	72	Yes	Yes		BB
8/26/2019	8	1167	1388	3384	4.0	583.5	690.0	1108.5	PASS	PASS	PASS	PASS	5.16	73	Yes	Yes		BB
8/27/2019	5	1099	1532	3256	2.5	549.5	763.5	1078.5	PASS	PASS	PASS	PASS	4.28	71	Yes	Yes		BB
8/27/2019	6	1236	1466	3478	3.0	618.0	730.0	1121.0	PASS	PASS	PASS	PASS	4.60	75	Yes	Yes		BB
8/28/2019	7	1090	1462	3302	3.5	545.0	727.5	1106.0	PASS	PASS	PASS	PASS	4.89	71	Yes	Yes		BB
8/28/2019	14	1119	1384	3313	7.0	559.5	685.0	1097.0	PASS	PASS	PASS	PASS	6.52	72	Yes	Yes		BB
8/28/2019	9	1119	1384	3313	4.5	559.5	687.5	1097.0	PASS	PASS	PASS	PASS	5.42	72	Yes	Yes		BB
8/29/2019	4	1076	1524	3281	2.0	538.0	760.0	1102.5	PASS	PASS	PASS	PASS	3.93	70	Yes	Yes		BB
8/29/2019	8	1273	1429	3067	4.0	636.5	710.5	897.0	PASS	PASS	PASS	PASS	5.16	76	Yes	Yes		BB
8/29/2019	8	1273	1429	3365	4.0	636.5	710.5	1046.0	PASS	PASS	PASS	PASS	5.16	76	Yes	Yes		BB
8/30/2019	3	1071	1417	3361	1.5	535.5	707.0	1145.0	PASS	PASS	PASS	PASS	3.53	70	Yes	Yes		BB
8/30/2019	5	1185	1440	3236	2.5	592.5	717.5	1025.5	PASS	PASS	PASS	PASS	4.28	74	Yes	Yes		BB
9/3/2019	5	1116	1505	3211	2.5	558.0	750.0	1047.5	PASS	PASS	PASS	PASS	4.28	72	Yes	Yes		BB
9/3/2019	11	1178	1482	3365	5.5	589.0	735.5	1093.5	PASS	PASS	PASS	PASS	5.89	73	Yes	Yes		BB
9/4/2019	7	1088	1545	3291	3.5	544.0	769.0	1101.5	PASS	PASS	PASS	PASS	4.89	71	Yes	Yes		BB
9/4/2019	13	1281	1395	3291	6.5	640.5	691.0	1005.0	PASS	PASS	PASS	PASS	6.32	77	Yes	Yes		BB
9/4/2019	10	1281	1395	3291	5.0	640.5	692.5	1005.0	PASS	PASS	PASS	PASS	5.66	77	Yes	Yes		BB
9/5/2019	8	1157	1544	3186	4.0	578.5	768.0	1014.5	PASS	PASS	PASS	PASS	5.16	73	Yes	Yes		DA/DL
9/5/2019	9	1281	1533	3320	4.5	640.5	762.0	1019.5	PASS	PASS	PASS	PASS	5.42	77	Yes	Yes		DA/DL
9/6/2019	5	1079	1538	3219	2.5	539.5	766.5	1070.0	PASS	PASS	PASS	PASS	4.28	70	Yes	Yes		DA/DL
9/6/2019	8	1238	1517	3306	4.0	619.0	754.5	1034.0	PASS	PASS	PASS	PASS	5.16	75	Yes	Yes		DA/DL
9/9/2019	7	1068	1484	3150	3.5	534.0	738.5	1041.0	PASS	PASS	PASS	PASS	4.89	70	Yes	Yes		DA/DL
9/9/2019	7	1260	1329	3306	3.5	630.0	661.0	1023.0	PASS	PASS	PASS	PASS	4.89	76	Yes	Yes		DA/DL
9/10/2019	8	1075	1525	3221	4.0	537.5	758.5	1073.0	PASS	PASS	PASS	PASS	5.16	70	Yes	Yes		DA/DL
9/10/2019	12	1259	1516	3392	6.0	629.5	752.0	1066.5	PASS	PASS	PASS	PASS	6.11	76	Yes	Yes		DA/DL
9/11/2019	14	1050	1431	3360	7.0	525.0	708.5	1155.0	PASS	PASS	PASS	PASS	6.52	69	Yes	Yes		DA/DL
9/12/2019	4	1280	1523	3450	2.0	640.0	759.5	1085.0	PASS	PASS	PASS	PASS	3.93	77	Yes	Yes		BB
9/12/2019	6	1335	1483	3402	3.0	667.5	738.5	1033.5	PASS	PASS	PASS	PASS	4.60	78	Yes	Yes		BB
9/12/2019	7	1344	1551	3513	3.5	672.0	772.0	1084.5	PASS	PASS	PASS	PASS	4.89	78	Yes	Yes		BB

HP Technician Signature:

Supervisor Signature:

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Initial Background and Source Counts for Control Chart								
	Initial bkg counts				Initial source plus bkg counts			
#	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm
1	5.00	2.5	1149.00	574.5	1415	707.5	3393	1696.5
2	10.00	5	1221.00	610.5	1363	681.5	3426	1713
3	4.00	2	1209.00	604.5	1357	678.5	3394	1697
4	2.00	1	1067.00	533.5	1088	544	3287	1643.5
5	9.00	4.5	1221.00	610.5	1422	711	3293	1646.5
6	9.00	4.5	1191.00	595.5	1390	695	3334	1667
7	5.00	2.5	1184.00	592	1417	708.5	3248	1624
8	3.00	1.5	1259.00	629.5	1453	726.5	3292	1646
9	4.00	2	1143.00	571.5	1389	694.5	3424	1712
10	5.00	2.5	1142.00	571	1339	669.5	3226	1613
Mean	5.60	2.80	1178.60	589.3	1363.3	681.7	3331.7	1665.9
$S_{(n-1)}$		1.38		27.44		51.33		36.63
Zero		0.00		400.00	-20%	545.32		1332.68
Control		70.00		15000.00	+20%	817.98		1999.02
Zero		0.00		500.00	-19%	552.14		1349.34
Warning		10.00		700.00	+19%	811.16		1982.36
					Mean-bkg	678.9		1076.6
					$S_{(n-1)}$	38.84		47.77
				Mean-bkg	-20%	543.08		861.24
				Mean-bkg	+20%	814.62		1291.86
				Mean-bkg	-19%	549.87		872.01
				Mean-bkg	+19%	807.83		1281.09

HP Technician Signature:

Supervisor Signature:

Counting Instrument:	Ludlum 2360	Detector:	43-37	Calibration Date:	3/4/2019
Serial #:	215271	Serial #:	PR216984	12 month calibration:	OK

Detector Active Area or Area Covered by Smear (cm^2): 582

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA (DPM/100cm^2)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.0740	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	100	2	2	2.60	0.91	824.3	20.79
Beta	0.1918	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	1000	2	2	502.35	25.80	1044.5	53.19

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
8/13/2019	5	1006	1643	3087	2.5	503.0	819.0	1040.5	PASS	PASS	PASS	PASS	15.56	67	Yes	Yes		BB
8/13/2019	3	930	1688	3186	1.5	465.0	842.5	1128.0	PASS	PASS	PASS	PASS	12.84	65	Yes	Yes		BB
8/14/2019	4	917	1655	2945	2.0	458.5	825.5	1014.0	PASS	PASS	PASS	PASS	14.29	64	Yes	Yes		DL
8/14/2019	3	932	1702	3011	1.5	466.0	849.5	1039.5	PASS	PASS	PASS	PASS	12.84	65	Yes	Yes		DL
8/15/2019	5	941	1579	2992	2.5	470.5	787.0	1025.5	PASS	PASS	PASS	PASS	15.56	65	Yes	Yes		BB
8/15/2019	4	939	1679	2985	2.0	469.5	837.5	1023.0	PASS	PASS	PASS	PASS	14.29	65	Yes	Yes		BB
8/16/2019	7	940	1502	3117	3.5	470.0	747.5	1088.5	PASS	PASS	PASS	PASS	17.77	65	Yes	Yes		BB
8/16/2019	7	940	1622	3117	3.5	470.0	807.5	1088.5	PASS	PASS	PASS	PASS	17.77	65	Yes	Yes		BB
8/16/2019	7	940	1679	3211	3.5	470.0	836.0	1135.5	PASS	PASS	PASS	PASS	17.77	65	Yes	Yes		BB
8/19/2019	4	911	1611	3054	2.0	455.5	803.5	1071.5	PASS	PASS	PASS	PASS	14.29	64	Yes	Yes		BB
8/19/2019	5	930	1604	3124	2.5	465.0	799.5	1097.0	PASS	PASS	PASS	PASS	15.56	65	Yes	Yes		BB
8/20/2019	3	961	1596	3009	1.5	480.5	796.5	1024.0	PASS	PASS	PASS	PASS	12.84	66	Yes	Yes		BB
8/20/2019	6	970	1597	3069	3.0	485.0	795.5	1049.5	PASS	PASS	PASS	PASS	16.71	66	Yes	Yes		BB
8/21/2019	7	945	1658	2981	3.5	472.5	825.5	1018.0	PASS	PASS	PASS	PASS	17.77	65	Yes	Yes		BB
8/21/2019	7	1038	1621	3156	3.5	519.0	807.0	1059.0	PASS	PASS	PASS	PASS	17.77	68	Yes	Yes		BB
8/22/2019	4	945	1706	2999	2.0	472.5	851.0	1027.0	PASS	PASS	PASS	PASS	14.29	65	Yes	Yes		BB
8/22/2019	7	956	1587	3194	3.5	478.0	790.0	1119.0	PASS	PASS	PASS	PASS	17.77	66	Yes	Yes		BB
8/23/2019	4	957	1631	3046	2.0	478.5	813.5	1044.5	PASS	PASS	PASS	PASS	14.29	66	Yes	Yes		BB
8/23/2019	6	1095	1582	3197	3.0	547.5	788.0	1051.0	PASS	PASS	PASS	PASS	16.71	70	Yes	Yes		BB
8/26/2019	7	939	1596	3040	3.5	469.5	794.5	1050.5	PASS	PASS	PASS	PASS	17.77	65	Yes	Yes		BB
8/26/2019	6	1204	1581	3162	3.0	602.0	787.5	979.0	PASS	PASS	PASS	PASS	16.71	74	Yes	Yes		BB
8/26/2019	6	1081	1581	3162	3.0	540.5	787.5	1040.5	PASS	PASS	PASS	PASS	16.71	70	Yes	Yes		BB
8/27/2019	8	956	1586	3023	4.0	478.0	789.0	1033.5	PASS	PASS	PASS	PASS	18.76	66	Yes	Yes		BB
8/27/2019	6	1092	1624	3158	3.0	546.0	809.0	1033.0	PASS	PASS	PASS	PASS	16.71	70	Yes	Yes		BB
8/28/2019	8	906	1634	2981	4.0	453.0	813.0	1037.5	PASS	PASS	PASS	PASS	18.76	64	Yes	Yes		BB
8/28/2019	17	1023	1633	3182	8.5	511.5	808.0	1079.5	PASS	PASS	PASS	PASS	25.75	68	Yes	Yes		BB
8/29/2019	5	963	1579	3057	2.5	481.5	787.0	1047.0	PASS	PASS	PASS	PASS	15.56	66	Yes	Yes		BB
8/29/2019	6	1013	1598	3301	3.0	506.5	796.0	1144.0	PASS	PASS	PASS	PASS	16.71	68	Yes	Yes		BB
8/30/2019	3	912	1579	2976	1.5	456.0	788.0	1032.0	PASS	PASS	PASS	PASS	12.84	64	Yes	Yes		BB
8/30/2019	3	1071	1610	3171	1.5	535.5	803.5	1050.0	PASS	PASS	PASS	PASS	12.84	70	Yes	Yes		BB
9/3/2019	7	931	1627	2989	3.5	465.5	810.0	1029.0	PASS	PASS	PASS	PASS	17.77	65	Yes	Yes		BB
9/3/2019	8	1098	1658	3197	4.0	549.0	825.0	1049.5	PASS	PASS	PASS	PASS	18.76	70	Yes	Yes		BB
9/4/2019	3	934	1650	3082	1.5	467.0	823.5	1074.0	PASS	PASS	PASS	PASS	12.84	65	Yes	Yes		BB
9/4/2019	21	1139	1576	3146	10.5	569.5	777.5	1003.5	QUESTION	PASS	PASS	PASS	28.24	72	Yes	Yes		BB
9/4/2019	8	1055	1576	3146	4.0	527.5	784.0	1045.5	PASS	PASS	PASS	PASS	18.76	69	Yes	Yes		BB
9/5/2019	4	936	1527	3004	2.0	468.0	761.5	1034.0	PASS	PASS	PASS	PASS	14.29	65	Yes	Yes		DA/DL
9/5/2019	7	998	1362	3039	3.5	499.0	677.5	1020.5	PASS	PASS	PASS	PASS	17.77	67	Yes	Yes		DA/DL
9/6/2019	5	915	1532	3205	2.5	457.5	763.5	1145.0	PASS	PASS	PASS	PASS	15.56	64	Yes	Yes		DA/DL
9/6/2019	9	1097	1684	3142	4.5	548.5	837.5	1022.5	PASS	PASS	PASS	PASS	19.69	70	Yes	Yes		DA/DL
9/9/2019	5	1055	1670	3022	2.5	527.5	832.5	983.5	PASS	PASS	PASS	PASS	15.56	69	Yes	Yes		DA/DL
9/9/2019	11	1077	1653	3177	5.5	538.5	821.0	1050.0	PASS	PASS	PASS	PASS	21.40	70	Yes	Yes		DA/DL
9/10/2019	2	946	1457	2989	1.0	473.0	727.5	1021.5	PASS	PASS	PASS	PASS	11.12	65	Yes	Yes		DA/DL
9/10/2019	16	996	1529	3070	8.0	498.0	756.5	1037.0	PASS	PASS	PASS	PASS	25.09	67	Yes	Yes		DA/DL
9/11/2019	3	1029	1549	3009	1.5	514.5	773.0	990.0	PASS	PASS	PASS	PASS	12.84	68	Yes	Yes		DA/DL
9/11/2019	19	1063	1601	3218	9.5	531.5	791.0	1077.5	PASS	PASS	PASS	PASS	27.03	69	Yes	Yes		DA/DL
9/12/2019	5	1002	1415	3066	2.5	501.0	705.0	1032.0	PASS	PASS	PASS	PASS	15.56	67	Yes	Yes		DA/DL
9/12/2019	7	1287	1703	3103	3.5	643.5	848.0	908.0	PASS	PASS	PASS	PASS	17.77	76	Yes	Yes		DA/DL
9/13/2019	10	995	1547	3228	5.0	497.5	768.5	1116.5	PASS	PASS	PASS	PASS	20.56	67	Yes	Yes		DA/DL
9/13/2019	16	1238	1652	3268	8.0	619.0	818.0	1015.0	PASS	PASS	PASS	PASS	25.09	75	Yes	Yes		DA/DL
9/16/2019	6	952	1461	3222	3.0	476.0	727.5	1135.0	PASS	PASS	PASS	PASS	16.71	66	Yes	Yes		DA/DL
9/16/2019	10	1050	1521	3134	5.0	525.0	755.5	1042.0	PASS	PASS	PASS	PASS	20.56	69	Yes	Yes		DA/DL
9/17/2019	7	952	1383	2892	3.5	476.0	688.0	970.0	PASS	PASS	PASS	PASS	17.77	66	Yes	Yes		DA/DL
9/17/2019	18	1092	1399	3202	9.0	546.0	690.5	1055.0	PASS	PASS	PASS	PASS	26.40	70	Yes	Yes		DA/DL
9/18/2019	13	955	1695	3315	6.5	477.5	841.0	1180.0	PASS	PASS	PASS	PASS	22.96	66	Yes	Yes		DA/DL

HP Technician Signature:

Supervisor Signature:

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9/18/2019	11	1035	1465	3053	5.5	517.5	727.0	1009.0	PASS	PASS	PASS	PASS	21.40	68	Yes	Yes		DA/DL
9/19/2019	3	983	1457	2877	1.5	491.5	727.0	947.0	PASS	PASS	PASS	PASS	12.84	67	Yes	Yes		DA/DL
9/19/2019	17	892	1575	2879	8.5	446.0	779.0	993.5	PASS	PASS	PASS	PASS	25.75	64	Yes	Yes		DA/DL
9/20/2019	3	928	1749	2889	1.5	464.0	873.0	980.5	PASS	PASS	PASS	PASS	12.84	65	Yes	Yes		DA/DL
9/20/2019	15	1119	1420	3035	7.5	559.5	702.5	958.0	PASS	PASS	PASS	PASS	24.40	71	Yes	Yes		DA/DL
9/23/2019	8	971	1392	2990	4.0	485.5	692.0	1009.5	PASS	PASS	PASS	PASS	18.76	66	Yes	Yes		SH
9/23/2019	17	1131	1598	3196	8.5	565.5	790.5	1032.5	PASS	PASS	PASS	PASS	25.75	71	Yes	Yes		SH
9/24/2019	7	1110	1440	2903	3.5	555.0	716.5	896.5	PASS	PASS	PASS	PASS	17.77	71	Yes	Yes		SH
9/24/2019	31	1177	1436	3195	15.5	588.5	702.5	1009.0	QUESTION	PASS	PASS	PASS	33.56	73	Yes	Yes		SH
9/25/2019	8	982	1582	3136	4.0	491.0	787.0	1077.0	PASS	PASS	PASS	PASS	18.76	67	Yes	Yes		SH
9/25/2019	20	1266	1808	3315	10.0	633.0	894.0	1024.5	PASS	PASS	PASS	PASS	27.64	76	Yes	Yes		SH
9/26/2019	11	1114	1414	3064	5.5	557.0	701.5	975.0	PASS	PASS	PASS	PASS	21.40	71	Yes	Yes		DA/DL
9/26/2019	13	1136	1456	3111	6.5	568.0	721.5	987.5	PASS	PASS	PASS	PASS	22.96	72	Yes	Yes		DA/DL
9/27/2019	7	1243	1569	2950	3.5	621.5	781.0	853.5	PASS	PASS	PASS	PASS	17.77	75	Yes	Yes		DA/DL
9/27/2019	20	1013	1376	3045	10.0	506.5	678.0	1016.0	PASS	PASS	PASS	PASS	27.64	68	Yes	Yes		DA/DL
9/30/2019	5	867	1530	2894	2.5	433.5	762.5	1013.5	PASS	PASS	PASS	PASS	15.56	63	Yes	Yes		DA/DL
9/30/2019	20	1031	1480	3015	10.0	515.5	730.0	992.0	PASS	PASS	PASS	PASS	27.64	68	Yes	Yes		DA/DL
10/1/2019	7	874	1430	2769	3.5	437.0	711.5	947.5	PASS	PASS	PASS	PASS	17.77	63	Yes	Yes		DA/DL
10/1/2019	6	862	1463	2879	3.0	431.0	728.5	1008.5	PASS	PASS	PASS	PASS	16.71	63	Yes	Yes		DA/DL
10/2/2019	5	862	1472	2779	2.5	431.0	733.5	958.5	PASS	PASS	PASS	PASS	15.56	63	Yes	Yes		DA/DL
10/2/2019	16	1049	1439	2960	8.0	524.5	711.5	955.5	PASS	PASS	PASS	PASS	25.09	69	Yes	Yes		DA/DL
10/3/2019	4	852	1451	2894	2.0	426.0	723.5	1021.0	PASS	PASS	PASS	PASS	14.29	62	Yes	Yes		DA/DL
10/3/2019	17	913	1448	2716	8.5	456.5	715.5	901.5	PASS	PASS	PASS	PASS	25.75	64	Yes	Yes		DA/DL
10/4/2019	10	848	1418	2757	5.0	424.0	704.0	954.5	PASS	PASS	PASS	PASS	20.56	62	Yes	Yes		DA/DL
10/4/2019	20	1009	1478	2821	10.0	504.5	729.0	906.0	PASS	PASS	PASS	PASS	27.64	68	Yes	Yes		DA/DL
10/7/2019	5	815	1380	2951	2.5	407.5	687.5	1068.0	PASS	PASS	PASS	PASS	15.56	61	Yes	Yes		DA/DL
10/7/2019	20	1011	1440	2858	10.0	505.5	710.0	923.5	PASS	PASS	PASS	PASS	27.64	68	Yes	Yes		DA/DL
10/8/2019	2	864	1368	2865	1.0	432.0	683.0	1000.5	PASS	PASS	PASS	PASS	11.12	63	Yes	Yes		DA/DL
10/8/2019	9	908	1506	2724	4.5	454.0	748.5	908.0	PASS	PASS	PASS	PASS	19.69	64	Yes	Yes		DA/DL
10/9/2019	5	931	1373	2708	2.5	465.5	684.0	888.5	PASS	PASS	PASS	PASS	15.56	65	Yes	Yes		DA/DL
10/9/2019	8	946	1431	2860	4.0	473.0	711.5	957.0	PASS	PASS	PASS	PASS	18.76	65	Yes	Yes		DA/DL
10/10/2019	4	975	1622	2917	2.0	487.5	809.0	971.0	PASS	PASS	PASS	PASS	14.29	66	Yes	Yes		DA/DL
10/10/2019	18	1063	1506	3197	9.0	531.5	744.0	1067.0	PASS	PASS	PASS	PASS	26.40	69	Yes	Yes		DA/DL
10/11/2019	5	973	1357	2783	2.5	486.5	676.0	905.0	PASS	PASS	PASS	PASS	15.56	66	Yes	Yes		DA/DL
10/11/2019	10	1101	1451	2884	5.0	550.5	720.5	891.5	PASS	PASS	PASS	PASS	20.56	71	Yes	Yes		BB
10/15/2019	6	837	1332	2868	3.0	418.5	663.0	1015.5	PASS	PASS	QUESTION	PASS	16.71	62	Yes	Yes		DA/DL
10/15/2019	6	837	1395	2868	3.0	418.5	694.5	1015.5	PASS	PASS	PASS	PASS	16.71	62	Yes	Yes		DA/DL
10/15/2019	6	969	1440	3068	3.0	484.5	717.0	1049.5	PASS	PASS	PASS	PASS	16.71	66	Yes	Yes		DA/DL
10/16/2019	6	927	1388	2770	3.0	463.5	691.0	921.5	PASS	PASS	PASS	PASS	16.71	65	Yes	Yes		DA/DL
10/16/2019	12	878	1450	2842	6.0	439.0	719.0	982.0	PASS	PASS	PASS	PASS	22.19	63	Yes	Yes		DA/DL
10/18/2019	10	885	1457	2899	5.0	442.5	723.5	1007.0	PASS	PASS	PASS	PASS	20.56	63	Yes	Yes		DA/DL
10/18/2019	13	915	1390	2884	6.5	457.5	688.5	984.5	PASS	PASS	PASS	PASS	22.96	64	Yes	Yes		DA/DL
10/21/2019	5	821	1400	2923	2.5	410.5	697.5	1051.0	PASS	PASS	PASS	PASS	15.56	61	Yes	Yes		DA/DL
10/21/2019	3	998	1488	2977	1.5	499.0	742.5	989.5	PASS	PASS	PASS	PASS	12.84	67	Yes	Yes		DA/DL
10/22/2019	3	855	1392	2926	1.5	427.5	694.5	1035.5	PASS	PASS	PASS	PASS	12.84	62	Yes	Yes		DA/DL
10/22/2019	11	1118	1421	2999	5.5	559.0	705.0	940.5	PASS	PASS	PASS	PASS	21.40	71	Yes	Yes		DA/DL
10/23/2019	3	952	1357	2874	1.5	476.0	677.0	961.0	PASS	PASS	PASS	PASS	12.84	66	Yes	Yes		DA/DL
10/23/2019	9	1091	1390	3022	4.5	545.5	690.5	965.5	PASS	PASS	PASS	PASS	19.69	70	Yes	Yes		DA/DL
10/24/2019	5	961	1401	2821	2.5	480.5	698.0	930.0	PASS	PASS	PASS	PASS	15.56	66	Yes	Yes		DA/DL
10/24/2019	7	1010	1545	3041	3.5	505.0	769.0	1015.5	PASS	PASS	PASS	PASS	17.77	68	Yes	Yes		DA/DL
10/25/2019	5	897	1383	2786	2.5	448.5	689.0	944.5	PASS	PASS	PASS	PASS	15.56	64	Yes	Yes		DA/DL
10/25/2019	8	932	1453	2992	4.0	466.0	722.5	1030.0	PASS	PASS	PASS	PASS	18.76	65	Yes	Yes		DA/DL
10/29/2019	9	841	1363	2838	4.5	420.5	677.0	998.5	PASS	PASS	PASS	PASS	19.69	62	Yes	Yes		DA/DL
10/29/2019	8	886	1519	2821	4.0	443.0	755.5	967.5	PASS	PASS	PASS	PASS	18.76	63	Yes	Yes		DA/DL
10/30/2019	5	843	1399	2617	2.5	421.5	697.0	887.0	PASS	PASS	PASS	PASS	15.56	62	Yes	Yes		DA/DL
10/30/2019	15	1017	1648	3000	7.5	508.5	816.5	991.5	PASS	PASS	PASS	PASS	24.40	68	Yes	Yes		DA/DL
10/31/2019	8	801	1477	2887	4.0	400.5	734.5	1043.0	PASS	PASS	PASS	PASS	18.76	60	Yes	Yes		DA/DL
10/31/2019	12	950	1422	2679	6.0	475.0	705.0	864.5	PASS	PASS	PASS	PASS	22.19	66	Yes	Yes		DA/DL
11/1/2019	10	812	1330	2650	5.0	406.0	660.0	919.0	PASS	PASS	QUESTION	PASS	20.56	61	Yes	Yes		DA/DL
11/1/2019	10	812	1444	2650	5.0	406.0	717.0	919.0	PASS	PASS	PASS	PASS	20.56	61	Yes	Yes		DA/DL
11/1/2019	20	1037	1390	2979	10.0	518.5	685.0	971.0	PASS	PASS	PASS	PASS	27.64	68	Yes	Yes		JF
11/4/2019	5	902	1383	2673	2.5	451.0	689.0	885.5	PASS	PASS	PASS	PASS	15.56	64	Yes	Yes		DA/PK
11/4/2019	17	935	1394	2954	8.5	467.5	688.5	1009.5	PASS	PASS	PASS	PASS	25.75	65	Yes	Yes		DA/PK
11/5/2019	7	830	1386	2656	3.5	415.0	689.5	913.0	PASS	PASS	PASS	PASS	17.77	61	Yes	Yes		DA/PK
11/5/2019	20	834	1359	2610	10.0	417.0	669.5	888.0	PASS	PASS	PASS	PASS	27.64	62	Yes	Yes		DA/PK
11/6/2019	2	883	1341	2760	1.0	441.5	669.5	938.5	PASS	PASS	PASS	PASS	11.12	63	Yes	Yes		DA/PK
11/6/2019	15	800	1443	2757	7.5	400.0	714.0	978.5	PASS	PASS	PASS	PASS	24.40	60	Yes	Yes		DA/PK
11/7/2019	3	848	1536	2710	1.5	424.0	766.5	931.0	PASS	PASS	PASS	PASS	12.84	62	Yes	Yes		DA/PK
11/7/2019	19	827	1674	2902	9.5	413.5	827.5	1037.5	PASS	PASS	PASS	PASS	27.03	61	Yes	Yes		DA/PK

HP Technician Signature:

Supervisor Signature:

2360 SN 215271
43-37 SN PR216984

Initial Background and Source Counts for Control Chart								
	Initial bkg counts				Initial source plus bkg counts			
#	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm
1	6.00	3	959.00	479.5	1683	841.5	3059	1529.5
2	7.00	3.5	961.00	480.5	1646	823	3150	1575
3	6.00	3	1049.00	524.5	1632	816	3089	1544.5
4	6.00	3	1070.00	535	1668	834	3004	1502
5	3.00	1.5	999.00	499.5	1640	820	3089	1544.5
6	6.00	3	905.00	452.5	1693	846.5	3219	1609.5
7	3.00	1.5	1044.00	522	1664	832	3139	1569.5
8	8.00	4	993.00	496.5	1563	781.5	3037	1518.5
9	3.00	1.5	1019.00	509.5	1639	819.5	3125	1562.5
10	4.00	2	1048.00	524	1710	855	3026	1513
Mean	5.20	2.60	1004.7	502.4		826.9		1546.9
$S_{(n-1)}$		0.91		25.80		20.44		32.91
Zero		0.00		350.00	-20%	661.52		1237.48
99% CV		70.00		15000.00	+20%	992.28		1856.22
Zero		0.00		400.00	-19%	669.79		1252.95
95% CV		10.00		700.00	+19%	984.01		1840.75
					Mean-bkg	824.3		1044.5
					$S_{(n-1)}$	20.79		53.19
				Mean-bkg	-20%	659.44		835.60
				Mean-bkg	+20%	989.16		1253.40
				Mean-bkg	-19%	667.68		846.05
				Mean-bkg	+19%	980.92		1242.96

HP Technician Signature:

Supervisor Signature:

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			Ludlum 2360		Detector:	43-37		Calibration Date:		8/22/2020								
Serial #:			184920		Serial #:	PR216983		12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm^2):						582												
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.0750	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	100	2	2	3.05	0.80	861.3	30.63				
Beta	0.1980	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	1000	2	2	589.65	48.57	1074.5	52.20				

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
8/26/2019	5	1123	1732	3357	2.5	561.5	863.5	1117.0	PASS	PASS	PASS	PASS	15.35	69	Yes	Yes		LC
8/26/2019	4	1122	1710	3367	2.0	561.0	853.0	1122.5	PASS	PASS	PASS	PASS	14.10	69	Yes	Yes		LC
8/27/2019	4	1083	1744	3256	2.0	541.5	870.0	1086.5	PASS	PASS	PASS	PASS	14.10	68	Yes	Yes		LC
8/27/2019	7	1109	1733	3368	3.5	554.5	863.0	1129.5	PASS	PASS	PASS	PASS	17.54	69	Yes	Yes		LC/BB
8/28/2019	6	1069	1541	3238	3.0	534.5	767.5	1084.5	PASS	PASS	FAIL	PASS	16.49	67	Yes	Yes		LC
8/28/2019	6	1069	1699	3238	3.0	534.5	846.5	1084.5	PASS	PASS	PASS	PASS	16.49	67	Yes	Yes		LC
8/28/2019	9	1313	1674	3318	4.5	656.5	832.5	1002.5	PASS	PASS	PASS	PASS	19.43	74	Yes	Yes		LC
8/29/2019	3	1152	1687	3327	1.5	576.0	842.0	1087.5	PASS	PASS	PASS	PASS	12.67	70	Yes	Yes		BB
8/29/2019	9	1042	1648	3150	4.5	521.0	819.5	1054.0	PASS	PASS	PASS	PASS	19.43	66	Yes	Yes		BB
8/30/2019	9	1193	1648	3252	4.5	596.5	819.5	1029.5	PASS	PASS	PASS	PASS	19.43	71	Yes	Yes		BB
8/30/2019	7	1136	1644	3268	3.5	568.0	818.5	1066.0	PASS	PASS	PASS	PASS	17.54	69	Yes	Yes		BB

HP Technician Signature:

Supervisor Signature:

2360 SN 184920
43-37 SN PR216983

Initial Background and Source Counts for Control Chart								
	Initial bkg counts				Initial source plus bkg counts			
#	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm
1	5.00	2.5	1131.00	565.5	1672	836	3230	1615
2	5.00	2.5	1127.00	563.5	1604	802	3322	1661
3	8.00	4	1320.00	660	1742	871	3316	1658
4	7.00	3.5	1143.00	571.5	1782	891	3325	1662.5
5	5.00	2.5	1069.00	534.5	1788	894	3351	1675.5
6	7.00	3.5	1139.00	569.5	1699	849.5	3403	1701.5
7	7.00	3.5	1146.00	573	1773	886.5	3372	1686
8	3.00	1.5	1210.00	605	1750	875	3318	1659
9	6.00	3	1128.00	564	1686	843	3291	1645.5
10	8.00	4	1380.00	690	1791	895.5	3355	1677.5
Mean		3.05		589.7		864.4		1664.2
S(n-1)		0.91		25.80		30.87		23.62
Zero		0.00		350.00	-20%	691.48		1331.32
99% CV		70.00		15000.00	+20%	1037.22		1996.98
Zero		0.00		400.00	-19%	700.12		1347.96
95% CV		10.00		700.00	+19%	1028.58		1980.34
					Mean-bkg	861.3		1074.5
					$S_{(n-1)}$	30.63		52.20
				Mean-bkg	-20%	689.04		859.60
				Mean-bkg	+20%	1033.56		1289.40
				Mean-bkg	-19%	697.65		870.35
				Mean-bkg	+19%	1024.95		1278.66

HP Technician Signature:

Supervisor Signature:

Counting Instrument:	Ludlum 2360	Detector:	43-37	Calibration Date:	9/3/2019
Serial #:	220263	Serial #:	PR216985	12 month calibration:	OK

Detector Active Area or Area Covered by Smear (cm^2): 582

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA (DPM/100cm^2)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.0770	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	100	2	2	5.15	1.38	855.1	34.66
Beta	0.2064	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	1000	2	2	797.80	26.36	916.4	41.19

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
9/5/2019	9	1624	1716	3478	4.5	812.0	853.5	927.0	PASS	PASS	PASS	PASS	18.93	79	Yes	Yes		BB
9/5/2019	12	1594	1735	3303	6.0	797.0	861.5	854.5	PASS	PASS	PASS	PASS	21.34	79	Yes	Yes		BB
9/6/2019	7	1604	1752	3445	3.5	802.0	872.5	920.5	PASS	PASS	PASS	PASS	17.09	79	Yes	Yes		DA/DL
9/6/2019	13	1641	1701	3342	6.5	820.5	844.0	850.5	PASS	PASS	PASS	PASS	22.08	80	Yes	Yes		DA/DL
9/9/2019	7	1549	1694	3362	3.5	774.5	843.5	906.5	PASS	PASS	PASS	PASS	17.09	77	Yes	Yes		DA/DL
9/9/2019	25	1602	1755	3413	12.5	801.0	865.0	905.5	QUESTION	PASS	PASS	PASS	29.32	79	Yes	Yes		DA/DL
9/9/2019	16	1602	1755	3413	8.0	801.0	869.5	905.5	PASS	PASS	PASS	PASS	24.12	79	Yes	Yes		DA/DL
9/10/2019	7	1582	1649	3470	3.5	791.0	821.0	944.0	PASS	PASS	PASS	PASS	17.09	78	Yes	Yes		DA/DL
9/10/2019	20	1630	1748	3316	10.0	815.0	864.0	843.0	PASS	PASS	PASS	PASS	26.58	79	Yes	Yes		DA/DL
9/11/2019	13	1544	1716	3466	6.5	772.0	851.5	961.0	PASS	PASS	PASS	PASS	22.08	77	Yes	Yes		DA/DL
9/11/2019	19	1664	1814	3450	9.5	832.0	897.5	893.0	PASS	PASS	PASS	PASS	25.99	80	Yes	Yes		DA/DL
9/12/2019	12	1771	1729	3392	6.0	885.5	858.5	810.5	PASS	PASS	PASS	PASS	21.34	83	Yes	Yes		DA/DL
9/12/2019	18	1662	1817	3262	9.0	831.0	899.5	800.0	PASS	PASS	PASS	PASS	25.38	80	Yes	Yes		DA/DL
9/13/2019	16	1616	1688	3349	8.0	808.0	836.0	866.5	PASS	PASS	PASS	PASS	24.12	79	Yes	Yes		DA/DL
9/13/2019	20	1635	1725	3201	10.0	817.5	852.5	783.0	PASS	PASS	PASS	PASS	26.58	80	Yes	Yes		DA/DL
9/16/2019	13	1570	1688	3382	6.5	785.0	837.5	906.0	PASS	PASS	PASS	PASS	22.08	78	Yes	Yes		DA/DL
9/16/2019	16	1526	1789	3350	8.0	763.0	886.5	912.0	PASS	PASS	PASS	PASS	24.12	77	Yes	Yes		DA/DL
9/17/2019	16	1601	1682	3414	8.0	800.5	833.0	906.5	PASS	PASS	PASS	PASS	24.12	79	Yes	Yes		DA/DL
9/17/2019	19	1671	1720	3332	9.5	835.5	850.5	830.5	PASS	PASS	PASS	PASS	25.99	80	Yes	Yes		DA/DL
9/18/2019	10	1583	1562	3442	5.0	791.5	776.0	929.5	PASS	PASS	PASS	PASS	19.77	78	Yes	Yes		DA/DL
9/18/2019	19	1624	1770	3215	9.5	812.0	875.5	795.5	PASS	PASS	PASS	PASS	25.99	79	Yes	Yes		DA/DL
9/19/2019	15	1573	1709	3478	7.5	786.5	847.0	952.5	PASS	PASS	PASS	PASS	23.46	78	Yes	Yes		DA/DL
9/19/2019	15	1635	1759	3299	7.5	817.5	872.0	832.0	PASS	PASS	PASS	PASS	23.46	80	Yes	Yes		DA/DL
9/20/2019	13	1770	1734	3460	6.5	885.0	860.5	845.0	PASS	PASS	PASS	PASS	22.08	83	Yes	Yes		DA/DL
9/20/2019	19	1564	1666	3388	9.5	782.0	823.5	912.0	PASS	PASS	PASS	PASS	25.99	78	Yes	Yes		DA/DL
9/23/2019	8	1552	1526	3491	4.0	776.0	759.0	969.5	PASS	PASS	PASS	PASS	18.04	78	Yes	Yes		SH
9/23/2019	20	1700	1714	3303	10.0	850.0	847.0	801.5	PASS	PASS	PASS	PASS	26.58	81	Yes	Yes		SH
9/24/2019	9	1546	1760	3388	4.5	773.0	875.5	921.0	PASS	PASS	PASS	PASS	18.93	77	Yes	Yes		SH
9/24/2019	19	1616	1583	3235	9.5	808.0	782.0	809.5	PASS	PASS	PASS	PASS	25.99	79	Yes	Yes		SH
9/25/2019	20	1575	1587	3222	10.0	787.5	783.5	823.5	PASS	PASS	PASS	PASS	26.58	78	Yes	Yes		SH
9/25/2019	20	1588	1770	3073	10.0	794.0	875.0	742.5	PASS	PASS	PASS	PASS	26.58	78	Yes	Yes		SH
9/26/2019	13	1715	1516	3262	6.5	857.5	751.5	773.5	PASS	PASS	PASS	PASS	22.08	81	Yes	Yes		DA/DL
9/26/2019	26	1610	1746	3301	13.0	805.0	860.0	845.5	QUESTION	PASS	PASS	PASS	29.83	79	Yes	Yes		DA/DL
9/26/2019	20	1610	1746	3301	10.0	805.0	863.0	845.5	PASS	PASS	PASS	PASS	26.58	79	Yes	Yes		DA/DL
9/27/2019	9	1601	1680	3345	4.5	800.5	835.5	872.0	PASS	PASS	PASS	PASS	18.93	79	Yes	Yes		DA/DL
9/27/2019	19	1579	1604	3434	9.5	789.5	792.5	927.5	PASS	PASS	PASS	PASS	25.99	78	Yes	Yes		DA/DL
9/30/2019	7	1638	1494	3440	3.5	819.0	743.5	901.0	PASS	PASS	PASS	PASS	17.09	80	Yes	Yes		DA/DL
9/30/2019	17	1616	1489	3365	8.5	808.0	736.0	874.5	PASS	PASS	PASS	PASS	24.76	79	Yes	Yes		DA/DL
10/1/2019	11	1544	1519	3540	5.5	772.0	754.0	998.0	PASS	PASS	PASS	PASS	20.57	77	Yes	Yes		DA/DL
10/1/2019	8	1739	1505	3452	4.0	869.5	748.5	856.5	PASS	PASS	PASS	PASS	18.04	82	Yes	Yes		DA/DL
10/2/2019	7	1645	1690	3345	3.5	822.5	841.5	850.0	PASS	PASS	PASS	PASS	17.09	80	Yes	Yes		DA/DL
10/2/2019	10	1707	1835	3422	5.0	853.5	912.5	857.5	PASS	PASS	PASS	PASS	19.77	81	Yes	Yes		DA/DL
10/3/2019	4	1384	1752	3464	2.0	692.0	874.0	1040.0	PASS	PASS	PASS	PASS	13.74	73	Yes	Yes		DA/DL
10/3/2019	13	1491	1760	3354	6.5	745.5	873.5	931.5	PASS	PASS	PASS	PASS	22.08	76	Yes	Yes		DA/DL
10/4/2019	12	1695	1483	3461	6.0	847.5	735.5	883.0	PASS	PASS	PASS	PASS	21.34	81	Yes	Yes		DA/DL
10/4/2019	23	1715	1438	3251	11.5	857.5	707.5	768.0	QUESTION	PASS	PASS	PASS	28.26	81	Yes	Yes		DA/DL
10/4/2019	18	1715	1438	3251	9.0	857.5	710.0	768.0	PASS	PASS	PASS	PASS	25.38	81	Yes	Yes		DA/DL
10/7/2019	14	1645	1480	3428	7.0	822.5	733.0	891.5	PASS	PASS	PASS	PASS	22.78	80	Yes	Yes		DA/DL
10/7/2019	18	1685	1544	3285	9.0	842.5	763.0	800.0	PASS	PASS	PASS	PASS	25.38	81	Yes	Yes		DA/DL
10/8/2019	7	1737	1500	3283	3.5	868.5	746.5	773.0	PASS	PASS	PASS	PASS	17.09	82	Yes	Yes		DA/DL
10/8/2019	14	1636	1692	3417	7.0	818.0	839.0	890.5	PASS	PASS	PASS	PASS	22.78	80	Yes	Yes		DA/DL
10/9/2019	10	1555	1530	3451	5.0	777.5	760.0	948.0	PASS	PASS	PASS	PASS	19.77	78	Yes	Yes		DA/DL
10/9/2019	12	1604	1532	3336	6.0	802.0	760.0	866.0	PASS	PASS	PASS	PASS	21.34	79	Yes	Yes		DA/DL
10/10/2019	11	1594	1611	3355	5.5	797.0	800.0	880.5	PASS	PASS	PASS	PASS	20.57	79	Yes	Yes		DA/DL

HP Technician Signature:

Supervisor Signature:

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10/11/2019	11	1504	2004	3258	5.5	752.0	996.5	877.0	PASS	PASS	PASS	PASS	20.57	76	Yes	Yes		DA/DL
10/11/2019	20	1597	1467	3247	10.0	798.5	723.5	825.0	PASS	PASS	PASS	PASS	26.58	79	Yes	Yes		DA/DL
10/15/2019	7	1535	1472	3448	3.5	767.5	732.5	956.5	PASS	PASS	PASS	PASS	17.09	77	Yes	Yes		DA/DL
10/15/2019	13	1538	1813	3380	6.5	769.0	900.0	921.0	PASS	PASS	PASS	PASS	22.08	77	Yes	Yes		DA/DL
10/16/2019	8	1492	1630	3380	4.0	746.0	811.0	944.0	PASS	PASS	PASS	PASS	18.04	76	Yes	Yes		DA/DL
10/16/2019	14	1610	1707	3447	7.0	805.0	846.5	918.5	PASS	PASS	PASS	PASS	22.78	79	Yes	Yes		DA/DL
10/17/2019	8	1588	1640	3539	4.0	794.0	816.0	975.5	PASS	PASS	PASS	PASS	18.04	78	Yes	Yes		DA/DL
10/17/2019	19	1657	1745	3397	9.5	828.5	863.0	870.0	PASS	PASS	PASS	PASS	25.99	80	Yes	Yes		DA/DL
10/18/2019	8	1526	1650	3387	4.0	763.0	821.0	930.5	PASS	PASS	PASS	PASS	18.04	77	Yes	Yes		DA/DL
10/18/2019	13	1581	1671	3365	6.5	790.5	829.0	892.0	PASS	PASS	PASS	PASS	22.08	78	Yes	Yes		DA/DL
10/21/2019	7	1430	1616	3411	3.5	715.0	804.5	990.5	PASS	PASS	PASS	PASS	17.09	74	Yes	Yes		DA/DL
10/21/2019	20	1574	1737	3333	10.0	787.0	858.5	879.5	PASS	PASS	PASS	PASS	26.58	78	Yes	Yes		DA/DL
10/22/2019	8	1511	1660	3348	4.0	755.5	826.0	918.5	PASS	PASS	PASS	PASS	18.04	77	Yes	Yes		DA/DL
10/24/2019	10	1625	1454	3383	5.0	812.5	722.0	879.0	PASS	PASS	PASS	PASS	19.77	79	Yes	Yes		BB
10/24/2019	9	1576	1494	3404	4.5	788.0	742.5	914.0	PASS	PASS	PASS	PASS	18.93	78	Yes	Yes		BB
10/25/2019	12	1518	1613	3502	6.0	759.0	800.5	992.0	PASS	PASS	PASS	PASS	21.34	77	Yes	Yes		DA/DL
10/25/2019	12	1619	1760	3383	6.0	809.5	874.0	882.0	PASS	PASS	PASS	PASS	21.34	79	Yes	Yes		DA/DL
10/28/2019	15	1600	1645	3401	7.5	800.0	815.0	900.5	PASS	PASS	PASS	PASS	23.46	79	Yes	Yes		DA/DL
10/28/2019	15	1531	1584	3410	7.5	765.5	784.5	939.5	PASS	PASS	PASS	PASS	23.46	77	Yes	Yes		DA/DL
10/29/2019	8	1415	1697	3415	4.0	707.5	844.5	1000.0	PASS	PASS	PASS	PASS	18.04	74	Yes	Yes		DA/DL
10/29/2019	19	1463	1716	3241	9.5	731.5	848.5	889.0	PASS	PASS	PASS	PASS	25.99	75	Yes	Yes		DA/DL
10/31/2019	5	1409	1578	3452	2.5	704.5	786.5	1021.5	PASS	PASS	PASS	PASS	14.96	74	Yes	Yes		DA/DL
10/31/2019	13	1631	1758	3618	6.5	815.5	872.5	993.5	PASS	PASS	PASS	PASS	22.08	79	Yes	Yes		DA/DL
11/1/2019	7	1596	1716	3611	3.5	798.0	854.5	1007.5	PASS	PASS	PASS	PASS	17.09	79	Yes	Yes		DA/DL
11/1/2019	17	1671	1812	3478	8.5	835.5	897.5	903.5	PASS	PASS	PASS	PASS	24.76	80	Yes	Yes		JF
11/4/2019	1	1537	1687	3588	0.5	768.5	843.0	1025.5	PASS	PASS	PASS	PASS	8.54	77	Yes	Yes		DA/PK
11/4/2019	15	1578	1733	3527	7.5	789.0	859.0	974.5	PASS	PASS	PASS	PASS	23.46	78	Yes	Yes		DA/PK
11/5/2019	3	1554	1747	3458	1.5	777.0	872.0	952.0	PASS	PASS	PASS	PASS	12.34	78	Yes	Yes		DA/PK
11/5/2019	13	1676	1687	3495	6.5	838.0	837.0	909.5	PASS	PASS	PASS	PASS	22.08	81	Yes	Yes		DA/PK
11/6/2019	14	1584	1616	3484	7.0	792.0	801.0	950.0	PASS	PASS	PASS	PASS	22.78	78	Yes	Yes		DA/PK
11/6/2019	14	1595	1695	3624	7.0	797.5	840.5	1014.5	PASS	PASS	PASS	PASS	22.78	79	Yes	Yes		DA/PK
11/7/2019	5	1552	1670	3601	2.5	776.0	832.5	1024.5	PASS	PASS	PASS	PASS	14.96	78	Yes	Yes		DA/PK
11/7/2019	17	1609	1681	3617	8.5	804.5	832.0	1004.0	PASS	PASS	PASS	PASS	24.76	79	Yes	Yes		DA/PK
11/8/2019	4	1490	1626	3553	2.0	745.0	811.0	1031.5	PASS	PASS	PASS	PASS	13.74	76	Yes	Yes		DA/PK
11/8/2019	29	1534	1658	3714	14.5	767.0	814.5	1090.0	QUESTION	PASS	PASS	PASS	31.32	77	Yes	Yes		DA/PK
11/8/2019	20	1534	1658	3714	10.0	767.0	819.0	1090.0	PASS	PASS	PASS	PASS	26.58	77	Yes	Yes		DA/PK
11/11/2019	3	1554	1542	3549	1.5	777.0	769.5	997.5	PASS	PASS	PASS	PASS	12.34	78	Yes	Yes		DA/PK
11/11/2019	18	1614	1742	3675	9.0	807.0	862.0	1030.5	PASS	PASS	PASS	PASS	25.38	79	Yes	Yes		DA/PK
11/12/2019	4	1489	1573	3645	2.0	744.5	784.5	1078.0	PASS	PASS	PASS	PASS	13.74	76	Yes	Yes		DA/PK
11/12/2019	11	1593	1584	3707	5.5	796.5	786.5	1057.0	PASS	PASS	PASS	PASS	20.57	79	Yes	Yes		DA/PK
11/13/2019	4	1476	1642	3657	2.0	738.0	819.0	1090.5	PASS	PASS	PASS	PASS	13.74	76	Yes	Yes		DA/PK
11/13/2019	21	1464	1563	3588	10.5	732.0	771.0	1062.0	QUESTION	PASS	PASS	PASS	27.15	75	Yes	Yes		DL/PK
11/13/2019	16	1464	1563	3588	8.0	732.0	773.5	1062.0	PASS	PASS	PASS	PASS	24.12	75	Yes	Yes		DL/PK
11/14/2019	6	1501	1730	3644	3.0	750.5	862.0	1071.5	PASS	PASS	PASS	PASS	16.07	76	Yes	Yes		DL/PK
11/14/2019	17	1459	1645	3611	8.5	729.5	814.0	1076.0	PASS	PASS	PASS	PASS	24.76	75	Yes	Yes		DL/PK
11/15/2019	4	1555	1511	3561	2.0	777.5	753.5	1003.0	PASS	PASS	PASS	PASS	13.74	78	Yes	Yes		DL/PK
11/15/2019	17	1620	1671	3612	8.5	810.0	827.0	996.0	PASS	PASS	PASS	PASS	24.76	79	Yes	Yes		DL/PK
11/20/2019	8	1548	1702	3655	4.0	774.0	847.0	1053.5	PASS	PASS	PASS	PASS	18.04	77	Yes	Yes		DA
11/20/2019	17	1701	1688	3444	8.5	850.5	835.5	871.5	PASS	PASS	PASS	PASS	24.76	81	Yes	Yes		DA

HP Technician Signature:

Supervisor Signature:

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Initial Background and Source Counts for Control Chart								
	Initial bkg counts				Initial source plus bkg counts			
#	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm
1	11.00	5.5	1540.00	770	1699	849.5	3444	1722
2	14.00	7	1579.00	789.5	1630	815	3361	1680.5
3	11.00	5.5	1555.00	777.5	1651	825.5	3374	1687
4	12.00	6	1632.00	816	1647	823.5	3342	1671
5	8.00	4	1655.00	827.5	1786	893	3533	1766.5
6	14.00	7	1705.00	852.5	1681	840.5	3402	1701
7	7.00	3.5	1591.00	795.5	1779	889.5	3465	1732.5
8	6.00	3	1573.00	786.5	1765	882.5	3420	1710
9	9.00	4.5	1547.00	773.5	1745	872.5	3502	1751
10	11.00	5.5	1579.00	789.5	1821	910.5	3441	1720.5
Mean		5.15		797.8		860.2		1714.2
$S_{(n-1)}$		1.38		26.36		33.68		30.66
Zero		0.00		500.00	-20%	688.16		1371.36
99% CV		70.00		15000.00	+20%	1032.24		2057.04
Zero		0.00		600.00	-19%	696.76		1388.50
95% CV		10.00		900.00	+19%	1023.64		2039.90
					Mean-bkg	855.1		916.4
					$S_{(n-1)}$	34.66		41.19
				Mean-bkg	-20%	684.04		733.12
				Mean-bkg	+20%	1026.06		1099.68
				Mean-bkg	-19%	692.59		742.28
				Mean-bkg	+19%	1017.51		1090.52

HP Technician Signature:

Supervisor Signature:

Counting Instrument:	Ludlum 2360	Detector:	43-37	Calibration Date:	9/11/2019
Serial #:	278604	Serial #:	PR190617	12 month calibration:	OK

Detector Active Area or Area Covered by Smear (cm^2): 582

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA (DPM/100cm^2)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.0670	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	100	2	2	2.15	1.11	659.1	19.12
Beta	0.1960	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	1000	2	2	643.20	31.47	888.6	48.88

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
9/17/2019	3	1214	1369	3033	1.5	607.0	683.0	909.5	PASS	PASS	PASS	PASS	14.18	72	Yes	Yes		BB
9/17/2019	17	1473	1266	2968	8.5	736.5	624.5	747.5	PASS	PASS	PASS	PASS	28.45	80	Yes	Yes		BB
9/18/2019	4	1217	1330	3141	2.0	608.5	663.0	962.0	PASS	PASS	PASS	PASS	15.78	72	Yes	Yes		BB
9/18/2019	5	1389	1495	2953	2.5	694.5	745.0	782.0	PASS	PASS	PASS	PASS	17.19	77	Yes	Yes		BB
9/19/2019	8	1310	1377	3162	4.0	655.0	684.5	926.0	PASS	PASS	PASS	PASS	20.72	75	Yes	Yes		DA/DL
9/19/2019	11	1471	1127	3017	5.5	735.5	558.0	773.0	PASS	PASS	PASS	PASS	23.63	80	Yes	Yes		DA/DL
9/20/2019	5	1324	1363	2955	2.5	662.0	679.0	815.5	PASS	PASS	PASS	PASS	17.19	76	Yes	Yes		DA/DL
9/20/2019	14	1490	1325	3102	7.0	745.0	655.5	806.0	PASS	PASS	PASS	PASS	26.17	80	Yes	Yes		DA/DL
9/23/2019	4	1420	1308	2957	2.0	710.0	652.0	768.5	PASS	PASS	PASS	PASS	15.78	78	Yes	Yes		SH
9/23/2019	18	1467	1435	3056	9.0	733.5	708.5	794.5	PASS	PASS	PASS	PASS	29.16	79	Yes	Yes		SH
9/24/2019	3	1337	1394	3102	1.5	668.5	695.5	882.5	PASS	PASS	PASS	PASS	14.18	76	Yes	Yes		SH
9/24/2019	20	1440	1384	3101	10.0	720.0	682.0	830.5	PASS	PASS	PASS	PASS	30.53	79	Yes	Yes		SH
9/25/2019	1	1398	1197	3109	0.5	699.0	598.0	855.5	PASS	PASS	PASS	PASS	9.81	78	Yes	Yes		SH
9/26/2019	3	1305	1306	3071	1.5	652.5	651.5	883.0	PASS	PASS	PASS	PASS	14.18	75	Yes	Yes		BB
9/26/2019	4	1317	1356	3129	2.0	658.5	676.0	906.0	PASS	PASS	PASS	PASS	15.78	75	Yes	Yes		BB
9/26/2019	18	1422	1380	3101	9.0	711.0	681.0	839.5	PASS	PASS	PASS	PASS	29.16	78	Yes	Yes		BB
9/27/2019	5	1315	1315	3006	2.5	657.5	655.0	845.5	PASS	PASS	PASS	PASS	17.19	75	Yes	Yes		DA/DL
9/27/2019	14	1310	1139	3181	7.0	655.0	562.5	935.5	PASS	PASS	PASS	PASS	26.17	75	Yes	Yes		DA/DL
9/30/2019	4	1267	1115	3030	2.0	633.5	555.5	881.5	PASS	PASS	PASS	PASS	15.78	74	Yes	Yes		DA/DL
9/30/2019	20	1446	1176	3145	10.0	723.0	578.0	849.5	PASS	PASS	PASS	PASS	30.53	79	Yes	Yes		DA/DL
10/1/2019	8	1272	1236	3008	4.0	636.0	614.0	868.0	PASS	PASS	PASS	PASS	20.72	74	Yes	Yes		DA/DL
10/1/2019	15	1452	1167	3075	7.5	726.0	576.0	811.5	PASS	PASS	PASS	PASS	26.95	79	Yes	Yes		DA/DL
10/2/2019	3	1307	1144	3018	1.5	653.5	570.5	855.5	PASS	PASS	PASS	PASS	14.18	75	Yes	Yes		DA/DL
10/2/2019	12	1493	1184	3102	6.0	746.5	586.0	804.5	PASS	PASS	PASS	PASS	24.51	80	Yes	Yes		DA/DL
10/3/2019	10	1268	1275	3038	5.0	634.0	632.5	885.0	PASS	PASS	PASS	PASS	22.71	74	Yes	Yes		DA/DL
10/3/2019	16	1402	1309	2992	8.0	701.0	646.5	795.0	PASS	PASS	PASS	PASS	27.71	78	Yes	Yes		DA/DL
10/4/2019	4	1271	1275	3024	2.0	635.5	635.5	876.5	PASS	PASS	PASS	PASS	15.78	74	Yes	Yes		DA/DL
10/4/2019	13	1360	1256	3008	6.5	680.0	621.5	824.0	PASS	PASS	PASS	PASS	25.36	77	Yes	Yes		DA/DL
10/7/2019	3	1343	1278	3094	1.5	671.5	637.5	875.5	PASS	PASS	PASS	PASS	14.18	76	Yes	Yes		DA/DL
10/7/2019	15	1509	1326	3085	7.5	754.5	655.5	788.0	PASS	PASS	PASS	PASS	26.95	81	Yes	Yes		DA/DL
10/8/2019	2	1336	1272	3085	1.0	668.0	635.0	874.5	PASS	PASS	PASS	PASS	12.28	76	Yes	Yes		DA/DL
10/8/2019	3	1476	1209	2928	1.5	738.0	603.0	726.0	PASS	PASS	PASS	PASS	14.18	80	Yes	Yes		DA/DL
10/9/2019	5	1237	1115	3045	2.5	618.5	555.0	904.0	PASS	PASS	PASS	PASS	17.19	73	Yes	Yes		DA/DL
10/9/2019	10	1393	1114	3064	5.0	696.5	552.0	835.5	PASS	PASS	PASS	PASS	22.71	77	Yes	Yes		DA/DL
10/10/2019	3	1261	1088	2969	1.5	630.5	542.5	854.0	PASS	PASS	PASS	PASS	14.18	74	Yes	Yes		DA/DL
10/10/2019	9	1343	1423	3000	4.5	671.5	707.0	828.5	PASS	PASS	PASS	PASS	21.74	76	Yes	Yes		DA/DL
10/11/2019	11	1283	1279	3160	5.5	641.5	634.0	938.5	PASS	PASS	PASS	PASS	23.63	74	Yes	Yes		DA/DL
10/11/2019	16	1427	1265	3060	8.0	713.5	624.5	816.5	PASS	PASS	PASS	PASS	27.71	78	Yes	Yes		DA/DL
10/16/2019	7	1130	1264	3007	3.5	565.0	628.5	938.5	PASS	QUESTION	PASS	PASS	19.63	70	Yes	Yes		DA/DL
10/16/2019	7	1239	1280	2905	3.5	619.5	636.5	833.0	PASS	PASS	PASS	PASS	19.63	73	Yes	Yes		DA/DL
10/16/2019	8	1285	1180	3033	4.0	642.5	586.0	874.0	PASS	PASS	PASS	PASS	20.72	74	Yes	Yes		DA/DL
10/17/2019	3	1286	1364	2988	1.5	643.0	680.5	851.0	PASS	PASS	PASS	PASS	14.18	74	Yes	Yes		DA/DL
10/17/2019	20	1297	1328	3111	10.0	648.5	654.0	907.0	PASS	PASS	PASS	PASS	30.53	75	Yes	Yes		DA/DL
10/18/2019	4	1214	1147	2959	2.0	607.0	571.5	872.5	PASS	PASS	PASS	PASS	15.78	72	Yes	Yes		DA/DL
10/18/2019	6	1297	1098	2973	3.0	648.5	546.0	838.0	PASS	PASS	PASS	PASS	18.46	75	Yes	Yes		DA/DL
10/21/2019	14	1391	1324	2937	7.0	695.5	655.0	773.0	PASS	PASS	PASS	PASS	26.17	77	Yes	Yes		DA/DL
10/21/2019	13	1390	1379	3131	6.5	695.0	683.0	870.5	PASS	PASS	PASS	PASS	25.36	77	Yes	Yes		DA/DL
10/22/2019	4	1244	1336	3057	2.0	622.0	666.0	906.5	PASS	PASS	PASS	PASS	15.78	73	Yes	Yes		DA/DL
10/22/2019	15	1404	1301	3053	7.5	702.0	643.0	824.5	PASS	PASS	PASS	PASS	26.95	78	Yes	Yes		JF/DL
10/23/2019	8	1246	1166	3014	4.0	623.0	579.0	884.0	PASS	PASS	PASS	PASS	20.72	73	Yes	Yes		JF/DL
10/23/2019	10	1486	1248	3034	5.0	743.0	619.0	774.0	PASS	PASS	PASS	PASS	22.71	80	Yes	Yes		JF/DL
10/24/2019	2	1365	1229	3056	1.0	682.5	613.5	845.5	PASS	PASS	PASS	PASS	12.28	77	Yes	Yes		JF/DL
10/24/2019	6	1240	1205	2760	3.0	620.0	599.5	760.0	PASS	PASS	PASS	PASS	18.46	73	Yes	Yes		JF/DL
10/25/2019	3	1434	1173	2967	1.5	717.0	585.0	766.5	PASS	PASS	PASS	PASS	14.18	79	Yes	Yes		JF/DL

HP Technician Signature:

Supervisor Signature:

2360 SN 278604
43-37 SN PR190617

10/25/2019	11	1494	1350	3178	5.5	747.0	669.5	842.0	PASS	PASS	PASS	PASS	23.63	80	Yes	Yes		JF/DL
10/28/2019	4	1221	1208	2944	2.0	610.5	602.0	861.5	PASS	PASS	PASS	PASS	15.78	73	Yes	Yes		JF/DL
10/28/2019	4	1274	1221	3095	2.0	637.0	608.5	910.5	PASS	PASS	PASS	PASS	15.78	74	Yes	Yes		JF/DL
10/30/2019	2	1158	1080	2967	1.0	579.0	539.0	904.5	PASS	QUESTION	PASS	PASS	12.28	71	Yes	Yes		DA
10/30/2019	4	1201	1080	2967	2.0	600.5	538.0	883.0	PASS	PASS	PASS	PASS	15.78	72	Yes	Yes		DA/DL
10/30/2019	18	1286	1100	3102	9.0	643.0	541.0	908.0	PASS	PASS	PASS	PASS	29.16	74	Yes	Yes		DA/DL

HP Technician Signature:

Supervisor Signature:

2360 SN 278604
43-37 SN PR190617

Initial Background and Source Counts for Control Chart								
	Initial bkg counts				Initial source plus bkg counts			
#	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm
1	4.00	2	1274.00	637	1266	633	3141	1570.5
2	10.00	5	1319.00	659.5	1372	686	3124	1562
3	3.00	1.5	1313.00	656.5	1328	664	2971	1485.5
4	4.00	2	1402.00	701	1333	666.5	3039	1519.5
5	2.00	1	1287.00	643.5	1262	631	3073	1536.5
6	4.00	2	1333.00	666.5	1350	675	3046	1523
7	5.00	2.5	1230.00	615	1363	681.5	3074	1537
8	3.00	1.5	1302.00	651	1345	672.5	3008	1504
9	3.00	1.5	1186.00	593	1322	661	3132	1566
10	5.00	2.5	1218.00	609	1283	641.5	3028	1514
Mean		2.15		643.2		661.2		1531.8
$S_{(n-1)}$		1.11		31.47		19.65		28.07
Zero		0.00		500.00	-20%	528.96		1225.44
99% CV		70.00		15000.00	+20%	793.44		1838.16
Zero		0.00		600.00	-19%	535.57		1240.76
95% CV		10.00		800.00	+19%	786.83		1822.84
					Mean-bkg	659.1		888.6
					$S_{(n-1)}$	19.12		48.88
				Mean-bkg	-20%	527.24		710.88
				Mean-bkg	+20%	790.86		1066.32
				Mean-bkg	-19%	533.83		719.77
				Mean-bkg	+19%	784.27		1057.43

HP Technician Signature:

Supervisor Signature:

Counting Instrument:	Ludlum 2360	Detector:	43-37	Calibration Date:	9/11/2019
Serial #:	245779	Serial #:	PR190618	12 month calibration:	OK

Detector Active Area or Area Covered by Smear (cm^2): 582

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA (DPM/100cm^2)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.066	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	100	2	2	2.45	1.46	711.8	24.89
Beta	0.207	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	1000	2	2	648.20	38.77	990.9	58.59

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
9/17/2019	4	1370	1438	3383	2.0	685.0	717.0	1006.5	PASS	PASS	PASS	PASS	16.02	73	Yes	Yes		BB
9/17/2019	9	1368	1477	3296	4.5	684.0	734.0	964.0	PASS	PASS	PASS	PASS	22.07	73	Yes	Yes		BB
9/18/2019	3	1371	1393	3229	1.5	685.5	695.0	929.0	PASS	PASS	PASS	PASS	14.40	73	Yes	Yes		BB
9/18/2019	7	1449	1505	3244	3.5	724.5	749.0	897.5	PASS	PASS	PASS	PASS	19.93	75	Yes	Yes		DA/DL
9/19/2019	6	1392	1363	3198	3.0	696.0	678.5	903.0	PASS	PASS	PASS	PASS	18.74	73	Yes	Yes		DA/DL
9/19/2019	7	1497	1574	3252	3.5	748.5	783.5	877.5	PASS	PASS	PASS	PASS	19.93	76	Yes	Yes		DA/DL
9/20/2019	1	1341	1477	3253	0.5	670.5	738.0	956.0	PASS	PASS	PASS	PASS	9.96	72	Yes	Yes		DA/DL
9/20/2019	5	1484	1199	3188	2.5	742.0	597.0	852.0	PASS	PASS	PASS	PASS	17.45	76	Yes	Yes		DA/DL
9/23/2019	9	1368	1503	3240	4.5	684.0	747.0	936.0	PASS	PASS	PASS	PASS	22.07	73	Yes	Yes		SH
9/23/2019	20	1520	1546	3165	10.0	760.0	763.0	822.5	PASS	PASS	PASS	PASS	30.99	77	Yes	Yes		SH
9/24/2019	2	1347	1515	3237	1.0	673.5	756.5	945.0	PASS	PASS	PASS	PASS	12.47	72	Yes	Yes		SH
9/24/2019	14	1447	1504	3071	7.0	723.5	745.0	812.0	PASS	PASS	PASS	PASS	26.57	75	Yes	Yes		SH
9/25/2019	5	1507	1463	3126	2.5	753.5	729.0	809.5	PASS	PASS	PASS	PASS	17.45	76	Yes	Yes		SH
9/25/2019	7	1466	1489	3237	3.5	733.0	741.0	885.5	PASS	PASS	PASS	PASS	19.93	75	Yes	Yes		SH
9/26/2019	3	1383	1275	3244	1.5	691.5	636.0	930.5	PASS	PASS	PASS	PASS	14.40	73	Yes	Yes		DA/DL
9/26/2019	18	1380	1238	3143	9.0	690.0	610.0	881.5	PASS	PASS	PASS	PASS	29.60	73	Yes	Yes		DA/DL
9/27/2019	2	1269	1244	3138	1.0	634.5	621.0	934.5	PASS	PASS	PASS	PASS	12.47	70	Yes	Yes		DA/DL
9/27/2019	8	1336	1404	3211	4.0	668.0	698.0	937.5	PASS	PASS	PASS	PASS	21.04	72	Yes	Yes		DA/DL
9/30/2019	3	1255	1252	2957	1.5	627.5	624.5	851.0	PASS	PASS	PASS	PASS	14.40	70	Yes	Yes		BB
9/30/2019	14	1282	1434	3155	7.0	641.0	710.0	936.5	PASS	PASS	PASS	PASS	26.57	70	Yes	Yes		DA/DL
10/1/2019	3	1265	1462	3217	1.5	632.5	729.5	976.0	PASS	PASS	PASS	PASS	14.40	70	Yes	Yes		DA/DL
10/1/2019	16	1414	1314	3174	8.0	707.0	649.0	880.0	PASS	PASS	PASS	PASS	28.13	74	Yes	Yes		DA/DL
10/2/2019	1	1326	1382	2910	0.5	663.0	690.5	792.0	PASS	PASS	PASS	FAIL	9.96	72	Yes	Yes		DA/DL
10/2/2019	1	1326	1382	3064	0.5	663.0	690.5	869.0	PASS	PASS	PASS	PASS	9.96	72	Yes	Yes		DA/DL
10/2/2019	5	1299	1380	3171	2.5	649.5	687.5	936.0	PASS	PASS	PASS	PASS	17.45	71	Yes	Yes		DA/DL
10/3/2019	2	1284	1349	3222	1.0	642.0	673.5	969.0	PASS	PASS	PASS	PASS	12.47	70	Yes	Yes		DA/DL
10/3/2019	16	1396	1379	3183	8.0	698.0	681.5	893.5	PASS	PASS	PASS	PASS	28.13	73	Yes	Yes		DA/DL
10/4/2019	2	1258	1345	3047	1.0	629.0	671.5	894.5	PASS	PASS	PASS	PASS	12.47	70	Yes	Yes		DA/DL
10/4/2019	14	1235	1278	3055	7.0	617.5	632.0	910.0	PASS	PASS	PASS	PASS	26.57	69	Yes	Yes		DA/DL
10/7/2019	4	1255	1361	3260	2.0	627.5	678.5	1002.5	PASS	PASS	PASS	PASS	16.02	70	Yes	Yes		DA/DL
10/7/2019	9	1416	1370	3282	4.5	708.0	680.5	933.0	PASS	PASS	PASS	PASS	22.07	74	Yes	Yes		DA/DL
10/8/2019	3	1338	1419	3202	1.5	669.0	708.0	932.0	PASS	PASS	PASS	PASS	14.40	72	Yes	Yes		DA/DL
10/8/2019	8	1203	1348	3217	4.0	601.5	670.0	1007.0	PASS	PASS	PASS	PASS	21.04	68	Yes	Yes		DA/DL
10/9/2019	4	1342	1419	3178	2.0	671.0	707.5	918.0	PASS	PASS	PASS	PASS	16.02	72	Yes	Yes		DA/DL
10/9/2019	18	1264	1212	3025	9.0	632.0	597.0	880.5	PASS	PASS	PASS	PASS	29.60	70	Yes	Yes		DA/DL
10/10/2019	3	1304	1339	3169	1.5	652.0	668.0	932.5	PASS	PASS	PASS	PASS	14.40	71	Yes	Yes		DA/DL
10/10/2019	9	1232	1426	3227	4.5	616.0	708.5	997.5	PASS	PASS	PASS	PASS	22.07	69	Yes	Yes		DA/DL
10/11/2019	3	1297	1390	3151	1.5	648.5	693.5	927.0	PASS	PASS	PASS	PASS	14.40	71	Yes	Yes		DA/DL
10/11/2019	5	1224	1368	3186	2.5	612.0	681.5	981.0	PASS	PASS	PASS	PASS	17.45	69	Yes	Yes		DA/DL
10/15/2019	4	1225	1368	3192	2.0	612.5	682.0	983.5	PASS	PASS	PASS	PASS	16.02	69	Yes	Yes		DA/DL
10/15/2019	5	1226	1413	3105	2.5	613.0	704.0	939.5	PASS	PASS	PASS	PASS	17.45	69	Yes	Yes		DA/DL
10/16/2019	4	1283	1482	3256	2.0	641.5	739.0	986.5	PASS	PASS	PASS	PASS	16.02	70	Yes	Yes		DA/DL
10/16/2019	3	1203	1409	3166	1.5	601.5	703.0	981.5	PASS	PASS	PASS	PASS	14.40	68	Yes	Yes		DA/DL

HP Technician Signature:

Supervisor Signature:

2360 SN 245779
43-37 SN PR190618

Initial Background and Source Counts for Control Chart								
	Initial bkg counts				Initial source plus bkg counts			
#	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm
1	1.00	0.5	1230.00	615	1428	714	3272	1636
2	1.00	0.5	1358.00	679	1438	719	3166	1583
3	3.00	1.5	1302.00	651	1494	747	3339	1669.5
4	6.00	3	1186.00	593	1409	704.5	3281	1640.5
5	7.00	3.5	1214.00	607	1439	719.5	3229	1614.5
6	10.00	5	1216.00	608	1340	670	3365	1682.5
7	4.00	2	1332.00	666	1395	697.5	3253	1626.5
8	5.00	2.5	1359.00	679.5	1391	695.5	3269	1634.5
9	4.00	2	1390.00	695	1502	751	3429	1714.5
10	8.00	4	1377.00	688.5	1449	724.5	3178	1589
Mean		2.45		648.2		714.3		1639.1
$S_{(n-1)}$		1.46		38.77		24.18		40.75
Zero		0.00		500.00	-20%	571.40		1311.24
99% CV		70.00		15000.00	+20%	857.10		1966.86
Zero		0.00		600.00	-19%	578.54		1327.63
95% CV		10.00		800.00	+19%	849.96		1950.47
					Mean-bkg	711.8		990.9
					$S_{(n-1)}$	24.89		58.59
				Mean-bkg	-20%	569.44		792.68
				Mean-bkg	+20%	854.16		1189.02
				Mean-bkg	-19%	576.56		802.59
				Mean-bkg	+19%	847.04		1179.11

HP Technician Signature:

Supervisor Signature:

Counting Instrument:	Ludlum 2360	Detector:	43-37	Calibration Date:	11/11/2019
Serial #:	275739	Serial #:	PR302114	12 month calibration:	OK

Detector Active Area or Area Covered by Smear (cm^2): 582

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.0760	Th-230	M6-837	5,521	6/16/2015	7.54E+04	5,521	100	2	2	5.44	1.10	828.8	263.14
Beta	0.1970	Tc-99	M6-836	5,976	6/16/2015	2.11E+05	5,976	1000	2	2	768.56	29.20	797.3	253.05

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
11/13/2019	10	1569	1558	3114	5.0	784.5	774.0	772.5	PASS	PASS	PASS	PASS	20.02	82	Yes	Yes		BB/DL
11/14/2019	5	1517	1572	3116	2.5	758.5	783.5	799.5	PASS	PASS	PASS	PASS	15.15	80	Yes	Yes		DA/DL
11/14/2019	19	1556	1560	3016	9.5	778.0	770.5	730.0	PASS	PASS	PASS	PASS	26.32	81	Yes	Yes		BB/DL
11/15/2019	7	1495	1606	3095	3.5	747.5	799.5	800.0	PASS	PASS	PASS	PASS	17.31	80	Yes	Yes		DA/DL
11/15/2019	17	1573	1453	2956	8.5	786.5	716.0	691.5	PASS	PASS	PASS	PASS	25.06	82	Yes	Yes		DA/DL
11/18/2019	11	1571	1378	3175	5.5	785.5	683.5	802.0	PASS	PASS	PASS	PASS	20.83	82	Yes	Yes		DA/DL
11/16/2019	20	1623	1687	3141	10.0	811.5	833.5	759.0	PASS	PASS	PASS	PASS	26.91	83	Yes	Yes		DL/DA
11/19/2019	8	1539	1664	3218	4.0	769.5	828.0	839.5	PASS	PASS	PASS	PASS	18.27	81	Yes	Yes		DA
11/19/2019	14	1565	1442	3010	7.0	782.5	714.0	722.5	PASS	PASS	PASS	PASS	23.07	82	Yes	Yes		DL
11/20/2019	12	1588	1409	3082	6.0	794.0	698.5	747.0	PASS	PASS	PASS	PASS	21.61	82	Yes	Yes		DA
11/20/2019	19	1632	1625	3036	9.5	816.0	803.0	702.0	PASS	PASS	PASS	PASS	26.32	83	Yes	Yes		DA
11/21/2019	20	1607	1550	3163	10.0	803.5	765.0	775.0	PASS	PASS	PASS	PASS	26.91	83	Yes	Yes		DA
11/21/2019	14	1631	1551	3171	7.0	815.5	766.5	770.0	PASS	PASS	PASS	PASS	23.07	83	Yes	Yes		DA

HP Technician Signature:

Supervisor Signature:

2360 SN 275739
43-37 SN PR302114

Initial Background and Source Counts for Control Chart								
	Initial bkg counts				Initial source plus bkg counts			
#	Alpha	cpm	Beta	cpm	Alpha	cpm	Beta	cpm
1	12.00	6	1420.00	710	1633	816.5	3073	1536.5
2	8.00	4	1539.00	769.5	1674	837	3131	1565.5
3	12.00	6	1506.00	753	1597	798.5	3079	1539.5
4	13.00	6.5	1565.00	782.5	1701	850.5	3152	1576
5	9.00	4.5	1503.00	751.5	1733	866.5	3134	1567
6	12.00	6	1591.00	795.5	1676	838	3183	1591.5
7	10.00	5	1559.00	779.5	1643	821.5	3148	1574
8	14.00	7	1622.00	811	1744	872	3203	1601.5
9	8.00	4	1529.00	764.5	1651	825.5	3131	1565.5
10	10.00	5	1569.00	784.5	1641	820.5	3135	1567.5
Mean	10.80	5.40	1540.3	770.2		834.7		1568.5
$S_{(n-1)}$		1.05		27.99		23.02		19.97
Zero		0.00		350.00	-20%	667.72		1254.76
99% CV		70.00		1160.00	+20%	1001.58		1882.14
Zero		0.00		600.00	-19%	676.07		1270.44
95% CV		10.00		850.00	+19%	993.23		1866.46
					Mean-bkg	829.3		798.3
					$S_{(n-1)}$	22.86		13.25
				Mean-bkg	-20%	663.40		638.64
				Mean-bkg	+20%	995.10		957.96
				Mean-bkg	-19%	671.69		646.62
				Mean-bkg	+19%	986.81		949.98

HP Technician Signature:

Supervisor Signature:

Inst.# 104556		
QC Daily Source		
Date	Result (µrem/hr)	P/F
8/12/2019	4	Pass
8/12/2019	5	Pass
8/13/2019	5	Pass
8/13/2019	5	Pass
8/14/2019	5	Pass
8/14/2019	5	Pass
8/15/2019	5	Pass
8/15/2019	5	Pass
8/16/2019	4	Pass
8/16/2019	5	Pass
8/19/2019	5	Pass
8/19/2019	5	Pass
8/20/2019	5	Pass
8/20/2019	4	Pass
8/21/2019	4	Pass
8/21/2019	5	Pass
8/22/2019	5	Pass
8/22/2019	5	Pass
8/23/2019	5	Pass
8/23/2019	5	Pass
8/26/2019	5	Pass
8/26/2019	4	Pass
8/27/2019	4	Pass
8/27/2019	4	Pass
8/28/2019	5	Pass
8/28/2019	5	Pass
8/29/2019	5	Pass
8/29/2019	5	Pass
8/30/2019	5	Pass
8/30/2019	5	Pass
9/3/2019	5	Pass
9/3/2019	5	Pass
9/4/2019	5	Pass
9/4/2019	5	Pass
9/9/2019	4	Pass
9/9/2019	5	Pass
9/12/2019	5	Pass
9/12/2019	4	Pass
9/13/2019	5	Pass
9/13/2019	5	Pass
9/30/2019	5	Pass
9/30/2019	5	Pass
10/7/2019	5	Pass
10/7/2019	5	Pass
10/11/2019	5	Pass
10/11/2019	5	Pass
10/21/2019	4	Pass
10/21/2019	5	Pass
11/1/2019	5	Pass
11/1/2019	5	Pass
11/8/2019	4	Pass
11/8/2019	5	Pass

Inst.# 104556		Source Ser. #	Bkg
Initial Source Readings		Nuclide	Bkg
Date	Result (µrem/hr)		
8/12/2019	4		
8/12/2019	5		
8/12/2019	5		
8/12/2019	4		
8/12/2019	4		
8/12/2019	5		
8/12/2019	4		
8/12/2019	4		
8/12/2019	5		
8/12/2019	5		
	Average		
	5		

HP Technician Signature:

Supervisor Signature:

Inst.# 104556		
QC Daily Source		
Date	Result (µrem/hr)	P/F
8/12/2019	100	Pass
8/12/2019	100	Pass
8/13/2019	100	Pass
8/13/2019	90	Pass
8/14/2019	100	Pass
8/14/2019	100	Pass
8/15/2019	100	Pass
8/15/2019	100	Pass
8/16/2019	90	Pass
8/16/2019	100	Pass
8/19/2019	100	Pass
8/19/2019	100	Pass
8/20/2019	90	Pass
8/20/2019	100	Pass
8/21/2019	100	Pass
8/21/2019	100	Pass
8/22/2019	100	Pass
8/22/2019	100	Pass
8/23/2019	90	Pass
8/23/2019	100	Pass
8/26/2019	100	Pass
8/26/2019	100	Pass
8/27/2019	100	Pass
8/27/2019	100	Pass
8/28/2019	100	Pass
8/28/2019	100	Pass
8/29/2019	100	Pass
8/29/2019	100	Pass
8/30/2019	100	Pass
8/30/2019	100	Pass
9/3/2019	100	Pass
9/3/2019	100	Pass
9/4/2019	100	Pass
9/4/2019	100	Pass
9/9/2019	100	Pass
9/9/2019	100	Pass
9/12/2019	90	Pass
9/12/2019	100	Pass
9/19/2019	90	Pass
9/19/2019	90	Pass
9/30/2019	100	Pass
9/30/2019	90	Pass
10/7/2019	100	Pass
10/7/2019	100	Pass
10/11/2019	100	Pass
10/11/2019	100	Pass
10/21/2019	100	Pass
10/21/2019	90	Pass
11/1/2019	90	Pass
11/1/2019	90	Pass
11/8/2019	100	Pass
11/8/2019	90	Pass

Inst.# 104556		Source Ser. #	1592-30-1
Initial Source Readings		Nuclide	Co-60
Date	Result (µrem/hr)		
8/12/2019	90		
8/12/2019	90		
8/12/2019	100		
8/12/2019	100		
8/12/2019	100		
8/12/2019	100		
8/12/2019	90		
8/12/2019	90		
8/12/2019	90		
8/12/2019	100		
	Average		
	95		

HP Technician Signature:

Supervisor Signature:

Inst.# 176952		
QC Daily Source		
Date	Result (cpm)	P/F
8/12/2019	7564	Pass
8/12/2019	7875	Pass
8/13/2019	7682	Pass
8/13/2019	7780	Pass
8/14/2019	7258	Pass
8/14/2019	8124	Pass
8/15/2019	7587	Pass
8/15/2019	7765	Pass
8/16/2019	7652	Pass
8/16/2019	7729	Pass
8/19/2019	7029	Pass
8/19/2019	7762	Pass
8/20/2019	7105	Pass
8/20/2019	7709	Pass
8/21/2019	7081	Pass
8/21/2019	7210	Pass
8/22/2019	7165	Pass
8/22/2019	7503	Pass
8/23/2019	7508	Pass
8/23/2019	7331	Pass
8/26/2019	7380	Pass
8/26/2019	7841	Pass
8/27/2019	7177	Pass
8/27/2019	7442	Pass
8/28/2019	7369	Pass
8/28/2019	7533	Pass
8/29/2019	7797	Pass
8/29/2019	7499	Pass
8/30/2019	7271	Pass
8/30/2019	7544	Pass
9/3/2019	7225	Pass
9/3/2019	7039	Pass

Inst.# 176952		Source Ser. #	Bkg
Initial Source Readings		Nuclide	Bkg
Date	Result (cpm)		
8/12/2019	7946		
8/12/2019	7715		
8/12/2019	7922		
8/12/2019	7904		
8/12/2019	7629		
8/12/2019	7678		
8/12/2019	7769		
8/12/2019	7795		
8/12/2019	7679		
8/12/2019	7702		
	Average		
	7774		

HP Technician Signature:

Supervisor Signature:

Instrument
#176952

9/4/2019	7223	Pass
9/4/2019	7450	Pass
9/9/2019	7146	Pass
9/9/2019	7477	Pass
9/12/2019	7740	Pass
9/12/2019	7622	Pass
9/19/2019	7643	Pass
9/19/2019	7608	Pass
9/26/2019	7782	Pass
9/26/2019	7569	Pass
9/27/2019	7245	Pass
9/27/2019	7533	Pass
9/30/2019	7666	Pass
9/30/2019	7329	Pass
10/1/2019	7786	Pass
10/1/2019	7669	Pass
10/3/2019	7544	Pass
10/3/2019	7269	Pass
10/4/2019	7333	Pass
10/4/2019	7543	Pass
10/8/2019	7929	Pass
10/8/2019	7763	Pass
10/9/2019	7677	Pass
10/9/2019	7540	Pass
10/10/2019	7239	Pass
10/10/2019	7529	Pass
10/11/2019	7995	Pass
10/11/2019	7741	Pass
10/15/2019	7325	Pass
10/15/2019	7824	Pass
10/16/2019	7427	Pass
10/16/2019	7515	Pass
10/17/2019	7276	Pass
10/17/2019	7304	Pass
10/18/2019	7497	Pass

HP Technician Signature:
Supervisor Signature:

Instrument
#176952

10/18/2019	7792	Pass
10/21/2019	7263	Pass
10/21/2019	7281	Pass
10/22/2019	7399	Pass
10/22/2019	7258	Pass
10/23/2019	7886	Pass
10/23/2019	7583	Pass
10/24/2019	7973	Pass
10/24/2019	7773	Pass
10/25/2019	7432	Pass
10/25/2019	7864	Pass
10/29/2019	7476	Pass
10/29/2019	8086	Pass
11/1/2019	8450	Pass
11/1/2019	8255	Pass
11/5/2019	7968	Pass
11/5/2019	7731	Pass
11/6/2019	7826	Pass
11/6/2019	7929	Pass
11/7/2019	7801	Pass
11/7/2019	7654	Pass
11/11/2019	8046	Pass
11/11/2019	8195	Pass
11/14/2019	7855	Pass
11/14/2019	8045	Pass
11/15/2019	7933	Pass
11/15/2019	7310	Pass
11/18/2019	8646	Pass
11/18/2019	8448	Pass
11/19/2019	6909	Pass

HP Technician Signature:
Supervisor Signature:

Inst.# 176952		
QC Daily Source		
Date	Result (cpm)	P/F
11/19/2109	6963	Pass
11/20/2019	7659	Pass
11/20/2019	7630	Pass

Inst.# 176952		Source Ser. #	Bkg
Initial Source Readings		Nuclide	Bkg
Date	Result (cpm)		
8/12/2019	7946		
8/12/2019	7715		
8/12/2019	7922		
8/12/2019	7904		
8/12/2019	7629		
8/12/2019	7678		
8/12/2019	7769		
8/12/2019	7795		
8/12/2019	7679		
8/12/2019	7702		
	Average		
	7774		

HP Technician Signature:

Supervisor Signature:

Inst.# 176952		
QC Daily Source		
Date	Result (cpm)	P/F
11/19/2019	104108	Pass
11/20/2019	108308	Pass
11/20/2019	110238	Pass

Inst.# 176952		Source Ser. #	1592-30-1
Initial Source Readings		Nuclide	Co-60
Date	Result (cpm)		
8/12/2019	103434		
8/12/2019	109309		
8/12/2019	109408		
8/12/2019	102208		
8/12/2019	109090		
8/12/2019	108413		
8/12/2019	103494		
8/12/2019	101139		
8/12/2019	112232		
8/12/2019	103272		
	Average		
	106200		

HP Technician Signature:

Supervisor Signature:

Inst.# 176952		
QC Daily Source		
Date	Result (cpm)	P/F
8/12/2019	105662	Pass
8/12/2019	109556	Pass
8/13/2019	101888	Pass
8/13/2019	103146	Pass
8/14/2019	103802	Pass
8/14/2019	103466	Pass
8/15/2019	103629	Pass
8/15/2019	104324	Pass
8/16/2019	103111	Pass
8/16/2019	103478	Pass
8/19/2019	107076	Pass
8/19/2019	103488	Pass
8/20/2019	105703	Pass
8/20/2019	107279	Pass
8/21/2019	106957	Pass
8/21/2019	104637	Pass
8/22/2019	114472	Pass
8/22/2019	102483	Pass
8/23/2019	117101	Pass
8/23/2019	110721	Pass
8/26/2019	100999	Pass
8/26/2019	101822	Pass
8/27/2019	106325	Pass
8/27/2019	102509	Pass
8/28/2019	106016	Pass
8/28/2019	104891	Pass
8/29/2019	114932	Pass
8/29/2019	105891	Pass
8/30/2019	118006	Pass
8/30/2019	105688	Pass
9/3/2019	102995	Pass
9/3/2019	107963	Pass

Inst.# 176952		Source Ser. #	1592-30-1
Initial Source Readings		Nuclide	Co-60
Date	Result (cpm)		
8/12/2019	103434		
8/12/2019	109309		
8/12/2019	109408		
8/12/2019	102208		
8/12/2019	109090		
8/12/2019	108413		
8/12/2019	103494		
8/12/2019	101139		
8/12/2019	112232		
8/12/2019	103272		
	Average		
	106200		

HP Technician Signature:

Supervisor Signature:

Instrument
#176952

9/4/2019	115263	Pass
9/4/2019	105722	Pass
9/9/2019	106054	Pass
9/9/2019	102404	Pass
9/12/2019	106788	Pass
9/12/2019	103679	Pass
9/19/2019	102593	Pass
9/19/2019	102394	Pass
9/26/2019	101367	Pass
9/26/2019	104328	Pass
9/27/2019	105811	Pass
9/27/2019	103466	Pass
9/30/2019	105746	Pass
9/30/2019	106532	Pass
10/1/2019	103481	Pass
10/1/2019	103279	Pass
10/3/2019	103871	Pass
10/3/2019	102811	Pass
10/4/2019	105673	Pass
10/4/2019	104661	Pass
10/8/2019	105633	Pass
10/8/2019	105422	Pass
10/9/2019	108562	Pass
10/9/2019	104329	Pass
10/10/2019	103970	Pass
10/10/2019	102678	Pass
10/11/2019	99085	Pass
10/11/2019	102342	Pass
10/15/2019	106041	Pass
10/15/2019	104430	Pass
10/16/2019	99986	Pass
10/16/2019	103838	Pass
10/17/2019	104978	Pass
10/17/2019	108994	Pass
10/18/2019	102382	Pass

HP Technician Signature:

Supervisor Signature:

Instrument
#176952

10/18/2019	106522	Pass
10/21/2019	103035	Pass
10/21/2019	101392	Pass
10/22/2019	102864	Pass
10/22/2019	103561	Pass
10/23/2019	102613	Pass
10/23/2019	107759	Pass
10/24/2019	105941	Pass
10/24/2019	104215	Pass
10/25/2019	107533	Pass
10/25/2019	106392	Pass
10/29/2019	99839	Pass
10/29/2019	101228	Pass
11/1/2019	105531	Pass
11/1/2019	106737	Pass
11/5/2019	104360	Pass
11/5/2019	107411	Pass
11/6/2019	103874	Pass
11/6/2019	106931	Pass
11/7/2019	104792	Pass
11/7/2019	102780	Pass
11/11/2019	105192	Pass
11/11/2019	104512	Pass
11/14/2019	101595	Pass
11/14/2019	102593	Pass
11/15/2019	104511	Pass
11/15/2019	105129	Pass
11/18/2019	101927	Pass
11/18/2019	117320	Pass
11/19/2019	112647	Pass

HP Technician Signature:

Supervisor Signature:

APPENDIX F
GAMMA SURVEY DATA

Deleted: DCN: APTM-0006-4550-0099

DCN: APTM-0006-4550-0099

SU 1 Gamma Bias

Instrument (SN) - 3x3 NaI		
Meter	2221	(SN176952)
Probe	44-20	(PR262403)
Date Collected	11/21/2019	

Concrete RBA Level:	14,421
Metal RBA Level:	7,173

Gamma Static cpm (1-min Count)			Coordinates		Comment
Sample ID#	Matrix	Count	Northing	Easting	
SU1-GB1	Concrete (Horz)	11,943	2094340.50	6022149.30	Gamma Scan >3z
SU1-GB2	Concrete (Horz)	11,748	2094352.53	6022155.94	Gamma Scan >3z
SU1-GB3	Concrete (Horz)	11,866	2094341.36	6022149.87	Gamma Scan >3z
SU1-GB4	Concrete (Horz)	12,024	2094343.08	6022151.32	Gamma Scan >3z
SU1-GB5	Concrete (Horz)	10,748	2094344.19	6022152.18	Gamma Scan >3z
SU1-GB6	Concrete (Horz)	11,910	2094345.05	6022152.95	Gamma Scan >3z
SU1-GB7	Concrete (Horz)	11,736	2094350.91	6022154.75	Gamma Scan >3z
SU1-GB8	Concrete (Horz)	11,147	2094347.49	6022154.59	Gamma Scan >3z
SU1-GB9	Concrete (Horz)	11,996	2094348.75	6022155.40	Gamma Scan >3z
SU1-GB10	Concrete (Horz)	11,998	2094349.90	6022156.17	Gamma Scan >3z
SU1-GB11	Concrete (Horz)	11,560	2094350.91	6022156.77	Gamma Scan >3z
SU1-GB12	Concrete (Horz)	11,532	2094352.17	6022157.58	Gamma Scan >3z
SU1-GB13	Concrete (Horz)	11,403	2094353.35	6022158.41	Gamma Scan >3z
SU1-GB14	Concrete (Horz)	11,495	2094357.72	6022160.86	Gamma Scan >3z
SU1-GB15	Concrete (Horz)	11,521	2094361.52	6022162.33	Gamma Scan >3z
SU1-GB16	Concrete (Horz)	10,976	2094349.23	6022153.44	Gamma Scan >3z
SU1-GB17	Concrete (Horz)	10,433	2094366.21	6022166.67	Gamma Scan >3z
SU1-GB18	Concrete (Horz)	10,293	2094368.97	6022168.74	Gamma Scan >3z
SU1-GB19	Concrete (Horz)	10,295	2094373.08	6022171.82	Gamma Scan >3z
SU1-GB20	Concrete (Horz)	10,790	2094294.65	6022114.06	Gamma Scan >3z
SU1-GB21	Concrete (Horz)	10,172	2094282.68	6022104.50	Gamma Scan >3z
SU1-GB22	Concrete (Vert)	9,586	2094300.61	6022205.88	Gamma Vertical Scan >3z
Min		9,586			
Max		12,024			
Mean		11,235			
SD		717			

SU 2 Gamma Bias

Instrument (SN) - 3x3 NaI		
Meter	2221	(SN176952)
Probe	44-20	(PR262403)
Date Collected	11/5/2019	

Concrete RBA Level:	14,421
Metal RBA Level:	7,173

Gamma Static cpm (1-min Count)			Coordinates		Comment
Sample ID#	Matrix	Count	Northing	Easting	
SU2-GB1	Concrete (Wall)	14,742	2094427.08	6022051.34	Gamma Scan >3z
SU2-GB2	Concrete (Wall)	13,405	2094426.52	6022051.18	Gamma Scan >3z
SU2-GB3	Concrete (Wall)	12,821	2094426.07	6022051.75	Gamma Scan >3z
SU2-GB4	Concrete (Horz)	10,975	2094518.53	6022217.90	Gamma Vertical Scan >3z
SU2-GB5	Concrete (Horz)	11,265	2094520.78	6022219.97	Gamma Vertical Scan >3z
SU2-GB6	Concrete (Horz)	11,730	2094521.53	6022220.71	Gamma Vertical Scan >3z
SU2-GB7	Concrete (Horz)	11,861	2094378.60	6022000.81	Gamma Vertical Scan >3z
SU2-GB8	Concrete (Horz)	11,582	2094375.77	6022003.73	Gamma Vertical Scan >3z
SU2-GB9	Concrete (Horz)	12,808	2094373.33	6022002.21	Gamma Vertical Scan >3z
SU2-GB10	Concrete (Horz)	12,142	2094371.43	6022000.76	Gamma Vertical Scan >3z
SU2-GB11	Concrete (Horz)	11,255	2094371.56	6022003.90	Gamma Vertical Scan >3z
SU2-GB12	Concrete (Horz)	11,785	2094369.29	6022002.36	Gamma Vertical Scan >3z
SU2-GB13	Concrete (Horz)	13,193	2094367.12	6022000.52	Gamma Vertical Scan >3z
SU2-GB14	Concrete (Horz)	11,679	2094365.97	6021999.97	Gamma Vertical Scan >3z
SU2-GB15	Concrete (MH)	11,896	2094365.69	6022000.95	Gamma MH Scan >3z
SU2-GB16	Concrete (MH)	11,260	2094366.38	6022001.17	Gamma MH Scan >3z
Min		10,975			
Max		14,742			
Mean		11,998			
SD		1,001			

SU 3 Gamma Bias Drydock 7 & Berth 64

Instrument (SN) - 3x3 NaI		
Meter	2221	(SN176952)
Probe	44-20	(PR262403)
Date Collected	10/23/2019/ and 10/24/19	

Concrete RBA Level:	14,421
Metal RBA Level:	7,173

Gamma Static cpm (1-min Count)			Coordinates		Comment
Sample ID#	Matrix	Count	Northing	Easting	
SU3-GB1	Concrete	14,119	2094725.87	6022111.34	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB2	Concrete	13,137	2094724.43	6022110.53	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB3	Concrete	12,855	2094611.42	6022025.54	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB4	Concrete	12,421	2094610.00	6022025.25	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB5	Concrete	12,508	2094491.03	6021936.39	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB6	Concrete	14,159	2094467.71	6021918.35	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB7	Concrete	13,110	2094462.17	6021914.14	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB8	Concrete	13,515	2094460.01	6021912.70	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB9	Concrete	16,136	2094462.49	6021901.09	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB10	Concrete	15,157	2094461.52	6021899.85	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB11	Concrete	15,050	2094461.58	6021898.59	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB12	Concrete	15,116	2094460.61	6021898.51	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB13	Concrete	17,323	2094454.03	6021893.10	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB14	Concrete	18,183	2094453.38	6021893.06	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB15	Concrete	13,961	2094501.16	6022022.27	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB16	Concrete	15,127	2094493.98	6022018.20	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB17	Concrete	14,911	2094494.23	6022017.22	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB18	Concrete	10,239	2094524.03	6021942.83	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB19	Concrete	10,449	2094652.60	6022040.72	Gamma Scan >3z (Berth 64 Vertical)
SU3-GB20	Concrete	9,344	2094444.60	6021892.65	Gamma Scan 2.9z (Drydock 7 Horizontal)
Min		9,344			
Max		18,183			
Mean		13,841			
SD		2,232			

SU 3 Gamma Bias Berth 62-63

Instrument (SN) - 3x3 NaI		
Meter	2221	(SN176952)
Probe	44-20	(PR262403)
Date Collected	10/25/2019	

Concrete RBA Level:	14,421
Metal RBA Level:	7,173

Gamma Static cpm (1-min Count)			Coordinates		Comment
Sample ID#	Matrix	Count	Northing	Easting	
SU3-GB21	Concrete	6,462	2094796.86	6022161.94	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB22	Metal	6,470	2094807.30	6022171.34	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB23	Concrete	6,560	2094809.85	6022170.82	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB24	Concrete	6,959	2094812.64	6022171.14	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB25	Concrete	6,882	2094814.59	6022174.01	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB26	Concrete	7,079	2094830.75	6022181.33	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB27	Metal	6,131	2094920.93	6022254.89	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB28	Metal	5,479	2094921.56	6022246.99	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB29	Metal	4,835	2094935.49	6022258.66	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB30	Concrete	6,632	2094956.08	6022277.56	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB31	Concrete	7,447	2094966.58	6022284.71	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB32	Concrete	6,435	2094971.03	6022290.37	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB33	Concrete	6,543	2094974.13	6022291.42	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB34	Concrete	6,379	2094975.98	6022293.08	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB35	Metal	6,385	2094992.89	6022307.78	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB36	Metal	6,668	2094842.46	6022131.60	Gamma Scan >3z (Berth 62/63 Vertical)
SU3-GB37	Metal	5,254	2094841.02	6022131.39	Gamma Scan >3z (Berth 62/63 Vertical)
Min		4,835			
Max		7,447			
Mean		6,388			
SD		660			

Inspector 1000 ROIs

Nuclide	Peak Energy (keV)	Peak Width (keV)	Approximate ROI Boundaries*	
			Left Boundary (keV)	Right Boundary (keV)
^{226}Ra	295.2	24.6	258.3	332.1
	352.0	26.9	311.7	392.3
	609.3	35.4	556.2	662.4
	1120.3	48.0	1048.4	1192.2
^{40}K	1460.8	54.8	1378.6	1543.0
^{232}Th	583.0	34.6	531.1	634.9
	911.2	43.3	846.3	976.1

*ROI Boundaries determined for each spectrum using the Genie 2K software

ROI = Region of Interest

keV = kiloelectronvolt

^{226}Ra = radium-226

^{40}K = potassium-40

^{232}Th = Thorium-232

SU2-GB1 Inspector 1000 Counts

Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU2-GB1 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	6077	-2%
	352.0	4233	4386	4656	6%
	609.3	2082	2190	2075	-5%
	1120.3	822	890	903	1%
^{40}K	1460.8	830	898	1035	15%
^{232}Th	583.0	2074	2181	2162	-1%
	911.2	1049	1126	1083	-4%

RBA = reference background area

MH1086 = Manhole 1086

SU3-GB9 Inspector 1000 Counts

Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU3-GB9 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	9078	46%
	352.0	4233	4386	6366	45%
	609.3	2082	2190	2696	23%
	1120.3	822	890	1281	44%
^{40}K	1460.8	830	898	1133	26%
^{232}Th	583.0	2074	2181	2896	33%
	911.2	1049	1126	1561	39%

RBA = reference background area

SU3-GB10 Inspector 1000 Counts

Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU3-GB10 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	7851	26%
	352.0	4233	4386	6044	38%
	609.3	2082	2190	2518	15%
	1120.3	822	890	1125	26%
^{40}K	1460.8	830	898	1028	14%
^{232}Th	583.0	2074	2181	2622	20%
	911.2	1049	1126	1387	23%

RBA = reference background area

SU3-GB11 Inspector 1000 Counts

Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU3-GB11 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	7898	27%
	352.0	4233	4386	5507	26%
	609.3	2082	2190	2000	-9%
	1120.3	822	890	1081	21%
^{40}K	1460.8	830	898	999	11%
^{232}Th	583.0	2074	2181	2498	15%
	911.2	1049	1126	1329	18%

RBA = reference background area

SU3-GB12 Inspector 1000 Counts

Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU3-GB12 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	6871	10%
	352.0	4233	4386	4940	13%
	609.3	2082	2190	2172	-1%
	1120.3	822	890	932	5%
^{40}K	1460.8	830	898	864	-4%
^{232}Th	583.0	2074	2181	2251	3%
	911.2	1049	1126	1246	11%

RBA = reference background area

SU3-GB13 Inspector 1000 Counts

Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU3-GB13 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	10504	69%
	352.0	4233	4386	7759	77%
	609.3	2082	2190	3125	43%
	1120.3	822	890	1480	66%
^{40}K	1460.8	830	898	1380	54%
^{232}Th	583.0	2074	2181	3385	55%
	911.2	1049	1126	1864	66%

RBA = reference background area

SU3-GB14 Inspector 1000 Counts

Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU3-GB14 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	5734	-8%
	352.0	4233	4386	4089	-7%
	609.3	2082	2190	1715	-22%
	1120.3	822	890	803	-10%
^{40}K	1460.8	830	898	786	-12%
^{232}Th	583.0	2074	2181	1825	-16%
	911.2	1049	1126	933	-17%

RBA = reference background area

SU3-GB16 Inspector 1000 Counts

Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU3-GB16 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	7549	21%
	352.0	4233	4386	5578	27%
	609.3	2082	2190	2489	14%
	1120.3	822	890	1151	29%
^{40}K	1460.8	830	898	979	9%
^{232}Th	583.0	2074	2181	2534	16%
	911.2	1049	1126	1376	22%

RBA = reference background area

SU3-GB17 Inspector 1000 Counts

Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU3-GB17 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	8187	32%
	352.0	4233	4386	5776	32%
	609.3	2082	2190	2545	16%
	1120.3	822	890	1186	33%
^{40}K	1460.8	830	898	981	9%
^{232}Th	583.0	2074	2181	2705	24%
	911.2	1049	1126	1515	35%

RBA = reference background area

SU2-M1 Inspector 1000 Counts

Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU3-GB17 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	6429	3%
	352.0	4233	4386	4520	3%
	609.3	2082	2190	1950	-11%
	1120.3	822	890	860	-3%
^{40}K	1460.8	830	898	818	-9%
^{232}Th	583.0	2074	2181	2107	-3%
	911.2	1049	1126	1054	-6%

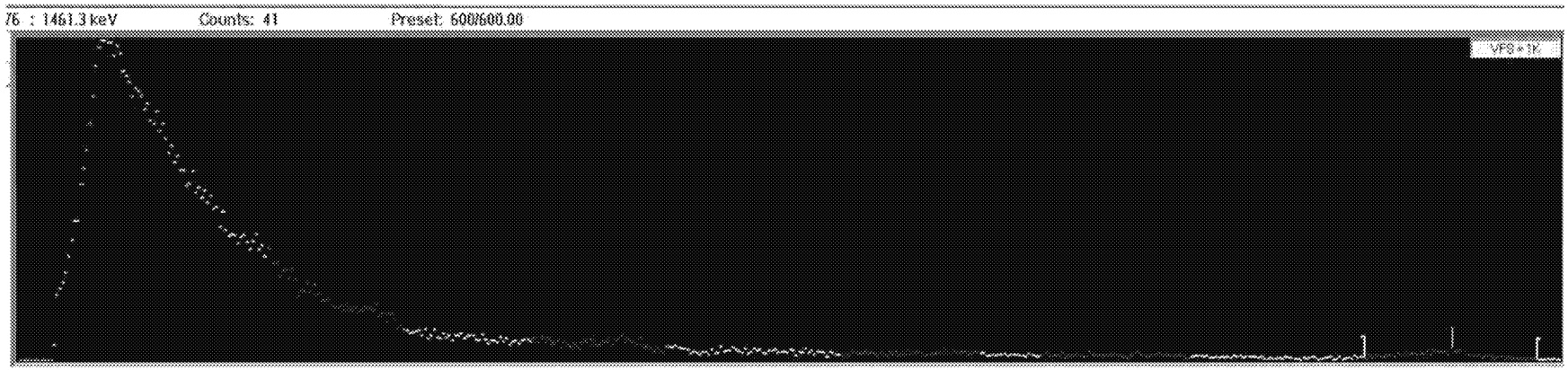
RBA = reference background area

SU3-M3 Inspector 1000 Counts

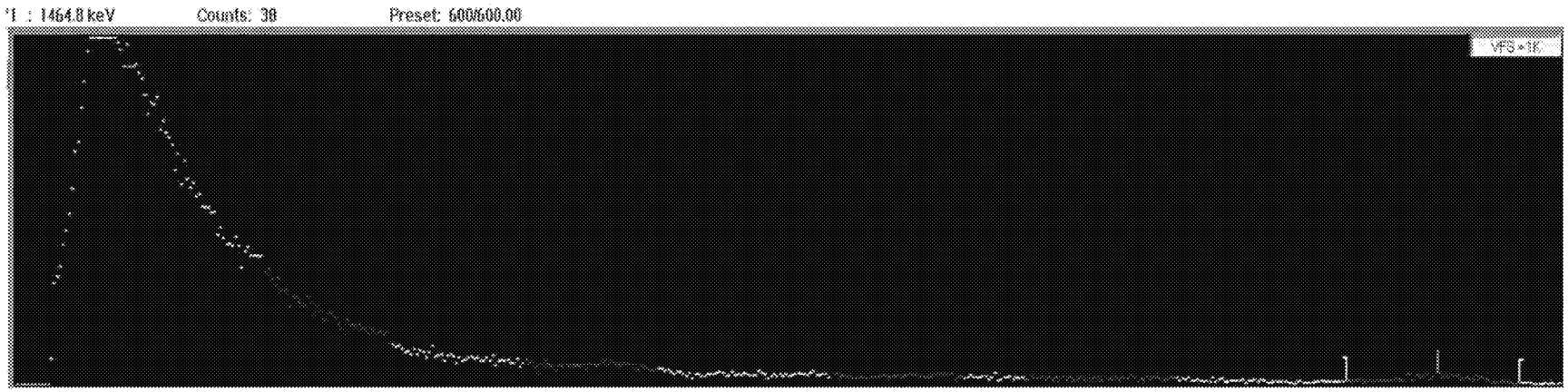
Nuclide	Peak Energy (keV)	Concrete RBA Counts	Concrete RBA Critical Value	SU3-GB17 Counts	Percent Above Critical Value
^{226}Ra	295.2	6043	6225	5481	-12%
	352.0	4233	4386	4175	-5%
	609.3	2082	2190	1726	-21%
	1120.3	822	890	816	-8%
^{40}K	1460.8	830	898	740	-18%
^{232}Th	583.0	2074	2181	1780	-18%
	911.2	1049	1126	997	-11%

RBA = reference background area

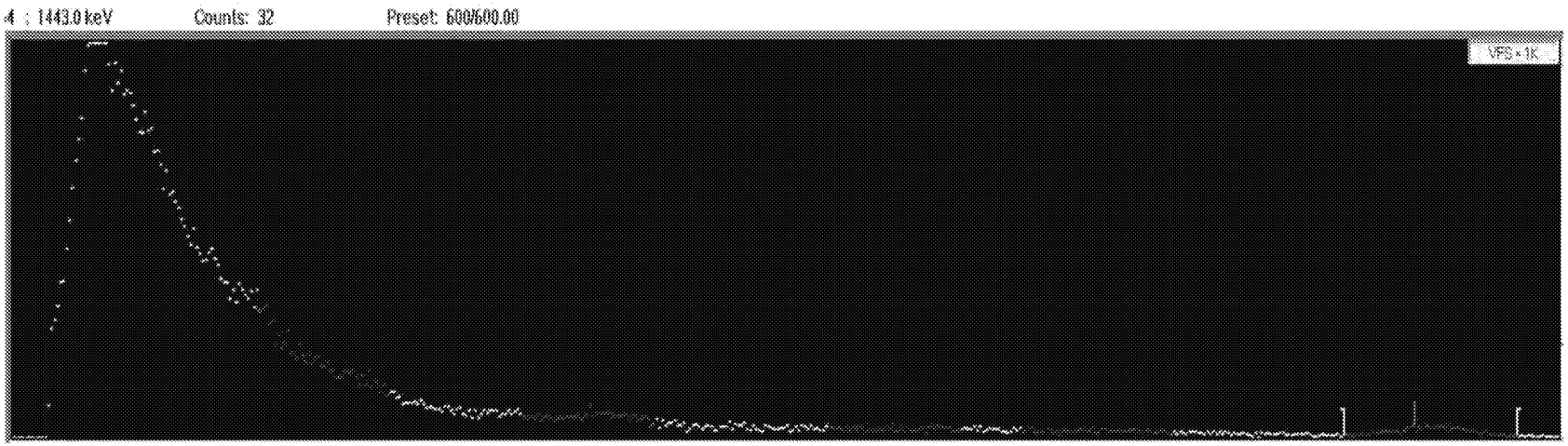
SU2-GB1 Inspector 1000 Spectrum with ROIs:



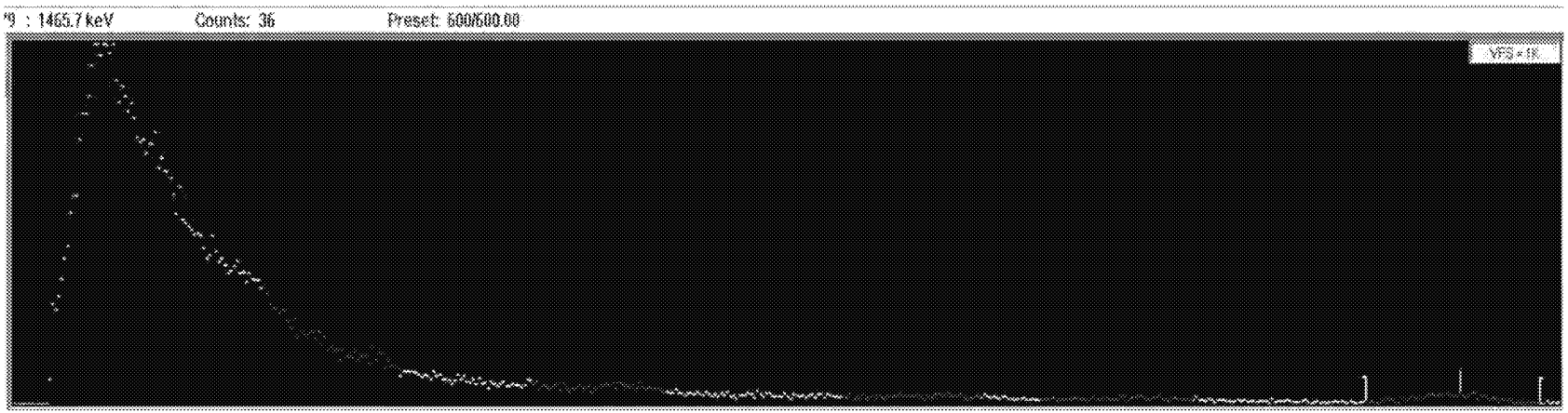
SU3-GB9 Inspector 1000 Spectrum with ROIs:



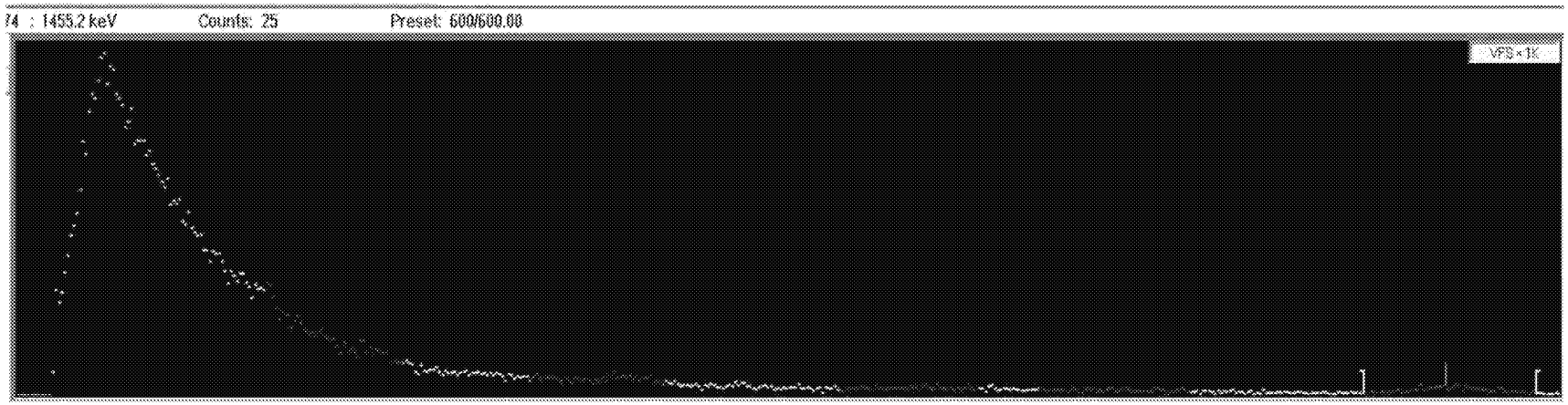
SU3-GB10 Inspector 1000 Spectrum with ROIs:



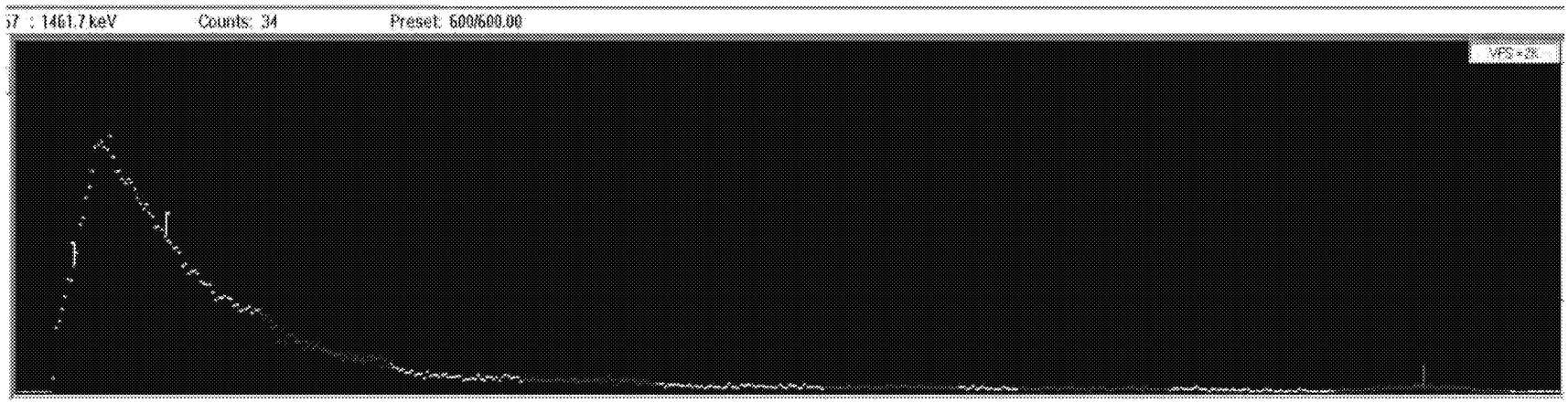
SU3-GB11 Inspector 1000 Spectrum with ROIs:



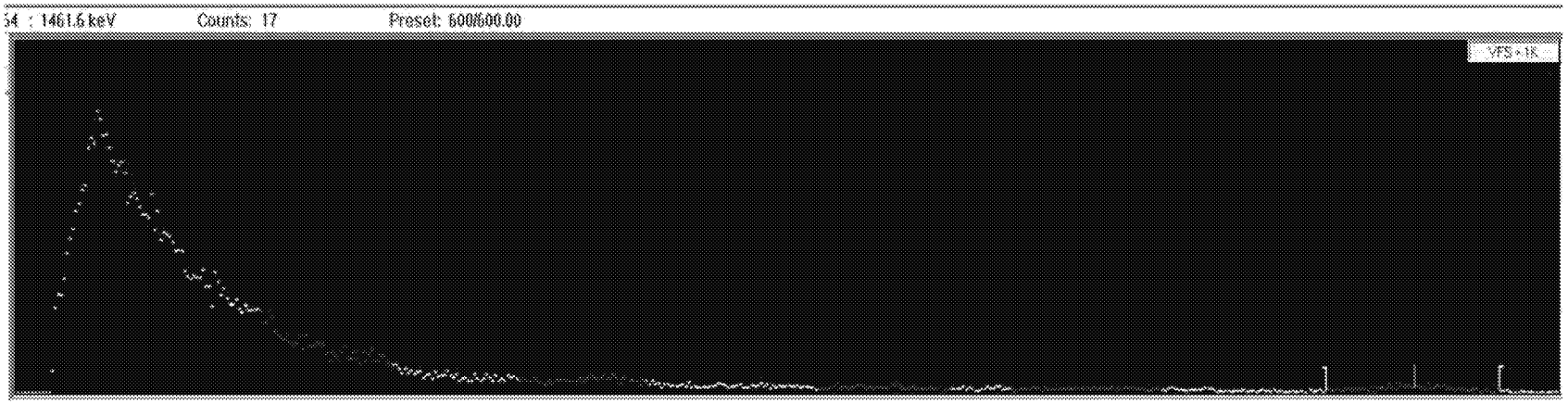
SU3-GB12 Inspector 1000 Spectrum with ROIs:



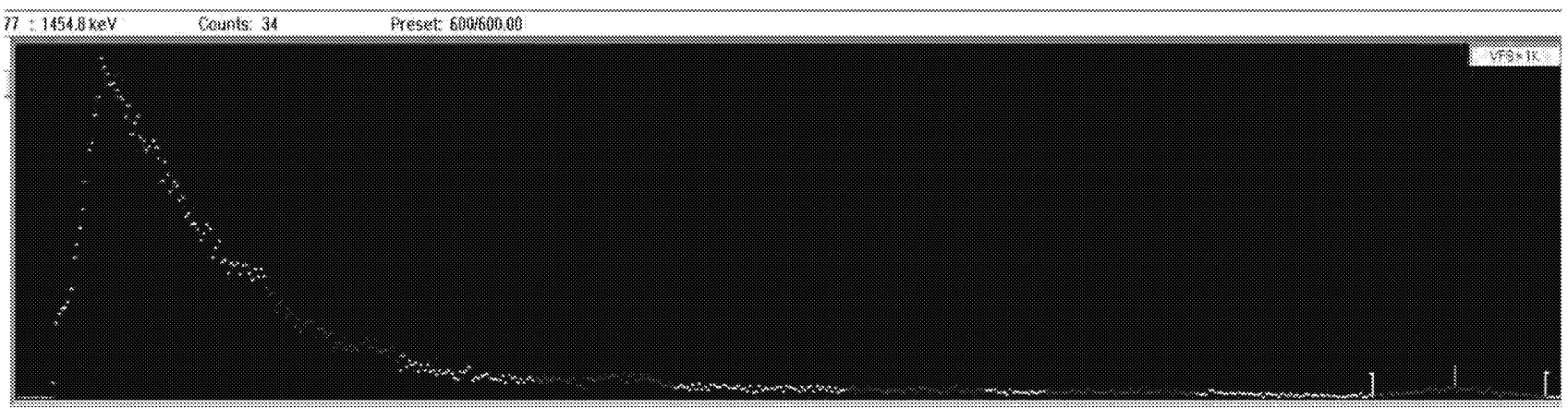
SU3-GB13 Inspector 1000 Spectrum with ROIs:



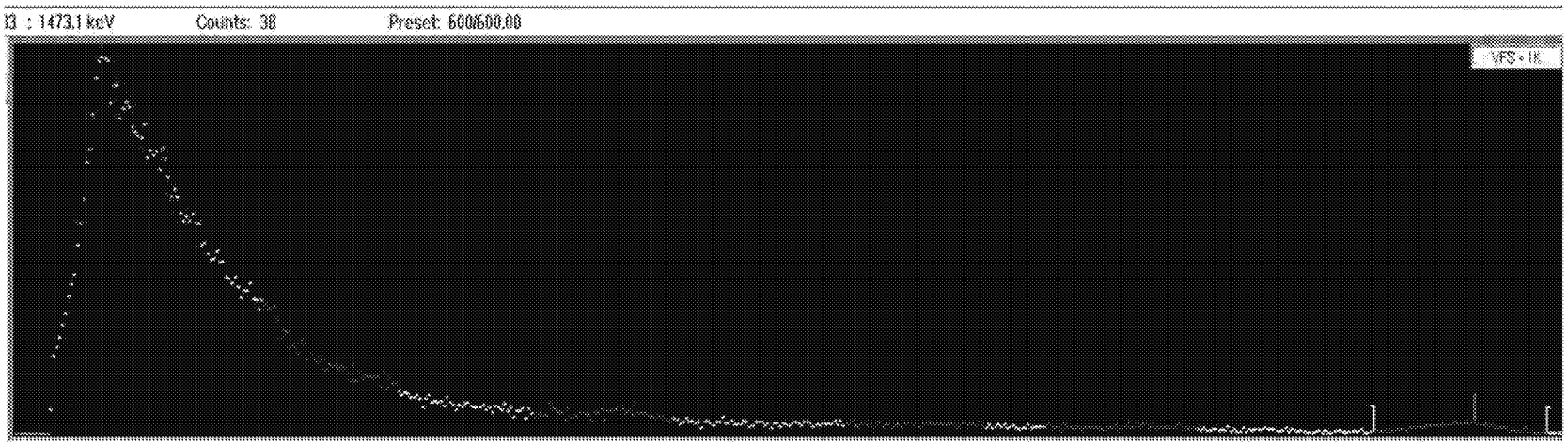
SU3-GB14 Inspector 1000 Spectrum with ROIs:



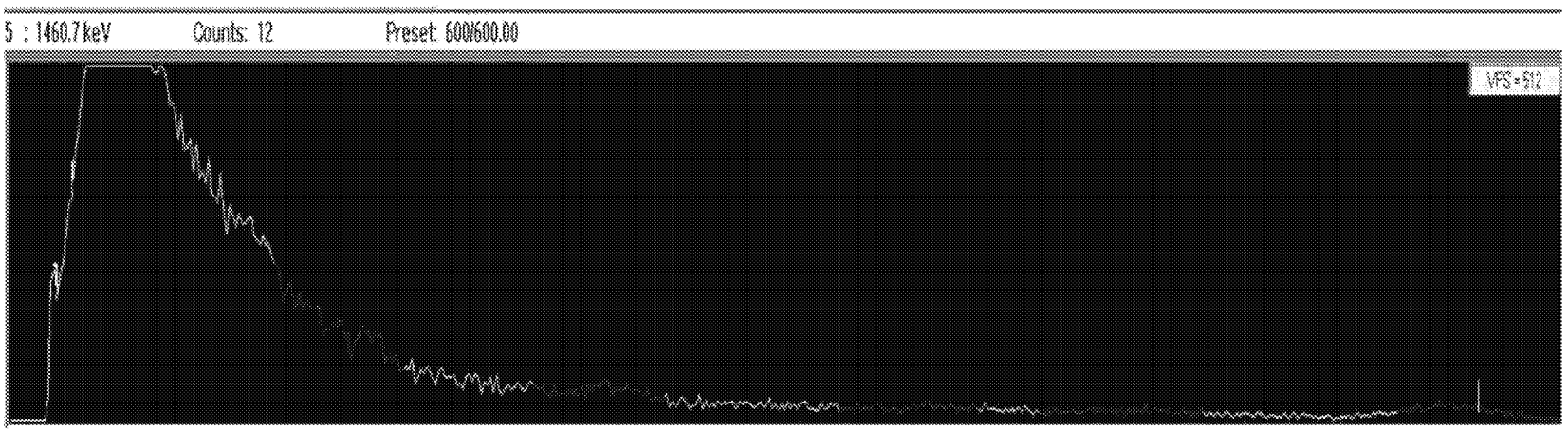
SU3-GB16 Inspector 1000 Spectrum with ROIs:



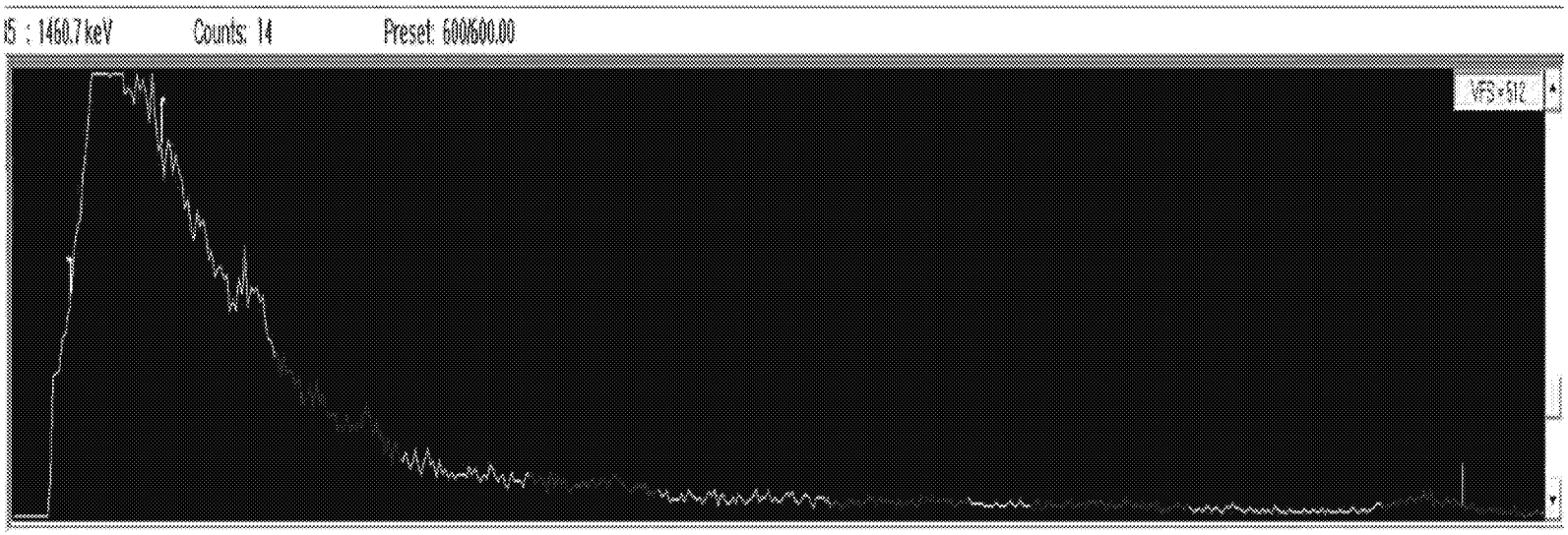
SU3-GB17 Inspector 1000 Spectrum with ROIs:



SU2-M1 Inspector 1000 Spectrum with ROIs:



SU3-M3 Inspector 1000 Spectrum with ROIs:



Concrete Background Inspector 1000 Spectrum with ROIs:

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
12179	13632	11590	2673.94992	2993.80596	2367.90899
12164	13008	11271	2651.72735	2936.21607	2366.72495
12092	12873	11171	2650.54117	2930.20708	2362.31422
11917	12780	11166	2647.60668	2930.19273	2359.48962
11670	12679	11163	2641.87867	2922.47776	2356.52346
11654	12670	11147	2629.11076	2913.04193	2351.37183
11439	12654	11129	2622.90105	2896.19214	2350.91063
11423	12298	11128	2615.83708	2893.92317	2347.4866
11398	12132	11126	2613.84257	2888.87163	2346.59237
11373	12121	11124	2613.05124	2888.74526	2345.82934
11359	12083	11110	2611.91116	2888.15495	2341.96085
11222	12029	11104	2607.31977	2878.05101	2338.19423
11180	11994	11092	2606.44811	2876.7399	2334.97597
11171	11982	11085	2605.4386	2876.01694	2331.71493
11158	11977	11068	2598.3248	2863.01374	2329.17805
11129	11974	11029	2588.43806	2862.44384	2328.48547
11121	11930	11025	2581.68157	2861.14212	2324.05594
11090	11927	11017	2578.64743	2857.59147	2323.41444
11079	11925	10998	2570.29818	2856.43746	2321.5294
11072	11872	10976	2569.03848	2851.00568	2319.94501
11039	11868	10968	2564.51371	2848.71304	2317.0617
11034	11847	10959	2564.16488	2847.90591	2316.29955
10999	11817	10954	2564.02575	2844.30469	2316.05353
10987	11798	10940	2555.41612	2842.71803	2314.82124
10982	11791	10928	2551.26188	2841.42769	2312.28072
10979	11789	10925	2548.66212	2840.86047	2310.182
10952	11776	10922	2546.41092	2840.57764	2309.94243
10938	11723	10899	2539.3997	2840.16655	2306.93723
10933	11722	10870	2535.64031	2837.71441	2304.16836
10912	11717	10845	2529.51734	2837.57265	2302.80406
10909	11716	10827	2528.0333	2837.29273	2302.40313
10892	11692	10826	2525.53015	2830.99512	2302.27431
10883	11686	10809	2521.8864	2828.47619	2300.47296
10880	11675	10801	2521.01936	2827.25928	2299.18785

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
10879	11662	10793	2519.15594	2826.98691	2298.29988
10868	11662	10787	2517.89753	2826.86759	2297.17229
10867	11660	10787	2515.02009	2825.43211	2296.70363
10845	11657	10781	2515.01262	2824.99961	2296.1541
10842	11650	10777	2513.13415	2823.28706	2295.04515
10834	11650	10747	2509.26911	2823.2847	2294.47654
10830	11641	10730	2507.51706	2820.84583	2294.16084
10827	11621	10722	2501.00764	2819.70377	2293.81739
10791	11612	10721	2500.266	2816.87231	2293.15969
10783	11606	10694	2499.05689	2814.55199	2292.25195
10779	11605	10690	2498.38609	2814.26283	2292.17142
10775	11588	10687	2496.88724	2810.56209	2291.70367
10775	11588	10671	2496.75378	2810.28093	2290.93693
10768	11585	10665	2491.75001	2808.83064	2290.29461
10763	11580	10655	2490.25417	2808.54902	2289.94232
10741	11572	10654	2488.27802	2808.13216	2286.70084
10736	11562	10648	2484.73754	2807.16503	2286.03962
10731	11551	10646	2484.37405	2802.55026	2285.70784
10719	11548	10645	2482.87971	2800.24832	2284.70255
10713	11542	10642	2477.62366	2800.10547	2284.25139
10695	11538	10631	2466.10026	2799.82493	2283.16476
10694	11537	10630	2459.8659	2796.84394	2283.04792
10689	11532	10629	2456.7461	2794.96239	2283.04112
10665	11531	10620	2452.48028	2793.1264	2282.69944
10662	11509	10596	2446.60171	2792.5231	2281.92749
10657	11504	10593	2438.09276	2791.24445	2281.92224
10655	11493	10590	2436.60169	2790.85772	2281.7013
10643	11488	10586	2436.35362	2790.55354	2281.36153
10632	11487	10586	2434.83129	2790.55282	2281.28311
10630	11477	10578	2431.23148	2790.39255	2280.69352
10623	11475	10568	2427.74668	2788.98081	2278.05219
10620	11468	10567	2426.86528	2787.44938	2277.69497
10616	11458	10565	2423.98717	2787.26065	2276.9287
10613	11456	10556	2421.57962	2787.2398	2274.93735

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
10608	11452	10553	2421.21757	2783.53758	2274.92727
10604	11451	10547	2419.73486	2783.40226	2274.80932
10599	11449	10545	2413.3352	2783.10505	2272.91879
10598	11445	10534	2412.82305	2782.53779	2271.69742
10589	11443	10534	2411.33627	2781.54003	2270.91585
10585	11440	10526	2410.98822	2780.70152	2269.47282
10584	11437	10525	2408.85859	2779.54001	2268.14479
10575	11421	10519	2406.09316	2779.09049	2267.94279
10574	11419	10515	2405.57058	2777.68481	2267.69684
10569	11418	10515	2404.34065	2776.55728	2267.58107
10566	11415	10513	2404.33448	2776.22958	2267.34459
10563	11410	10512	2401.22382	2776.11956	2267.14727
10561	11400	10510	2398.21643	2774.12003	2267.04349
10553	11397	10504	2395.85459	2773.95161	2266.80597
10552	11394	10504	2394.20495	2772.80886	2266.37657
10549	11364	10502	2393.5604	2771.97798	2266.15233
10542	11362	10498	2392.61026	2770.84499	2266.04027
10535	11359	10480	2391.61455	2770.40738	2263.80907
10532	11349	10479	2390.84516	2769.98549	2263.80726
10511	11343	10475	2389.20567	2769.78745	2263.57726
10508	11334	10472	2388.60929	2769.67073	2263.03274
10507	11333	10462	2386.08175	2768.70365	2262.92211
10503	11328	10458	2382.58805	2768.11517	2262.69226
10494	11320	10451	2379.97157	2765.80625	2262.25848
10493	11311	10447	2379.85316	2765.67338	2261.49313
10487	11308	10446	2376.24629	2765.46596	2260.91151
10478	11293	10439	2376.20526	2764.95373	2260.49369
10475	11288	10432	2371.60624	2763.22662	2259.15088
10462	11283	10425	2371.60331	2763.07865	2259.02551
10462	11283	10424	2371.5497	2762.54316	2255.8146
10460	11281	10407	2371.36026	2762.38912	2255.80393
10454	11268	10406	2371.07818	2761.66899	2254.04367
10453	11258	10406	2369.37467	2759.94639	2253.69749
10451	11249	10402	2366.95384	2759.66425	2253.34663

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
10447	11237	10396	2365.96538	2759.11343	2253.25211
10445	11236	10395	2365.94207	2758.06338	2253.02652
10444	11233	10392	2364.60038	2756.37222	2252.57233
10434	11232	10391	2364.0745	2754.3519	2251.34624
10433	11220	10389	2363.95322	2754.24281	2251.14452
10430	11220	10382	2361.60002	2752.94638	2251.0301
10429	11218	10378	2359.95459	2752.92554	2249.82378
10423	11208	10369	2358.2999	2749.38821	2249.12854
10412	11208	10365	2356.47946	2748.94208	2248.24047
10407	11196	10361	2355.83762	2747.96374	2248.13606
10406	11196	10361	2355.1848	2746.10791	2247.6801
10401	11177	10359	2354.30476	2745.07402	2246.92565
10396	11166	10353	2354.06813	2744.23212	2246.1357
10391	11165	10347	2352.52976	2743.10909	2245.36344
10384	11154	10339	2349.29469	2742.17514	2245.02374
10384	11138	10338	2349.1889	2742.07369	2244.691
10378	11131	10335	2348.94751	2741.97157	2243.37785
10376	11129	10333	2348.41224	2739.24548	2243.23092
10375	11127	10322	2347.36069	2735.64941	2242.91032
10374	11127	10322	2345.7119	2734.29423	2242.90962
10372	11124	10320	2344.52698	2733.55734	2242.69413
10369	11114	10314	2342.59617	2732.11096	2242.57102
10369	11111	10313	2342.18048	2729.54055	2238.90967
10362	11107	10309	2341.94734	2728.53269	2238.47601
10357	11102	10306	2341.76543	2728.51924	2237.25504
10357	11100	10301	2341.47682	2728.50367	2237.13003
10350	11094	10301	2340.95348	2728.11325	2237.1239
10343	11092	10291	2339.94606	2726.64911	2236.88605
10339	11078	10288	2339.92311	2726.23348	2236.79541
10335	11069	10288	2339.53438	2724.52502	2236.34035
10324	11065	10285	2338.8258	2724.51081	2236.13375
10323	11056	10281	2338.53583	2724.37236	2234.46732
10322	11052	10280	2337.9533	2717.35197	2233.36011
10315	11040	10278	2337.05833	2715.91404	2232.13813

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
10315	11028	10271	2336.29447	2714.23061	2231.79239
10308	11025	10271	2335.5283	2713.10021	2229.79901
10302	11021	10269	2333.64418	2711.78543	2229.46028
10300	11000	10263	2331.88151	2711.23322	2229.02263
10292	10999	10262	2330.94151	2710.5076	2228.20505
10292	10991	10261	2328.40661	2709.71468	2227.89976
10290	10991	10260	2328.06416	2706.49189	2227.69942
10289	10983	10259	2327.05261	2706.29368	2226.23278
10287	10978	10253	2326.82273	2705.51485	2226.01291
10286	10967	10250	2326.41055	2704.07598	2225.68407
10285	10965	10246	2325.64347	2702.50137	2224.34578
10284	10957	10245	2325.36705	2702.35969	2222.90989
10281	10947	10240	2325.27035	2701.89822	2222.90384
10281	10943	10238	2323.81973	2701.36373	2222.8126
10279	10926	10223	2322.17852	2700.08783	2222.5741
10279	10921	10223	2321.46527	2699.54488	2220.9108
10278	10921	10220	2321.16883	2699.47484	2220.78582
10273	10916	10208	2320.74356	2699.36172	2220.78502
10270	10909	10200	2320.05189	2698.40398	2220.77978
10267	10908	10199	2319.69754	2696.80134	2220.24097
10267	10901	10190	2318.8195	2696.23929	2219.68217
10256	10896	10185	2316.58573	2694.95164	2218.9013
10249	10896	10184	2315.2996	2694.49833	2218.89802
10243	10894	10183	2314.82204	2693.32662	2218.34598
10240	10885	10183	2314.81377	2691.64309	2217.67959
10237	10883	10176	2314.81334	2691.49652	2215.56564
10237	10882	10175	2314.16661	2689.22068	2213.12751
10233	10881	10166	2314.16642	2689.09581	2213.00552
10229	10852	10163	2308.80193	2687.68545	2212.53137
10221	10842	10163	2306.81433	2687.5473	2211.00779
10218	10833	10161	2306.546	2687.20638	2210.98697
10217	10819	10158	2306.52359	2686.81816	2210.79128
10217	10816	10151	2306.39857	2686.81767	2210.77863
10215	10813	10151	2303.82757	2686.48697	2210.67384

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
10213	10804	10148	2303.81492	2685.51608	2210.23265
10212	10803	10147	2303.74805	2684.62075	2209.90304
10212	10747	10145	2303.03788	2682.01162	2209.78394
10211	10746	10142	2302.50856	2681.63248	2209.44407
10208	10744	10141	2299.04623	2679.63736	2209.11873
10203	10740	10138	2298.59089	2679.50795	2209.11856
10195	10739	10136	2296.73246	2678.95369	2208.35159
10193	10737	10134	2296.70362	2678.33452	2208.12394
10191	10726	10133	2296.04431	2678.21377	2207.80036
10189	10723	10132	2295.69795	2677.48008	2207.7868
10180	10720	10132	2294.16892	2676.24355	2206.4495
10180	10719	10129	2293.81299	2675.35315	2206.00625
10178	10717	10125	2292.49978	2675.21461	2205.78875
10178	10708	10123	2292.40157	2675.069	2205.78424
10178	10691	10120	2292.04091	2674.95029	2205.67275
10172	10690	10114	2291.94789	2674.35439	2204.7842
10171	10686	10113	2290.15435	2673.95214	2204.67405
10169	10682	10112	2289.46691	2673.21608	2204.67052
10167	10681	10111	2288.38244	2672.94731	2203.45389
10166	10681	10107	2284.69216	2671.46753	2203.22339
10166	10664	10103	2282.72384	2671.08108	2202.8898
10165	10649	10101	2280.77515	2670.94932	2200.57225
10164	10644	10098	2279.58629	2667.62115	2199.00186
10163	10623	10095	2278.93009	2667.59692	2198.56627
10160	10622	10095	2278.26444	2667.35112	2198.5632
10156	10602	10093	2276.0352	2665.21733	2196.89517
10153	10601	10091	2275.40329	2661.87044	2195.89763
10150	10597	10088	2275.26016	2661.81135	2194.7888
10146	10586	10081	2274.71414	2661.14308	2194.00572
10137	10580	10081	2273.02728	2660.21141	2193.9132
10134	10562	10076	2272.57716	2660.07437	2193.65482
10133	10542	10076	2272.46377	2659.34288	2192.11641
10131	10538	10073	2267.89908	2659.22116	2191.78553
10122	10532	10070	2267.79185	2658.19276	2191.65586

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
10121	10487	10067	2267.48441	2657.59221	2191.43601
10113	10470	10066	2265.1419	2655.78767	2190.88818
10113	10448	10065	2263.13735	2654.71537	2190.56639
10111	10437	10059	2262.2529	2654.20488	2189.79374
10109	10434	10055	2261.91485	2654.07409	2189.78182
10102	10388	10053	2261.80289	2653.14596	2189.68475
10101	10370	10053	2261.04356	2652.47484	2188.98022
10091	10265	10049	2259.80086	2647.33391	2188.32939
10090	10264	10038	2259.24943	2647.07413	2187.99536
10083	10260	10033	2259.03713	2647.07057	2187.77482
10073	10254	10025	2255.25528	2646.19671	2187.56052
10072	10240	10023	2254.804	2645.58656	2187.43518
10071	10215	10018	2254.45591	2645.20561	2186.88602
10067	10201	10017	2254.02406	2644.27253	2185.99656
10063	10178	10016	2253.24515	2644.08415	2185.98766
10058	10130	10014	2252.69648	2641.06778	2185.78459
10055	10110	10011	2252.02533	2640.73576	2185.68692
10049	10109	10008	2251.79516	2638.94085	2184.76784
10048	10108	10007	2250.6874	2636.67038	2184.11214
10038	10056	10006	2250.36234	2634.54939	2184.10581
10033	10031	10001	2248.02091	2633.92431	2183.56315
10032	10013	9997	2247.57789	2632.72564	2183.23891
10031	9987	9990	2246.12276	2631.0648	2183.10004
10031	9978	9990	2245.36477	2630.80402	2180.99824
10028	9973	9988	2242.58901	2630.21991	2180.99525
10028	9894	9987	2241.5709	2626.93156	2180.78444
10026	9834	9986	2240.68824	2626.18476	2179.98711
10022	9771	9983	2240.34668	2624.85569	2179.66005
10016	9764	9975	2239.90651	2622.80802	2179.56279
10012	9745	9963	2239.90496	2622.33808	2179.55503
10007	9718	9961	2239.90386	2621.93452	2179.43053
10006	9668	9958	2239.68417	2620.06138	2179.21993
10004	9602	9956	2238.78539	2619.96426	2179.21175
10004	9581	9947	2238.57349	2619.72045	2178.45089

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
10001	9566	9944	2238.46832	2619.32334	2178.10082
9994	9520	9940	2237.67385	2618.58546	2177.99099
9992	9503	9938	2237.56897	2617.32339	2177.76783
9992	9480	9936	2237.54761	2615.71261	2177.1254
9991	9467	9933	2237.35279	2615.58075	2175.79001
9982	9467	9933	2235.01582	2614.9613	2174.99219
9980	9438	9930	2234.67773	2613.57658	2174.89159
9980	9433	9926	2234.00921	2612.92475	2174.88965
9978	9420	9920	2233.68566	2612.7066	2174.56332
9972	9277	9919	2233.35852	2611.31788	2174.55758
9972	9255	9914	2233.34578	2610.7014	2174.53613
9964	9243	9914	2233.12129	2609.443	2174.44987
9958	9219	9912	2232.79155	2609.18169	2174.41398
9956	9176	9906	2232.23218	2608.91975	2173.19012
9955	9160	9900	2232.01239	2608.6105	2173.1063
9955	9126	9900	2231.79093	2607.57607	2172.77428
9954	9081	9897	2230.78971	2607.09237	2172.77171
9952	9073	9894	2230.23801	2606.79536	2172.45074
9951	9056	9888	2229.56495	2605.1959	2171.87949
9948	9048	9886	2229.45425	2604.91818	2171.67202
9947	9030	9883	2229.2284	2604.79109	2171.42549
9941	9030	9881	2229.12037	2601.43617	2170.98461
9936	9022	9879	2228.90874	2600.91732	2170.57446
9930	8985	9878	2228.90317	2600.5426	2170.45013
9928	8971	9875	2228.78155	2600.05218	2169.87898
9928	8966	9870	2228.5654	2599.44405	2169.54179
9924	8964	9869	2228.11196	2599.17408	2168.88078
9913	8942	9869	2227.13072	2598.93564	2168.19884
9908	8933	9863	2227.12128	2595.19136	2167.98585
9904	8930	9863	2227.00951	2595.04153	2166.66923
9900	8924	9857	2225.45511	2594.43814	2166.663
9897	8902	9854	2225.36972	2594.39403	2166.55801
9896	8891	9853	2224.89972	2594.30889	2166.55714
9895	8879	9852	2224.66922	2593.05083	2165.57762

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9892	8871	9848	2224.34416	2592.98135	2164.89279
9886	8864	9847	2223.55818	2592.17897	2164.88603
9884	8852	9846	2222.78566	2591.48318	2164.53444
9878	8850	9840	2222.33826	2589.66389	2163.65864
9876	8839	9840	2222.0041	2588.17748	2162.77656
9873	8827	9839	2221.89447	2587.57609	2162.14501
9872	8823	9832	2221.34394	2586.83556	2161.66354
9870	8820	9832	2221.00833	2586.82364	2160.55534
9870	8819	9831	2220.67221	2586.2094	2160.55477
9867	8817	9831	2220.56582	2586.16699	2160.44502
9862	8813	9829	2220.44763	2585.92151	2160.42218
9861	8810	9828	2219.90478	2585.03991	2160.31249
9857	8804	9825	2219.89312	2584.82737	2160.20407
9854	8798	9822	2219.66277	2584.17762	2160.0923
9849	8792	9821	2219.45542	2584.05948	2159.88751
9847	8788	9820	2219.01911	2582.1768	2159.76005
9845	8787	9819	2218.12271	2581.91347	2158.19906
9843	8778	9817	2218.11711	2581.43472	2158.09486
9840	8770	9813	2216.78773	2581.43442	2157.87677
9840	8761	9811	2216.77528	2580.04417	2157.87676
9837	8755	9811	2216.10853	2579.16604	2155.87601
9835	8738	9804	2215.45174	2579.06198	2154.76559
9827	8737	9802	2215.34607	2578.42474	2154.66249
9826	8721	9799	2214.89682	2578.42206	2154.42512
9821	8718	9798	2214.11425	2578.30079	2154.33675
9820	8718	9791	2214.00133	2578.29477	2154.20686
9812	8717	9786	2213.89602	2578.17527	2154.09001
9808	8717	9776	2213.6821	2577.70147	2154.08606
9808	8717	9775	2212.67399	2575.31157	2153.9811
9799	8714	9775	2212.6708	2575.04298	2153.76722
9798	8713	9773	2212.56173	2574.55016	2153.19696
9797	8693	9771	2212.45215	2574.52244	2152.87538
9793	8689	9770	2212.11893	2573.94505	2152.7676
9790	8689	9768	2212.11022	2571.18617	2152.5518

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9787	8685	9765	2212.10703	2571.16078	2151.65927
9784	8675	9764	2211.88874	2570.66147	2149.98152
9782	8663	9761	2211.78062	2570.56552	2148.55271
9778	8662	9755	2211.22531	2569.91574	2147.40797
9769	8656	9753	2211.22206	2569.55425	2146.97684
9765	8654	9746	2211.12151	2569.32173	2146.75973
9761	8648	9734	2210.69814	2569.15107	2146.65565
9760	8641	9731	2210.67327	2569.06095	2146.2043
9757	8641	9729	2210.6702	2568.03574	2146.08045
9754	8637	9727	2210.56251	2567.44539	2145.98265
9749	8634	9725	2210.18452	2567.2925	2145.76539
9745	8610	9723	2210.11975	2566.91272	2145.66008
9741	8606	9722	2210.01297	2566.25026	2145.65924
9741	8604	9710	2209.98709	2566.15929	2145.44208
9735	8601	9699	2209.89293	2565.31273	2145.28592
9733	8597	9698	2209.66754	2565.29165	2144.86724
9732	8591	9697	2209.55672	2563.78083	2144.7738
9732	8591	9695	2209.33585	2563.55612	2144.65953
9724	8582	9690	2209.33559	2562.78216	2144.54856
9723	8580	9678	2209.13363	2562.41572	2144.08684
9723	8576	9677	2208.67253	2562.29878	2143.76126
9720	8576	9677	2208.55813	2562.28577	2143.65588
9719	8570	9676	2208.13925	2562.26592	2143.43669
9717	8570	9676	2208.11174	2562.16264	2141.86825
9716	8564	9675	2208.11098	2562.03883	2141.69877
9716	8562	9675	2208.00327	2560.52543	2141.53974
9714	8562	9674	2207.77816	2560.41478	2141.29115
9713	8557	9667	2207.66744	2560.25313	2140.33108
9712	8550	9667	2207.22285	2559.76647	2139.65126
9711	8541	9666	2206.88851	2558.02459	2138.64366
9709	8538	9665	2206.66087	2557.68755	2137.6538
9706	8533	9660	2206.22844	2557.17461	2137.61502
9705	8526	9660	2206.11273	2556.29781	2136.96931
9704	8519	9655	2205.77003	2555.77923	2136.53811

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9701	8514	9652	2205.4273	2555.67965	2136.3377
9701	8512	9652	2205.10866	2555.52258	2135.97634
9699	8504	9652	2205.06553	2555.45587	2135.30007
9699	8503	9647	2204.66264	2554.64953	2134.86631
9696	8501	9645	2204.55712	2554.41741	2134.75723
9687	8501	9637	2203.99952	2554.40847	2134.65536
9684	8494	9636	2203.99363	2553.39409	2134.54718
9680	8493	9634	2203.55848	2553.17451	2133.96695
9679	8491	9634	2203.55251	2552.90159	2133.75096
9676	8488	9622	2203.44844	2552.51123	2132.96804
9675	8483	9622	2203.08345	2552.16148	2132.8692
9674	8481	9610	2203.0082	2550.92479	2132.8666
9673	8481	9600	2202.99142	2550.90661	2132.5497
9672	8479	9589	2202.89473	2550.16372	2131.65179
9671	8473	9589	2202.6636	2549.40599	2131.53772
9670	8469	9587	2201.99976	2549.16278	2130.95262
9666	8463	9583	2201.88986	2549.15869	2130.8691
9663	8463	9582	2201.66485	2549.15839	2130.75564
9659	8463	9573	2201.55502	2549.14819	2130.70998
9656	8461	9573	2201.55201	2549.03405	2130.65594
9655	8460	9572	2201.44756	2548.7949	2130.64089
9655	8460	9567	2201.00901	2548.77609	2130.55056
9649	8459	9567	2200.78326	2548.67306	2130.53602
9645	8453	9566	2200.76767	2548.65996	2130.51826
9645	8450	9564	2200.43674	2548.65294	2130.44368
9642	8447	9564	2199.77851	2548.28532	2129.98523
9637	8445	9564	2199.6654	2548.15978	2129.98396
9635	8441	9562	2199.23037	2547.91386	2129.96151
9633	8440	9561	2199.11078	2547.64561	2129.7644
9632	8438	9561	2198.64853	2547.29608	2129.76067
9631	8435	9555	2198.33433	2546.89977	2129.29532
9629	8433	9547	2198.21384	2546.81726	2129.08586
9629	8426	9542	2197.99285	2546.41358	2128.84178
9625	8418	9540	2197.98207	2545.89518	2128.65507

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9620	8415	9536	2197.77651	2545.79102	2128.59889
9619	8412	9534	2197.3371	2544.66667	2128.55129
9618	8409	9534	2197.33341	2544.50411	2128.39552
9615	8407	9532	2196.77564	2544.15457	2127.977
9612	8400	9527	2196.32012	2544.03203	2127.8598
9607	8393	9526	2196.21203	2544.02906	2127.76564
9606	8385	9512	2196.11207	2543.77064	2127.18489
9604	8383	9510	2195.66389	2543.71918	2127.08663
9601	8363	9506	2194.998	2543.41526	2126.86245
9599	8363	9499	2194.88861	2542.15385	2126.74156
9599	8361	9497	2194.45394	2541.90448	2125.65357
9596	8360	9496	2194.22902	2541.90294	2125.64972
9583	8359	9494	2194.21244	2541.28461	2125.5514
9580	8352	9487	2194.12711	2541.26939	2125.29735
9579	8351	9487	2193.88759	2540.91061	2125.17916
9579	8349	9483	2193.88627	2540.29503	2125.17207
9577	8348	9483	2193.76739	2540.27396	2123.56237
9573	8348	9481	2193.65925	2539.78714	2123.42349
9573	8347	9479	2193.6566	2539.29167	2122.96791
9568	8347	9478	2193.63835	2539.02673	2122.76231
9567	8341	9478	2193.44498	2538.90698	2122.38639
9554	8338	9476	2193.44121	2538.89727	2121.86258
9554	8337	9473	2193.33545	2538.02825	2121.49647
9552	8336	9466	2193.17206	2537.77979	2121.43302
9552	8336	9465	2192.85772	2536.90163	2121.40511
9551	8333	9458	2192.2225	2536.41269	2121.18291
9542	8333	9453	2192.1068	2536.4056	2121.07882
9540	8331	9450	2192.10505	2535.3968	2121.06995
9539	8328	9450	2191.00557	2535.15607	2120.8647
9536	8318	9448	2190.96155	2535.14902	2120.76252
9536	8306	9441	2190.88057	2535.02678	2120.64445
9534	8298	9434	2190.76583	2534.39519	2120.56594
9533	8295	9427	2190.53593	2534.27823	2120.48978
9529	8294	9422	2190.34258	2534.15606	2119.43414

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9527	8292	9420	2190.22156	2533.90259	2119.07368
9521	8289	9418	2190.21616	2533.76951	2119.07098
9518	8282	9418	2190.2125	2533.73699	2118.96855
9517	8262	9417	2189.99192	2533.52899	2118.9654
9517	8260	9416	2189.88555	2533.52892	2118.54013
9505	8259	9416	2189.77288	2533.51157	2118.08664
9500	8257	9414	2189.76254	2533.15376	2117.86337
9498	8256	9410	2189.33423	2532.78213	2117.84591
9491	8250	9402	2188.87995	2532.51737	2116.96186
9485	8249	9401	2188.55314	2532.26972	2116.7619
9482	8248	9400	2188.53687	2532.13165	2116.64952
9480	8241	9399	2188.4449	2532.00708	2116.28426
9472	8240	9397	2188.42871	2531.79428	2116.07289
9471	8240	9390	2188.09253	2531.65483	2115.94887
9470	8236	9388	2187.88499	2531.40855	2115.74935
9467	8231	9385	2187.88446	2531.38608	2115.17401
9463	8227	9382	2187.88373	2531.27775	2114.97782
9463	8227	9381	2187.78067	2529.77072	2114.96335
9461	8225	9377	2187.76964	2529.27364	2114.54589
9460	8223	9375	2187.31242	2529.20238	2114.33018
9459	8216	9361	2186.88381	2529.1549	2114.07454
9457	8213	9349	2186.87244	2529.14594	2113.86306
9448	8210	9347	2186.5586	2528.64196	2113.8582
9448	8210	9345	2186.54953	2528.27577	2113.85579
9443	8209	9343	2185.99254	2528.15088	2113.76312
9442	8208	9340	2185.9826	2528.03762	2112.96676
9439	8208	9339	2185.66511	2527.65206	2112.6465
9437	8207	9326	2185.64106	2527.40043	2112.07425
9434	8205	9325	2185.55469	2527.38301	2111.75194
9427	8204	9320	2185.31814	2527.01692	2111.32965
9422	8202	9308	2185.31555	2526.89914	2111.09326
9421	8201	9297	2185.0947	2526.77137	2110.80806
9418	8199	9290	2184.99335	2526.7664	2110.16548
9412	8196	9280	2184.66197	2526.02403	2109.7561

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9412	8194	9274	2184.66158	2526.02296	2109.64971
9409	8194	9273	2184.53886	2525.76814	2109.17381
9406	8191	9272	2184.42146	2525.53821	2107.85568
9405	8189	9263	2184.00023	2525.02385	2107.75278
9405	8187	9262	2183.76638	2524.90752	2107.54375
9402	8184	9258	2182.76274	2524.52643	2107.38535
9401	8184	9255	2182.09477	2524.26555	2106.96626
9397	8181	9254	2182.00531	2524.15025	2106.86338
9396	8181	9250	2181.88788	2524.14407	2106.85284
9395	8178	9243	2181.88242	2524.02188	2106.54448
9394	8174	9236	2181.88081	2523.52034	2105.85361
9390	8173	9233	2181.87198	2523.04059	2105.75051
9388	8173	9225	2181.87069	2522.75734	2105.54102
9387	8170	9225	2181.7655	2522.50987	2105.28418
9377	8170	9225	2181.7651	2522.40642	2105.26411
9376	8169	9224	2181.76459	2521.80503	2104.53919
9376	8169	9222	2181.11013	2521.37689	2104.17409
9376	8163	9220	2181.09651	2520.89403	2103.85622
9370	8157	9218	2180.99022	2520.67846	2103.84878
9369	8153	9218	2180.8881	2519.51378	2103.64721
9368	8146	9211	2180.88143	2518.64078	2103.64374
9365	8145	9204	2180.66341	2518.52941	2103.64313
9360	8139	9203	2179.43809	2518.38983	2102.962
9358	8137	9202	2179.22221	2518.27426	2102.75081
9357	8133	9196	2179.19889	2517.91817	2102.64204
9356	8132	9196	2178.98232	2516.17322	2102.63847
9351	8132	9180	2178.76665	2516.01599	2102.63751
9348	8131	9162	2178.67123	2515.64391	2102.43378
9348	8131	9161	2178.54377	2515.53222	2101.6532
9342	8129	9159	2178.22184	2515.39705	2101.5421
9341	8124	9158	2178.17858	2515.38904	2101.53857
9341	8123	9154	2177.99661	2515.13226	2101.48064
9339	8120	9151	2177.66947	2514.89188	2100.85598
9339	8120	9150	2177.31261	2514.52137	2100.7451

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9337	8119	9147	2177.20486	2514.39633	2100.6492
9337	8118	9144	2177.20082	2514.39456	2100.64408
9334	8117	9140	2177.12456	2514.03115	2100.6403
9334	8117	9129	2177.11392	2514.00769	2100.38104
9333	8113	9095	2176.89117	2513.25395	2099.63663
9333	8111	9094	2176.87995	2513.15044	2099.53844
9332	8110	9094	2176.66363	2512.8912	2098.95818
9328	8109	9092	2175.87941	2512.656	2098.95535
9328	8107	9084	2175.76325	2512.51591	2098.16759
9326	8107	9079	2175.76022	2512.38219	2097.84769
9326	8105	9078	2175.64379	2512.14454	2097.7452
9317	8096	9068	2175.443	2512.00936	2097.64352
9314	8094	9066	2175.43614	2511.89883	2096.42937
9311	8093	9064	2175.43055	2511.88679	2096.42857
9311	8092	9060	2175.42832	2511.77711	2096.1612
9308	8091	9051	2174.9895	2511.50424	2096.06121
9307	8090	9040	2174.88578	2511.28659	2096.06049
9306	8088	9034	2174.8742	2511.02088	2095.95232
9303	8086	9028	2174.7696	2510.52457	2095.64203
9303	8081	9026	2174.44184	2510.00727	2095.53955
9300	8081	9023	2174.31407	2509.90038	2095.5281
9299	8079	9021	2173.77681	2509.76968	2095.3342
9295	8072	9020	2173.76862	2509.14649	2095.1641
9295	8071	9014	2173.65708	2508.88726	2094.86123
9292	8070	9012	2173.54503	2508.76652	2094.84929
9292	8064	9011	2173.44622	2508.64359	2094.53651
9289	8061	9008	2173.32717	2508.13544	2094.37653
9286	8060	9007	2172.67268	2508.00089	2094.275
9285	8057	9006	2172.65405	2507.88423	2094.16445
9284	8053	9005	2172.52261	2507.63715	2093.95564
9283	8048	9002	2172.43936	2507.52199	2093.64091
9277	8048	9002	2172.43336	2507.14094	2093.05915
9274	8045	9002	2172.20078	2506.88964	2092.16356
9271	8041	8995	2172.0949	2506.28474	2091.64536

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9263	8034	8992	2171.54504	2506.26422	2091.62959
9261	8033	8991	2171.44844	2506.26221	2091.52036
9261	8031	8990	2171.4112	2506.1529	2091.36954
9260	8026	8988	2171.09455	2505.8858	2091.16136
9259	8026	8988	2171.09396	2505.86397	2090.73997
9258	8025	8987	2170.98529	2505.80277	2090.64303
9258	8017	8982	2170.76955	2505.75865	2090.64152
9257	8017	8981	2170.65704	2505.63968	2090.53861
9255	8016	8978	2170.65549	2505.13622	2090.48001
9253	8015	8978	2170.64625	2504.89091	2090.22537
9251	8010	8973	2170.56793	2504.88752	2090.07016
9250	8007	8970	2170.55298	2504.86556	2090.06163
9250	8006	8967	2170.09054	2504.52158	2089.9545
9248	8005	8966	2170.00258	2504.50636	2089.75341
9242	8001	8964	2169.77023	2504.25328	2089.64125
9241	7999	8957	2169.65823	2504.11478	2088.63419
9230	7998	8955	2169.65205	2504.02649	2088.61918
9227	7998	8953	2169.08244	2503.88467	2088.32692
9223	7997	8950	2168.87808	2503.76457	2087.68767
9219	7996	8948	2168.77619	2503.64082	2087.42292
9217	7996	8938	2168.55151	2503.51209	2087.2672
9216	7994	8937	2168.54529	2502.74696	2086.95717
9215	7993	8935	2168.53977	2502.49365	2086.95279
9212	7993	8933	2168.53491	2502.38223	2086.74968
9211	7991	8933	2168.43955	2502.26081	2086.63719
9210	7987	8925	2168.41552	2502.14439	2086.36278
9210	7986	8923	2167.98997	2502.13661	2086.32594
9209	7986	8911	2167.98444	2502.13464	2086.027
9208	7985	8910	2167.88077	2502.01523	2085.96781
9208	7983	8905	2167.54697	2502.0011	2085.95459
9204	7983	8902	2167.42921	2501.63434	2085.8514
9201	7980	8898	2167.42372	2501.62952	2085.84036
9201	7980	8895	2167.22655	2501.56115	2085.16596
9200	7972	8890	2167.22327	2501.52685	2085.14981

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9198	7965	8888	2166.75815	2501.38782	2084.84576
9192	7965	8884	2166.52623	2501.26424	2084.37795
9189	7964	8883	2166.09111	2501.25995	2084.32448
9186	7964	8882	2165.87787	2500.89006	2084.27548
9185	7961	8881	2165.86524	2500.88902	2084.16235
9178	7961	8878	2165.76052	2500.51264	2084.15461
9177	7961	8876	2165.42007	2500.37979	2084.10954
9171	7957	8870	2165.30042	2500.26813	2084.05654
9170	7956	8870	2165.20409	2500.14375	2083.63676
9170	7953	8868	2164.98678	2500.13398	2083.06254
9169	7951	8865	2164.97668	2499.89694	2082.84761
9162	7951	8862	2164.85762	2499.66426	2082.64026
9162	7949	8859	2164.42523	2499.5157	2082.63912
9157	7947	8842	2164.42118	2499.13645	2081.74193
9157	7946	8839	2164.22354	2498.88949	2081.62975
9156	7946	8838	2163.887	2498.7622	2081.62685
9148	7945	8837	2163.65494	2498.25932	2081.62552
9148	7943	8834	2163.54707	2498.13354	2081.53887
9145	7942	8823	2163.52032	2497.63555	2081.15921
9143	7941	8823	2163.19591	2497.38332	2080.74305
9143	7939	8821	2163.19044	2497.26472	2080.63449
9142	7938	8817	2162.98423	2497.2591	2080.56044
9142	7938	8814	2162.77106	2497.00919	2080.15704
9140	7937	8814	2162.54969	2496.63357	2080.05563
9139	7935	8808	2162.43909	2496.03508	2080.05342
9131	7933	8807	2161.87098	2496.01304	2079.75377
9130	7933	8799	2161.8656	2495.87659	2079.6309
9128	7933	8793	2161.76681	2495.87336	2079.42858
9127	7932	8791	2161.65002	2495.73286	2079.2187
9126	7931	8778	2161.39699	2495.51954	2079.05289
9125	7930	8778	2161.31974	2495.40176	2078.95292
9123	7928	8778	2160.966	2495.39464	2078.92964
9123	7927	8773	2160.86875	2495.13868	2078.8447
9123	7918	8766	2160.83852	2494.87565	2078.8425

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9120	7917	8763	2160.77945	2494.78157	2078.74255
9111	7915	8761	2160.77303	2494.51091	2078.73882
9111	7915	8760	2160.76482	2494.27045	2078.63545
9108	7914	8760	2160.65641	2493.641	2078.25864
9108	7914	8757	2160.43476	2493.50566	2077.7398
9106	7913	8756	2160.41154	2493.49725	2077.53242
9102	7912	8756	2160.18473	2493.39218	2077.14651
9100	7912	8754	2159.98555	2493.2746	2076.9513
9100	7911	8750	2159.98071	2493.25213	2076.9484
9100	7911	8744	2159.97683	2493.24397	2076.94143
9098	7910	8741	2159.87697	2493.11189	2076.74115
9096	7908	8739	2159.76711	2492.88974	2076.64962
9096	7907	8737	2159.76682	2492.77323	2076.63762
9096	7906	8725	2159.74999	2492.77193	2076.53379
9086	7906	8724	2159.65819	2492.3804	2076.21686
9085	7906	8722	2159.64262	2492.37756	2076.16138
9084	7902	8719	2159.54297	2492.37714	2076.15112
9081	7893	8718	2159.54098	2492.28532	2075.84575
9080	7893	8712	2159.33097	2492.13556	2075.73972
9079	7891	8709	2159.30219	2491.89822	2075.6442
9071	7891	8704	2158.87291	2491.74714	2075.15666
9070	7890	8703	2158.86484	2491.25694	2074.25706
9066	7889	8696	2158.65566	2491.256	2074.15015
9064	7889	8694	2158.53777	2491.01793	2073.94203
9053	7888	8690	2158.44184	2490.63739	2073.63052
9049	7887	8689	2157.98078	2490.40396	2073.52696
9042	7887	8687	2157.86724	2490.3754	2073.51878
9033	7886	8687	2157.86081	2490.00989	2073.21972
9032	7886	8681	2157.75695	2490.0016	2073.14982
9026	7884	8679	2157.42296	2489.50455	2072.94465
9022	7882	8677	2157.08471	2489.15659	2072.94351
9018	7881	8676	2157.08465	2488.88207	2072.74135
9016	7879	8675	2156.99552	2488.49879	2072.62106
9014	7879	8672	2156.86852	2488.38111	2071.8428

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
9009	7878	8671	2156.86372	2488.25564	2071.83876
9005	7877	8671	2156.75975	2487.7527	2071.25661
8999	7877	8670	2156.43758	2487.63349	2070.98223
8987	7877	8670	2155.99519	2487.52039	2070.95658
8984	7877	8668	2155.85746	2487.40031	2070.7377
8982	7876	8664	2155.65402	2487.38515	2070.66928
8981	7875	8661	2155.65085	2487.38155	2070.57915
8974	7870	8660	2155.44791	2487.37636	2070.52163
8974	7866	8660	2155.40335	2487.26782	2069.06558
8971	7864	8656	2154.98142	2487.25621	2068.94903
8965	7864	8656	2154.96028	2487.1295	2068.83324
8965	7864	8648	2154.88351	2486.87528	2068.74088
8959	7863	8647	2154.87431	2486.64459	2068.63288
8957	7863	8638	2154.8725	2486.28194	2068.53305
8956	7862	8636	2154.76506	2486.13326	2068.44188
8950	7862	8634	2154.64821	2486.12806	2068.21906
8947	7861	8624	2154.54958	2485.87519	2067.63834
8946	7860	8623	2154.08181	2485.86841	2067.63482
8941	7860	8621	2154.08167	2485.75101	2067.52676
8941	7852	8621	2154.08132	2485.50099	2067.42581
8940	7849	8619	2153.98476	2485.25375	2067.15502
8933	7849	8617	2153.86115	2485.25111	2067.14403
8932	7847	8608	2153.76959	2485.12975	2066.94503
8926	7846	8603	2153.76171	2484.98201	2066.73743
8920	7844	8598	2153.54292	2484.12013	2066.73308
8915	7844	8597	2153.54124	2483.51764	2066.63725
8911	7840	8592	2153.09411	2483.50106	2066.6342
8908	7840	8590	2152.97913	2482.47175	2066.63241
8906	7837	8584	2152.86991	2482.38035	2066.53738
8903	7837	8574	2152.79458	2482.37822	2066.53313
8898	7835	8573	2152.75492	2482.25227	2066.36286
8897	7834	8572	2152.75162	2482.13098	2066.17212
8893	7833	8571	2152.6597	2482.12008	2065.94407
8879	7831	8568	2152.65443	2481.49357	2065.83335

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
8878	7831	8567	2152.65431	2481.23304	2065.75434
8872	7830	8559	2152.62014	2480.8781	2065.74775
8870	7825	8559	2152.54081	2480.62658	2065.73477
8870	7825	8556	2152.3277	2480.24869	2065.72347
8866	7822	8550	2152.30408	2480.1398	2065.412
8863	7822	8548	2152.08562	2479.98946	2064.73903
8848	7822	8533	2152.07974	2479.87669	2064.63113
8848	7821	8532	2151.97699	2479.76308	2064.55401
8845	7820	8524	2151.55068	2479.74782	2064.53721
8843	7820	8523	2151.51305	2479.37865	2064.15176
8839	7819	8523	2151.19633	2479.3757	2064.14593
8838	7819	8523	2151.08035	2479.34885	2063.93367
8836	7815	8520	2150.97506	2479.01098	2063.84334
8830	7815	8520	2150.95984	2478.87744	2063.8379
8818	7813	8517	2150.8635	2478.74625	2063.62943
8804	7810	8517	2150.65138	2478.36785	2063.62574
8801	7809	8515	2150.51803	2478.12726	2063.53286
8800	7808	8512	2150.41475	2477.2406	2063.43465
8789	7807	8509	2150.29068	2476.63111	2063.42533
8784	7806	8507	2150.22004	2476.25495	2063.31968
8782	7806	8502	2150.07741	2476.12875	2063.1621
8778	7804	8501	2150.07604	2476.10992	2063.06586
8777	7801	8499	2149.87637	2475.99269	2062.93802
8777	7801	8499	2149.7554	2475.61689	2062.74316
8770	7799	8495	2149.6185	2475.25184	2062.52565
8764	7791	8485	2149.54947	2475.25095	2062.45171
8763	7790	8472	2149.5408	2475.249	2061.25103
8750	7790	8467	2149.31405	2475.24557	2060.93949
8740	7790	8457	2149.30516	2475.00072	2060.5322
8731	7789	8455	2149.29373	2474.75612	2060.37384
8724	7788	8453	2149.28404	2474.49734	2060.14425
8722	7785	8446	2149.08695	2474.49616	2060.04268
8719	7783	8445	2149.00019	2474.24929	2059.83677
8717	7782	8443	2148.8728	2474.24813	2058.94728

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
8714	7772	8442	2148.86626	2474.24235	2058.94057
8704	7771	8438	2148.86408	2474.17834	2058.93669
8699	7768	8437	2148.84523	2474.13976	2058.83988
8699	7767	8433	2148.79917	2474.00343	2058.73134
8694	7757	8428	2148.75937	2473.9996	2058.14681
8692	7753	8428	2148.66528	2473.87508	2058.05005
8685	7753	8426	2148.65311	2473.75369	2058.04042
8681	7751	8422	2148.65115	2473.37032	2058.03696
8676	7751	8419	2148.54877	2473.36991	2057.83488
8675	7749	8417	2148.54273	2472.88022	2057.64728
8673	7746	8417	2148.44284	2472.62814	2057.63528
8667	7744	8416	2148.19135	2472.3754	2057.53109
8666	7741	8415	2148.09012	2472.24676	2056.93152
8664	7740	8415	2148.0545	2472.13137	2056.8466
8648	7737	8412	2147.97196	2472.12511	2056.73466
8644	7732	8412	2147.85956	2471.9974	2056.73382
8639	7730	8406	2147.66549	2471.87724	2056.63386
8636	7730	8404	2147.63888	2471.64438	2055.83412
8636	7729	8403	2147.55647	2471.48636	2055.73507
8634	7729	8403	2147.4055	2471.36438	2055.24915
8623	7724	8403	2147.2056	2471.24794	2055.03678
8606	7722	8402	2146.9727	2471.1246	2054.84115
8601	7720	8398	2146.97215	2470.74355	2054.73423
8599	7719	8396	2146.66296	2470.37839	2054.34714
8595	7716	8395	2146.54192	2470.00031	2053.75454
8579	7716	8393	2146.54105	2469.74111	2053.73687
8571	7713	8393	2146.43253	2469.48193	2053.73628
8567	7713	8388	2146.39033	2469.4067	2053.52964
8560	7711	8387	2146.19748	2469.37798	2053.52793
8554	7711	8384	2146.08453	2469.36596	2053.14473
8553	7710	8384	2145.98295	2469.1235	2052.82485
8551	7710	8382	2145.86358	2468.9994	2052.82457
8551	7709	8376	2145.76455	2468.99926	2052.62921
8548	7707	8375	2145.64363	2468.73994	2052.6283

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
8543	7705	8370	2145.08343	2468.61998	2052.61961
8539	7703	8366	2144.98811	2468.3753	2052.52933
8535	7701	8366	2144.97672	2468.12546	2052.52229
8534	7696	8366	2144.96271	2467.61372	2052.31902
8524	7693	8364	2144.86598	2467.49708	2052.13833
8515	7688	8362	2144.77107	2467.38091	2052.05141
8512	7684	8360	2144.7614	2466.9951	2051.9438
8507	7677	8357	2144.76084	2466.88113	2051.6344
8505	7676	8356	2144.75971	2466.23787	2051.6212
8505	7676	8355	2144.64924	2466.12046	2051.45585
8503	7675	8351	2144.6443	2465.99293	2050.53032
8492	7673	8351	2144.28995	2465.48611	2050.52884
8488	7668	8348	2144.18169	2464.75177	2050.52749
8479	7666	8347	2144.08949	2464.39656	2050.43312
8478	7665	8338	2144.08375	2464.24413	2050.24269
8475	7663	8338	2143.86604	2463.88274	2050.21242
8471	7660	8335	2143.75943	2463.36757	2050.14147
8463	7659	8334	2143.66521	2463.34566	2050.04795
8462	7659	8334	2143.65536	2463.00372	2050.04725
8449	7658	8328	2143.65473	2462.88714	2049.93899
8427	7655	8322	2143.65272	2462.36594	2049.93662
8424	7655	8322	2143.42951	2462.36432	2049.9355
8422	7650	8320	2143.39033	2461.87508	2049.92337
8415	7646	8313	2143.2922	2460.99679	2049.86369
8406	7644	8313	2143.27388	2460.13315	2049.83331
8401	7643	8306	2142.97258	2460.10177	2049.83056
8401	7642	8301	2142.97068	2460.00607	2049.7331
8401	7640	8300	2142.96656	2459.86336	2049.63677
8391	7640	8300	2142.85466	2459.49935	2049.62671
8389	7640	8298	2142.63901	2459.48248	2049.32101
8387	7637	8296	2142.30929	2459.47882	2049.03252
8382	7636	8295	2142.18316	2459.37651	2048.83351
8381	7634	8294	2142.14023	2459.24116	2048.83137
8373	7631	8290	2142.05983	2459.11322	2048.65084

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
8373	7630	8289	2141.98346	2459.00742	2048.63025
8371	7629	8289	2141.97465	2458.87962	2048.52937
8371	7626	8284	2141.86422	2458.72901	2048.5258
8367	7626	8280	2141.86214	2458.4997	2048.41936
8367	7625	8280	2141.6671	2458.13165	2048.31817
8365	7625	8280	2141.64741	2458.12751	2048.14259
8355	7624	8275	2141.54682	2457.86905	2048.13717
8348	7624	8272	2141.4053	2457.74269	2047.82724
8344	7623	8269	2141.32783	2457.62471	2047.72895
8343	7618	8269	2141.00087	2457.38519	2047.72389
8342	7618	8268	2140.98972	2456.23775	2047.62977
8338	7612	8267	2140.8633	2455.99587	2047.62737
8337	7612	8263	2140.65826	2455.99375	2047.62707
8336	7610	8261	2140.65374	2455.87644	2047.14703
8334	7608	8257	2140.43536	2455.74851	2046.92377
8332	7605	8257	2140.43218	2455.73282	2046.83403
8332	7604	8257	2139.96572	2455.36901	2046.52348
8331	7604	8256	2139.75725	2454.98702	2045.94076
8323	7603	8253	2139.65798	2454.62801	2045.93632
8315	7603	8251	2139.65699	2454.48473	2045.63174
8314	7603	8247	2139.41779	2454.2321	2045.32062
8312	7602	8246	2139.18365	2454.20285	2045.24018
8308	7602	8243	2139.07663	2453.99781	2045.04998
8306	7599	8242	2138.97225	2453.74685	2045.03677
8306	7598	8240	2138.97112	2453.72738	2045.0288
8305	7596	8239	2138.96919	2453.7237	2044.75015
8304	7595	8230	2138.74886	2453.48725	2044.72634
8301	7587	8227	2138.65124	2453.24601	2044.65349
8300	7587	8227	2138.54531	2453.00197	2044.54054
8297	7584	8226	2138.44483	2452.7689	2044.52126
8296	7584	8224	2138.42038	2452.49085	2044.42044
8294	7584	8224	2138.07855	2452.47453	2044.23867
8292	7583	8222	2137.97165	2452.11399	2044.05871
8287	7579	8221	2137.96819	2451.98365	2043.92911

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
8286	7575	8220	2137.86558	2451.63054	2043.83661
8285	7574	8220	2137.86067	2450.9911	2043.73033
8284	7573	8218	2137.76041	2450.36524	2043.72951
8281	7570	8217	2137.75612	2450.11534	2043.72881
8278	7570	8215	2137.65448	2450.10027	2043.63266
8277	7570	8212	2137.6442	2449.99925	2043.05539
8276	7569	8212	2137.41156	2449.99087	2042.83309
8276	7564	8212	2137.38344	2449.74585	2042.73428
8271	7564	8212	2137.17653	2449.3737	2042.62756
8267	7562	8211	2136.86311	2449.24406	2042.52827
8266	7560	8209	2136.75839	2449.24117	2042.42477
8265	7557	8209	2136.75676	2449.23573	2042.41335
8264	7552	8207	2136.64529	2449.23492	2042.13244
8261	7550	8202	2136.64189	2449.23321	2042.13101
8260	7548	8197	2136.54091	2449.11245	2042.03908
8260	7547	8193	2136.20162	2449.11174	2041.83304
8257	7547	8193	2135.96361	2448.82377	2041.73182
8256	7546	8192	2135.75602	2448.62637	2041.53031
8255	7546	8189	2135.75246	2448.45877	2041.42131
8254	7543	8187	2135.53555	2448.37306	2041.34059
8253	7538	8187	2135.32119	2448.24206	2041.10874
8252	7536	8186	2135.16193	2447.98737	2040.93145
8247	7536	8184	2134.96695	2447.41321	2040.51683
8243	7536	8180	2134.86195	2447.22634	2040.42107
8242	7534	8168	2134.85885	2447.0896	2040.31853
8237	7534	8167	2134.83611	2446.86357	2039.94522
8232	7532	8167	2134.74979	2446.62576	2039.25255
8231	7530	8165	2134.66277	2446.59763	2038.72905
8229	7530	8165	2134.65749	2446.35118	2038.64754
8229	7528	8165	2134.6541	2446.23243	2038.03705
8227	7525	8161	2134.53609	2445.97097	2037.74062
8225	7514	8158	2134.16772	2445.47023	2037.72113
8222	7511	8156	2134.08378	2445.34327	2036.93189
8220	7505	8149	2134.06223	2444.74744	2036.83003

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
8220	7504	8149	2133.96304	2444.50308	2036.72892
8219	7500	8149	2133.96238	2444.25253	2036.62169
8218	7499	8148	2133.95694	2444.10129	2036.61616
8215	7492	8147	2133.89765	2444.09513	2036.42064
8214	7491	8143	2133.87804	2443.88526	2035.72799
8213	7490	8141	2133.75601	2443.74771	2035.23282
8212	7488	8138	2133.7166	2443.74363	2034.9294
8211	7488	8137	2133.64531	2443.62451	2034.72959
8210	7487	8134	2133.41232	2443.59726	2034.51838
8210	7486	8134	2133.32235	2443.47071	2034.41055
8206	7486	8129	2133.16989	2442.74906	2034.33668
8205	7485	8127	2132.98018	2442.73979	2034.23359
8202	7481	8123	2132.96616	2442.47624	2034.13546
8197	7481	8118	2132.85802	2442.47022	2033.92595
8194	7476	8114	2132.85796	2442.35979	2033.92295
8194	7476	8111	2132.85661	2442.11185	2033.81941
8193	7475	8107	2132.74666	2442.08764	2033.71572
8190	7474	8104	2132.71786	2441.86973	2033.71223
8189	7472	8099	2132.65006	2441.84306	2033.62287
8188	7472	8098	2132.53923	2441.11229	2033.61852
8185	7471	8096	2132.32927	2440.987	2033.4181
8184	7470	8095	2132.2859	2440.97338	2033.34145
8184	7470	8092	2132.07176	2440.86918	2033.13291
8184	7469	8090	2131.85732	2440.59438	2033.12961
8182	7469	8090	2131.85102	2440.46809	2032.93263
8182	7468	8089	2131.75817	2440.32161	2032.83119
8180	7467	8089	2131.73901	2440.21661	2032.72331
8179	7467	8088	2131.64228	2439.86671	2032.42039
8176	7467	8083	2131.49268	2439.84041	2032.22898
8176	7464	8079	2130.96808	2439.74319	2031.82723
8175	7462	8078	2130.95224	2439.61818	2031.82439
8175	7461	8075	2130.85429	2439.22881	2031.62711
8174	7456	8071	2130.85216	2439.11011	2031.42171
8172	7456	8071	2130.65115	2438.98392	2031.02784

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
8166	7455	8069	2130.55452	2438.86975	2030.91752
8163	7451	8068	2130.40275	2438.86807	2030.82318
8162	7447	8067	2130.20006	2438.86284	2030.72603
8161	7446	8066	2129.96591	2438.85512	2030.61821
8160	7443	8064	2129.85931	2438.7429	2030.52116
8160	7443	8062	2129.75296	2438.71396	2030.4211
8160	7439	8061	2129.74881	2437.74212	2030.42079
8160	7439	8056	2129.40844	2437.35474	2030.40726
8157	7439	8053	2129.28355	2437.13723	2030.0253
8157	7438	8052	2129.1777	2436.49631	2029.9257
8156	7436	8052	2128.75695	2436.47659	2029.91825
8156	7429	8051	2128.75491	2436.4658	2029.72309
8154	7427	8051	2128.55816	2436.34303	2029.61882
8150	7426	8051	2128.54051	2435.86864	2029.51928
8148	7425	8044	2128.53345	2435.34312	2029.51877
8148	7422	8040	2128.27354	2434.10173	2029.21963
8145	7422	8040	2128.19623	2433.98766	2028.92778
8144	7420	8036	2127.97517	2433.22762	2028.82979
8141	7419	8033	2127.96656	2432.75674	2028.6234
8141	7419	8030	2127.85879	2432.74057	2028.6224
8139	7417	8030	2127.75221	2431.9817	2028.41703
8138	7416	8025	2127.54604	2431.86198	2028.13277
8137	7413	8024	2127.52915	2431.73962	2028.02515
8137	7412	8024	2127.48568	2431.58835	2027.83443
8133	7412	8023	2127.43918	2430.61932	2027.82501
8132	7412	8020	2127.28592	2430.34812	2027.61379
8132	7411	8020	2126.96832	2429.94301	2027.50857
8131	7411	8015	2126.7541	2428.85445	2027.45898
8131	7411	8010	2126.53732	2428.72278	2026.91907
8130	7409	8007	2126.17713	2428.71474	2026.73163
8127	7406	8004	2126.05983	2428.61704	2026.72314
8126	7403	8003	2125.96951	2428.38458	2026.52223
8122	7402	8002	2125.96517	2428.36778	2026.42555
8120	7400	8002	2125.84596	2428.34708	2026.12659

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
8117	7395	8001	2125.54036	2428.10421	2025.72021
8115	7394	7993	2125.53506	2427.83781	2025.62193
8114	7392	7990	2125.429	2427.7433	2025.23347
8113	7392	7987	2125.29866	2427.09984	2024.82532
8113	7392	7983	2125.19561	2426.9762	2024.82391
8113	7390	7983	2125.17677	2426.73651	2024.70149
8112	7390	7980	2124.96753	2426.35336	2023.82162
8111	7389	7978	2124.96008	2425.99082	2023.71597
8111	7388	7978	2124.86351	2425.62308	2023.62307
8111	7387	7978	2124.75034	2425.489	2023.62162
8108	7385	7978	2124.74616	2424.99397	2023.61911
8107	7385	7977	2124.64594	2424.34542	2023.51599
8106	7383	7970	2124.29079	2423.22237	2023.41581
8106	7380	7969	2124.25594	2422.99519	2022.92355
8105	7377	7967	2124.17709	2422.95837	2022.62243
8104	7376	7966	2124.16027	2422.86554	2022.52035
8103	7375	7965	2124.09334	2422.3267	2022.40829
8103	7371	7965	2123.96131	2421.95597	2022.02673
8096	7371	7965	2123.88425	2421.88834	2022.02608
8094	7371	7962	2123.64355	2421.61806	2022.02433
8094	7370	7960	2123.54145	2420.85444	2021.92234
8091	7367	7959	2123.44843	2420.73772	2021.92088
8087	7366	7952	2123.43317	2420.73708	2021.91769
8086	7363	7948	2123.28589	2420.49468	2021.90899
8082	7362	7942	2123.06308	2420.20263	2021.80766
8081	7361	7940	2123.04077	2419.7437	2021.72136
8081	7358	7937	2122.95662	2419.73872	2021.61726
8079	7357	7936	2122.86037	2419.70774	2021.51859
8077	7357	7934	2122.85726	2418.97702	2021.51711
8075	7355	7930	2122.85617	2418.85685	2021.40808
8072	7353	7928	2122.64294	2418.82109	2021.31313
8070	7351	7924	2122.54419	2418.43418	2021.02051
8067	7351	7923	2122.44409	2418.3419	2020.51749
8067	7348	7921	2122.3308	2418.05996	2020.12812

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
8066	7348	7917	2121.95463	2417.87029	2019.91779
8062	7344	7916	2121.85497	2417.34464	2019.7347
8060	7343	7914	2121.84416	2417.24747	2019.62501
8059	7343	7903	2121.7576	2417.0939	2019.62139
8057	7340	7900	2121.74249	2417.08914	2019.2283
8056	7339	7897	2121.0649	2416.62344	2019.0226
8054	7338	7897	2120.96418	2416.61695	2018.83028
8050	7336	7893	2120.95958	2416.45675	2018.61691
8047	7334	7890	2120.95167	2416.33866	2018.42259
8047	7326	7886	2120.85684	2416.33186	2018.32005
8047	7324	7886	2120.75226	2416.21641	2017.61405
8045	7324	7885	2120.74811	2416.09679	2017.61306
8044	7322	7883	2120.64424	2415.99421	2017.60427
8044	7318	7881	2120.6441	2415.97672	2017.51688
8041	7317	7877	2120.53673	2415.7313	2017.41741
8037	7310	7874	2120.49603	2415.71321	2017.32404
8037	7306	7871	2120.38749	2415.60595	2017.02317
8036	7306	7863	2120.28206	2415.46242	2016.82191
8036	7298	7862	2120.06798	2415.21188	2016.51887
8036	7296	7855	2120.06312	2414.85658	2015.8106
8035	7295	7855	2119.96909	2414.85434	2014.72362
8034	7290	7853	2119.96392	2414.82048	2014.71656
8034	7289	7851	2119.96041	2414.74391	2014.61591
8033	7287	7850	2119.93742	2414.70767	2014.51941
8031	7286	7844	2119.7681	2414.32601	2014.31783
8031	7285	7841	2119.5168	2414.21672	2013.92026
8028	7281	7840	2119.43103	2414.09785	2013.72156
8028	7278	7837	2119.42909	2414.09674	2013.72002
8028	7278	7836	2119.27627	2413.733	2013.51637
8028	7276	7830	2119.25613	2413.58907	2013.51605
8027	7276	7827	2119.21222	2413.57665	2013.51527
8024	7274	7826	2119.17869	2413.09	2013.42126
8020	7271	7826	2118.85284	2412.86096	2013.41046
8019	7271	7825	2118.84919	2412.53158	2013.13221

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
8018	7268	7822	2118.75999	2412.21134	2012.92151
8014	7267	7819	2118.74428	2411.96552	2012.91506
8013	7266	7818	2118.74209	2411.21555	2012.73883
8008	7265	7804	2118.64465	2410.61653	2012.69306
8006	7265	7799	2117.94188	2410.45733	2012.62622
8005	7262	7798	2117.85674	2410.22112	2012.42103
8004	7262	7796	2117.72842	2410.21578	2012.19589
8004	7262	7793	2117.27998	2410.17357	2011.93213
8002	7262	7790	2117.27446	2410.08935	2011.8167
8002	7259	7790	2117.14852	2409.70101	2011.81601
8001	7257	7789	2117.06212	2409.59782	2011.70378
8001	7256	7788	2117.05795	2409.21395	2011.50701
7999	7255	7787	2116.62574	2408.58557	2011.32408
7995	7254	7781	2116.53929	2408.58206	2011.10977
7995	7252	7778	2116.50279	2408.45155	2011.01829
7991	7250	7773	2116.42886	2408.43247	2010.81543
7990	7246	7773	2116.07212	2408.33952	2010.71686
7989	7246	7770	2116.05778	2408.32961	2010.41219
7988	7244	7767	2115.95011	2408.06902	2010.41131
7987	7242	7762	2115.856	2407.97852	2010.21911
7985	7237	7761	2115.85487	2407.97539	2010.10823
7984	7236	7761	2115.80119	2407.84854	2009.72736
7984	7235	7760	2115.746	2407.49249	2009.51087
7977	7234	7757	2115.52963	2407.45991	2009.41553
7976	7233	7755	2115.17168	2407.00549	2009.41368
7974	7226	7750	2115.047	2406.45735	2009.22544
7974	7226	7750	2114.86419	2406.43226	2009.11189
7972	7225	7730	2114.85634	2406.41855	2008.91534
7968	7225	7728	2114.85629	2406.33628	2008.61102
7966	7224	7728	2114.84316	2406.21466	2008.51871
7965	7223	7725	2114.58847	2405.93583	2008.51095
7964	7222	7724	2114.58846	2405.69487	2008.21881
7961	7219	7720	2114.15285	2405.21375	2008.12087
7960	7218	7719	2113.95695	2404.70605	2008.01762

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7959	7216	7717	2113.85235	2404.61514	2008.00351
7958	7214	7715	2113.83915	2404.19745	2007.71691
7956	7212	7714	2113.53413	2404.09491	2007.71346
7955	7209	7714	2113.42832	2403.9765	2007.61642
7952	7204	7712	2113.06758	2403.81184	2007.61133
7950	7203	7710	2112.53584	2403.61329	2006.82903
7948	7199	7707	2112.53283	2403.4886	2006.82651
7947	7198	7703	2112.43083	2402.34831	2006.82556
7946	7196	7702	2112.17208	2402.07604	2006.81649
7944	7195	7700	2111.97544	2401.56677	2006.61241
7944	7192	7698	2111.95833	2401.37396	2006.51797
7944	7192	7698	2111.80428	2401.33277	2006.50963
7939	7191	7698	2111.4882	2401.25052	2005.91341
7938	7190	7696	2111.38448	2401.07507	2005.71612
7936	7184	7695	2111.07686	2400.97298	2005.71233
7932	7179	7695	2111.06794	2400.32774	2005.62061
7931	7178	7691	2111.06681	2400.09005	2005.52725
7929	7176	7690	2111.06178	2399.60857	2005.52167
7928	7176	7685	2110.95351	2399.57028	2005.51966
7927	7173	7684	2110.74431	2399.48813	2005.51816
7927	7170	7681	2110.42864	2399.43613	2005.51504
7927	7167	7680	2110.37808	2399.3206	2005.51474
7926	7162	7679	2110.18513	2399.21351	2005.31401
7924	7161	7679	2110.17078	2398.97087	2005.01661
7918	7157	7678	2109.96592	2398.20547	2005.01505
7918	7157	7678	2109.85514	2397.84616	2004.52133
7915	7155	7673	2109.84592	2397.73119	2004.42451
7914	7154	7672	2109.63294	2397.57132	2004.41432
7914	7152	7668	2109.46202	2397.20161	2004.10169
7913	7151	7666	2109.37527	2396.95983	2004.01609
7912	7151	7666	2109.32079	2396.70066	2004.00795
7909	7150	7659	2109.06296	2396.47982	2003.82761
7909	7150	7657	2108.96517	2396.32318	2003.81549
7908	7148	7655	2108.94698	2396.09225	2003.81114

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7902	7146	7651	2108.85043	2395.84928	2003.71662
7902	7141	7648	2108.8495	2395.18822	2003.71489
7902	7140	7645	2108.8469	2394.96796	2003.62139
7900	7139	7638	2108.53033	2394.96772	2003.61134
7898	7137	7635	2108.38222	2394.69974	2003.60954
7898	7136	7633	2108.31548	2394.61131	2003.60337
7896	7135	7633	2108.17137	2394.4441	2003.51122
7896	7130	7630	2107.96998	2394.32606	2002.71545
7894	7123	7623	2107.95662	2393.84769	2002.61532
7893	7121	7619	2107.84747	2393.84324	2002.41151
7888	7118	7616	2107.74467	2393.57574	2002.13017
7886	7118	7615	2107.74353	2393.20303	2002.02109
7885	7118	7613	2107.5344	2393.20279	2001.89621
7882	7118	7611	2106.95197	2393.09235	2001.81694
7881	7118	7608	2106.84721	2392.96892	2001.81618
7873	7117	7606	2106.75506	2392.60966	2001.61478
7872	7110	7605	2106.75284	2392.44641	2001.30934
7869	7110	7604	2106.73805	2391.85457	2001.18771
7868	7107	7604	2106.65159	2390.99439	2001.1217
7866	7107	7603	2106.64364	2390.97691	2000.71378
7863	7106	7599	2106.63802	2390.72296	2000.51736
7862	7104	7598	2106.53792	2390.5743	2000.51653
7862	7103	7597	2106.4793	2390.45416	1999.81454
7862	7102	7597	2106.32541	2390.27117	1999.51656
7860	7100	7587	2106.18699	2389.84863	1999.20135
7858	7098	7583	2106.17036	2389.83063	1999.00569
7858	7097	7583	2106.16463	2389.56775	1998.90838
7857	7090	7582	2106.05857	2389.21739	1998.41167
7856	7087	7581	2105.95507	2389.21667	1998.31409
7854	7086	7579	2105.84385	2389.20542	1997.81341
7853	7086	7578	2105.83727	2388.96666	1997.81153
7852	7086	7575	2105.75003	2388.64887	1997.71346
7849	7084	7575	2105.63626	2388.60856	1997.41571
7847	7083	7572	2105.63335	2388.60272	1997.20965

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7847	7080	7572	2105.39388	2388.43222	1997.01637
7844	7075	7571	2105.37497	2387.96544	1996.94808
7843	7074	7569	2105.32013	2387.43236	1996.91139
7842	7074	7568	2105.26938	2387.20395	1996.61523
7841	7073	7568	2104.95162	2386.7267	1996.61235
7833	7072	7566	2104.9498	2386.4239	1996.60989
7831	7071	7564	2104.84703	2385.97361	1996.51109
7826	7070	7562	2104.63657	2385.97316	1996.50555
7824	7070	7562	2104.43125	2385.97081	1995.71291
7824	7068	7561	2104.06037	2385.46763	1995.71152
7823	7062	7558	2104.05993	2385.20592	1995.61335
7822	7060	7548	2103.95047	2384.59749	1995.60731
7822	7058	7547	2103.94625	2384.30402	1995.51177
7822	7058	7547	2103.85561	2384.20588	1995.10695
7821	7054	7546	2103.85069	2384.20059	1994.90815
7821	7053	7546	2103.8448	2384.08618	1994.71493
7810	7051	7538	2103.8437	2384.08142	1994.71042
7810	7050	7537	2103.7429	2383.60295	1994.00988
7807	7047	7537	2103.74023	2383.49376	1993.91357
7802	7047	7537	2103.63984	2383.2019	1993.91277
7801	7046	7529	2103.5334	2382.96664	1993.90929
7800	7045	7528	2103.52137	2382.96624	1993.8349
7798	7040	7527	2103.43358	2382.96293	1993.50951
7795	7040	7526	2103.373	2382.85502	1993.50507
7786	7038	7525	2103.32035	2382.72447	1992.81586
7778	7033	7520	2103.31552	2382.6088	1992.61711
7777	7033	7519	2103.3105	2382.33466	1992.51247
7776	7029	7516	2103.16125	2382.08264	1992.40754
7774	7026	7516	2103.08417	2381.97341	1992.20328
7771	7023	7516	2103.07007	2381.73243	1992.11454
7770	7023	7510	2103.05638	2381.40911	1992.01053
7768	7023	7508	2102.95309	2381.32302	1992.00064
7766	7020	7508	2102.93736	2381.20642	1991.81208
7764	7020	7507	2102.74336	2380.96943	1991.71731

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7762	7017	7504	2102.71655	2380.60381	1991.31078
7761	7016	7503	2102.62551	2380.32385	1991.20891
7759	7015	7496	2102.43972	2380.08556	1991.01075
7759	7014	7493	2102.43348	2379.85459	1991.00834
7758	7014	7492	2102.16114	2379.83869	1991.00301
7756	7013	7491	2101.93982	2378.9727	1990.80508
7755	7012	7488	2101.84381	2378.55924	1990.72573
7754	7010	7478	2101.74513	2378.55448	1990.71135
7753	7007	7478	2101.43496	2378.45186	1990.50401
7751	7005	7476	2100.95493	2378.43334	1990.4106
7748	7005	7471	2100.95321	2378.26199	1990.40774
7748	7002	7469	2100.63719	2378.1969	1990.00514
7747	7002	7467	2100.43001	2377.94692	1989.80572
7747	7001	7467	2100.32049	2377.72387	1989.61182
7747	7000	7466	2099.74405	2377.72015	1989.60615
7745	6998	7466	2099.63592	2377.59953	1989.19763
7744	6997	7465	2099.635	2377.59627	1988.89478
7744	6997	7458	2099.53714	2377.43083	1988.60856
7742	6994	7457	2099.53023	2377.31458	1988.3122
7741	6993	7455	2099.52933	2375.84559	1987.31237
7741	6990	7453	2099.40386	2375.84133	1987.20725
7740	6987	7453	2099.27538	2375.61191	1987.10035
7740	6978	7452	2098.94761	2375.31553	1987.00736
7739	6978	7451	2098.93085	2374.07152	1987.0057
7737	6977	7441	2098.85317	2373.84453	1986.794
7736	6977	7441	2098.84935	2373.0824	1986.71217
7736	6975	7441	2098.84609	2372.96079	1986.2018
7734	6969	7438	2098.83636	2372.84305	1985.71163
7730	6969	7436	2098.75553	2372.84218	1985.61384
7730	6966	7431	2098.64282	2372.83607	1985.51236
7729	6966	7427	2098.63595	2372.83383	1985.51201
7723	6966	7421	2098.63431	2372.70828	1985.50962
7721	6960	7421	2098.53043	2372.55263	1985.20469
7719	6958	7420	2098.42511	2372.55039	1985.10193

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7717	6958	7417	2098.30455	2372.36233	1984.5074
7716	6956	7417	2097.74248	2371.8315	1984.41099
7715	6953	7415	2097.43341	2371.42509	1984.12203
7713	6947	7413	2097.42669	2371.31899	1983.81061
7709	6941	7411	2097.42417	2371.31548	1983.70709
7707	6941	7406	2096.94669	2371.19984	1983.40661
7706	6939	7404	2096.84894	2370.95878	1983.39953
7703	6939	7404	2096.84798	2370.94181	1983.30834
7695	6937	7403	2096.74082	2370.94045	1983.0013
7694	6936	7402	2096.73382	2370.72243	1982.90837
7686	6933	7401	2096.62674	2370.6631	1982.5125
7685	6932	7398	2096.21187	2370.31491	1982.51177
7684	6932	7397	2095.95043	2369.90864	1982.3125
7680	6927	7396	2095.744	2369.83237	1982.29608
7679	6926	7394	2095.42739	2369.82623	1981.91745
7675	6925	7394	2095.26641	2369.41572	1981.82944
7664	6922	7393	2095.24594	2368.9546	1981.82476
7657	6922	7385	2095.05378	2368.83665	1981.51162
7657	6922	7384	2094.94867	2368.36373	1981.01941
7656	6921	7382	2094.75713	2367.96277	1980.80503
7656	6919	7382	2094.16396	2367.90232	1980.79667
7654	6916	7382	2094.15824	2367.72482	1980.40868
7653	6911	7381	2094.05551	2367.07147	1980.20745
7653	6909	7377	2094.05264	2367.04686	1979.5181
7652	6908	7377	2093.84202	2366.72899	1978.8011
7652	6906	7374	2093.73942	2366.07917	1978.7109
7650	6904	7372	2093.7338	2366.07072	1978.60528
7650	6903	7369	2093.64204	2366.06075	1978.51783
7649	6903	7362	2093.63236	2365.05846	1977.90915
7645	6902	7358	2093.52596	2364.8771	1977.81419
7639	6900	7358	2093.42092	2364.77834	1977.80274
7638	6900	7357	2093.31362	2364.53877	1977.60587
7632	6899	7357	2093.26869	2363.78798	1977.50646
7630	6899	7355	2092.94911	2363.42814	1977.40627

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7630	6898	7354	2092.84851	2363.195	1977.30173
7626	6898	7353	2092.75442	2363.19151	1977.19811
7624	6898	7352	2092.74084	2363.07086	1976.9989
7620	6896	7352	2092.73938	2362.95285	1976.90355
7616	6893	7346	2092.73545	2362.71941	1976.89994
7614	6890	7345	2092.63473	2362.68563	1976.88449
7614	6889	7340	2092.6331	2362.58901	1976.70827
7612	6884	7339	2092.52263	2362.43034	1976.4058
7612	6882	7337	2092.42147	2362.07272	1976.3084
7606	6876	7337	2092.27314	2361.97037	1976.20446
7603	6874	7326	2092.05557	2361.70316	1976.20408
7602	6874	7324	2092.05489	2361.54817	1976.10097
7598	6873	7324	2092.05443	2361.43531	1976.09967
7598	6873	7321	2091.97531	2361.42449	1975.97044
7597	6870	7318	2091.94639	2361.42031	1975.80198
7594	6869	7318	2091.83737	2361.38656	1975.70576
7592	6867	7318	2091.81009	2361.30537	1975.61217
7591	6866	7316	2091.75132	2361.18781	1975.40889
7590	6862	7308	2091.63787	2360.95529	1975.40579
7587	6862	7302	2091.6332	2360.84114	1975.31185
7586	6860	7301	2091.52519	2360.48282	1974.71138
7585	6855	7301	2091.42329	2360.47043	1974.52609
7583	6846	7297	2091.046	2360.44219	1974.20765
7580	6842	7293	2090.94786	2360.18912	1974.10612
7579	6841	7290	2090.94634	2360.06548	1974.00469
7578	6838	7289	2090.94566	2359.95887	1973.803
7575	6833	7289	2090.94186	2359.85938	1973.71662
7574	6832	7289	2090.94141	2359.71952	1973.71013
7572	6831	7288	2090.75835	2359.68546	1973.70035
7559	6830	7288	2090.42654	2359.36845	1973.50713
7557	6824	7288	2089.95244	2359.30225	1973.50299
7556	6824	7286	2089.95166	2358.84881	1973.30938
7556	6821	7286	2089.94622	2358.83994	1973.00364
7551	6820	7286	2089.84689	2358.59921	1972.80639

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7549	6817	7285	2089.74191	2358.18748	1972.70502
7548	6812	7280	2089.73777	2358.07538	1972.70282
7548	6807	7275	2089.64315	2358.07272	1972.60635
7548	6804	7270	2089.51775	2358.06698	1971.8111
7543	6803	7264	2089.26387	2357.97994	1971.81064
7543	6797	7263	2089.13026	2357.96038	1971.72283
7542	6791	7259	2088.95828	2357.95767	1971.60471
7540	6789	7258	2088.94501	2357.65953	1971.59851
7538	6780	7253	2088.73865	2357.58139	1971.48015
7537	6780	7250	2088.63561	2357.30505	1971.40829
7537	6779	7249	2088.63111	2357.1926	1971.40536
7534	6776	7248	2088.15659	2356.76969	1971.39416
7534	6775	7247	2088.14336	2356.60712	1971.3011
7533	6769	7243	2088.11163	2356.53767	1971.20004
7533	6768	7242	2087.96124	2356.28849	1971.10563
7532	6766	7240	2087.92919	2356.2006	1970.96933
7529	6765	7239	2087.73802	2356.19238	1970.90231
7528	6759	7238	2087.53301	2355.18261	1970.89886
7526	6756	7234	2087.26609	2354.7103	1970.8066
7526	6753	7232	2086.85538	2354.36559	1970.80195
7523	6750	7232	2086.8447	2354.16456	1970.80192
7521	6748	7232	2086.84402	2353.95247	1970.70289
7520	6738	7232	2086.84146	2353.94544	1970.70096
7520	6732	7231	2086.8414	2353.93928	1970.60668
7515	6731	7231	2086.74575	2353.83468	1970.39903
7515	6730	7229	2086.74388	2353.18386	1970.09674
7512	6728	7227	2086.73638	2353.06159	1970.00294
7511	6726	7224	2086.53887	2353.05609	1969.79966
7511	6726	7223	2086.31378	2352.95222	1969.60877
7510	6726	7215	2086.26091	2352.9397	1969.60429
7506	6723	7213	2086.25887	2352.83365	1969.60309
7506	6723	7207	2086.1641	2352.83332	1969.60168
7505	6722	7203	2085.93453	2352.76617	1969.50884
7504	6719	7203	2085.83914	2352.5419	1969.50083

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7502	6717	7202	2085.83793	2352.42316	1969.41166
7500	6716	7202	2085.74247	2352.20284	1969.1907
7500	6713	7201	2085.73828	2352.18436	1969.18582
7499	6713	7200	2085.73134	2351.8319	1968.97042
7497	6711	7200	2085.6282	2351.82855	1968.80348
7495	6710	7197	2085.53197	2351.53674	1968.71161
7493	6706	7194	2085.52315	2351.1795	1968.20928
7490	6704	7193	2084.74791	2351.07038	1967.9039
7490	6704	7191	2084.73419	2350.95568	1967.60799
7489	6702	7190	2084.73225	2350.82985	1967.59988
7489	6700	7184	2084.62806	2349.77492	1967.31313
7488	6698	7184	2084.62779	2349.53973	1966.79366
7487	6694	7183	2084.52567	2348.07072	1966.70203
7485	6690	7182	2084.46453	2347.8279	1966.18804
7483	6686	7180	2083.84263	2347.82188	1965.80093
7481	6684	7178	2083.42311	2347.70733	1965.79798
7481	6683	7177	2083.07631	2347.52984	1965.70535
7478	6683	7175	2083.03789	2347.08062	1965.3088
7476	6683	7174	2082.9464	2347.06608	1965.19808
7473	6676	7173	2082.86401	2347.06174	1964.90011
7471	6674	7170	2082.63315	2346.95863	1964.70534
7471	6674	7164	2082.63008	2346.94555	1964.7042
7470	6672	7163	2082.06029	2346.82801	1964.70072
7469	6670	7162	2082.04898	2346.77052	1964.60071
7466	6668	7157	2081.94466	2346.59965	1964.59531
7464	6668	7157	2081.35341	2346.06009	1964.40442
7463	6666	7156	2081.0516	2345.47619	1964.3119
7459	6663	7155	2080.93456	2345.19214	1963.8003
7459	6659	7153	2080.92892	2344.94792	1963.5016
7458	6659	7152	2080.74751	2344.76105	1963.50115
7455	6658	7148	2080.72535	2344.34759	1963.49045
7451	6656	7147	2079.83991	2344.30173	1963.41663
7450	6650	7147	2079.83847	2343.83042	1962.9956
7450	6643	7147	2079.72911	2342.93346	1962.994

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Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7448	6643	7144	2079.72828	2342.92674	1962.89103
7439	6642	7141	2079.72739	2342.8535	1962.80491
7438	6642	7135	2079.63519	2342.82846	1962.59803
7433	6641	7129	2079.0523	2342.36314	1962.50483
7431	6639	7129	2078.73386	2342.29573	1962.40764
7431	6635	7128	2078.63237	2341.9623	1962.40632
7429	6633	7126	2078.62883	2341.95077	1962.07071
7429	6633	7126	2078.52302	2341.64742	1961.99439
7426	6632	7117	2078.46604	2341.59672	1961.6045
7425	6630	7116	2078.42167	2341.596	1961.60317
7421	6623	7113	2078.41925	2340.70986	1961.60032
7421	6621	7111	2077.94804	2340.4772	1960.90318
7420	6619	7111	2077.94481	2340.04905	1960.89379
7418	6618	7109	2077.94402	2340.03874	1960.79419
7417	6617	7108	2077.73116	2339.47881	1960.70491
7416	6612	7107	2077.62839	2339.18094	1960.46562
7415	6607	7102	2077.41398	2338.93223	1960.31535
7413	6607	7102	2077.15252	2338.76184	1959.79856
7411	6607	7101	2077.05336	2338.72026	1959.7957
7411	6605	7099	2077.04807	2338.59273	1959.78951
7410	6603	7098	2076.84501	2338.5924	1959.60223
7410	6598	7098	2076.44516	2338.59144	1959.59118
7407	6595	7095	2076.04168	2338.18807	1959.49522
7406	6592	7095	2075.95155	2338.06282	1959.31196
7400	6586	7094	2075.94206	2338.05789	1959.20864
7398	6585	7092	2075.93931	2337.93604	1958.50041
7398	6585	7092	2075.63182	2337.60782	1958.40285
7398	6583	7090	2075.04042	2337.43718	1957.99959
7396	6581	7089	2074.9533	2337.4084	1957.99253
7396	6581	7087	2074.83375	2337.19812	1957.4067
7395	6580	7086	2074.73714	2337.18141	1957.40126
7394	6578	7082	2074.63804	2337.17703	1957.18861
7394	6577	7081	2074.63478	2337.04764	1956.99289
7393	6575	7081	2073.7402	2336.82647	1956.611

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7391	6575	7078	2073.72879	2336.60328	1956.20572
7390	6574	7076	2073.5303	2336.4308	1956.09723
7387	6574	7076	2073.52688	2336.27705	1956.07558
7386	6573	7070	2073.52683	2336.06437	1955.99398
7382	6568	7068	2073.45505	2336.02827	1955.99231
7381	6560	7068	2073.42404	2335.93021	1955.69755
7378	6558	7067	2073.35204	2335.05965	1955.4019
7374	6554	7067	2073.21286	2334.82688	1955.18756
7372	6553	7064	2073.04201	2334.70801	1954.99956
7372	6547	7063	2072.94596	2334.43267	1954.79701
7371	6547	7056	2072.63584	2334.17606	1954.60169
7369	6547	7055	2072.62728	2333.04545	1954.51391
7367	6543	7054	2072.62231	2332.94241	1954.40176
7366	6536	7050	2072.41633	2332.58707	1954.30942
7365	6535	7043	2072.35993	2332.29292	1953.99773
7365	6535	7040	2071.96192	2331.94171	1953.97802
7365	6532	7036	2071.73431	2331.47345	1953.79353
7364	6532	7036	2071.61541	2331.17332	1953.61437
7363	6532	7034	2070.93577	2331.02913	1953.60419
7363	6527	7032	2070.84551	2330.70112	1953.59938
7363	6520	7030	2070.62437	2330.16436	1953.49775
7361	6518	7025	2070.35406	2330.04706	1952.99098
7360	6518	7021	2070.15017	2329.95588	1952.88772
7357	6517	7019	2070.14705	2329.80658	1952.40379
7356	6510	7015	2070.04793	2329.72438	1951.60124
7355	6509	7013	2069.93891	2329.53692	1951.49886
7352	6509	7009	2069.63649	2329.40785	1951.40568
7352	6506	7008	2069.04339	2329.30215	1951.29933
7350	6502	7007	2068.93637	2329.27635	1950.89076
7347	6502	7006	2068.8421	2328.82432	1950.79885
7342	6502	7004	2068.8378	2328.17238	1950.696
7341	6502	7003	2068.83736	2328.06009	1950.18444
7340	6499	7003	2068.82983	2328.0588	1950.11651
7338	6496	7002	2068.63372	2328.05255	1950.0865

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7337	6495	7002	2068.52205	2327.41303	1949.97036
7336	6491	6997	2068.24745	2327.40521	1949.88944
7335	6490	6997	2067.94021	2327.40361	1949.792
7333	6487	6995	2067.93935	2327.20281	1949.69272
7332	6485	6993	2067.85356	2327.16135	1949.58195
7332	6485	6992	2067.82838	2326.83328	1949.5001
7327	6483	6991	2067.4218	2326.41663	1948.88511
7327	6481	6990	2067.34775	2326.29974	1948.69599
7327	6481	6989	2067.24361	2326.29093	1948.30109
7327	6479	6987	2067.10389	2326.02736	1948.29859
7326	6473	6987	2067.04102	2325.92666	1948.27566
7326	6472	6984	2066.83615	2325.70866	1948.00551
7320	6472	6984	2065.93801	2325.33294	1947.9934
7319	6467	6982	2065.92505	2325.27821	1947.98918
7319	6466	6979	2064.84317	2324.95597	1947.7917
7316	6465	6978	2064.83583	2324.89654	1947.79152
7313	6464	6971	2064.736	2324.83365	1947.69581
7310	6455	6971	2064.52545	2324.82807	1947.60673
7305	6454	6971	2064.52034	2324.8254	1947.26146
7305	6453	6970	2064.35613	2324.71647	1947.19732
7303	6452	6968	2064.0362	2324.52708	1946.98509
7298	6450	6965	2064.00611	2324.52295	1946.98339
7298	6450	6962	2063.83543	2324.30053	1946.90891
7296	6449	6960	2063.82972	2324.17667	1946.79104
7290	6449	6960	2063.62954	2324.1697	1946.68899
7290	6445	6959	2063.44876	2323.75796	1946.50893
7288	6444	6957	2063.24369	2323.72566	1946.50177
7286	6443	6956	2062.95057	2323.59352	1946.3987
7285	6443	6953	2062.8305	2323.58991	1946.08639
7285	6442	6951	2062.73393	2323.54465	1945.89057
7283	6441	6948	2062.62883	2323.04943	1945.88707
7283	6441	6947	2062.62454	2322.87635	1945.88568
7282	6441	6944	2062.51994	2322.82624	1945.79176
7282	6440	6944	2062.43582	2322.82581	1945.79069

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7282	6438	6943	2062.41358	2322.82478	1945.49739
7271	6438	6941	2061.93586	2322.82212	1945.40537
7266	6437	6937	2061.82729	2322.81886	1945.30214
7266	6435	6935	2061.51947	2322.71533	1945.01103
7265	6433	6935	2061.4198	2322.3916	1944.98766
7262	6427	6933	2060.93487	2322.293	1944.88493
7258	6426	6932	2060.92907	2322.07005	1944.59766
7258	6426	6931	2060.52145	2322.05257	1944.49514
7258	6425	6927	2060.3417	2322.0441	1944.40092
7256	6425	6923	2060.04121	2321.70494	1943.71239
7255	6424	6923	2059.62659	2321.62503	1943.69192
7251	6424	6922	2059.61215	2321.59728	1943.60805
7249	6423	6922	2059.51976	2321.53032	1943.50006
7246	6423	6922	2059.34146	2321.5144	1943.38986
7246	6420	6913	2059.04557	2321.41496	1943.30619
7241	6418	6913	2058.92994	2321.07187	1943.09063
7240	6413	6908	2058.51557	2320.93879	1942.8839
7236	6409	6908	2058.31463	2320.92577	1942.59479
7236	6408	6905	2058.14246	2320.82965	1942.51746
7232	6406	6904	2057.82711	2320.6398	1942.39768
7231	6404	6901	2057.52036	2320.59067	1942.39322
7218	6401	6897	2057.52035	2320.51399	1941.98785
7216	6397	6886	2057.41639	2320.40157	1941.79369
7216	6396	6886	2057.03153	2320.17986	1941.79163
7214	6395	6881	2056.94129	2320.05383	1941.6875
7212	6394	6877	2056.7315	2319.92891	1941.59427
7212	6392	6875	2056.7231	2319.82356	1941.50203
7208	6389	6874	2056.42126	2319.82283	1941.49819
7208	6387	6872	2056.03553	2319.70047	1941.39849
7207	6377	6870	2055.93848	2319.58536	1940.88651
7205	6372	6865	2055.71959	2319.05767	1940.88308
7205	6367	6862	2055.62504	2319.05376	1940.79585
7203	6365	6860	2055.62176	2318.93809	1940.69193
7202	6364	6859	2055.62165	2318.92681	1940.69025

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7200	6362	6858	2055.02869	2318.82193	1940.58887
7198	6359	6858	2054.82432	2318.821	1940.49938
7198	6359	6856	2054.6307	2318.81734	1940.49469
7196	6359	6856	2054.62734	2318.49641	1939.88349
7196	6355	6855	2054.54447	2318.47117	1939.78736
7195	6347	6851	2054.52034	2318.41673	1939.71154
7187	6346	6844	2054.44766	2318.15953	1939.49859
7186	6343	6844	2054.44311	2317.95366	1939.49392
7185	6334	6843	2054.34682	2317.81757	1939.39853
7182	6333	6840	2054.21102	2317.80311	1939.21384
7181	6332	6836	2054.04186	2317.72164	1938.79577
7180	6327	6834	2054.03588	2317.51509	1938.78708
7178	6327	6833	2053.93305	2317.27751	1938.49351
7177	6327	6832	2053.80709	2317.18224	1938.30387
7175	6325	6830	2053.72514	2317.17167	1937.98043
7173	6321	6829	2053.62235	2317.06457	1937.77867
7172	6321	6828	2053.38076	2317.05882	1937.69051
7170	6318	6824	2053.30714	2317.05308	1937.59365
7169	6315	6820	2053.23942	2317.03834	1937.49579
7168	6313	6818	2053.13542	2316.82057	1937.34981
7167	6311	6813	2053.02613	2316.68046	1937.31271
7167	6311	6812	2052.7237	2316.40544	1937.17373
7166	6311	6803	2052.64056	2316.15788	1936.98232
7166	6308	6800	2052.41431	2316.03184	1936.88104
7165	6307	6798	2052.40238	2315.71151	1936.77543
7164	6305	6796	2052.31957	2315.70705	1936.68983
7161	6304	6793	2052.13864	2315.57538	1936.59525
7160	6299	6789	2052.03561	2315.57035	1936.4962
7158	6296	6787	2051.93487	2315.51435	1936.49014
7156	6293	6772	2051.9299	2315.51242	1936.40456
7155	6290	6771	2051.72764	2315.39813	1936.30128
7154	6288	6766	2051.43116	2315.17822	1936.30046
7152	6285	6763	2051.4185	2315.04884	1935.78418
7151	6283	6763	2051.34693	2314.94058	1935.48913

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7150	6282	6761	2050.83732	2314.93715	1934.76908
7148	6279	6760	2050.71887	2314.75096	1934.68285
7147	6278	6756	2050.62077	2314.39809	1934.49818
7144	6278	6750	2050.39953	2314.04403	1934.3527
7143	6277	6748	2050.30779	2314.01703	1934.27407
7143	6273	6747	2049.83328	2313.92844	1934.1208
7140	6273	6747	2049.71167	2313.73279	1933.97487
7137	6270	6746	2049.62489	2313.70908	1933.87995
7136	6267	6746	2049.61909	2313.04445	1933.695
7136	6264	6743	2049.52064	2313.04146	1933.66111
7135	6260	6742	2049.03677	2312.70187	1933.58661
7132	6258	6740	2049.0321	2312.47147	1933.49129
7130	6257	6739	2048.94169	2312.39599	1932.98525
7128	6255	6738	2048.82955	2312.38748	1932.97132
7126	6254	6737	2047.51084	2312.16372	1932.68971
7123	6254	6733	2047.12766	2312.0405	1932.68811
7121	6253	6732	2046.93508	2311.9237	1932.40881
7121	6252	6725	2046.92441	2311.46715	1932.39689
7119	6249	6723	2046.61168	2311.40292	1932.30198
7115	6249	6723	2046.43085	2311.3764	1931.78253
7113	6248	6717	2046.31126	2311.31464	1931.70176
7112	6248	6716	2046.15474	2311.08887	1931.58898
7109	6243	6701	2045.72915	2310.85135	1931.49239
7107	6241	6697	2045.7288	2310.81806	1931.39269
7106	6240	6694	2045.62025	2310.71258	1930.87668
7099	6239	6692	2045.41094	2310.7115	1930.69188
7097	6239	6690	2044.92972	2310.70171	1930.39819
7096	6237	6689	2044.72167	2310.69621	1930.38562
7089	6237	6688	2044.52486	2310.58839	1929.9771
7088	6235	6688	2043.61755	2310.51585	1929.17624
7088	6235	6688	2043.2404	2310.27334	1928.68363
7086	6234	6688	2042.92318	2310.14672	1928.16416
7086	6234	6687	2042.51539	2310.05129	1927.67897
7085	6234	6686	2042.42325	2310.04432	1927.58976

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7085	6232	6683	2042.13513	2309.81623	1927.49137
7083	6231	6682	2041.941	2309.46639	1927.39651
7077	6231	6682	2041.93106	2309.38369	1927.34059
7077	6226	6682	2041.83487	2308.60343	1926.97983
7076	6225	6681	2041.83041	2308.58194	1926.7055
7074	6224	6681	2041.73971	2308.39292	1925.97785
7073	6223	6680	2041.72402	2308.38335	1925.68683
7071	6220	6678	2041.72361	2308.2856	1925.4957
7071	6213	6676	2041.51648	2308.26733	1925.49041
7068	6211	6671	2041.12535	2308.15426	1925.40816
7062	6211	6671	2041.03175	2307.93966	1925.39582
7059	6210	6671	2041.00953	2307.93313	1924.97608
7052	6209	6667	2040.61789	2307.93114	1924.77455
7049	6209	6667	2039.81756	2307.70698	1924.68587
7045	6208	6665	2039.41583	2307.57302	1924.49088
7042	6208	6663	2038.72172	2307.51039	1924.3951
7041	6206	6663	2038.61372	2307.39468	1923.77162
7041	6206	6663	2038.22744	2307.39168	1923.49663
7040	6206	6661	2037.93143	2307.3532	1923.29894
7040	6203	6659	2037.72085	2307.27574	1922.87736
7040	6202	6657	2037.52815	2307.26231	1922.7661
7038	6199	6656	2037.3134	2307.05033	1922.68895
7036	6198	6656	2036.84318	2307.04777	1922.66946
7036	6196	6656	2036.82349	2306.63536	1922.59437
7033	6193	6654	2036.62055	2306.3939	1922.49064
7028	6193	6654	2036.41721	2306.16193	1922.39461
7026	6193	6652	2036.12783	2306.06517	1922.34406
7024	6192	6652	2035.91673	2306.04651	1922.15398
7023	6190	6651	2035.83847	2306.04484	1922.10124
7021	6187	6651	2035.81221	2305.93414	1921.87601
7021	6184	6646	2034.81848	2305.81846	1921.07003
7021	6183	6646	2034.61528	2305.58342	1920.89376
7019	6183	6645	2034.4145	2305.5151	1920.88484
7016	6181	6644	2034.02708	2305.04022	1920.79298

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
7016	6179	6643	2033.92818	2304.95556	1920.78004
7015	6173	6641	2033.91679	2304.92982	1920.66911
7015	6169	6641	2033.81766	2304.92893	1920.48635
7015	6168	6640	2033.43424	2304.86571	1920.16344
7009	6167	6640	2033.31026	2304.6915	1919.49332
7008	6166	6638	2032.81815	2304.58159	1919.49253
7005	6165	6637	2032.42453	2304.50536	1919.49185
7005	6163	6635	2032.41068	2303.93891	1918.97404
7000	6160	6635	2032.3098	2303.93067	1918.97163
7000	6156	6635	2031.91646	2303.62662	1918.75248
6996	6151	6632	2031.51715	2303.29352	1918.6834
6993	6151	6630	2031.51439	2303.27395	1918.67655
6990	6145	6627	2031.22431	2303.14639	1918.58512
6990	6144	6627	2031.12426	2302.94055	1918.57799
6985	6141	6626	2031.0221	2302.92095	1918.38564
6983	6138	6625	2030.61278	2302.91478	1918.35588
6981	6137	6623	2029.9214	2302.84263	1917.79129
6978	6136	6623	2029.81675	2302.04827	1917.58672
6976	6135	6622	2029.81269	2302.02429	1917.51767
6972	6132	6622	2029.31344	2301.93424	1917.49119
6961	6127	6620	2029.14559	2301.81513	1916.7535
6961	6127	6614	2028.82119	2301.75389	1916.68589
6955	6127	6613	2028.81737	2301.70071	1916.49282
6954	6127	6610	2028.73069	2301.6993	1916.49238
6953	6123	6609	2028.53933	2301.58267	1916.49018
6951	6121	6608	2028.51002	2301.15936	1916.1619
6949	6120	6603	2028.40958	2300.94107	1915.99212
6940	6115	6598	2027.91543	2300.15545	1915.95751
6939	6113	6598	2027.61535	2300.14052	1915.88384
6933	6111	6597	2027.61461	2300.02982	1915.78739
6931	6110	6593	2027.52332	2299.92624	1915.78076
6914	6104	6593	2027.2217	2299.57509	1915.68222
6906	6099	6592	2027.02261	2299.27503	1915.66416
6896	6097	6590	2026.71194	2299.16924	1915.57792

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6881	6095	6587	2026.61551	2299.15671	1915.49178
6872	6093	6580	2026.23067	2299.05412	1914.87475
6869	6093	6580	2025.81815	2299.04661	1914.67574
6865	6091	6577	2025.53404	2298.92943	1914.58625
6863	6088	6574	2025.20814	2298.86031	1914.30257
6863	6085	6573	2024.81111	2298.81812	1913.77777
6859	6083	6571	2024.71103	2298.8071	1912.77928
6855	6083	6570	2024.61407	2298.70014	1912.77598
6849	6082	6570	2024.02067	2298.58282	1912.77362
6847	6081	6568	2023.4182	2298.5779	1912.68211
6843	6080	6568	2023.22113	2298.52418	1912.4856
6839	6080	6565	2023.02794	2298.51361	1911.87186
6835	6079	6561	2022.83375	2298.37409	1911.68422
6833	6079	6561	2022.6153	2298.27265	1911.49047
6832	6078	6558	2022.24125	2297.85649	1910.77891
6830	6077	6558	2021.91847	2297.81658	1910.68073
6826	6076	6555	2021.41992	2297.61535	1910.13309
6825	6075	6555	2021.40564	2297.58344	1910.10611
6824	6074	6555	2021.01625	2297.41246	1909.96351
6820	6071	6554	2020.92103	2297.27416	1909.67532
6815	6069	6553	2020.72296	2297.04319	1909.48632
6811	6064	6552	2020.70569	2296.93245	1908.97964
6808	6063	6551	2020.61986	2296.93096	1908.87874
6808	6062	6549	2020.60968	2296.92641	1908.77369
6806	6061	6547	2019.41541	2296.61058	1908.6791
6803	6060	6544	2019.13111	2296.58404	1908.48724
6799	6058	6542	2019.02021	2296.57883	1908.48645
6793	6056	6540	2018.91896	2296.57273	1908.26241
6792	6055	6539	2018.91778	2296.50954	1908.06119
6792	6053	6536	2018.51309	2296.41069	1907.77533
6790	6052	6535	2018.02209	2296.04953	1907.77482
6787	6047	6530	2017.71209	2295.92917	1907.58367
6782	6045	6527	2017.71103	2295.92892	1907.54493
6777	6040	6525	2017.61435	2295.81242	1907.49127

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6777	6039	6525	2017.02529	2295.70004	1907.48506
6776	6039	6523	2016.91541	2295.6991	1907.296
6775	6038	6515	2016.80317	2295.6886	1907.05778
6773	6037	6514	2016.5061	2295.55021	1906.68104
6773	6032	6514	2016.40693	2295.49256	1906.67729
6772	6028	6510	2015.71724	2295.29604	1906.20302
6769	6026	6509	2015.71271	2295.27749	1906.17208
6768	6023	6509	2015.70547	2295.26961	1905.86682
6767	6018	6506	2015.5074	2295.07501	1904.49307
6763	6013	6503	2015.50383	2294.94505	1903.86483
6762	6012	6502	2015.41751	2294.70937	1903.77982
6759	6011	6499	2015.31137	2294.69705	1903.77812
6755	6004	6498	2015.30152	2294.24159	1903.58824
6749	6003	6494	2014.726	2294.14985	1903.58529
6749	6002	6487	2014.61025	2294.12443	1903.0601
6746	6001	6486	2014.60906	2294.04569	1902.97341
6743	6000	6484	2014.5095	2294.03167	1902.77245
6743	5998	6476	2014.1082	2293.70532	1902.66838
6741	5994	6475	2013.81825	2293.70224	1902.58319
6740	5989	6473	2013.81275	2293.28394	1902.49271
6738	5988	6472	2013.81227	2292.94732	1901.8816
6737	5980	6468	2013.7117	2292.92628	1901.39053
6732	5980	6465	2013.69882	2292.84348	1901.23848
6731	5977	6465	2013.30528	2292.81407	1900.96084
6730	5971	6465	2012.81036	2292.80515	1900.77736
6728	5965	6463	2012.11291	2292.78472	1900.58129
6723	5965	6461	2012.10348	2292.57262	1900.15503
6720	5962	6459	2011.91086	2292.49308	1899.58496
6714	5960	6455	2011.91058	2292.23232	1898.67235
6713	5958	6455	2011.52619	2292.14944	1898.58742
6709	5951	6453	2011.20046	2292.03871	1898.58341
6702	5950	6441	2010.61421	2291.92437	1898.48799
6702	5946	6441	2009.9186	2291.73045	1898.3913
6697	5944	6434	2008.72822	2291.69599	1898.3899

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6696	5944	6430	2008.62119	2291.61313	1898.29179
6695	5943	6430	2008.60987	2291.57845	1897.56811
6690	5943	6426	2008.41978	2291.23688	1897.50278
6687	5942	6423	2007.90918	2291.04091	1897.48762
6683	5935	6418	2007.60483	2290.93609	1896.96068
6679	5934	6415	2007.11069	2290.9349	1896.48483
6678	5928	6413	2007.00837	2290.59415	1895.66944
6674	5925	6412	2006.2014	2290.5831	1895.58291
6672	5919	6405	2005.71408	2290.49474	1895.20138
6665	5914	6401	2005.63852	2290.04506	1894.95844
6654	5913	6392	2003.80132	2289.81167	1894.57864
6642	5906	6392	2002.99982	2289.52249	1894.14551
6641	5902	6389	2002.708	2289.38948	1893.7704
6640	5900	6386	2002.60608	2289.38945	1893.76508
6639	5899	6386	2001.70604	2289.29971	1892.86299
6633	5894	6384	2001.40496	2289.15377	1892.86218
6626	5892	6380	2000.90565	2289.15015	1892.5765
6624	5889	6378	2000.71391	2289.04233	1892.48747
6624	5886	6376	1999.90901	2289.03299	1892.38861
6623	5885	6375	1999.89584	2288.9367	1891.50342
6621	5884	6371	1999.80887	2288.93295	1891.23859
6620	5883	6371	1999.71679	2288.60837	1890.04733
6620	5871	6369	1998.90607	2288.57072	1889.76738
6618	5860	6369	1998.70735	2288.4653	1889.76703
6616	5859	6366	1998.62376	2288.15837	1889.76659
6616	5858	6362	1997.40289	2288.15112	1889.68126
6616	5847	6358	1997.38884	2288.15111	1889.67441
6616	5842	6354	1997.20914	2287.91944	1889.67031
6596	5831	6352	1997.10302	2287.81372	1889.42598
6593	5822	6351	1996.1109	2286.92896	1888.95903
6592	5814	6342	1996.01198	2286.68683	1888.85771
6592	5812	6333	1996.00552	2286.57559	1888.76781
6588	5809	6331	1995.71411	2286.46511	1888.67215
6588	5809	6328	1995.50635	2286.27427	1887.67544

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6588	5809	6320	1995.09113	2286.26788	1886.58374
6587	5804	6319	1994.99648	2286.03408	1886.38851
6564	5804	6319	1994.99531	2285.85018	1885.86112
6564	5804	6318	1994.8048	2285.80952	1885.37987
6562	5804	6316	1994.69891	2285.70855	1885.30014
6560	5795	6315	1994.61583	2285.69557	1885.16007
6557	5795	6313	1994.51198	2285.69022	1883.76536
6557	5794	6313	1994.30485	2285.51188	1882.76668
6556	5789	6311	1994.19529	2285.49695	1882.58173
6556	5786	6308	1993.70755	2285.25966	1882.4829
6554	5786	6308	1992.40419	2285.05634	1881.38299
6554	5786	6298	1992.09739	2284.953	1880.68581
6553	5783	6297	1991.70432	2284.69413	1880.29435
6552	5781	6291	1991.70134	2284.68922	1880.03863
6551	5777	6287	1991.69363	2284.50259	1879.86374
6550	5770	6287	1991.1021	2284.46406	1878.76303
6549	5770	6285	1991.09598	2284.39109	1878.57711
6544	5769	6279	1990.80371	2284.36454	1877.95372
6543	5767	6274	1990.79855	2284.05197	1877.66902
6537	5766	6273	1990.70461	2284.02774	1877.10229
6535	5765	6267	1990.64076	2283.92723	1876.76489
6532	5763	6264	1990.58842	2283.92649	1876.6724
6532	5761	6262	1990.49967	2283.9221	1875.76223
6527	5759	6262	1989.90623	2283.81811	1875.58081
6527	5754	6262	1989.9003	2283.81412	1875.47985
6520	5749	6261	1988.59679	2283.81115	1874.38934
6518	5747	6258	1988.20182	2283.69492	1873.57103
6517	5744	6258	1988.10993	2283.69319	1872.6732
6514	5744	6255	1987.7238	2283.68761	1872.52913
6511	5739	6252	1987.70008	2283.58342	1871.97318
6507	5738	6251	1987.60609	2283.40834	1871.4804
6504	5733	6248	1987.60453	2283.13874	1869.57374
6500	5732	6245	1987.60194	2282.4958	1868.04775
6493	5727	6243	1986.70027	2282.46523	1867.47848

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6493	5725	6241	1986.6941	2282.14969	1867.22307
6491	5720	6239	1986.30547	2281.91624	1866.93701
6484	5717	6222	1985.50454	2281.58	1866.76807
6463	5712	6220	1985.40149	2281.46263	1866.57454
6463	5710	6220	1983.5942	2281.45931	1866.5709
6463	5709	6219	1983.49064	2281.37209	1863.57015
6460	5708	6219	1982.88394	2280.92445	1863.47455
6458	5705	6216	1982.80271	2280.92426	1863.4012
6453	5702	6214	1981.1032	2280.92187	1862.66726
6447	5701	6214	1980.89591	2280.79456	1860.93635
6442	5700	6209	1979.40438	2280.15334	1860.6605
6437	5699	6207	1978.99787	2279.92089	1860.47838
6437	5697	6202	1978.69891	2279.7252	1858.93348
6435	5696	6201	1977.79304	2279.69668	1857.86408
6434	5696	6200	1977.69037	2279.61027	1857.65961
6433	5692	6198	1977.60175	2279.45623	1856.06027
6431	5686	6198	1977.5992	2279.26295	1855.47519
6429	5684	6195	1977.09334	2279.23402	1855.31012
6427	5677	6194	1976.78761	2279.03398	1854.77016
6426	5675	6193	1975.89811	2278.92666	1854.56454
6426	5672	6189	1975.7944	2278.92456	1853.86284
6424	5669	6184	1975.49758	2278.91299	1851.56684
6423	5666	6181	1974.30598	2278.69272	1849.48414
6422	5665	6181	1974.09406	2278.57186	1847.54228
6422	5660	6180	1973.69734	2278.36599	1847.38219
6418	5656	6177	1973.4967	2278.03634	1845.66792
6414	5647	6176	1972.8941	2278.02928	1844.37861
6406	5643	6174	1971.49198	2277.81372	1842.28529
6401	5640	6168	1971.08777	2277.79887	1840.55964
6395	5640	6165	1970.59747	2277.69027	1837.47492
6394	5639	6164	1969.48892	2277.57754	1836.12227
6391	5633	6155	1969.40763	2277.49392	1835.83876
6388	5624	6150	1969.3967	2277.40036	1834.74653
6388	5623	6150	1969.29753	2277.03238	1833.56056

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6382	5622	6145	1967.99338	2276.92548	1826.37362
6382	5620	6141	1967.69585	2276.90598	1825.09383
6381	5618	6140	1967.2926	2276.82094	1824.01834
6375	5616	6139	1965.69678	2276.81013	1821.38911
6375	5615	6138	1965.39307	2276.26609	1819.73321
6375	5615	6135	1964.69787	2276.26496	1818.55396
6373	5615	6131	1963.98395	2275.8065	1817.6451
6372	5612	6130	1963.69793	2275.80569	1815.82285
6371	5612	6127	1962.88685	2275.71908	1813.01442
6369	5611	6120	1962.80804	2275.68231	1812.64839
6368	5610	6115	1962.19337	2275.38772	1811.46465
6366	5606	6111	1961.49392	2275.35764	1809.00675
6364	5605	6108	1958.49458	2275.14125	1779.54449
6363	5602	6105	1958.48537	2275.03548	
6359	5601	6103	1957.39922	2274.69297	
6356	5600	6102	1956.39856	2273.80845	
6354	5596	6100	1955.69	2273.6784	
6348	5596	6100	1955.58494	2273.15942	
6346	5594	6097	1953.07892	2273.04169	
6343	5588	6097	1950.6869	2272.92723	
6341	5588	6096	1949.50088	2272.91714	
6340	5580	6095	1947.08298	2272.80201	
6337	5578	6091	1946.19819	2272.58037	
6336	5574	6085	1945.78692	2272.39529	
6335	5570	6083	1945.60327	2272.37128	
6332	5563	6078	1945.17232	2272.26071	
6332	5558	6078	1944.48843	2272.25421	
6330	5558	6071	1944.3836	2272.14777	
6329	5557	6070	1943.88147	2272.1471	
6327	5549	6069	1941.68416	2271.91153	
6320	5549	6065	1941.58866	2271.9062	
6317	5546	6064	1940.78243	2271.58034	
6316	5546	6059	1940.58558	2271.48293	
6313	5538	6059	1936.77945	2271.46363	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6309	5538	6056	1935.68446	2271.38236	
6307	5537	6055	1934.96339	2271.35843	
6306	5530	6050	1934.58374	2271.27751	
6305	5530	6048	1926.77779	2271.26019	
6304	5527	6046	1926.57757	2271.23529	
6293	5527	6040	1924.67515	2271.12975	
6293	5523	6038	1921.77955	2271.06426	
6289	5522	6036	1920.57972	2270.90441	
6289	5521	6036	1919.48245	2270.80048	
6288	5517	6035	1917.57709	2270.68419	
6288	5517	6033	1907.473	2270.59217	
6287	5517	6033	1903.96431	2270.46754	
6287	5516	6031	1903.57662	2270.37037	
6286	5515	6030	1894.66465	2270.34998	
6276	5514	6029	1889.85282	2270.26636	
6276	5512	6024		2270.2595	
6276	5508	6018		2270.14345	
6273	5507	6015		2269.91844	
6273	5507	6011		2269.87086	
6273	5499	6006		2269.68893	
6272	5494	6006		2269.59984	
6271	5491	6005		2269.56924	
6270	5490	6003		2269.37002	
6269	5487	6001		2269.27385	
6268	5486	5998		2269.16165	
6268	5485	5997		2268.9196	
6267	5482	5995		2268.71358	
6266	5482	5993		2268.47913	
6265	5478	5992		2268.26682	
6264	5478	5992		2268.25962	
6262	5476	5984		2268.25621	
6260	5475	5982		2268.23138	
6255	5474	5980		2268.15802	
6254	5471	5973		2268.14441	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6248	5471	5970		2267.80748	
6246	5471	5960		2267.46101	
6244	5470	5958		2267.34002	
6237	5467	5958		2267.2584	
6230	5467	5958		2267.16514	
6229	5465	5951		2267.0234	
6224	5464	5948		2266.91599	
6224	5464	5946		2266.7916	
6221	5462	5944		2266.48166	
6221	5461	5943		2266.36668	
6217	5456	5940		2266.14425	
6215	5453	5939		2266.13412	
6212	5452	5939		2265.92982	
6211	5449	5934		2265.92929	
6211	5446	5918		2265.9262	
6210	5446	5915		2265.92153	
6209	5440	5911		2265.80023	
6208	5440	5903		2265.68879	
6206	5431	5902		2265.37586	
6205	5428	5899		2265.15252	
6200	5428	5896		2265.02936	
6200	5428	5893		2264.80501	
6199	5419	5893		2264.68436	
6198	5411	5890		2264.56391	
6197	5410	5889		2264.25797	
6197	5406	5885		2264.25569	
6194	5404	5884		2264.24527	
6191	5400	5883		2263.93817	
6190	5396	5878		2263.80599	
6189	5396	5876		2263.57778	
6188	5396	5870		2263.36554	
6184	5395	5866		2263.36457	
6183	5380	5854		2263.32503	
6180	5378	5853		2263.26389	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6179	5367	5851		2263.23497	
6176	5364	5840		2263.02876	
6175	5359	5840		2262.92092	
6173	5354	5840		2262.66753	
6173	5351	5839		2262.03717	
6171	5348	5839		2262.02402	
6167	5345	5838		2261.91858	
6166	5345	5837		2261.9135	
6160	5343	5835		2261.80555	
6158	5341	5835		2261.69123	
6152	5335	5828		2261.68676	
6151	5329	5827		2261.57675	
6147	5317	5824		2261.57416	
6146	5317	5824		2261.4635	
6144	5315	5823		2261.01815	
6142	5304	5813		2261.01022	
6139	5299	5813		2260.91108	
6138	5298	5812		2260.82054	
6135	5295	5812		2260.6882	
6134	5295	5806		2260.66274	
6133	5292	5803		2260.57932	
6130	5288	5798		2260.33423	
6129	5287	5794		2260.14518	
6124	5287	5786		2259.78069	
6122	5287	5785		2259.69224	
6121	5279	5779		2259.68652	
6120	5277	5778		2259.58925	
6118	5271	5777		2259.57103	
6111	5266	5775		2259.5635	
6107	5263	5775		2259.47759	
6105	5260	5774		2259.13947	
6104	5254	5772		2259.13695	
6101	5248	5770		2259.01832	
6097	5246	5768		2258.91951	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6092	5231	5763		2258.91113	
6088	5225	5761		2258.68853	
6085	5223	5760		2258.5811	
6085	5218	5758		2258.49561	
6082	5214	5754		2258.45469	
6081	5201	5751		2258.45304	
6081	5195	5746		2258.36149	
6078	5189	5741		2258.1377	
6075	5170	5740		2258.02328	
6075	5167	5740		2258.02304	
6072	5163	5737		2257.92025	
6072	5158	5736		2257.91522	
6068	5116	5734		2257.6863	
6068	5088	5731		2257.34031	
6067	5072	5728		2257.12412	
6066	5065	5725		2257.02097	
6062	5057	5722		2256.89897	
6060	5046	5716		2256.81107	
6059	5026	5709		2256.80126	
6058	5023	5704		2256.7996	
6055	5022	5702		2256.79766	
6052	5009	5698		2256.69802	
6051	4993	5697		2256.68443	
6049	4991	5695		2256.4589	
6048	4978	5694		2256.34757	
6048	4922	5693		2256.2512	
6047	4910	5689		2256.12951	
6045	4899	5686		2255.59429	
6045	4896	5678		2255.24468	
6041	4894	5670		2255.24005	
6038	4888	5666		2254.79511	
6038	4873	5665		2254.55851	
6037	4865	5661		2254.46441	
6033	4848	5659		2254.36427	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
6032	4809	5659		2254.23962	
6031	4767	5659		2254.02465	
6030	4753	5656		2254.02197	
6028	4734	5652		2254.02065	
6027	4728	5652		2253.60089	
6024	4724	5645		2253.46465	
6019	4723	5644		2253.01016	
6018	4696	5643		2252.88205	
6015	4674	5643		2252.803	
6013		5642		2252.68636	
6013		5640		2252.46313	
6011		5640		2251.80196	
6007		5639		2251.70326	
6000		5639		2251.65771	
6000		5638		2251.47625	
5997		5636		2251.35497	
5996		5636		2251.13374	
5996		5634		2251.12721	
5996		5633		2251.10815	
5994		5630		2250.69957	
5992		5629		2250.13347	
5992		5624		2250.13157	
5991		5622		2250.13121	
5990		5611		2250.02447	
5989		5605		2249.9035	
5987		5600		2249.80096	
5983		5598		2249.80001	
5972		5596		2249.13506	
5970		5593		2249.01859	
5967		5593		2248.9134	
5965		5591		2248.87805	
5962		5586		2248.79766	
5961		5586		2248.70987	
5958		5581		2248.68555	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
5958		5581		2248.56658	
5956		5576		2248.46543	
5947		5574		2248.17134	
5947		5573		2248.13895	
5943		5571		2248.03972	
5943		5570		2248.0258	
5942		5567		2247.9269	
5941		5565		2247.57257	
5941		5565		2247.56219	
5937		5564		2247.13405	
5934		5554		2247.13265	
5933		5554		2247.02107	
5924		5551		2247.01621	
5922		5549		2246.91473	
5922		5546		2246.91093	
5916		5543		2246.9046	
5916		5542		2246.66567	
5912		5539		2246.6502	
5911		5533		2246.61214	
5910		5533		2246.56799	
5906		5533		2245.55403	
5902		5532		2245.35471	
5901		5531		2245.02361	
5900		5529		2244.91086	
5900		5525		2244.90658	
5895		5524		2244.68414	
5894		5520		2244.57656	
5891		5518		2244.55687	
5888		5515		2244.46589	
5886		5508		2244.11728	
5882		5506		2243.68538	
5879		5506		2243.58637	
5876		5504		2243.35855	
5875		5502		2243.24407	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
5875		5502		2243.14601	
5875		5499		2243.14265	
5871		5498		2243.13949	
5870		5496		2242.90564	
5865		5493		2242.79347	
5865		5493		2242.68386	
5863		5493		2242.60583	
5861		5486		2242.5705	
5855		5481		2242.35132	
5853		5481		2242.01766	
5853		5480		2241.90884	
5849		5478		2241.90468	
5844		5477		2241.79717	
5844		5472		2241.7896	
5842		5464		2241.58106	
5836		5461		2241.56397	
5835		5461		2241.46167	
5831		5460		2241.01355	
5825		5460		2240.35868	
5824		5457		2240.25619	
5823		5455		2239.91144	
5821		5453		2239.79543	
5820		5450		2239.78837	
5818		5447		2239.69125	
5816		5445		2239.24528	
5813		5445		2239.15604	
5812		5444		2239.0165	
5812		5440		2238.78914	
5799		5437		2238.78693	
5797		5436		2238.56332	
5792		5435		2238.45017	
5791		5434		2238.34598	
5786		5432		2237.78802	
5784		5431		2237.68209	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
5784		5428		2237.56569	
5772		5425		2236.79151	
5766		5424		2236.45862	
5766		5421		2236.34821	
5765		5417		2236.33987	
5760		5415		2236.12629	
5757		5413		2235.90528	
5749		5412		2235.89551	
5749		5412		2235.79801	
5746		5410		2235.41125	
5744		5409		2235.12401	
5742		5409		2235.12031	
5741		5406		2235.00988	
5740		5404		2235.00779	
5739		5401		2235.00558	
5738		5397		2234.68155	
5732		5397		2234.4513	
5727		5394		2234.01317	
5724		5387		2233.91599	
5723		5386		2233.90138	
5719		5386		2233.42165	
5719		5383		2233.34391	
5715		5381		2233.12702	
5713		5376		2232.78733	
5701		5373		2232.67882	
5700		5372		2232.34794	
5696		5372		2232.01815	
5694		5371		2232.01347	
5692		5371		2231.92177	
5691		5368		2231.91069	
5689		5368		2231.90589	
5687		5366		2231.69784	
5686		5366		2231.588	
5685		5358		2230.91891	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
5683		5353		2230.90186	
5679		5347		2230.79482	
5668		5345		2230.78921	
5665		5341		2230.68266	
5657		5333		2230.46359	
5649		5332		2230.45274	
5639		5330		2230.33322	
5637		5316		2230.2346	
5636		5313		2229.89497	
5636		5313		2229.67451	
5628		5312		2229.23833	
5626		5312		2229.12331	
5626		5311		2228.7898	
5621		5308		2228.57334	
5621		5308		2228.45704	
5618		5304		2228.12219	
5616		5300		2228.06052	
5606		5294		2227.78654	
5606		5290		2227.35227	
5605		5287		2227.23346	
5603		5284		2227.1206	
5600		5283		2226.99531	
5598		5282		2226.91024	
5592		5280		2226.78305	
5590		5280		2226.67978	
5558		5278		2226.2361	
5556		5278		2226.11974	
5553		5276		2226.01533	
5552		5276		2225.79331	
5552		5272		2225.78695	
5551		5272		2225.69203	
5542		5258		2225.56775	
5539		5247		2225.45182	
5533		5244		2225.22292	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
5523		5231		2224.90393	
5512		5228		2224.80803	
5511		5223		2224.78301	
5505		5222		2224.67662	
5504		5219		2224.46069	
5503		5213		2224.44276	
5494		5211		2224.34651	
5493		5208		2224.34132	
5492		5207		2224.33897	
5491		5207		2224.32984	
5489		5197		2224.26102	
5489		5197		2223.88809	
5487		5196		2223.56442	
5486		5192		2223.56291	
5480		5188		2223.56246	
5462		5186		2223.45801	
5461		5183		2223.34404	
5460		5179		2223.01758	
5451		5176		2222.90548	
5449		5170		2222.82828	
5449		5168		2222.45126	
5437		5167		2222.34874	
5437		5160		2222.00852	
5436		5158		2221.79052	
5435		5158		2221.46318	
5434		5151		2221.00714	
5430		5150		2221.00667	
5422		5147		2220.78278	
5421		5136		2220.68466	
5415		5133		2220.5569	
5404		5131		2220.33335	
5403		5121		2220.24575	
5403		5120		2220.22843	
5402		5115		2220.12464	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
5393		5113		2220.11586	
5390		5111		2219.90745	
5389		5105		2219.89956	
5386		5099		2219.78484	
5385		5099		2218.89942	
5355		5099		2218.81145	
5355		5097		2218.02034	
5353		5090		2218.00689	
5334		5089		2216.9917	
5332		5089		2216.78182	
5325		5085		2216.67241	
5325		5085		2216.6414	
5325		5082		2216.56182	
5314		5074		2216.45023	
5294		5071		2216.43347	
5293		5069		2215.8909	
5285		5068		2215.89022	
5278		5067		2215.22232	
5269		5063		2215.00909	
5265		5063		2214.67088	
5254		5061		2214.56523	
5240		5060		2214.34283	
5237		5059		2214.2522	
5236		5055		2214.11029	
5234		5053		2214.00477	
5233		5053		2213.99831	
5230		5051		2213.78562	
5211		5048		2213.67321	
5208		5044		2213.22716	
5204		5044		2213.22236	
5189		5042		2212.96595	
5176		5042		2212.80094	
5138		5042		2212.77686	
5137		5041		2212.77567	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
5125		5041		2212.21897	
5118		5038		2212.11563	
5076		5037		2211.88368	
5074		5037		2211.67281	
5074		5034		2211.56778	
5070		5034		2211.56723	
5023		5029		2211.45578	
5009		5027		2211.31975	
4995		5027		2210.9965	
4931		5023		2210.77922	
4878		5019		2210.64667	
4861		5011		2210.00195	
4841		5005		2209.90855	
4821		5003		2209.89285	
4816		5001		2209.66305	
4801		5001		2209.3338	
4783		4996		2209.23718	
4777		4996		2209.11313	
4742		4991		2209.00404	
4696		4991		2208.99948	
4692		4990		2208.99885	
4635		4984		2208.67096	
4590		4983		2208.56884	
4551		4978		2208.45561	
4461		4972		2208.22324	
4367		4968		2207.85928	
4348		4966		2207.45232	
4304		4964		2207.12726	
4301		4957		2206.88283	
		4956		2206.80898	
		4951		2206.63606	
		4947		2206.57982	
		4946		2206.56503	
		4946		2206.33274	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
		4945		2206.22996	
		4940		2206.22467	
		4939		2206.12723	
		4928		2206.1218	
		4909		2206.01088	
		4906		2205.8776	
		4901		2205.55081	
		4898		2205.11034	
		4897		2204.77803	
		4893		2204.12048	
		4893		2204.11862	
		4886		2203.99905	
		4884		2203.87434	
		4884		2203.55868	
		4883		2203.11043	
		4878		2202.86487	
		4876		2202.77215	
		4863		2202.55987	
		4860		2201.79805	
		4852		2201.31399	
		4844		2201.30276	
		4839		2200.78721	
		4819		2200.78222	
		4817		2200.77684	
		4810		2199.85793	
		4808		2199.76663	
		4801		2199.34471	
		4798		2198.8938	
		4797		2198.89023	
		4795		2198.66975	
		4795		2198.21489	
		4794		2198.09157	
		4793		2197.6663	
		4789		2197.54444	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
		4776		2197.43526	
		4776		2196.88853	
		4776		2196.88659	
		4772		2196.77035	
		4763		2196.65612	
		4761		2196.1038	
		4761		2195.88916	
		4748		2194.88595	
		4745		2194.79823	
		4743		2194.77274	
		4743		2194.76879	
		4740		2194.67571	
		4738		2194.33879	
		4734		2193.88711	
		4731		2193.70594	
		4730		2193.66933	
		4724		2193.66312	
		4712		2193.41403	
		4709		2193.32493	
		4702		2193.00285	
		4701		2192.97502	
		4698		2192.88502	
		4698		2192.77874	
		4698		2192.66889	
		4695		2192.32505	
		4695		2191.88489	
		4692		2190.77506	
		4684		2190.32338	
		4670		2189.91524	
		4670		2189.6746	
		4667		2189.45184	
		4664		2189.12992	
		4664		2189.09905	
		4654		2188.90344	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
		4654		2188.88148	
		4646		2188.55397	
		4627		2187.19488	
		4624		2187.00345	
		4622		2186.9923	
		4619		2186.88344	
		4619		2186.63227	
		4612		2186.55787	
		4608		2186.44507	
		4602		2186.13299	
		4600		2186.10033	
		4586		2185.9874	
		4586		2185.88068	
		4582		2185.77691	
		4579		2185.77204	
		4558		2185.56261	
		4558		2185.29972	
		4552		2184.98617	
		4514		2184.76555	
		4510		2184.43073	
		4507		2184.29894	
		4503		2184.23364	
		4502		2184.20273	
		4494		2184.18371	
		4492		2183.70493	
		4491		2183.44389	
		4484		2183.36762	
		4483		2183.33195	
		4463		2183.31769	
		4424		2183.31218	
		4424		2182.88623	
		4423		2182.77493	
		4415		2182.23335	
		4413		2182.11134	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
		4403		2181.3199	
		4401		2181.30597	
		4379		2181.20736	
		4367		2180.9917	
		4331		2180.554	
		4327		2180.54257	
		4322		2180.43138	
		4321		2180.20206	
		4295		2179.75802	
		4271		2179.66426	
		4256		2179.54056	
		4227		2179.08291	
		4205		2178.74921	
		4193		2178.43261	
		4189		2178.43024	
		4177		2178.07797	
		4165		2177.88043	
		4164		2177.87766	
		4136		2177.87147	
		4130		2177.66225	
		4118		2177.54202	
		4100		2176.97537	
		4035		2176.78962	
		4014		2176.55936	
		3994		2175.45493	
		3876		2174.97948	
		3860		2174.65856	
		3851		2173.99229	
		3823		2173.9897	
		3819		2173.77536	
		3816		2173.77361	
		3797		2173.40355	
		3768		2173.00318	
		3736		2170.97835	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
		3706		2169.66408	
				2168.98664	
				2168.20378	
				2167.85925	
				2166.88041	
				2166.76145	
				2166.56229	
				2166.55653	
				2166.20456	
				2166.10021	
				2166.09123	
				2165.88369	
				2165.7631	
				2165.55563	
				2164.98003	
				2164.77211	
				2164.55459	
				2164.4349	
				2164.08967	
				2163.98528	
				2163.77688	
				2163.76912	
				2163.50488	
				2163.40826	
				2162.88815	
				2162.76392	
				2162.32294	
				2161.87483	
				2161.66423	
				2160.87392	
				2160.87104	
				2160.77623	
				2159.43918	
				2159.41716	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
				2158.985	
				2158.10994	
				2157.98407	
				2157.97604	
				2156.9786	
				2155.42523	
				2155.09562	
				2154.40929	
				2153.33589	
				2153.30667	
				2152.96682	
				2151.96714	
				2151.76179	
				2150.42087	
				2149.88054	
				2149.07267	
				2147.18683	
				2146.64855	
				2145.51828	
				2144.98131	
				2144.9715	
				2144.18618	
				2142.74937	
				2142.74311	
				2142.7428	
				2140.09394	
				2139.65062	
				2139.29168	
				2138.75222	
				2137.54609	
				2136.07331	
				2133.65026	
				2133.64962	
				2132.17684	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Horizontal 44-20	SU2 Horizontal 44-20	SU3 Horizontal 44-20	SU1 Horizontal RS700	SU2 Horizontal RS700	SU3 Horizontal RS700
				2131.64302	
				2129.7483	
				2129.43279	
				2128.87487	
				2128.52123	
				2127.28439	
				2125.6474	
				2125.06857	
				2123.55573	
				2123.54511	
				2120.51807	
				2119.53838	
				2115.43397	
				2115.42804	
				2111.64117	
				2109.74172	
				2108.53254	
				2108.42008	
				2106.28236	
				2105.61776	
				2105.16407	
				2104.97401	
				2100.06487	
				2099.19921	
				2094.94758	
				2086.01893	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
15530	12122	16210	17480	15016
15404	12064	15800	16607	13940
15207	11976	15498	16382	13207
15102	11954	15286	16310	13207
14875	11935	15203	16263	13139
14771	11877	15107	16054	12245
14759	11873	15044	15879	11996
14677	11776	14972	15712	11757
14515	11768	14921	15701	11379
14382	11731	14859	15233	10803
14242	11691	14792	15178	10473
14230	11675	14621	15094	10473
14222	11628	14611	15040	10462
14220	11621	14605	15018	10042
14208	11569	14502	14996	10023
14191	11536	14490	14917	9647
14182	11524	14455	14792	9587
14137	11483	14332	14776	9580
14120	11475	14319	14752	9580
14100	11459	14294	14744	9380
14097	11440	14291	14694	9262
14091	11415	14205	14663	9113
14088	11412	14103	14623	9105
14069	11408	14095	14618	8940
14028	11399	14084	14579	8820
13943	11371	14068	14469	8820
13941	11371	14065	14457	8753
13932	11365	14001	14364	8712
13919	11352	13975	14311	8712
13897	11339	13945	14265	8645
13891	11323	13944	14203	8584
13860	11306	13938	14158	8567
13848	11306	13894	14138	8567
13804	11296	13893	14123	8549

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
13801	11267	13890	14113	8545
13794	11267	13887	14091	8469
13782	11259	13884	14084	8468
13769	11251	13848	14058	8468
13764	11235	13843	14027	8465
13737	11233	13841	13973	8454
13725	11217	13827	13958	8454
13715	11213	13805	13950	8417
13704	11172	13782	13935	8415
13685	11163	13778	13917	8388
13651	11156	13778	13914	8386
13642	11154	13771	13910	8386
13641	11147	13735	13842	8338
13632	11138	13730	13814	8327
13601	11127	13697	13810	8326
13601	11117	13696	13809	8326
13598	11101	13676	13790	8285
13512	11098	13669	13771	8282
13489	11097	13640	13754	8272
13485	11095	13614	13751	8267
13466	11091	13607	13734	8266
13462	11083	13603	13714	8266
13458	11080	13601	13703	8256
13450	11080	13584	13697	8253
13447	11059	13583	13689	8253
13443	11051	13582	13641	8248
13439	11026	13570	13639	8236
13402	11025	13563	13625	8236
13399	11022	13563	13622	8235
13367	11017	13555	13621	8225
13360	11016	13552	13615	8225
13358	11015	13550	13601	8220
13357	11010	13510	13587	8214
13350	10995	13510	13582	8211

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
13344	10980	13501	13565	8211
13332	10976	13485	13564	8207
13318	10972	13465	13559	8207
13318	10968	13463	13543	8199
13316	10967	13437	13520	8183
13316	10963	13431	13518	8181
13311	10959	13424	13518	8174
13310	10952	13411	13507	8171
13299	10945	13410	13501	8164
13296	10944	13406	13484	8158
13283	10942	13404	13472	8158
13277	10941	13402	13467	8157
13263	10931	13391	13465	8153
13256	10930	13389	13457	8152
13254	10928	13388	13452	8152
13242	10925	13378	13450	8151
13238	10924	13373	13434	8142
13234	10922	13371	13429	8142
13233	10910	13361	13424	8137
13227	10895	13349	13421	8127
13225	10892	13346	13419	8126
13211	10890	13343	13412	8122
13211	10888	13340	13406	8118
13206	10887	13338	13396	8117
13201	10882	13336	13390	8113
13199	10874	13325	13390	8113
13195	10872	13322	13377	8111
13192	10870	13305	13377	8101
13185	10867	13304	13376	8096
13178	10850	13296	13370	8096
13174	10849	13294	13367	8095
13171	10847	13282	13346	8091
13166	10845	13282	13340	8088
13164	10841	13275	13338	8085

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
13164	10838	13273	13337	8085
13162	10835	13271	13315	8084
13161	10825	13266	13305	8082
13160	10824	13252	13304	8082
13156	10823	13239	13297	8082
13154	10819	13235	13294	8077
13151	10817	13222	13284	8070
13151	10807	13221	13274	8065
13147	10805	13221	13271	8063
13146	10793	13220	13271	8057
13144	10792	13214	13269	8053
13142	10790	13213	13268	8049
13140	10788	13211	13225	8048
13138	10786	13205	13220	8042
13135	10786	13204	13219	8035
13135	10782	13203	13217	8035
13130	10781	13202	13207	8035
13128	10774	13201	13196	8014
13122	10773	13194	13188	8014
13109	10768	13194	13188	8007
13104	10758	13192	13186	8002
13099	10748	13167	13170	7999
13093	10745	13166	13166	7995
13091	10743	13163	13157	7990
13086	10732	13157	13156	7988
13085	10730	13152	13156	7988
13083	10719	13152	13155	7978
13082	10717	13151	13130	7977
13080	10715	13150	13129	7977
13079	10714	13148	13128	7976
13078	10710	13141	13118	7976
13076	10706	13140	13111	7976
13076	10701	13140	13103	7975
13070	10700	13137	13088	7973

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
13061	10698	13135	13079	7972
13059	10695	13125	13076	7970
13056	10693	13123	13073	7967
13055	10693	13123	13070	7966
13053	10690	13119	13065	7962
13052	10690	13115	13061	7961
13052	10687	13112	13056	7958
13051	10681	13107	13042	7958
13050	10673	13105	13040	7958
13049	10669	13102	13038	7958
13048	10666	13102	13030	7957
13047	10659	13101	13020	7950
13043	10656	13097	13018	7949
13043	10651	13095	13011	7949
13042	10647	13093	13001	7947
13041	10647	13092	12995	7947
13035	10645	13090	12984	7946
13033	10641	13090	12975	7946
13032	10640	13089	12972	7946
13028	10639	13088	12967	7945
13025	10639	13083	12963	7944
13016	10639	13080	12962	7940
13013	10638	13079	12950	7936
13010	10638	13067	12948	7934
13007	10636	13067	12947	7930
12995	10636	13065	12943	7930
12990	10636	13056	12940	7930
12986	10631	13055	12937	7929
12982	10631	13055	12924	7929
12980	10628	13055	12923	7928
12976	10618	13046	12919	7927
12966	10616	13043	12919	7922
12963	10610	13042	12910	7921
12963	10610	13040	12905	7919

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12960	10609	13040	12904	7919
12957	10609	13039	12901	7915
12953	10607	13030	12900	7915
12949	10601	13029	12893	7915
12944	10601	13024	12891	7912
12942	10598	13021	12889	7911
12939	10597	13018	12889	7910
12935	10596	13016	12886	7908
12935	10596	13014	12878	7908
12933	10594	13011	12871	7908
12930	10589	13009	12860	7904
12925	10584	13009	12857	7900
12924	10580	13008	12849	7897
12922	10578	12994	12846	7897
12921	10566	12991	12843	7895
12918	10566	12991	12838	7887
12918	10563	12990	12836	7886
12916	10562	12989	12823	7886
12913	10561	12985	12821	7882
12910	10559	12979	12821	7882
12907	10557	12975	12816	7879
12901	10555	12974	12808	7879
12901	10551	12974	12808	7877
12891	10549	12973	12805	7875
12889	10547	12966	12800	7867
12888	10546	12963	12800	7867
12888	10546	12963	12793	7860
12887	10546	12962	12786	7858
12885	10544	12960	12782	7858
12878	10541	12957	12780	7858
12876	10530	12952	12780	7855
12873	10527	12952	12769	7847
12867	10527	12951	12767	7847
12866	10524	12947	12761	7845

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12861	10516	12944	12750	7841
12860	10516	12943	12747	7838
12859	10512	12942	12739	7838
12850	10505	12942	12734	7838
12849	10504	12941	12734	7838
12846	10500	12937	12733	7835
12843	10500	12937	12733	7834
12842	10494	12935	12731	7833
12831	10492	12930	12730	7833
12830	10485	12930	12726	7832
12828	10483	12930	12718	7832
12827	10481	12927	12717	7832
12822	10480	12927	12711	7831
12819	10479	12917	12708	7830
12813	10477	12913	12708	7826
12811	10469	12913	12703	7825
12806	10465	12912	12703	7825
12804	10458	12911	12703	7825
12791	10454	12911	12699	7824
12783	10445	12911	12696	7824
12781	10444	12910	12692	7822
12780	10435	12909	12692	7822
12776	10434	12907	12690	7818
12776	10433	12900	12688	7815
12773	10430	12887	12688	7813
12771	10426	12884	12687	7813
12770	10423	12881	12683	7807
12770	10420	12876	12682	7807
12767	10419	12872	12672	7807
12766	10408	12870	12667	7803
12764	10402	12870	12663	7803
12763	10399	12869	12657	7797
12758	10397	12867	12655	7795
12757	10396	12865	12653	7793

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12756	10388	12863	12652	7793
12750	10387	12862	12650	7791
12746	10387	12861	12641	7786
12742	10386	12860	12641	7782
12741	10385	12857	12640	7782
12737	10377	12855	12640	7782
12736	10376	12853	12633	7777
12736	10375	12853	12626	7776
12733	10374	12852	12626	7775
12732	10374	12850	12625	7773
12729	10373	12847	12623	7771
12726	10360	12847	12620	7771
12726	10360	12843	12618	7766
12726	10359	12842	12616	7766
12725	10355	12841	12615	7765
12724	10354	12841	12614	7765
12715	10349	12841	12611	7763
12714	10341	12839	12609	7758
12712	10341	12838	12607	7753
12710	10340	12836	12606	7750
12704	10337	12832	12606	7750
12701	10336	12828	12605	7746
12700	10333	12827	12604	7744
12700	10333	12824	12604	7739
12699	10328	12822	12604	7739
12687	10328	12820	12602	7736
12686	10325	12819	12598	7736
12684	10324	12815	12594	7736
12682	10319	12813	12591	7736
12682	10313	12811	12586	7736
12679	10312	12807	12583	7734
12668	10312	12807	12575	7731
12664	10311	12807	12573	7731
12661	10310	12803	12568	7730

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12657	10307	12803	12567	7727
12657	10291	12802	12566	7727
12651	10290	12799	12563	7725
12649	10286	12797	12560	7724
12649	10286	12796	12558	7723
12648	10280	12794	12557	7719
12647	10278	12793	12557	7719
12647	10263	12791	12557	7719
12642	10263	12789	12553	7718
12641	10263	12789	12550	7716
12639	10262	12788	12549	7716
12628	10261	12788	12549	7716
12627	10258	12784	12549	7713
12624	10257	12778	12548	7713
12620	10251	12778	12543	7713
12612	10248	12775	12540	7711
12612	10230	12775	12540	7711
12607	10226	12775	12537	7709
12607	10222	12768	12537	7709
12604	10221	12766	12535	7709
12602	10218	12765	12532	7708
12600	10217	12764	12531	7708
12599	10216	12764	12531	7698
12597	10215	12762	12529	7695
12594	10214	12759	12527	7688
12593	10206	12754	12527	7688
12593	10204	12754	12526	7685
12592	10200	12754	12525	7685
12590	10192	12753	12525	7685
12589	10192	12753	12525	7683
12588	10187	12750	12525	7683
12583	10186	12750	12514	7683
12581	10185	12743	12514	7683
12577	10183	12742	12512	7680

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12576	10178	12739	12510	7680
12573	10178	12738	12502	7680
12568	10178	12736	12499	7680
12567	10173	12734	12499	7676
12566	10173	12734	12498	7676
12566	10172	12734	12498	7676
12565	10171	12733	12496	7673
12564	10165	12732	12496	7673
12562	10164	12732	12495	7672
12559	10161	12729	12490	7672
12557	10161	12728	12484	7670
12557	10156	12727	12483	7670
12556	10152	12722	12483	7667
12551	10150	12721	12482	7665
12546	10144	12720	12478	7663
12540	10128	12720	12475	7662
12540	10123	12718	12473	7662
12537	10122	12715	12472	7662
12535	10120	12715	12468	7662
12534	10117	12714	12467	7662
12530	10117	12714	12466	7657
12530	10111	12713	12465	7657
12525	10106	12710	12465	7657
12524	10105	12708	12462	7657
12523	10100	12708	12457	7655
12521	10098	12702	12454	7655
12521	10088	12695	12448	7654
12518	10079	12693	12447	7654
12518	10078	12693	12444	7653
12517	10077	12692	12443	7653
12517	10067	12691	12442	7652
12514	10064	12691	12441	7648
12514	10054	12685	12438	7648
12513	10035	12683	12438	7647

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12513	10029	12682	12437	7645
12512	10028	12682	12433	7642
12512	10019	12682	12433	7641
12511	10014	12681	12433	7641
12510	10012	12675	12429	7640
12509	10009	12675	12427	7639
12506	9998	12674	12424	7639
12505	9987	12673	12424	7638
12505	9974	12673	12421	7638
12503	9967	12673	12421	7637
12500	9965	12673	12416	7635
12500	9963	12672	12416	7635
12498	9958	12671	12414	7634
12494	9958	12670	12413	7631
12491	9956	12670	12410	7631
12490	9956	12669	12409	7631
12490	9942	12668	12408	7631
12489	9937	12666	12408	7630
12487	9930	12664	12406	7629
12487	9922	12662	12403	7627
12487	9919	12661	12401	7627
12487	9916	12661	12393	7627
12485	9913	12660	12388	7624
12481	9912	12658	12387	7624
12479	9909	12658	12382	7623
12478	9909	12656	12382	7620
12477	9900	12654	12378	7620
12476	9894	12654	12376	7620
12472	9892	12652	12374	7620
12471	9891	12647	12373	7620
12469	9883	12646	12372	7620
12465	9876	12643	12369	7620
12464	9869	12640	12369	7618
12464	9860	12639	12367	7618

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12463	9858	12638	12362	7617
12460	9855	12638	12360	7617
12459	9854	12638	12360	7616
12459	9853	12636	12359	7616
12459	9843	12633	12357	7613
12456	9835	12633	12354	7613
12454	9834	12629	12351	7612
12448	9832	12626	12350	7612
12446	9831	12620	12350	7610
12444	9830	12618	12349	7610
12443	9819	12614	12344	7608
12443	9817	12613	12341	7608
12442	9814	12611	12341	7607
12437	9811	12607	12341	7606
12435	9808	12602	12333	7604
12434	9806	12602	12333	7604
12431	9805	12601	12332	7603
12428	9802	12598	12329	7603
12427	9778	12596	12327	7603
12426	9765	12596	12326	7599
12423	9761	12593	12325	7599
12422	9758	12591	12324	7598
12421	9750	12589	12324	7598
12419	9742	12589	12321	7594
12418	9735	12589	12317	7594
12416	9733	12587	12311	7593
12416	9730	12586	12307	7591
12415	9721	12586	12306	7591
12412	9715	12579	12305	7586
12410	9700	12577	12304	7585
12410	9687	12576	12303	7585
12409	9684	12575	12302	7584
12407	9680	12571	12301	7584
12401	9665	12571	12300	7584

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12401	9662	12570	12299	7584
12401	9661	12570	12296	7579
12400	9657	12566	12293	7577
12399	9656	12566	12288	7575
12399	9649	12566	12286	7574
12398	9643	12565	12286	7574
12398	9642	12565	12286	7571
12397	9640	12556	12285	7571
12397	9638	12555	12283	7570
12395	9637	12555	12280	7570
12395	9635	12553	12279	7570
12394	9625	12551	12275	7569
12393	9616	12548	12274	7568
12393	9614	12544	12273	7568
12392	9613	12543	12272	7567
12392	9604	12533	12272	7567
12390	9602	12529	12268	7564
12390	9600	12529	12268	7563
12381	9599	12528	12261	7563
12381	9591	12528	12259	7562
12374	9583	12526	12253	7562
12373	9583	12519	12252	7561
12373	9580	12519	12241	7560
12372	9574	12519	12241	7560
12372	9573	12514	12241	7559
12368	9564	12512	12241	7559
12363	9564	12512	12239	7556
12363	9560	12511	12238	7555
12361	9552	12511	12238	7554
12360	9546	12509	12237	7551
12360	9545	12507	12234	7551
12360	9544	12506	12232	7548
12359	9537	12505	12232	7547
12354	9536	12504	12232	7538

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12348	9532	12503	12227	7538
12346	9525	12500	12227	7538
12346	9514	12500	12222	7536
12345	9507	12500	12221	7535
12344	9506	12499	12219	7535
12333	9502	12497	12218	7534
12332	9501	12494	12216	7533
12331	9498	12493	12216	7529
12330	9495	12492	12216	7529
12330	9493	12490	12216	7528
12326	9492	12487	12213	7525
12322	9488	12486	12209	7523
12321	9488	12486	12205	7523
12320	9476	12482	12202	7515
12319	9473	12478	12199	7514
12318	9464	12477	12199	7514
12318	9462	12477	12197	7513
12317	9459	12476	12195	7512
12317	9456	12476	12195	7510
12315	9456	12475	12192	7509
12313	9446	12472	12190	7509
12311	9443	12471	12188	7509
12310	9436	12471	12187	7508
12309	9435	12469	12185	7506
12309	9429	12467	12183	7505
12309	9428	12467	12183	7504
12309	9427	12467	12183	7504
12307	9426	12467	12180	7503
12301	9422	12466	12179	7500
12301	9420	12465	12170	7500
12300	9419	12465	12170	7498
12299	9418	12465	12169	7498
12298	9414	12465	12167	7493
12297	9412	12462	12167	7493

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12296	9409	12462	12166	7492
12289	9408	12457	12161	7491
12288	9405	12457	12160	7490
12283	9403	12454	12159	7487
12281	9398	12453	12158	7487
12275	9391	12453	12157	7486
12274	9390	12452	12156	7485
12270	9382	12450	12153	7485
12270	9378	12450	12148	7485
12269	9375	12443	12147	7484
12269	9373	12441	12146	7480
12265	9372	12440	12143	7478
12263	9363	12440	12142	7477
12262	9361	12439	12142	7477
12262	9355	12439	12141	7477
12261	9354	12438	12141	7474
12260	9352	12438	12141	7472
12258	9352	12435	12140	7472
12253	9349	12433	12138	7471
12251	9349	12428	12135	7471
12247	9349	12427	12135	7471
12246	9345	12426	12134	7470
12246	9344	12424	12134	7470
12245	9342	12424	12133	7468
12242	9341	12422	12131	7468
12241	9341	12421	12127	7468
12241	9337	12419	12125	7466
12241	9336	12419	12123	7466
12240	9333	12417	12123	7465
12240	9332	12415	12122	7463
12240	9327	12415	12122	7463
12240	9323	12413	12122	7463
12240	9321	12413	12120	7463
12238	9318	12412	12119	7458

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12238	9314	12412	12119	7458
12235	9312	12411	12117	7458
12235	9310	12410	12114	7453
12233	9310	12406	12113	7453
12232	9306	12405	12112	7451
12232	9305	12403	12111	7449
12228	9297	12402	12109	7449
12222	9295	12401	12109	7449
12221	9291	12396	12108	7448
12220	9288	12393	12106	7446
12220	9287	12393	12103	7446
12220	9284	12392	12103	7445
12218	9280	12391	12100	7445
12217	9278	12391	12098	7444
12216	9278	12390	12096	7444
12216	9273	12388	12095	7440
12214	9263	12387	12093	7438
12213	9261	12386	12092	7438
12211	9240	12385	12091	7437
12211	9233	12384	12089	7436
12209	9232	12383	12087	7433
12208	9227	12381	12086	7432
12208	9225	12378	12085	7431
12208	9225	12378	12084	7426
12205	9224	12377	12082	7426
12204	9213	12377	12082	7424
12204	9213	12376	12082	7424
12202	9207	12376	12077	7422
12200	9205	12375	12076	7420
12198	9203	12375	12076	7420
12198	9203	12375	12074	7420
12198	9200	12375	12073	7420
12196	9199	12374	12073	7416
12195	9197	12371	12069	7414

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12195	9195	12368	12068	7414
12193	9194	12368	12064	7412
12192	9190	12367	12060	7412
12190	9181	12367	12060	7411
12189	9181	12367	12056	7408
12185	9180	12366	12056	7406
12185	9179	12363	12055	7404
12184	9166	12361	12053	7403
12182	9164	12360	12053	7403
12182	9159	12356	12053	7403
12180	9157	12350	12052	7402
12179	9150	12348	12052	7402
12179	9148	12345	12052	7398
12179	9147	12345	12045	7396
12177	9145	12343	12045	7392
12176	9136	12342	12044	7391
12176	9135	12341	12041	7391
12173	9135	12339	12041	7389
12172	9126	12339	12039	7388
12171	9109	12338	12037	7386
12169	9109	12336	12036	7385
12165	9107	12331	12036	7384
12165	9101	12331	12035	7381
12165	9101	12330	12035	7381
12160	9095	12330	12033	7379
12160	9094	12330	12033	7378
12159	9093	12322	12033	7377
12158	9092	12320	12032	7375
12157	9091	12320	12031	7374
12152	9087	12320	12030	7373
12150	9086	12317	12027	7372
12147	9083	12317	12027	7372
12147	9079	12316	12025	7371
12145	9075	12316	12025	7370

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12145	9071	12316	12023	7368
12142	9067	12316	12018	7366
12141	9064	12315	12018	7366
12138	9063	12314	12014	7365
12138	9053	12314	12014	7365
12137	9042	12312	12012	7364
12137	9042	12308	12011	7364
12132	9038	12307	12009	7362
12131	9037	12307	12009	7362
12129	9033	12306	12008	7361
12129	9024	12305	12007	7361
12129	9022	12304	12005	7361
12127	9019	12302	12001	7358
12126	9017	12302	12001	7357
12126	9015	12301	12001	7357
12125	9007	12301	11999	7356
12124	9007	12300	11998	7354
12123	9005	12300	11996	7354
12123	9001	12299	11993	7354
12120	8997	12298	11992	7353
12120	8997	12298	11991	7353
12119	8991	12295	11991	7350
12119	8991	12292	11989	7350
12119	8980	12292	11988	7350
12118	8977	12292	11988	7350
12116	8975	12292	11987	7347
12115	8971	12290	11985	7347
12114	8963	12289	11985	7347
12111	8961	12286	11985	7347
12106	8947	12286	11985	7345
12106	8932	12285	11984	7341
12104	8931	12282	11983	7341
12104	8929	12282	11982	7341
12103	8924	12282	11982	7341

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12102	8920	12281	11981	7340
12101	8917	12280	11980	7337
12101	8914	12279	11979	7335
12100	8913	12278	11978	7335
12097	8912	12275	11978	7334
12096	8882	12275	11978	7330
12094	8876	12274	11978	7326
12093	8873	12272	11976	7325
12093	8873	12266	11976	7323
12092	8870	12266	11974	7322
12092	8869	12265	11973	7322
12091	8853	12265	11971	7316
12090	8849	12259	11971	7314
12089	8846	12258	11971	7314
12088	8845	12258	11971	7314
12086	8835	12256	11970	7311
12085	8833	12253	11969	7311
12083	8832	12252	11966	7311
12082	8831	12251	11966	7310
12082	8820	12251	11964	7308
12082	8790	12251	11964	7308
12081	8790	12248	11964	7305
12080	8760	12248	11963	7300
12077	8757	12246	11958	7297
12077	8744	12245	11955	7296
12075	8742	12244	11953	7293
12072	8741	12244	11953	7293
12070	8731	12244	11948	7292
12069	8731	12242	11945	7291
12069	8729	12242	11945	7286
12069	8722	12242	11943	7283
12067	8711	12239	11942	7282
12066	8700	12237	11941	7282
12062	8699	12236	11941	7282

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12062	8679	12236	11941	7279
12061	8670	12236	11941	7278
12061	8657	12234	11940	7278
12061	8652	12230	11937	7277
12061	8646	12228	11934	7276
12060	8632	12227	11933	7275
12060	8628	12225	11932	7275
12060	8619	12224	11931	7274
12059	8617	12224	11930	7271
12057	8612	12223	11928	7269
12056	8595	12222	11927	7269
12056	8592	12222	11925	7269
12054	8558	12221	11924	7269
12054	8554	12221	11924	7267
12053	8529	12219	11924	7264
12053	8527	12217	11923	7264
12052	8519	12217	11922	7264
12052	8498	12217	11922	7261
12049	8467	12215	11921	7261
12048	8449	12214	11920	7259
12044	8418	12214	11919	7259
12044	8380	12213	11916	7258
12044	8358	12213	11915	7258
12042	8352	12211	11914	7256
12042	8334	12210	11912	7256
12040	8313	12210	11910	7254
12038	8312	12210	11910	7254
12037	8274	12209	11909	7254
12036	8269	12205	11908	7253
12035	8241	12202	11907	7253
12034	8217	12202	11906	7252
12033	8189	12202	11906	7251
12033	8181	12198	11906	7246
12032	8151	12197	11905	7246

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
12032	8086	12196	11904	7245
12031	8038	12196	11904	7240
12031	8034	12194	11903	7239
12029	8030	12191	11902	7239
12029	7920	12189	11900	7235
12027	7886	12188	11900	7235
12027	7872	12188	11899	7232
12026	7753	12186	11899	7231
12023	7751	12186	11899	7228
12022	7736	12186	11898	7227
12021	7642	12184	11895	7224
12018	7609	12183	11894	7222
12018	7440	12183	11894	7222
12017	7406	12183	11891	7217
12015	7397	12182	11891	7215
12015	7388	12178	11891	7215
12015	7314	12177	11888	7213
12015	7277	12177	11887	7213
12013	7263	12176	11886	7213
12013	7251	12176	11885	7212
12010	7246	12176	11885	7210
12010	7237	12175	11885	7210
12007	7231	12171	11884	7208
12007	7226	12169	11883	7206
12005	7224	12168	11883	7204
12004	7194	12167	11883	7201
12002	7182	12167	11880	7199
12000	7126	12165	11879	7199
12000	7098	12161	11874	7196
12000	7094	12161	11873	7196
11999	7087	12159	11873	7195
11999	7064	12158	11872	7192
11999	7052	12157	11871	7191
11997	7018	12154	11870	7191

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11996	7010	12150	11868	7188
11995	7008	12149	11868	7188
11995	6989	12149	11867	7187
11993	6984	12149	11866	7187
11993	6982	12148	11866	7183
11988	6964	12144	11865	7183
11987	6939	12141	11865	7182
11987	6912	12141	11863	7180
11986	6912	12138	11863	7180
11983	6909	12137	11861	7180
11982	6900	12136	11858	7177
11982	6897	12136	11857	7177
11982	6885	12136	11857	7177
11982	6871	12135	11855	7174
11982	6871	12131	11855	7172
11979	6856	12131	11854	7172
11979	6828	12131	11854	7171
11975	6825	12129	11853	7171
11975	6818	12125	11851	7170
11973	6813	12124	11850	7170
11973	6808	12123	11850	7169
11970	6790	12123	11848	7167
11970	6777	12120	11847	7166
11965	6773	12120	11847	7163
11964	6768	12119	11847	7162
11964	6760	12119	11846	7162
11963	6759	12119	11845	7162
11960	6756	12119	11845	7161
11957	6743	12118	11845	7160
11957	6740	12118	11844	7160
11951	6734	12117	11842	7159
11950	6730	12116	11839	7159
11950	6730	12115	11838	7157
11949	6729	12114	11838	7152

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11949	6725	12114	11837	7152
11948	6718	12112	11836	7151
11946	6712	12111	11836	7151
11944	6703	12111	11835	7150
11943	6700	12110	11835	7150
11936	6695	12108	11834	7144
11936	6689	12108	11833	7144
11936	6685	12106	11831	7137
11931	6676	12106	11831	7133
11931	6672	12104	11831	7131
11926	6672	12104	11830	7131
11925	6665	12103	11830	7131
11925	6665	12103	11828	7129
11922	6661	12102	11828	7125
11922	6659	12102	11827	7122
11919	6633	12102	11826	7121
11917	6633	12098	11824	7118
11917	6633	12097	11823	7115
11915	6627	12093	11823	7115
11910	6624	12092	11822	7111
11910	6620	12091	11820	7104
11906	6614	12091	11818	7104
11906	6614	12090	11816	7095
11902	6610	12090	11816	7090
11902	6610	12090	11812	7087
11901	6609	12089	11812	7083
11898	6609	12088	11810	7081
11898	6605	12087	11810	7079
11897	6600	12086	11809	7079
11896	6596	12086	11807	7078
11895	6586	12084	11804	7078
11892	6579	12083	11797	7075
11891	6576	12078	11797	7075
11891	6572	12077	11797	7075

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11888	6571	12074	11796	7071
11885	6554	12074	11795	7067
11885	6553	12071	11795	7065
11885	6552	12070	11794	7063
11885	6538	12069	11793	7060
11884	6535	12068	11793	7060
11883	6531	12068	11793	7056
11881	6525	12066	11793	7056
11881	6524	12066	11790	7055
11880	6517	12064	11789	7055
11880	6515	12063	11788	7053
11879	6515	12062	11788	7047
11879	6509	12060	11786	7043
11879	6508	12058	11786	7038
11878	6507	12058	11786	7038
11878	6503	12057	11785	7037
11876	6503	12056	11783	7036
11876	6502	12053	11783	7036
11876	6499	12052	11782	7036
11876	6496	12050	11782	7035
11876	6491	12049	11779	7034
11876	6488	12047	11778	7033
11874	6486	12046	11778	7033
11873	6482	12044	11776	7031
11873	6472	12043	11776	7027
11868	6471	12043	11775	7017
11867	6463	12042	11775	7016
11866	6454	12041	11775	7012
11865	6453	12040	11774	7008
11865	6450	12036	11774	7005
11863	6450	12036	11773	7005
11863	6450	12032	11773	7002
11861	6446	12030	11773	6999
11861	6441	12029	11773	6997

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11858	6440	12029	11772	6997
11857	6438	12029	11769	6989
11856	6435	12027	11765	6988
11854	6435	12027	11764	6986
11853	6422	12025	11763	6986
11853	6415	12025	11763	6981
11853	6408	12024	11762	6981
11853	6405	12024	11760	6979
11852	6403	12021	11760	6979
11852	6402	12019	11759	6978
11852	6381	12018	11758	6978
11851	6377	12018	11758	6978
11851	6373	12018	11758	6978
11851	6371	12015	11757	6975
11849	6370	12014	11757	6962
11848	6358	12013	11757	6959
11845	6353	12012	11757	6957
11844	6344	12012	11756	6956
11842	6337	12010	11756	6955
11842	6337	12010	11754	6955
11842	6335	12010	11754	6954
11841	6327	12009	11751	6954
11841	6326	12008	11751	6945
11838	6318	12008	11751	6940
11837	6317	12007	11749	6940
11835	6315	12007	11749	6930
11833	6314	12006	11747	6930
11831	6309	12005	11745	6918
11828	6307	12005	11745	6917
11827	6300	12005	11744	6914
11825	6294	12004	11743	6909
11825	6281	12002	11742	6903
11824	6280	12002	11741	6901
11823	6269	12000	11739	6901

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11821	6267	11998	11739	6899
11819	6266	11998	11738	6889
11819	6249	11996	11737	6889
11819	6248	11995	11736	6886
11817	6247	11995	11736	6886
11815	6244	11993	11735	6883
11815	6237	11992	11735	6878
11814	6229	11992	11734	6878
11810	6225	11991	11734	6877
11810	6217	11990	11734	6873
11810	6216	11990	11733	6870
11809	6200	11989	11733	6858
11809	6191	11988	11731	6858
11807	6178	11983	11730	6858
11807	6171	11982	11730	6857
11806	6158	11980	11729	6855
11806	6147	11980	11729	6851
11805	6139	11979	11729	6849
11805	6134	11978	11726	6849
11805	6131	11977	11726	6849
11804	6127	11976	11725	6849
11804	6120	11975	11721	6848
11803	6100	11974	11721	6848
11803	6099	11973	11719	6848
11803	6071	11972	11717	6848
11799	6068	11972	11717	6842
11798	6065	11971	11716	6842
11797	6062	11970	11715	6841
11794	6061	11968	11714	6834
11794	6061	11965	11710	6834
11793	6029	11961	11709	6827
11793	6015	11961	11708	6827
11791	6014	11959	11708	6814
11790	5993	11959	11707	6811

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11790	5991	11958	11706	6811
11789	5990	11957	11703	6808
11786	5977	11956	11701	6793
11786	5958	11956	11700	6788
11785	5939	11955	11700	6782
11785	5938	11955	11700	6778
11781	5937	11955	11698	6768
11780	5925	11955	11697	6766
11780	5916	11954	11693	6766
11779	5900	11954	11693	6734
11779	5898	11953	11692	6723
11778	5875	11952	11692	6721
11777	5860	11952	11691	6721
11777	5846	11952	11689	6713
11775	5840	11951	11688	6713
11775	5838	11950	11688	6708
11774	5790	11949	11687	6706
11772	5787	11948	11685	6701
11769	5763	11946	11683	6700
11769	5746	11943	11683	6699
11769	5729	11943	11681	6696
11767	5720	11943	11680	6689
11764	5714	11942	11679	6686
11764	5680	11941	11678	6678
11763	5665	11939	11678	6678
11763	5664	11939	11677	6677
11763	5655	11938	11676	6663
11762	5614	11937	11675	6658
11762		11936	11674	6658
11761		11935	11674	6656
11760		11934	11674	6654
11760		11933	11673	6651
11760		11933	11671	6643
11759		11929	11669	6635

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11759		11928	11669	6632
11758		11928	11663	6628
11758		11926	11662	6628
11756		11925	11661	6626
11755		11923	11658	6625
11753		11921	11657	6618
11752		11919	11655	6616
11752		11918	11655	6610
11751		11918	11655	6607
11750		11915	11653	6603
11749		11915	11650	6596
11749		11914	11650	6596
11749		11912	11649	6591
11748		11909	11647	6589
11747		11909	11646	6583
11746		11909	11646	6582
11745		11907	11646	6581
11745		11905	11645	6573
11745		11905	11645	6569
11743		11904	11644	6566
11739		11904	11643	6565
11738		11904	11643	6564
11738		11902	11642	6564
11737		11902	11641	6560
11737		11902	11639	6557
11735		11901	11639	6552
11735		11901	11638	6552
11732		11900	11637	6550
11731		11899	11636	6543
11729		11898	11636	6542
11729		11898	11635	6542
11729		11896	11634	6540
11728		11896	11634	6540
11726		11896	11633	6538

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11725		11896	11632	6534
11724		11895	11630	6533
11724		11894	11630	6523
11723		11893	11627	6523
11722		11892	11624	6522
11722		11891	11624	6519
11721		11891	11622	6518
11720		11890	11622	6516
11719		11887	11619	6508
11719		11887	11619	6508
11718		11885	11618	6500
11711		11885	11618	6500
11706		11885	11617	6499
11703		11884	11616	6495
11703		11884	11616	6493
11703		11883	11616	6492
11702		11880	11615	6488
11700		11880	11615	6488
11697		11879	11614	6486
11697		11878	11614	6486
11697		11877	11614	6482
11696		11877	11612	6482
11694		11877	11611	6479
11693		11872	11610	6479
11693		11872	11608	6478
11692		11872	11605	6478
11691		11871	11602	6476
11686		11870	11601	6475
11685		11870	11600	6469
11685		11870	11600	6469
11684		11868	11600	6469
11681		11865	11599	6465
11680		11864	11599	6465
11680		11863	11599	6465

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11679		11863	11599	6461
11677		11859	11598	6460
11677		11858	11595	6460
11676		11858	11595	6456
11675		11858	11594	6455
11673		11857	11594	6453
11673		11854	11593	6450
11671		11853	11591	6450
11671		11852	11591	6446
11671		11849	11590	6445
11670		11848	11590	6442
11670		11847	11589	6438
11667		11847	11588	6438
11664		11847	11588	6438
11662		11846	11587	6435
11658		11846	11586	6435
11658		11845	11586	6428
11658		11844	11586	6419
11656		11844	11585	6417
11655		11843	11583	6417
11654		11842	11583	6414
11654		11842	11583	6413
11653		11839	11583	6404
11650		11838	11581	6404
11650		11838	11579	6393
11648		11838	11576	6393
11647		11837	11575	6389
11647		11835	11571	6388
11644		11834	11570	6387
11643		11834	11568	6385
11642		11833	11565	6385
11642		11831	11565	6373
11641		11830	11565	6372
11640		11830	11565	6369

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11638		11829	11564	6368
11637		11827	11563	6360
11636		11826	11563	6360
11633		11826	11563	6356
11631		11824	11563	6355
11631		11824	11561	6352
11630		11821	11560	6346
11630		11820	11558	6345
11630		11818	11558	6340
11630		11817	11556	6338
11630		11816	11556	6338
11627		11816	11556	6335
11625		11815	11555	6333
11623		11815	11554	6332
11623		11815	11552	6330
11623		11815	11551	6330
11623		11814	11548	6329
11621		11813	11548	6328
11621		11813	11547	6324
11620		11812	11547	6318
11619		11812	11547	6313
11618		11812	11546	6312
11617		11810	11544	6309
11616		11808	11544	6309
11615		11807	11543	6309
11615		11807	11543	6306
11613		11805	11542	6305
11613		11803	11541	6303
11612		11803	11540	6294
11611		11802	11539	6293
11610		11801	11539	6289
11609		11801	11539	6286
11608		11800	11539	6284
11608		11797	11538	6284

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11606		11797	11536	6279
11605		11796	11536	6279
11605		11792	11535	6278
11602		11791	11534	6277
11599		11790	11533	6272
11599		11790	11531	6269
11596		11790	11531	6268
11596		11789	11531	6267
11595		11789	11530	6262
11594		11786	11530	6261
11590		11785	11530	6261
11589		11785	11529	6258
11589		11784	11527	6258
11587		11784	11525	6253
11587		11784	11524	6246
11587		11783	11524	6243
11587		11783	11523	6243
11586		11782	11523	6240
11584		11782	11523	6239
11583		11780	11522	6239
11581		11778	11521	6237
11580		11778	11517	6236
11580		11778	11516	6236
11578		11774	11516	6232
11577		11773	11516	6232
11577		11771	11516	6230
11577		11771	11514	6225
11576		11768	11514	6223
11575		11767	11513	6218
11573		11767	11511	6217
11571		11766	11511	6216
11569		11766	11510	6212
11568		11764	11509	6208
11567		11762	11508	6208

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11566		11762	11506	6198
11565		11761	11506	6197
11562		11761	11505	6190
11561		11759	11503	6188
11561		11757	11502	6187
11561		11757	11501	6185
11561		11755	11501	6183
11561		11754	11495	6183
11559		11753	11495	6183
11559		11752	11494	6183
11558		11751	11493	6183
11557		11751	11492	6176
11553		11748	11490	6175
11553		11748	11490	6174
11552		11748	11487	6172
11551		11747	11486	6170
11549		11746	11486	6168
11546		11746	11484	6168
11544		11745	11483	6167
11544		11745	11483	6167
11544		11745	11482	6167
11542		11743	11482	6167
11539		11743	11482	6166
11539		11741	11480	6166
11538		11740	11480	6164
11536		11738	11479	6162
11535		11738	11478	6159
11529		11738	11478	6159
11528		11737	11478	6158
11527		11736	11476	6157
11527		11732	11475	6155
11526		11731	11474	6152
11525		11731	11473	6152
11524		11729	11471	6151

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11523		11729	11470	6150
11521		11728	11470	6144
11521		11723	11470	6142
11520		11722	11469	6138
11520		11721	11465	6136
11519		11718	11465	6134
11517		11717	11464	6131
11515		11717	11464	6131
11515		11717	11463	6129
11515		11716	11462	6127
11513		11715	11461	6127
11513		11715	11461	6127
11512		11715	11461	6125
11511		11714	11460	6123
11510		11714	11457	6111
11509		11713	11456	6110
11508		11712	11456	6110
11506		11711	11456	6109
11505		11711	11456	6107
11505		11710	11456	6107
11501		11708	11455	6107
11501		11707	11454	6106
11500		11707	11454	6106
11497		11706	11450	6105
11496		11706	11450	6101
11495		11706	11448	6099
11495		11705	11448	6099
11494		11705	11446	6099
11493		11704	11446	6093
11490		11704	11444	6090
11488		11704	11443	6084
11488		11702	11443	6078
11488		11700	11439	6078
11488		11699	11439	6076

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11487		11694	11438	6075
11485		11694	11438	6067
11484		11693	11437	6067
11483		11693	11437	6065
11483		11692	11437	6062
11481		11692	11434	6060
11481		11692	11434	6059
11480		11690	11434	6058
11477		11689	11434	6056
11477		11689	11433	6056
11475		11688	11430	6056
11472		11687	11429	6050
11472		11687	11427	6048
11471		11684	11426	6045
11470		11683	11426	6045
11468		11683	11426	6045
11468		11683	11424	6044
11468		11682	11422	6044
11467		11681	11419	6043
11466		11681	11419	6043
11466		11680	11418	6040
11465		11678	11418	6040
11464		11678	11417	6038
11464		11676	11417	6037
11463		11676	11416	6037
11462		11675	11415	6034
11462		11675	11414	6033
11461		11674	11413	6032
11461		11673	11413	6028
11456		11673	11413	6026
11456		11673	11412	6026
11456		11672	11412	6025
11452		11671	11411	6024
11452		11670	11410	6023

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11452		11667	11408	6022
11451		11665	11407	6018
11448		11664	11407	6015
11447		11663	11406	6015
11447		11663	11405	6014
11445		11662	11403	6013
11445		11662	11403	6012
11444		11661	11400	6011
11443		11661	11400	6010
11443		11659	11397	6008
11441		11659	11397	6007
11441		11657	11396	6007
11441		11657	11396	6003
11440		11656	11396	6000
11440		11656	11395	5999
11439		11656	11394	5998
11439		11655	11393	5995
11439		11655	11391	5993
11437		11653	11390	5992
11437		11652	11390	5992
11437		11652	11389	5991
11436		11652	11389	5990
11435		11651	11387	5987
11434		11651	11387	5981
11433		11650	11385	5980
11433		11650	11385	5978
11432		11649	11385	5978
11431		11649	11384	5977
11431		11647	11382	5976
11430		11647	11382	5976
11430		11647	11380	5974
11429		11646	11378	5974
11427		11644	11377	5974
11427		11644	11376	5973

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11426		11643	11376	5972
11426		11642	11375	5968
11423		11641	11374	5965
11420		11641	11374	5965
11419		11641	11374	5964
11419		11639	11374	5960
11418		11637	11373	5958
11417		11637	11371	5958
11417		11637	11370	5957
11417		11637	11369	5956
11416		11636	11369	5954
11416		11635	11368	5953
11415		11635	11362	5953
11415		11635	11362	5952
11414		11634	11360	5948
11414		11632	11359	5947
11414		11632	11359	5945
11410		11631	11359	5945
11410		11630	11358	5942
11410		11628	11357	5941
11406		11628	11356	5941
11406		11627	11356	5939
11405		11625	11355	5935
11403		11625	11355	5935
11403		11624	11355	5935
11402		11624	11355	5934
11401		11623	11354	5933
11400		11622	11353	5932
11400		11621	11353	5931
11398		11620	11352	5927
11390		11620	11352	5926
11389		11619	11351	5925
11387		11619	11350	5925
11386		11619	11348	5924

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11379		11617	11347	5923
11378		11616	11347	5922
11378		11615	11347	5922
11378		11615	11345	5921
11377		11613	11344	5920
11377		11613	11343	5920
11376		11611	11343	5918
11375		11611	11343	5918
11375		11610	11343	5916
11374		11610	11342	5912
11373		11609	11342	5911
11370		11609	11342	5910
11367		11607	11341	5910
11367		11606	11341	5909
11367		11605	11341	5908
11366		11604	11340	5908
11365		11604	11339	5907
11364		11602	11337	5907
11364		11602	11337	5906
11364		11601	11336	5905
11362		11600	11336	5904
11360		11600	11336	5903
11359		11600	11336	5902
11358		11598	11336	5902
11358		11597	11336	5902
11357		11596	11336	5900
11355		11595	11335	5899
11355		11594	11335	5899
11354		11594	11334	5898
11354		11594	11334	5897
11354		11592	11334	5896
11350		11592	11333	5893
11350		11591	11333	5890
11348		11589	11333	5889

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11346		11589	11333	5885
11346		11589	11332	5885
11343		11587	11331	5881
11342		11587	11331	5881
11340		11586	11328	5879
11340		11585	11328	5877
11338		11585	11328	5876
11336		11584	11328	5876
11335		11584	11327	5876
11333		11584	11325	5874
11333		11583	11325	5873
11331		11583	11323	5873
11331		11582	11323	5873
11327		11581	11322	5871
11327		11581	11322	5866
11326		11581	11322	5865
11321		11579	11321	5864
11320		11579	11321	5863
11319		11578	11320	5863
11318		11578	11320	5861
11318		11578	11319	5861
11317		11576	11319	5860
11316		11575	11318	5858
11315		11575	11317	5855
11313		11572	11317	5855
11313		11572	11316	5853
11309		11572	11316	5852
11308		11572	11314	5852
11308		11571	11313	5852
11307		11571	11313	5851
11307		11570	11312	5849
11305		11570	11312	5847
11304		11569	11310	5847
11304		11569	11309	5847

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11301		11569	11308	5846
11298		11568	11308	5845
11297		11568	11305	5844
11297		11568	11303	5842
11295		11566	11303	5842
11295		11566	11301	5842
11294		11564	11300	5841
11292		11563	11298	5841
11291		11562	11298	5841
11290		11561	11297	5840
11290		11561	11297	5839
11289		11558	11297	5838
11288		11557	11296	5837
11288		11557	11294	5836
11287		11556	11292	5836
11287		11555	11291	5835
11287		11555	11291	5833
11286		11555	11291	5833
11285		11554	11290	5832
11284		11554	11288	5831
11283		11553	11286	5831
11282		11552	11286	5831
11281		11552	11285	5829
11281		11551	11285	5829
11281		11551	11285	5829
11281		11550	11285	5829
11281		11550	11284	5828
11280		11549	11283	5828
11280		11548	11276	5827
11278		11546	11275	5827
11276		11545	11274	5823
11274		11545	11274	5823
11272		11544	11274	5823
11272		11544	11273	5822

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11270		11544	11273	5822
11270		11542	11273	5822
11269		11542	11272	5821
11269		11540	11270	5820
11267		11538	11270	5818
11267		11537	11268	5817
11267		11535	11268	5815
11265		11533	11267	5815
11264		11533	11267	5814
11264		11532	11266	5814
11264		11529	11266	5814
11263		11526	11265	5813
11262		11525	11265	5813
11260		11525	11265	5812
11259		11525	11264	5812
11257		11524	11264	5812
11252		11524	11262	5812
11250		11524	11262	5809
11250		11523	11261	5808
11246		11523	11261	5807
11245		11522	11261	5805
11245		11521	11261	5804
11245		11520	11260	5804
11242		11519	11260	5803
11242		11517	11259	5802
11242		11516	11259	5802
11242		11515	11258	5801
11242		11513	11258	5800
11241		11513	11257	5800
11236		11511	11257	5800
11236		11511	11257	5800
11235		11511	11256	5798
11235		11511	11256	5798
11233		11508	11255	5797

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11229		11506	11255	5797
11228		11506	11254	5796
11228		11505	11253	5796
11227		11505	11253	5791
11226		11504	11253	5791
11224		11504	11252	5790
11223		11503	11250	5789
11222		11501	11250	5788
11220		11500	11249	5787
11219		11499	11249	5786
11218		11498	11247	5786
11218		11498	11246	5782
11216		11497	11246	5781
11215		11497	11245	5781
11215		11497	11244	5780
11213		11496	11242	5779
11212		11494	11242	5779
11212		11493	11241	5778
11211		11493	11241	5778
11210		11493	11240	5776
11210		11492	11240	5775
11208		11491	11239	5775
11208		11490	11239	5775
11205		11490	11237	5773
11205		11489	11235	5773
11205		11489	11235	5773
11202		11488	11235	5772
11201		11488	11235	5772
11201		11487	11234	5769
11198		11485	11233	5768
11198		11485	11232	5768
11197		11484	11232	5764
11197		11483	11232	5763
11194		11482	11232	5762

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11194		11481	11230	5760
11193		11480	11229	5760
11193		11478	11228	5758
11192		11477	11227	5757
11190		11477	11227	5754
11190		11475	11226	5752
11189		11473	11226	5751
11186		11473	11226	5750
11182		11472	11225	5749
11181		11471	11224	5749
11181		11470	11223	5748
11180		11470	11223	5746
11178		11468	11223	5744
11178		11466	11223	5741
11178		11466	11222	5740
11176		11464	11222	5739
11175		11463	11222	5739
11173		11463	11221	5739
11173		11463	11221	5738
11172		11462	11220	5738
11171		11460	11220	5738
11170		11459	11220	5738
11169		11458	11220	5735
11168		11457	11219	5734
11168		11457	11217	5733
11168		11457	11217	5733
11166		11457	11216	5732
11163		11456	11216	5731
11161		11456	11214	5730
11159		11453	11213	5730
11158		11453	11213	5729
11158		11453	11212	5729
11157		11452	11212	5729
11154		11452	11212	5728

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11153		11452	11212	5728
11153		11451	11212	5728
11151		11451	11209	5727
11149		11450	11207	5727
11149		11450	11207	5726
11149		11450	11205	5726
11148		11449	11205	5725
11147		11448	11205	5724
11144		11446	11204	5724
11144		11445	11203	5724
11141		11445	11202	5722
11140		11443	11202	5722
11139		11443	11201	5721
11139		11443	11200	5720
11138		11442	11200	5719
11138		11442	11197	5719
11136		11442	11196	5719
11136		11442	11195	5718
11134		11441	11193	5718
11133		11438	11192	5718
11133		11434	11191	5717
11131		11432	11190	5715
11129		11431	11190	5711
11128		11431	11186	5711
11126		11430	11186	5710
11122		11430	11185	5709
11122		11430	11185	5709
11120		11429	11183	5707
11119		11428	11182	5707
11119		11428	11181	5703
11117		11428	11181	5703
11115		11428	11180	5701
11115		11427	11179	5701
11114		11426	11179	5699

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11114		11426	11178	5699
11113		11425	11175	5698
11113		11425	11175	5697
11111		11424	11174	5697
11111		11424	11174	5696
11111		11422	11173	5695
11111		11421	11173	5694
11110		11421	11172	5694
11110		11421	11172	5693
11109		11419	11171	5693
11109		11416	11171	5690
11109		11416	11171	5689
11107		11415	11171	5688
11107		11415	11171	5686
11107		11413	11169	5685
11102		11413	11169	5684
11102		11412	11168	5683
11102		11412	11167	5683
11101		11410	11166	5681
11101		11407	11165	5681
11100		11407	11163	5681
11099		11407	11163	5681
11098		11406	11163	5681
11098		11406	11162	5680
11096		11406	11162	5680
11096		11405	11161	5678
11096		11404	11161	5677
11095		11404	11161	5677
11094		11404	11160	5677
11094		11404	11160	5677
11094		11401	11158	5676
11090		11401	11157	5676
11089		11400	11156	5675
11087		11400	11154	5674

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11086		11396	11154	5672
11085		11395	11153	5672
11084		11394	11153	5671
11084		11394	11153	5671
11083		11393	11152	5669
11082		11392	11152	5669
11081		11392	11152	5669
11081		11392	11152	5668
11080		11391	11151	5668
11079		11390	11151	5668
11079		11390	11150	5667
11079		11389	11149	5667
11077		11389	11149	5665
11077		11388	11148	5665
11077		11387	11148	5663
11077		11385	11147	5663
11074		11383	11147	5663
11073		11382	11147	5661
11073		11381	11147	5660
11072		11381	11146	5660
11072		11381	11145	5660
11072		11380	11145	5660
11071		11380	11143	5658
11070		11377	11142	5658
11069		11377	11141	5657
11068		11377	11140	5656
11066		11376	11140	5655
11066		11375	11139	5655
11063		11374	11138	5653
11063		11373	11138	5652
11060		11369	11137	5652
11060		11369	11135	5651
11060		11369	11135	5650
11059		11368	11135	5648

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11059		11368	11134	5648
11058		11367	11134	5647
11057		11365	11133	5646
11055		11365	11133	5646
11052		11364	11132	5646
11052		11364	11131	5644
11051		11364	11130	5643
11051		11362	11130	5642
11047		11362	11130	5642
11046		11361	11129	5641
11045		11360	11129	5640
11045		11359	11128	5639
11044		11358	11127	5638
11044		11358	11127	5635
11043		11358	11126	5634
11043		11357	11126	5633
11043		11356	11126	5633
11041		11355	11125	5632
11041		11355	11124	5630
11040		11355	11123	5629
11040		11355	11123	5628
11039		11355	11123	5627
11036		11354	11121	5627
11036		11353	11121	5626
11036		11352	11120	5625
11035		11351	11120	5623
11035		11351	11119	5622
11032		11350	11118	5622
11031		11349	11118	5621
11030		11349	11118	5620
11029		11348	11117	5619
11027		11348	11117	5618
11027		11346	11116	5618
11025		11343	11115	5618

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
11024		11342	11114	5613
11022		11342	11113	5613
11020		11341	11113	5613
11018		11340	11112	5613
11015		11338	11112	5612
11011		11337	11111	5612
11011		11336	11111	5611
11010		11336	11111	5611
11009		11332	11111	5610
11009		11330	11110	5609
11008		11330	11109	5608
11007		11329	11108	5608
11006		11328	11107	5608
11006		11328	11107	5607
11006		11327	11106	5607
11006		11327	11106	5607
11006		11325	11106	5604
11004		11324	11105	5603
11004		11323	11104	5602
11004		11323	11104	5602
11003		11323	11103	5601
11003		11321	11103	5601
11003		11321	11103	5601
11002		11319	11102	5600
11001		11319	11101	5598
11001		11319	11101	5596
11000		11318	11101	5594
11000		11317	11100	5594
10999		11317	11100	5594
10998		11316	11100	5592
10997		11313	11099	5592
10997		11313	11098	5591
10996		11312	11097	5591
10995		11311	11096	5590

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10994		11311	11095	5590
10994		11308	11095	5590
10992		11303	11095	5589
10991		11302	11095	5589
10991		11302	11094	5589
10990		11302	11094	5588
10987		11302	11094	5588
10987		11301	11093	5588
10986		11301	11092	5587
10985		11300	11091	5586
10983		11299	11090	5584
10982		11298	11090	5583
10980		11298	11089	5583
10977		11298	11087	5582
10977		11297	11086	5582
10976		11297	11086	5582
10975		11297	11086	5580
10975		11297	11085	5579
10975		11296	11085	5579
10973		11296	11084	5579
10972		11294	11084	5579
10972		11294	11083	5578
10972		11292	11083	5577
10972		11292	11082	5576
10972		11291	11081	5576
10970		11291	11081	5576
10968		11289	11079	5575
10966		11286	11078	5575
10966		11282	11077	5574
10963		11281	11076	5574
10962		11281	11076	5574
10961		11280	11075	5574
10958		11279	11075	5574
10956		11278	11075	5573

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10955		11277	11075	5572
10955		11276	11075	5572
10955		11275	11074	5571
10955		11275	11074	5571
10953		11274	11074	5570
10953		11272	11074	5569
10953		11272	11074	5569
10952		11271	11073	5568
10951		11270	11073	5567
10948		11268	11073	5566
10946		11268	11072	5566
10946		11268	11071	5566
10946		11268	11071	5565
10944		11266	11071	5565
10943		11265	11071	5565
10942		11265	11070	5563
10942		11265	11070	5562
10942		11265	11069	5561
10941		11264	11069	5561
10941		11264	11067	5561
10941		11263	11066	5561
10941		11263	11066	5561
10941		11261	11066	5560
10940		11261	11065	5560
10940		11261	11065	5560
10939		11259	11064	5558
10938		11259	11064	5558
10936		11258	11064	5558
10935		11256	11062	5558
10935		11256	11062	5557
10933		11254	11061	5557
10933		11253	11061	5557
10932		11253	11061	5557
10930		11251	11061	5557

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10930		11250	11060	5556
10930		11250	11060	5556
10930		11250	11059	5556
10929		11249	11059	5555
10929		11249	11058	5555
10928		11249	11058	5555
10926		11248	11058	5553
10926		11248	11058	5553
10925		11248	11058	5553
10923		11246	11057	5552
10921		11245	11056	5552
10919		11244	11056	5551
10919		11244	11055	5551
10917		11244	11052	5550
10916		11244	11052	5549
10916		11243	11052	5547
10914		11243	11052	5547
10912		11242	11052	5547
10912		11241	11051	5547
10911		11241	11051	5546
10909		11238	11051	5545
10909		11237	11051	5542
10908		11237	11050	5542
10908		11236	11049	5541
10905		11236	11049	5540
10901		11235	11048	5539
10900		11235	11048	5539
10897		11234	11048	5538
10896		11234	11047	5537
10895		11232	11047	5536
10894		11231	11047	5535
10893		11231	11046	5535
10893		11229	11046	5535
10891		11228	11046	5533

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10891		11227	11045	5533
10890		11226	11044	5533
10889		11225	11044	5531
10888		11224	11043	5531
10886		11223	11042	5531
10886		11221	11041	5531
10886		11221	11040	5530
10885		11220	11039	5530
10884		11219	11039	5525
10883		11218	11038	5525
10882		11218	11037	5524
10882		11216	11037	5524
10882		11216	11037	5523
10882		11216	11035	5523
10882		11216	11035	5523
10882		11215	11034	5523
10881		11213	11034	5522
10881		11212	11033	5522
10880		11211	11032	5521
10880		11211	11031	5521
10878		11210	11030	5520
10877		11209	11029	5520
10876		11208	11028	5520
10875		11207	11028	5518
10871		11206	11026	5516
10869		11203	11026	5515
10868		11202	11026	5514
10864		11202	11025	5514
10864		11201	11025	5514
10858		11201	11024	5514
10856		11200	11024	5513
10855		11200	11023	5512
10853		11199	11022	5511
10853		11198	11022	5510

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10851		11197	11020	5509
10850		11197	11020	5509
10850		11196	11019	5509
10848		11195	11019	5508
10847		11194	11018	5508
10846		11194	11018	5507
10844		11193	11017	5505
10844		11193	11017	5505
10840		11193	11016	5504
10840		11193	11015	5502
10840		11193	11014	5502
10838		11192	11013	5501
10836		11192	11013	5501
10829		11192	11013	5500
10828		11191	11012	5499
10827		11190	11011	5498
10825		11188	11011	5497
10824		11187	11011	5497
10823		11186	11011	5497
10823		11186	11010	5497
10823		11186	11010	5496
10821		11186	11009	5496
10818		11185	11008	5495
10817		11181	11008	5494
10815		11179	11008	5493
10811		11179	11007	5492
10811		11179	11006	5491
10807		11178	11006	5490
10807		11178	11006	5489
10807		11177	11006	5489
10806		11177	11005	5486
10806		11176	11005	5486
10805		11176	11005	5485
10805		11176	11005	5485

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10801		11174	11004	5485
10796		11173	11004	5484
10796		11172	11003	5483
10794		11171	11001	5482
10793		11171	11001	5482
10793		11170	11001	5482
10792		11170	11000	5482
10791		11170	11000	5481
10790		11169	11000	5481
10790		11169	11000	5479
10789		11169	10999	5478
10786		11167	10999	5477
10785		11167	10998	5476
10785		11166	10998	5473
10784		11165	10998	5470
10783		11165	10998	5470
10782		11165	10998	5469
10781		11165	10998	5468
10781		11164	10998	5468
10780		11164	10998	5467
10778		11160	10998	5467
10775		11160	10997	5466
10775		11159	10995	5466
10774		11159	10994	5465
10774		11159	10993	5465
10772		11157	10993	5463
10771		11155	10992	5462
10770		11155	10992	5462
10770		11154	10992	5461
10770		11154	10991	5461
10768		11153	10988	5460
10764		11153	10988	5460
10762		11153	10988	5460
10761		11153	10987	5459

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10759		11153	10987	5459
10758		11148	10987	5459
10758		11147	10986	5459
10757		11147	10986	5458
10757		11147	10985	5457
10757		11146	10985	5455
10752		11145	10985	5454
10752		11144	10984	5454
10752		11144	10984	5452
10751		11143	10983	5452
10751		11142	10982	5451
10750		11141	10981	5450
10749		11140	10980	5450
10748		11140	10979	5450
10747		11140	10978	5449
10744		11136	10977	5449
10743		11136	10976	5449
10741		11135	10976	5448
10741		11135	10976	5448
10741		11134	10975	5447
10739		11134	10975	5446
10737		11134	10975	5446
10732		11133	10975	5445
10731		11133	10974	5445
10731		11132	10974	5444
10730		11131	10974	5444
10730		11131	10974	5444
10729		11131	10973	5444
10729		11131	10973	5444
10729		11130	10972	5444
10727		11130	10972	5444
10727		11130	10971	5443
10727		11129	10971	5443
10727		11129	10970	5443

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10727		11125	10970	5442
10726		11124	10970	5442
10726		11124	10969	5442
10725		11123	10969	5441
10724		11123	10969	5441
10724		11123	10969	5441
10722		11122	10968	5441
10721		11120	10968	5441
10717		11120	10967	5441
10716		11120	10967	5440
10715		11119	10965	5440
10715		11118	10965	5438
10713		11117	10965	5436
10711		11116	10965	5436
10710		11115	10964	5436
10710		11115	10964	5436
10710		11114	10964	5436
10707		11114	10963	5433
10706		11112	10962	5432
10706		11112	10961	5430
10705		11112	10960	5429
10704		11112	10960	5429
10704		11111	10958	5427
10702		11111	10957	5426
10700		11110	10957	5426
10700		11109	10957	5426
10698		11109	10957	5424
10697		11107	10957	5421
10696		11105	10957	5420
10695		11105	10955	5420
10695		11104	10955	5419
10694		11103	10955	5419
10694		11103	10955	5419
10694		11102	10955	5418

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10692		11102	10954	5418
10692		11096	10954	5417
10691		11096	10954	5417
10687		11096	10954	5417
10687		11094	10953	5416
10687		11094	10952	5416
10686		11093	10951	5415
10686		11093	10951	5415
10686		11092	10951	5412
10686		11090	10950	5411
10683		11089	10949	5411
10682		11089	10949	5411
10681		11089	10949	5411
10680		11088	10947	5410
10680		11087	10946	5408
10678		11086	10946	5408
10678		11085	10946	5406
10677		11084	10945	5406
10677		11083	10945	5405
10676		11083	10944	5405
10675		11083	10944	5403
10675		11082	10944	5402
10674		11080	10943	5402
10673		11079	10943	5402
10670		11079	10942	5401
10668		11077	10942	5401
10667		11077	10942	5400
10664		11077	10941	5399
10664		11076	10940	5399
10663		11075	10939	5399
10662		11075	10939	5399
10660		11075	10939	5399
10659		11074	10939	5396
10657		11074	10937	5396

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10657		11073	10936	5396
10653		11073	10936	5396
10652		11073	10935	5396
10651		11071	10935	5395
10649		11070	10935	5395
10648		11070	10934	5395
10648		11070	10934	5393
10648		11068	10934	5393
10646		11068	10932	5393
10640		11067	10932	5393
10639		11066	10931	5392
10637		11064	10931	5392
10637		11062	10931	5390
10636		11061	10931	5389
10634		11060	10930	5389
10633		11060	10930	5388
10632		11059	10930	5388
10631		11059	10930	5387
10631		11058	10929	5386
10630		11057	10928	5386
10629		11057	10928	5385
10627		11057	10927	5385
10623		11056	10927	5385
10623		11056	10927	5385
10622		11055	10927	5385
10621		11054	10926	5384
10620		11053	10926	5383
10620		11052	10926	5380
10617		11051	10926	5380
10617		11051	10925	5380
10616		11051	10924	5379
10615		11051	10924	5378
10614		11050	10924	5378
10613		11049	10923	5378

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10612		11049	10922	5378
10610		11048	10922	5376
10609		11047	10921	5376
10607		11047	10921	5376
10605		11047	10920	5373
10603		11047	10919	5373
10603		11046	10919	5373
10599		11046	10918	5373
10598		11044	10916	5373
10597		11043	10916	5372
10597		11041	10915	5371
10596		11041	10914	5371
10596		11039	10914	5371
10588		11039	10913	5371
10587		11037	10913	5370
10586		11036	10913	5370
10586		11036	10912	5370
10586		11036	10911	5369
10586		11034	10911	5369
10585		11033	10909	5369
10583		11032	10908	5369
10582		11030	10908	5368
10582		11029	10907	5368
10581		11029	10907	5367
10580		11028	10907	5367
10579		11028	10907	5366
10578		11028	10907	5366
10577		11028	10907	5365
10575		11027	10907	5365
10572		11025	10906	5364
10571		11025	10906	5363
10571		11023	10906	5363
10571		11023	10906	5362
10569		11021	10905	5361

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10567		11021	10905	5361
10566		11021	10903	5358
10565		11021	10903	5358
10564		11021	10902	5358
10564		11020	10901	5358
10563		11019	10901	5357
10562		11017	10901	5356
10561		11014	10901	5354
10561		11013	10900	5354
10560		11006	10899	5354
10560		11006	10899	5353
10559		11006	10898	5353
10559		11005	10898	5352
10555		11004	10898	5352
10555		11004	10897	5349
10555		11003	10895	5349
10554		11002	10894	5349
10554		11002	10894	5349
10552		11002	10894	5349
10552		11001	10893	5348
10550		11000	10893	5348
10550		10999	10892	5348
10549		10998	10892	5347
10545		10997	10892	5347
10545		10996	10892	5346
10544		10995	10892	5346
10543		10995	10892	5345
10543		10994	10891	5343
10541		10993	10890	5343
10540		10991	10890	5342
10537		10990	10887	5342
10537		10987	10887	5342
10536		10986	10887	5342
10534		10986	10886	5342

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10533		10985	10885	5341
10533		10985	10885	5341
10530		10985	10884	5340
10529		10984	10883	5340
10528		10984	10883	5339
10528		10983	10882	5339
10527		10983	10881	5338
10527		10983	10880	5338
10526		10983	10880	5338
10526		10979	10880	5337
10526		10979	10880	5337
10526		10979	10878	5337
10525		10978	10877	5337
10525		10978	10877	5336
10522		10978	10877	5335
10522		10976	10876	5334
10520		10976	10874	5334
10520		10975	10874	5334
10519		10975	10874	5333
10519		10974	10874	5333
10518		10974	10873	5333
10517		10974	10873	5333
10515		10973	10873	5333
10513		10972	10872	5332
10513		10970	10871	5331
10511		10968	10871	5331
10510		10967	10871	5331
10509		10967	10871	5330
10508		10967	10870	5329
10508		10967	10870	5328
10507		10964	10870	5328
10507		10964	10870	5326
10505		10962	10869	5324
10504		10962	10868	5323

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10503		10962	10868	5323
10502		10961	10867	5323
10502		10961	10867	5322
10501		10960	10866	5322
10501		10958	10866	5321
10500		10958	10866	5321
10500		10958	10864	5321
10500		10958	10863	5319
10500		10958	10863	5319
10498		10957	10863	5319
10498		10957	10862	5318
10496		10957	10862	5318
10496		10956	10861	5318
10495		10956	10861	5318
10495		10956	10861	5318
10495		10952	10860	5318
10495		10952	10860	5317
10495		10951	10860	5317
10495		10950	10860	5317
10495		10949	10860	5316
10494		10949	10859	5316
10488		10949	10859	5316
10488		10946	10859	5316
10487		10945	10858	5316
10486		10945	10858	5314
10483		10944	10857	5314
10479		10943	10857	5314
10479		10940	10857	5314
10478		10940	10857	5313
10477		10939	10856	5313
10477		10939	10856	5313
10476		10938	10856	5313
10476		10938	10854	5313
10475		10938	10853	5312

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10473		10937	10851	5312
10473		10937	10851	5312
10473		10936	10851	5311
10472		10935	10850	5311
10472		10935	10850	5310
10472		10934	10850	5310
10472		10934	10850	5310
10471		10932	10849	5308
10471		10932	10849	5308
10470		10931	10849	5308
10466		10931	10849	5308
10465		10930	10849	5307
10464		10929	10848	5306
10463		10927	10848	5306
10462		10926	10847	5304
10462		10926	10847	5304
10461		10926	10846	5303
10461		10925	10846	5303
10460		10924	10845	5303
10457		10924	10845	5302
10457		10923	10845	5302
10456		10923	10844	5301
10454		10923	10844	5301
10452		10922	10844	5300
10452		10922	10843	5300
10451		10922	10843	5300
10451		10920	10843	5300
10449		10918	10843	5299
10448		10918	10843	5299
10447		10916	10842	5299
10447		10916	10842	5298
10446		10916	10841	5298
10445		10912	10841	5298
10445		10912	10840	5298

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10444		10911	10840	5298
10444		10911	10839	5298
10443		10910	10839	5297
10442		10909	10838	5296
10440		10909	10837	5296
10439		10908	10837	5296
10435		10907	10837	5295
10433		10907	10836	5295
10432		10906	10836	5295
10432		10906	10835	5295
10431		10906	10835	5294
10431		10905	10834	5294
10430		10905	10834	5294
10429		10905	10834	5293
10428		10905	10833	5292
10427		10904	10833	5292
10426		10903	10833	5291
10425		10902	10832	5291
10425		10901	10832	5291
10421		10901	10831	5291
10421		10900	10831	5290
10421		10900	10831	5290
10421		10899	10831	5290
10420		10899	10831	5290
10419		10899	10830	5289
10419		10899	10830	5288
10417		10898	10830	5287
10417		10897	10830	5287
10416		10897	10830	5285
10415		10897	10830	5283
10414		10896	10830	5283
10413		10896	10829	5283
10412		10895	10829	5282
10411		10895	10829	5282

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10411		10895	10828	5282
10410		10894	10828	5281
10410		10893	10828	5281
10409		10892	10827	5281
10409		10891	10827	5281
10409		10890	10826	5280
10409		10890	10826	5280
10408		10890	10826	5279
10407		10890	10825	5279
10407		10888	10825	5279
10407		10888	10825	5278
10406		10888	10825	5277
10406		10887	10824	5276
10406		10886	10824	5276
10406		10884	10822	5276
10405		10882	10822	5276
10404		10881	10822	5276
10402		10880	10821	5276
10402		10879	10821	5276
10400		10879	10820	5275
10399		10877	10820	5275
10399		10877	10820	5274
10399		10876	10819	5274
10398		10876	10818	5274
10398		10876	10818	5274
10398		10876	10818	5273
10397		10875	10818	5273
10396		10875	10818	5272
10396		10874	10818	5271
10393		10873	10818	5271
10393		10872	10818	5270
10391		10871	10818	5269
10388		10869	10817	5269
10388		10868	10815	5268

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10387		10867	10815	5268
10386		10867	10815	5268
10384		10866	10814	5268
10383		10866	10814	5268
10383		10865	10814	5267
10382		10864	10814	5267
10382		10864	10813	5267
10382		10861	10813	5267
10381		10861	10813	5267
10380		10861	10812	5267
10379		10858	10811	5266
10379		10858	10811	5266
10376		10858	10811	5265
10374		10858	10810	5265
10370		10857	10810	5265
10369		10857	10809	5265
10368		10854	10809	5263
10365		10854	10808	5262
10363		10854	10807	5262
10362		10853	10807	5260
10362		10853	10806	5260
10361		10852	10805	5259
10361		10852	10804	5258
10361		10851	10804	5258
10359		10850	10803	5258
10359		10850	10803	5257
10358		10850	10802	5257
10358		10848	10802	5257
10357		10848	10802	5257
10355		10846	10800	5256
10354		10845	10799	5255
10354		10843	10799	5254
10352		10843	10799	5254
10352		10842	10797	5254

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10351		10841	10797	5253
10351		10841	10797	5253
10351		10840	10797	5253
10350		10840	10797	5253
10350		10839	10796	5253
10348		10838	10795	5253
10346		10838	10794	5252
10341		10838	10793	5251
10341		10838	10793	5251
10339		10837	10793	5251
10338		10836	10793	5251
10337		10835	10793	5251
10333		10835	10792	5251
10331		10834	10791	5250
10331		10834	10791	5250
10329		10834	10791	5250
10329		10833	10790	5249
10329		10833	10790	5249
10328		10830	10789	5249
10328		10829	10789	5249
10327		10829	10789	5248
10327		10828	10789	5248
10324		10828	10788	5247
10323		10827	10788	5247
10323		10827	10788	5247
10322		10826	10787	5247
10320		10826	10787	5246
10319		10826	10786	5246
10318		10825	10785	5246
10318		10825	10784	5246
10317		10824	10784	5246
10315		10824	10784	5244
10314		10823	10783	5244
10313		10822	10783	5244

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10312		10822	10783	5243
10311		10822	10782	5243
10311		10822	10782	5243
10310		10821	10781	5242
10310		10820	10781	5241
10307		10818	10781	5241
10304		10818	10780	5241
10304		10817	10780	5240
10303		10817	10780	5238
10301		10816	10780	5238
10301		10816	10779	5238
10300		10816	10779	5238
10299		10813	10779	5238
10299		10810	10778	5237
10298		10809	10777	5237
10297		10807	10777	5235
10296		10807	10774	5234
10296		10804	10774	5233
10296		10803	10774	5233
10295		10803	10773	5232
10293		10801	10773	5232
10293		10801	10772	5232
10290		10801	10771	5231
10290		10801	10771	5231
10290		10800	10771	5230
10289		10800	10770	5230
10287		10800	10769	5230
10286		10800	10769	5230
10284		10798	10769	5230
10283		10797	10767	5230
10282		10795	10767	5230
10281		10795	10766	5229
10280		10793	10766	5228
10279		10792	10766	5227

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10277		10791	10766	5227
10277		10791	10766	5227
10277		10789	10765	5227
10276		10789	10765	5226
10276		10788	10764	5225
10276		10788	10763	5225
10275		10787	10762	5225
10275		10785	10762	5225
10275		10785	10761	5223
10274		10784	10761	5223
10273		10784	10761	5223
10273		10783	10759	5223
10271		10783	10759	5223
10270		10783	10758	5222
10268		10783	10758	5222
10267		10782	10758	5222
10267		10779	10758	5222
10267		10779	10757	5219
10267		10777	10757	5219
10265		10777	10757	5218
10265		10777	10757	5218
10265		10776	10756	5218
10263		10775	10756	5217
10263		10773	10755	5215
10261		10771	10755	5214
10259		10770	10754	5213
10259		10770	10753	5212
10258		10770	10753	5212
10257		10770	10752	5212
10257		10769	10752	5212
10256		10765	10751	5212
10256		10764	10751	5211
10255		10764	10750	5211
10255		10763	10750	5211

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10255		10761	10749	5210
10253		10760	10748	5210
10252		10759	10748	5209
10251		10756	10748	5209
10251		10756	10747	5209
10250		10756	10747	5209
10246		10755	10747	5209
10246		10755	10747	5208
10244		10755	10746	5208
10244		10755	10746	5208
10243		10754	10745	5207
10243		10754	10743	5206
10242		10754	10743	5206
10242		10754	10743	5205
10242		10753	10743	5205
10241		10753	10742	5205
10240		10751	10742	5205
10239		10751	10742	5205
10239		10751	10742	5205
10238		10751	10741	5205
10238		10749	10741	5205
10238		10747	10741	5204
10235		10747	10740	5204
10234		10747	10740	5204
10233		10747	10740	5203
10233		10743	10739	5202
10233		10740	10739	5202
10230		10740	10739	5202
10230		10740	10739	5202
10230		10740	10738	5201
10230		10739	10737	5201
10229		10739	10737	5201
10229		10739	10737	5200
10228		10738	10736	5200

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10228		10737	10736	5200
10228		10735	10736	5200
10227		10735	10735	5199
10227		10734	10735	5199
10227		10734	10734	5198
10227		10733	10734	5198
10226		10733	10733	5198
10225		10732	10733	5197
10223		10732	10733	5197
10223		10732	10733	5197
10222		10731	10733	5197
10222		10731	10732	5195
10220		10730	10732	5195
10220		10730	10732	5195
10220		10729	10732	5195
10220		10728	10731	5195
10220		10726	10731	5194
10220		10726	10729	5194
10219		10724	10729	5193
10217		10724	10729	5193
10216		10724	10728	5193
10214		10723	10728	5193
10214		10722	10728	5192
10212		10722	10728	5192
10211		10722	10728	5192
10211		10721	10727	5191
10207		10721	10726	5191
10206		10720	10726	5190
10206		10720	10726	5190
10205		10720	10726	5190
10203		10717	10725	5190
10203		10717	10725	5190
10202		10717	10725	5189
10200		10717	10724	5189

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10199		10716	10724	5189
10199		10716	10724	5189
10198		10716	10723	5189
10196		10715	10722	5188
10196		10715	10722	5188
10196		10715	10722	5188
10195		10713	10721	5188
10195		10713	10720	5186
10195		10713	10720	5186
10195		10712	10719	5185
10194		10711	10719	5185
10192		10711	10718	5185
10191		10710	10718	5185
10191		10710	10718	5185
10191		10709	10717	5184
10190		10709	10716	5183
10189		10708	10715	5182
10189		10707	10714	5182
10187		10705	10713	5182
10184		10705	10713	5182
10182		10705	10713	5182
10182		10704	10712	5182
10181		10702	10712	5182
10181		10699	10712	5180
10181		10699	10711	5180
10180		10699	10711	5180
10179		10698	10710	5180
10178		10698	10709	5179
10177		10697	10709	5179
10176		10696	10709	5179
10175		10695	10708	5178
10174		10695	10708	5178
10173		10695	10708	5177
10173		10692	10708	5176

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10172		10691	10708	5175
10170		10690	10707	5175
10170		10690	10706	5175
10170		10690	10706	5174
10167		10689	10705	5173
10167		10689	10704	5170
10162		10689	10704	5170
10161		10688	10703	5170
10161		10686	10703	5170
10160		10686	10703	5170
10158		10686	10703	5169
10158		10686	10702	5169
10157		10685	10701	5169
10157		10684	10701	5169
10157		10683	10700	5168
10157		10683	10700	5168
10155		10681	10700	5167
10151		10680	10699	5167
10151		10679	10699	5167
10151		10678	10699	5167
10151		10678	10699	5167
10150		10677	10698	5166
10148		10677	10698	5165
10147		10675	10698	5163
10146		10674	10698	5163
10146		10673	10697	5163
10144		10673	10697	5163
10144		10673	10697	5163
10143		10672	10697	5162
10143		10671	10697	5161
10143		10670	10696	5161
10143		10669	10696	5161
10142		10668	10695	5160
10138		10668	10695	5160

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10136		10668	10695	5159
10136		10668	10695	5159
10133		10664	10695	5158
10131		10662	10695	5157
10129		10661	10695	5156
10129		10659	10694	5156
10128		10657	10692	5156
10126		10657	10691	5155
10126		10656	10691	5154
10126		10656	10691	5154
10126		10656	10691	5154
10125		10655	10691	5154
10122		10655	10691	5154
10121		10655	10690	5153
10120		10653	10690	5153
10118		10651	10690	5153
10117		10651	10690	5153
10116		10651	10690	5153
10115		10650	10689	5153
10114		10648	10689	5152
10113		10648	10689	5152
10113		10646	10688	5152
10113		10644	10688	5152
10109		10644	10688	5149
10108		10642	10687	5149
10107		10642	10687	5149
10106		10641	10687	5148
10105		10641	10687	5148
10105		10641	10687	5148
10105		10640	10686	5148
10103		10637	10686	5147
10102		10637	10686	5147
10102		10635	10685	5147
10101		10633	10685	5147

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10100		10632	10685	5146
10099		10629	10685	5146
10098		10629	10684	5146
10092		10628	10684	5146
10091		10627	10684	5145
10090		10626	10684	5144
10090		10625	10684	5144
10090		10625	10683	5144
10087		10623	10683	5143
10086		10622	10683	5143
10082		10620	10682	5143
10077		10620	10682	5143
10076		10619	10681	5143
10075		10618	10681	5143
10074		10618	10680	5143
10073		10617	10680	5141
10072		10617	10680	5141
10071		10617	10679	5140
10071		10617	10679	5140
10071		10616	10679	5139
10070		10615	10679	5139
10069		10612	10679	5139
10069		10612	10678	5139
10065		10612	10676	5138
10064		10611	10676	5138
10061		10611	10675	5137
10061		10611	10675	5137
10060		10611	10675	5137
10059		10610	10675	5137
10057		10609	10675	5136
10056		10608	10674	5135
10055		10608	10674	5134
10053		10608	10673	5134
10052		10606	10673	5134

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10051		10605	10673	5133
10050		10605	10672	5133
10049		10603	10672	5131
10049		10603	10672	5130
10047		10602	10672	5128
10047		10601	10672	5128
10047		10601	10672	5128
10047		10599	10670	5127
10046		10599	10670	5127
10043		10598	10670	5127
10043		10598	10668	5126
10040		10598	10668	5126
10040		10598	10668	5126
10039		10597	10668	5125
10038		10597	10668	5125
10038		10595	10667	5124
10038		10595	10666	5124
10036		10593	10666	5124
10036		10590	10666	5123
10035		10588	10665	5122
10034		10588	10665	5122
10033		10588	10664	5122
10033		10587	10663	5122
10033		10586	10663	5121
10032		10586	10662	5121
10029		10585	10662	5121
10028		10585	10662	5121
10026		10584	10661	5121
10026		10582	10659	5120
10025		10582	10659	5119
10024		10582	10659	5119
10021		10582	10659	5119
10020		10582	10658	5119
10020		10581	10658	5118

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
10018		10580	10658	5117
10017		10579	10657	5117
10017		10578	10657	5117
10017		10578	10657	5116
10016		10577	10656	5115
10013		10575	10656	5114
10013		10575	10656	5114
10012		10571	10656	5114
10011		10571	10656	5114
10011		10569	10655	5114
10011		10569	10655	5113
10010		10568	10655	5113
10010		10568	10653	5112
10010		10567	10653	5112
10009		10564	10653	5112
10009		10563	10653	5112
10007		10563	10652	5111
10005		10563	10652	5111
10003		10560	10652	5111
10003		10559	10651	5111
10002		10559	10651	5111
10002		10559	10650	5110
10001		10557	10650	5109
10001		10556	10650	5109
10001		10556	10650	5109
10000		10556	10650	5109
9999		10554	10650	5109
9999		10552	10649	5108
9998		10551	10649	5108
9997		10551	10647	5108
9995		10550	10647	5108
9995		10550	10646	5107
9994		10548	10646	5107
9992		10547	10644	5107

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9991		10547	10644	5106
9990		10545	10643	5106
9989		10543	10643	5106
9987		10542	10643	5106
9986		10541	10643	5105
9986		10541	10642	5105
9986		10541	10642	5105
9985		10541	10642	5104
9985		10541	10642	5104
9984		10540	10641	5104
9983		10539	10640	5104
9982		10538	10639	5104
9982		10538	10639	5103
9982		10536	10639	5103
9981		10536	10639	5103
9981		10534	10639	5103
9980		10531	10638	5103
9979		10530	10637	5102
9979		10526	10637	5102
9976		10525	10637	5102
9975		10524	10635	5101
9975		10523	10635	5099
9974		10523	10634	5099
9973		10522	10634	5098
9972		10520	10633	5098
9972		10520	10633	5098
9972		10520	10633	5098
9972		10519	10633	5098
9972		10518	10633	5098
9970		10517	10632	5097
9969		10515	10632	5097
9969		10515	10631	5097
9968		10515	10629	5096
9968		10514	10629	5096

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9968		10514	10629	5096
9966		10513	10628	5096
9965		10513	10628	5096
9965		10512	10628	5096
9965		10511	10628	5095
9964		10511	10627	5095
9964		10509	10627	5095
9963		10508	10626	5093
9963		10504	10626	5093
9962		10504	10626	5092
9962		10504	10623	5092
9961		10503	10623	5091
9961		10502	10623	5090
9960		10502	10622	5089
9959		10501	10622	5089
9958		10501	10622	5089
9958		10500	10622	5088
9958		10498	10621	5088
9958		10498	10621	5088
9957		10498	10620	5088
9955		10497	10619	5088
9954		10496	10619	5088
9953		10496	10618	5088
9953		10496	10618	5087
9951		10491	10618	5087
9951		10490	10618	5087
9950		10489	10617	5086
9949		10489	10617	5086
9948		10489	10617	5086
9948		10489	10617	5086
9947		10489	10616	5085
9947		10489	10616	5085
9947		10488	10616	5085
9947		10488	10616	5085

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9946		10487	10616	5085
9945		10487	10615	5084
9945		10486	10615	5084
9944		10486	10615	5083
9944		10485	10614	5083
9943		10485	10612	5083
9943		10485	10612	5083
9942		10482	10611	5082
9941		10482	10611	5081
9938		10481	10611	5081
9937		10481	10610	5081
9936		10481	10610	5080
9936		10480	10609	5079
9935		10480	10609	5079
9935		10479	10608	5079
9933		10477	10608	5079
9933		10477	10608	5079
9933		10476	10608	5079
9932		10475	10608	5078
9932		10474	10607	5078
9932		10474	10607	5078
9930		10472	10607	5077
9930		10471	10606	5077
9929		10471	10606	5077
9927		10471	10605	5077
9927		10470	10604	5077
9925		10470	10604	5077
9924		10469	10604	5077
9923		10469	10602	5077
9922		10468	10602	5076
9920		10468	10601	5076
9918		10466	10601	5076
9918		10466	10601	5075
9918		10464	10601	5075

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9918		10463	10600	5074
9916		10461	10600	5073
9915		10461	10599	5073
9915		10459	10599	5073
9914		10459	10599	5073
9914		10459	10599	5072
9913		10456	10597	5069
9913		10455	10597	5068
9913		10455	10597	5068
9913		10454	10597	5068
9912		10453	10597	5068
9910		10453	10596	5068
9910		10453	10596	5067
9909		10451	10595	5067
9908		10451	10595	5067
9907		10451	10595	5067
9906		10448	10593	5066
9906		10447	10593	5065
9905		10447	10593	5065
9904		10447	10593	5065
9903		10445	10592	5065
9900		10445	10592	5064
9900		10445	10592	5064
9900		10445	10591	5064
9900		10444	10591	5063
9899		10442	10591	5062
9898		10439	10590	5060
9897		10439	10590	5060
9897		10435	10589	5060
9895		10432	10589	5060
9895		10429	10589	5060
9893		10428	10589	5059
9893		10428	10589	5059
9892		10426	10588	5059

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9891		10426	10588	5059
9891		10424	10588	5059
9890		10423	10587	5058
9889		10421	10586	5058
9888		10421	10586	5058
9886		10420	10586	5058
9885		10419	10586	5058
9885		10417	10586	5057
9885		10417	10586	5057
9882		10413	10585	5057
9881		10413	10585	5057
9877		10410	10585	5056
9877		10410	10585	5055
9876		10410	10585	5055
9875		10409	10585	5055
9873		10408	10585	5055
9872		10408	10584	5054
9871		10407	10584	5054
9871		10405	10583	5053
9870		10405	10582	5053
9870		10404	10582	5053
9869		10404	10582	5053
9869		10403	10581	5051
9868		10403	10581	5051
9868		10400	10581	5051
9868		10400	10580	5050
9868		10399	10580	5050
9866		10396	10579	5050
9866		10395	10578	5049
9866		10395	10578	5049
9861		10395	10578	5049
9859		10393	10577	5049
9859		10390	10577	5048
9857		10390	10577	5047

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9856		10389	10576	5047
9856		10389	10576	5046
9855		10389	10576	5046
9855		10388	10575	5046
9855		10388	10575	5046
9854		10387	10575	5046
9851		10387	10575	5046
9851		10385	10575	5045
9849		10385	10574	5045
9849		10384	10574	5043
9848		10383	10573	5043
9848		10382	10573	5042
9848		10382	10573	5042
9847		10382	10572	5042
9847		10382	10572	5042
9846		10381	10572	5042
9846		10380	10572	5041
9845		10379	10572	5041
9843		10379	10571	5041
9842		10378	10571	5041
9842		10378	10571	5040
9840		10378	10569	5040
9840		10377	10569	5040
9839		10375	10569	5040
9838		10372	10568	5040
9837		10370	10568	5040
9836		10370	10568	5040
9836		10369	10568	5039
9835		10369	10567	5039
9833		10368	10567	5039
9833		10367	10567	5038
9833		10365	10566	5038
9831		10365	10566	5038
9831		10364	10565	5037

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9830		10363	10565	5037
9829		10362	10564	5036
9829		10362	10564	5036
9828		10361	10563	5035
9828		10361	10563	5034
9827		10360	10563	5034
9827		10359	10561	5033
9826		10357	10561	5033
9825		10356	10561	5032
9824		10355	10561	5032
9824		10355	10560	5032
9824		10355	10560	5031
9824		10354	10560	5031
9823		10352	10560	5030
9820		10351	10559	5030
9819		10350	10559	5030
9818		10350	10558	5030
9817		10348	10558	5029
9816		10348	10558	5029
9816		10347	10557	5028
9815		10347	10556	5028
9815		10346	10556	5027
9814		10346	10556	5027
9812		10346	10555	5027
9812		10344	10555	5026
9811		10342	10555	5026
9810		10342	10555	5025
9809		10341	10555	5025
9807		10338	10555	5025
9806		10337	10555	5025
9805		10337	10555	5024
9805		10337	10554	5024
9805		10337	10554	5024
9802		10335	10553	5024

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9802		10334	10553	5024
9801		10333	10550	5023
9798		10333	10550	5023
9796		10332	10550	5022
9796		10331	10549	5022
9796		10331	10548	5022
9795		10331	10548	5021
9795		10331	10547	5020
9795		10328	10547	5020
9794		10327	10545	5020
9792		10327	10544	5020
9790		10325	10544	5019
9789		10324	10543	5019
9789		10322	10543	5019
9788		10322	10543	5019
9788		10320	10543	5018
9786		10320	10543	5017
9785		10317	10542	5017
9785		10317	10542	5017
9785		10317	10540	5016
9785		10316	10540	5016
9784		10315	10540	5015
9784		10314	10539	5015
9783		10314	10539	5015
9783		10313	10538	5015
9781		10313	10538	5015
9780		10310	10537	5015
9779		10310	10537	5014
9777		10309	10536	5013
9776		10309	10536	5013
9774		10305	10535	5013
9774		10305	10535	5013
9773		10304	10534	5012
9772		10304	10534	5012

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9772		10303	10534	5012
9771		10302	10534	5011
9770		10301	10533	5011
9769		10296	10533	5010
9769		10295	10532	5010
9768		10294	10532	5010
9767		10294	10531	5010
9765		10294	10530	5008
9764		10294	10530	5008
9763		10293	10530	5008
9763		10292	10529	5008
9762		10292	10529	5008
9762		10292	10529	5007
9761		10291	10529	5007
9758		10291	10529	5007
9757		10289	10528	5007
9756		10288	10528	5007
9755		10288	10527	5006
9755		10287	10527	5005
9754		10287	10527	5005
9754		10286	10527	5004
9753		10286	10526	5004
9752		10286	10525	5004
9751		10284	10525	5004
9750		10283	10525	5003
9749		10283	10524	5002
9749		10283	10524	5002
9748		10282	10523	5002
9747		10282	10523	5001
9747		10281	10523	5001
9746		10281	10522	5001
9746		10280	10522	5001
9745		10280	10522	5000
9743		10280	10522	5000

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9742		10280	10522	5000
9742		10279	10522	4999
9741		10278	10521	4999
9741		10278	10520	4998
9740		10278	10519	4998
9739		10276	10519	4997
9739		10275	10518	4997
9738		10274	10518	4996
9738		10272	10517	4996
9735		10272	10516	4996
9734		10271	10516	4995
9732		10269	10516	4994
9732		10269	10516	4994
9729		10269	10515	4994
9727		10267	10514	4993
9725		10266	10514	4993
9723		10265	10514	4992
9722		10265	10514	4992
9721		10264	10514	4992
9721		10264	10513	4992
9720		10264	10513	4991
9720		10262	10512	4991
9718		10262	10511	4991
9718		10260	10511	4991
9717		10258	10511	4991
9717		10258	10511	4990
9716		10258	10510	4989
9714		10257	10510	4989
9713		10255	10510	4989
9713		10255	10509	4989
9711		10254	10509	4988
9711		10254	10509	4988
9711		10253	10508	4987
9710		10251	10508	4986

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9709		10249	10508	4985
9708		10248	10508	4985
9708		10248	10508	4984
9707		10247	10507	4984
9706		10247	10507	4984
9705		10245	10507	4984
9704		10244	10507	4983
9703		10244	10506	4983
9703		10243	10506	4983
9702		10242	10506	4983
9702		10240	10505	4982
9702		10240	10505	4982
9701		10239	10505	4982
9700		10237	10504	4981
9699		10237	10504	4981
9699		10236	10503	4981
9698		10236	10503	4981
9697		10235	10503	4980
9697		10235	10503	4980
9697		10235	10503	4980
9696		10234	10502	4980
9696		10233	10501	4980
9696		10233	10501	4979
9694		10232	10501	4978
9689		10231	10500	4978
9688		10231	10500	4977
9684		10231	10500	4977
9681		10230	10500	4976
9678		10230	10500	4976
9678		10230	10498	4976
9677		10230	10498	4976
9674		10229	10498	4976
9674		10229	10497	4975
9672		10228	10497	4975

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9671		10228	10497	4975
9671		10228	10497	4974
9670		10227	10497	4974
9669		10227	10496	4973
9669		10227	10496	4972
9668		10227	10496	4972
9666		10225	10496	4971
9665		10225	10496	4971
9664		10225	10495	4971
9663		10223	10495	4970
9661		10223	10495	4970
9661		10222	10494	4970
9660		10222	10494	4969
9660		10222	10494	4969
9659		10221	10493	4968
9657		10219	10492	4968
9657		10219	10491	4967
9656		10218	10490	4967
9654		10217	10490	4967
9654		10217	10490	4967
9653		10214	10490	4967
9651		10213	10490	4967
9649		10213	10489	4966
9648		10211	10488	4966
9648		10211	10488	4966
9648		10210	10488	4965
9647		10210	10487	4965
9646		10210	10487	4965
9646		10210	10487	4965
9646		10209	10487	4964
9645		10208	10486	4963
9645		10207	10486	4963
9644		10207	10486	4963
9642		10206	10486	4961

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9641		10205	10485	4961
9641		10205	10485	4960
9641		10205	10485	4960
9640		10204	10485	4960
9638		10204	10484	4959
9637		10203	10484	4959
9637		10203	10483	4959
9635		10201	10483	4959
9633		10200	10483	4958
9633		10199	10483	4958
9629		10199	10482	4958
9629		10199	10482	4958
9627		10198	10482	4957
9627		10197	10482	4957
9626		10196	10481	4957
9626		10196	10481	4957
9626		10195	10481	4956
9626		10194	10480	4956
9623		10193	10479	4956
9623		10193	10479	4955
9622		10192	10479	4954
9622		10191	10479	4954
9621		10190	10478	4953
9620		10190	10478	4953
9620		10190	10478	4953
9619		10189	10478	4953
9618		10188	10477	4953
9618		10188	10477	4953
9618		10186	10476	4953
9617		10184	10476	4953
9617		10184	10475	4952
9617		10184	10475	4952
9615		10183	10473	4951
9614		10183	10473	4951

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9614		10182	10473	4951
9614		10181	10472	4950
9614		10181	10472	4950
9613		10180	10471	4950
9613		10180	10470	4950
9613		10180	10470	4950
9612		10180	10469	4947
9612		10180	10468	4947
9612		10179	10468	4947
9612		10178	10468	4947
9612		10175	10467	4947
9611		10175	10467	4946
9611		10172	10467	4946
9611		10170	10466	4945
9611		10169	10466	4945
9610		10168	10466	4944
9607		10167	10466	4943
9606		10167	10465	4943
9606		10165	10465	4942
9606		10165	10464	4942
9606		10164	10464	4941
9605		10164	10463	4940
9604		10163	10462	4940
9604		10162	10462	4940
9603		10162	10462	4939
9602		10161	10461	4939
9602		10159	10461	4938
9598		10159	10461	4938
9598		10158	10461	4938
9597		10158	10461	4937
9596		10157	10461	4937
9595		10157	10461	4935
9594		10157	10460	4935
9594		10157	10460	4935

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9593		10157	10460	4933
9592		10156	10460	4932
9591		10156	10459	4932
9589		10155	10459	4931
9589		10154	10459	4931
9589		10154	10458	4931
9589		10154	10458	4931
9586		10154	10457	4931
9586		10153	10457	4930
9586		10148	10456	4930
9585		10147	10456	4930
9585		10146	10455	4930
9585		10145	10455	4929
9585		10144	10455	4929
9585		10144	10454	4927
9584		10143	10454	4926
9583		10141	10454	4926
9583		10140	10452	4926
9582		10139	10452	4926
9582		10139	10451	4926
9581		10139	10451	4925
9581		10138	10451	4924
9580		10137	10450	4924
9580		10136	10449	4923
9580		10136	10449	4923
9579		10136	10449	4923
9578		10134	10449	4923
9577		10130	10448	4923
9574		10129	10448	4923
9571		10128	10448	4922
9571		10127	10448	4922
9570		10127	10448	4921
9569		10127	10448	4921
9568		10126	10447	4920

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9568		10125	10447	4920
9567		10125	10447	4920
9566		10125	10447	4920
9565		10124	10447	4919
9563		10124	10447	4918
9562		10124	10447	4918
9562		10123	10447	4918
9562		10123	10446	4918
9561		10122	10445	4918
9561		10122	10445	4918
9560		10120	10444	4917
9559		10120	10443	4917
9559		10117	10443	4916
9558		10117	10443	4916
9558		10116	10443	4916
9558		10116	10442	4916
9556		10115	10442	4916
9555		10114	10442	4915
9551		10113	10441	4915
9550		10113	10441	4914
9550		10113	10441	4912
9550		10112	10440	4911
9548		10112	10440	4911
9547		10111	10439	4911
9545		10110	10439	4910
9545		10110	10439	4910
9543		10110	10439	4909
9542		10109	10439	4909
9542		10107	10438	4909
9541		10106	10437	4909
9540		10106	10437	4909
9538		10105	10436	4908
9537		10104	10436	4908
9536		10103	10436	4907

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9536		10103	10435	4907
9536		10103	10435	4906
9535		10103	10435	4906
9534		10102	10433	4905
9532		10102	10433	4905
9532		10102	10433	4905
9530		10101	10433	4904
9528		10101	10432	4904
9528		10099	10432	4904
9528		10099	10431	4904
9527		10098	10431	4904
9524		10098	10430	4903
9523		10098	10430	4903
9522		10098	10429	4903
9520		10097	10429	4903
9520		10097	10428	4903
9519		10097	10428	4902
9519		10097	10428	4902
9518		10096	10427	4902
9516		10095	10427	4902
9516		10095	10426	4902
9514		10094	10426	4901
9514		10094	10426	4901
9513		10093	10426	4900
9513		10093	10426	4899
9512		10092	10424	4899
9512		10091	10424	4898
9511		10091	10424	4898
9511		10091	10424	4898
9510		10087	10423	4898
9510		10087	10423	4898
9509		10086	10423	4898
9509		10086	10422	4897
9508		10085	10421	4897

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9507		10084	10418	4897
9502		10083	10418	4896
9502		10083	10418	4896
9502		10083	10418	4896
9502		10082	10418	4896
9502		10079	10417	4895
9501		10077	10417	4895
9501		10077	10416	4895
9501		10076	10416	4894
9498		10076	10416	4894
9498		10076	10414	4894
9497		10075	10414	4894
9497		10071	10414	4893
9496		10071	10414	4892
9494		10071	10413	4891
9494		10071	10413	4891
9493		10070	10412	4891
9492		10069	10412	4890
9492		10068	10412	4890
9489		10066	10411	4890
9488		10066	10411	4889
9487		10065	10411	4889
9487		10062	10411	4888
9487		10061	10411	4888
9486		10060	10410	4888
9485		10060	10410	4888
9485		10059	10410	4888
9484		10057	10409	4887
9481		10056	10408	4886
9481		10056	10408	4886
9481		10054	10407	4886
9480		10053	10406	4886
9480		10053	10406	4885
9480		10052	10406	4885

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9480		10051	10405	4884
9479		10050	10405	4884
9478		10050	10405	4883
9478		10050	10405	4882
9477		10048	10405	4882
9476		10046	10404	4882
9475		10046	10402	4882
9473		10044	10402	4881
9472		10043	10402	4881
9471		10042	10402	4881
9470		10040	10400	4881
9468		10040	10400	4880
9468		10040	10400	4880
9466		10039	10399	4880
9465		10038	10399	4879
9463		10038	10399	4879
9463		10038	10398	4879
9463		10036	10398	4878
9462		10036	10397	4877
9462		10033	10396	4877
9460		10033	10396	4877
9459		10032	10396	4877
9459		10031	10396	4876
9459		10030	10396	4875
9458		10029	10396	4875
9458		10029	10395	4875
9457		10028	10395	4874
9457		10027	10395	4874
9456		10027	10395	4874
9455		10027	10395	4873
9454		10027	10395	4871
9453		10025	10394	4871
9452		10024	10394	4869
9452		10024	10393	4869

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9449		10023	10393	4869
9448		10022	10391	4868
9447		10021	10391	4868
9447		10021	10391	4868
9447		10019	10391	4868
9446		10018	10390	4867
9444		10018	10387	4867
9444		10018	10387	4867
9443		10018	10387	4867
9441		10016	10387	4867
9440		10015	10387	4867
9440		10014	10386	4866
9439		10013	10386	4866
9438		10013	10385	4866
9437		10012	10385	4866
9436		10012	10385	4866
9433		10012	10384	4866
9432		10012	10383	4866
9432		10011	10383	4865
9431		10011	10383	4864
9431		10010	10383	4864
9430		10008	10381	4863
9430		10007	10380	4863
9429		10006	10380	4863
9429		10006	10380	4862
9428		10000	10380	4862
9428		9999	10380	4862
9428		9994	10379	4862
9427		9994	10379	4861
9427		9991	10379	4861
9426		9990	10377	4861
9426		9990	10377	4861
9426		9990	10377	4860
9424		9989	10377	4860

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9424		9988	10377	4860
9424		9987	10376	4859
9422		9986	10376	4859
9422		9982	10376	4859
9421		9981	10376	4858
9420		9981	10376	4858
9420		9979	10375	4857
9417		9979	10375	4857
9417		9979	10375	4857
9416		9978	10375	4856
9416		9977	10375	4856
9415		9975	10374	4856
9415		9975	10374	4856
9414		9971	10374	4855
9413		9970	10374	4855
9412		9968	10373	4855
9411		9968	10373	4854
9408		9967	10372	4854
9407		9966	10372	4854
9407		9966	10371	4853
9406		9965	10371	4853
9406		9964	10371	4853
9406		9964	10369	4853
9405		9963	10369	4852
9405		9963	10368	4851
9405		9962	10367	4851
9403		9961	10367	4851
9401		9961	10367	4850
9400		9961	10367	4850
9400		9960	10366	4850
9400		9960	10366	4850
9399		9959	10365	4850
9397		9959	10365	4849
9397		9959	10365	4849

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9396		9958	10365	4848
9395		9958	10364	4848
9394		9958	10363	4848
9390		9956	10363	4848
9390		9956	10363	4848
9385		9956	10362	4848
9385		9955	10362	4848
9385		9955	10361	4848
9381		9955	10361	4847
9381		9954	10361	4847
9381		9954	10361	4847
9380		9952	10361	4847
9378		9951	10360	4846
9378		9949	10360	4846
9377		9948	10359	4846
9375		9947	10359	4845
9375		9947	10358	4845
9375		9946	10357	4845
9374		9943	10357	4845
9373		9941	10357	4845
9372		9941	10357	4844
9371		9940	10357	4844
9371		9940	10357	4844
9371		9940	10356	4844
9370		9938	10356	4844
9369		9938	10356	4843
9368		9937	10356	4843
9366		9937	10354	4843
9366		9936	10354	4843
9365		9936	10353	4842
9364		9935	10353	4842
9363		9934	10353	4842
9363		9934	10353	4841
9363		9933	10352	4841

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9362		9933	10352	4841
9362		9931	10351	4841
9360		9931	10351	4841
9358		9931	10351	4841
9356		9930	10350	4841
9355		9930	10349	4841
9355		9930	10349	4841
9354		9929	10348	4840
9354		9929	10348	4840
9353		9929	10347	4839
9353		9929	10347	4839
9353		9927	10346	4839
9353		9925	10346	4838
9352		9925	10345	4837
9351		9924	10343	4837
9351		9924	10342	4837
9351		9923	10341	4836
9349		9923	10340	4836
9349		9921	10340	4836
9347		9921	10338	4836
9346		9920	10337	4836
9346		9919	10336	4834
9345		9918	10336	4834
9345		9917	10335	4834
9343		9917	10335	4833
9342		9917	10335	4833
9342		9916	10334	4833
9341		9916	10334	4833
9341		9912	10333	4833
9338		9911	10333	4833
9338		9911	10333	4832
9337		9909	10332	4832
9337		9908	10332	4831
9336		9906	10332	4831

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9335		9905	10331	4830
9334		9904	10331	4830
9334		9904	10331	4830
9333		9903	10330	4830
9330		9903	10330	4830
9327		9903	10330	4828
9326		9903	10330	4828
9325		9902	10330	4828
9324		9901	10329	4828
9320		9901	10329	4828
9319		9901	10329	4828
9318		9900	10329	4828
9317		9900	10329	4827
9313		9899	10328	4827
9313		9899	10328	4826
9313		9898	10328	4825
9313		9896	10328	4825
9312		9895	10327	4825
9311		9893	10327	4825
9311		9892	10327	4824
9309		9892	10327	4824
9308		9891	10326	4824
9307		9891	10326	4824
9306		9891	10326	4823
9305		9890	10325	4822
9305		9890	10324	4822
9305		9889	10324	4822
9303		9889	10324	4822
9299		9887	10323	4822
9299		9887	10323	4821
9294		9887	10323	4821
9293		9885	10322	4821
9292		9884	10322	4820
9292		9883	10322	4820

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9291		9882	10322	4819
9290		9882	10321	4818
9289		9881	10321	4818
9289		9881	10321	4818
9288		9879	10321	4818
9288		9879	10321	4817
9287		9878	10319	4817
9285		9878	10319	4817
9283		9877	10318	4816
9283		9876	10317	4816
9280		9876	10317	4816
9280		9875	10317	4815
9278		9875	10316	4815
9277		9875	10316	4815
9277		9875	10315	4814
9277		9875	10315	4813
9276		9874	10315	4812
9275		9874	10314	4812
9275		9870	10314	4812
9274		9869	10314	4812
9270		9866	10313	4812
9270		9866	10312	4811
9269		9865	10312	4811
9268		9864	10312	4811
9267		9863	10311	4810
9266		9863	10311	4809
9266		9862	10308	4808
9265		9862	10307	4808
9264		9860	10307	4808
9263		9859	10306	4808
9263		9859	10306	4808
9262		9858	10306	4807
9262		9857	10305	4807
9262		9856	10305	4807

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9260		9854	10305	4807
9260		9853	10304	4807
9258		9852	10303	4807
9257		9852	10302	4807
9257		9851	10302	4807
9257		9851	10301	4806
9257		9851	10301	4806
9256		9850	10301	4806
9255		9849	10301	4806
9251		9849	10301	4806
9251		9849	10301	4806
9250		9845	10300	4806
9250		9842	10300	4806
9249		9842	10300	4806
9248		9842	10299	4806
9247		9841	10299	4806
9246		9838	10297	4805
9243		9838	10297	4805
9243		9837	10296	4804
9243		9837	10296	4803
9243		9835	10296	4803
9241		9835	10296	4803
9238		9835	10296	4803
9238		9832	10296	4803
9237		9832	10295	4802
9236		9832	10294	4802
9236		9831	10294	4802
9235		9831	10294	4800
9235		9829	10293	4800
9235		9829	10293	4800
9234		9828	10293	4800
9234		9828	10292	4799
9234		9827	10291	4799
9233		9827	10291	4799

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9233		9827	10291	4798
9232		9826	10290	4798
9232		9826	10290	4798
9230		9825	10290	4798
9229		9823	10290	4798
9229		9823	10289	4797
9229		9821	10289	4796
9227		9819	10289	4795
9224		9817	10289	4794
9221		9817	10289	4794
9220		9817	10289	4794
9220		9816	10289	4794
9217		9814	10288	4793
9216		9814	10288	4793
9216		9814	10288	4793
9215		9812	10288	4793
9215		9811	10288	4793
9214		9811	10288	4793
9214		9810	10288	4793
9214		9810	10288	4792
9214		9810	10288	4791
9213		9808	10287	4791
9210		9808	10287	4790
9208		9807	10287	4790
9207		9803	10287	4790
9206		9802	10286	4790
9206		9802	10286	4790
9206		9801	10285	4790
9205		9801	10285	4789
9204		9800	10285	4789
9203		9800	10285	4788
9203		9800	10284	4788
9202		9799	10284	4787
9202		9798	10284	4787

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9201		9797	10284	4787
9199		9796	10283	4787
9198		9796	10282	4787
9198		9795	10282	4786
9198		9794	10282	4786
9197		9793	10281	4786
9197		9793	10281	4786
9195		9792	10281	4785
9195		9792	10280	4785
9195		9790	10280	4785
9195		9790	10280	4785
9194		9789	10280	4785
9194		9787	10279	4785
9191		9787	10279	4785
9191		9785	10279	4784
9191		9785	10278	4784
9190		9784	10278	4783
9190		9784	10277	4783
9189		9782	10277	4783
9189		9779	10277	4783
9188		9778	10276	4783
9187		9778	10276	4782
9183		9777	10275	4782
9183		9777	10275	4781
9182		9777	10274	4781
9182		9776	10274	4781
9180		9776	10274	4780
9178		9775	10274	4780
9176		9774	10273	4779
9174		9773	10273	4779
9174		9772	10272	4779
9174		9771	10272	4779
9173		9771	10272	4778
9173		9771	10272	4778

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9171		9770	10271	4778
9171		9770	10271	4777
9171		9768	10271	4777
9171		9768	10271	4776
9170		9767	10270	4776
9169		9767	10270	4776
9167		9766	10270	4776
9166		9766	10270	4776
9166		9765	10268	4775
9166		9765	10268	4775
9165		9763	10267	4775
9165		9762	10267	4774
9164		9762	10267	4774
9163		9760	10266	4774
9163		9758	10266	4773
9160		9758	10265	4773
9160		9757	10265	4773
9160		9753	10265	4773
9159		9752	10265	4773
9156		9751	10265	4773
9154		9749	10265	4772
9154		9749	10264	4772
9154		9748	10264	4772
9153		9746	10263	4772
9153		9746	10263	4771
9153		9746	10263	4771
9153		9745	10263	4771
9152		9745	10263	4770
9152		9743	10262	4770
9150		9743	10262	4769
9150		9742	10262	4768
9149		9741	10262	4768
9148		9740	10261	4768
9147		9740	10261	4768

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9147		9739	10261	4767
9147		9738	10261	4767
9144		9738	10260	4767
9142		9738	10259	4767
9142		9736	10259	4767
9141		9736	10259	4766
9141		9735	10259	4766
9139		9734	10259	4766
9139		9734	10258	4765
9136		9733	10258	4765
9134		9732	10258	4764
9134		9732	10258	4764
9132		9729	10258	4764
9132		9729	10257	4763
9131		9727	10257	4763
9130		9727	10257	4763
9129		9727	10255	4763
9128		9726	10255	4763
9127		9726	10253	4762
9126		9726	10253	4762
9122		9726	10253	4762
9122		9725	10251	4762
9121		9724	10251	4762
9121		9724	10250	4761
9120		9723	10248	4761
9120		9723	10247	4761
9118		9722	10247	4761
9118		9722	10247	4760
9117		9721	10246	4760
9116		9721	10246	4760
9116		9714	10245	4760
9115		9712	10245	4759
9115		9712	10245	4759
9112		9711	10245	4759

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9112		9711	10244	4758
9112		9708	10244	4758
9108		9707	10243	4757
9107		9706	10243	4756
9107		9705	10242	4756
9107		9704	10242	4756
9106		9703	10242	4756
9106		9703	10242	4756
9105		9701	10242	4755
9105		9700	10242	4755
9103		9700	10241	4755
9103		9700	10241	4754
9102		9700	10241	4754
9102		9699	10240	4753
9101		9698	10240	4753
9100		9698	10240	4753
9099		9696	10240	4753
9098		9694	10240	4753
9098		9694	10240	4752
9096		9694	10239	4752
9095		9692	10239	4752
9095		9692	10237	4751
9095		9691	10237	4751
9094		9691	10236	4751
9094		9690	10236	4751
9091		9689	10236	4751
9090		9688	10236	4751
9089		9687	10236	4750
9089		9687	10235	4750
9087		9686	10235	4750
9086		9686	10235	4749
9086		9686	10234	4748
9086		9685	10234	4747
9085		9685	10234	4746

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9085		9685	10233	4746
9084		9684	10233	4746
9084		9682	10233	4745
9083		9682	10233	4745
9083		9680	10232	4745
9082		9680	10232	4744
9081		9679	10232	4744
9079		9678	10231	4744
9077		9677	10230	4744
9077		9676	10229	4744
9076		9675	10228	4744
9075		9675	10227	4744
9074		9675	10227	4743
9074		9675	10227	4743
9073		9674	10227	4742
9073		9674	10226	4742
9071		9674	10226	4742
9070		9673	10226	4742
9070		9673	10226	4742
9069		9673	10225	4742
9069		9673	10225	4741
9069		9670	10224	4741
9069		9669	10224	4741
9067		9668	10223	4740
9064		9666	10222	4740
9063		9665	10221	4740
9063		9665	10220	4740
9062		9663	10220	4739
9062		9662	10218	4739
9062		9661	10217	4739
9061		9660	10217	4739
9061		9660	10217	4739
9061		9659	10217	4739
9059		9657	10217	4738

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9058		9654	10216	4738
9057		9653	10216	4738
9056		9653	10216	4738
9055		9653	10215	4738
9054		9652	10215	4738
9054		9652	10215	4737
9054		9650	10215	4736
9054		9650	10214	4736
9052		9649	10213	4735
9052		9648	10213	4735
9051		9648	10212	4735
9050		9648	10212	4735
9050		9647	10212	4735
9048		9647	10212	4734
9047		9647	10211	4734
9047		9646	10211	4734
9046		9646	10211	4733
9043		9645	10211	4733
9043		9644	10209	4733
9040		9644	10208	4733
9039		9643	10207	4732
9038		9641	10207	4732
9038		9640	10207	4732
9038		9639	10207	4732
9037		9639	10206	4731
9035		9637	10204	4731
9034		9637	10204	4731
9033		9636	10204	4731
9031		9636	10204	4731
9031		9636	10203	4731
9030		9635	10203	4731
9030		9633	10203	4731
9029		9633	10202	4731
9029		9632	10202	4729

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
9029		9632	10202	4728
9026		9632	10201	4728
9024		9630	10201	4728
9022		9629	10200	4728
9022		9628	10200	4728
9019		9627	10199	4728
9017		9627	10199	4728
9016		9627	10199	4727
9015		9626	10198	4727
9014		9626	10198	4726
9014		9625	10198	4726
9014		9625	10197	4726
9014		9625	10197	4725
9013		9625	10197	4725
9013		9623	10196	4725
9012		9622	10195	4725
9010		9621	10195	4724
9008		9618	10195	4724
9006		9618	10194	4724
9003		9617	10194	4724
9002		9617	10192	4723
9002		9616	10192	4723
9002		9615	10192	4723
9002		9615	10192	4723
9002		9614	10192	4723
8996		9613	10192	4723
8993		9613	10191	4722
8992		9611	10191	4721
8989		9611	10191	4721
8988		9611	10190	4721
8988		9610	10189	4721
8986		9610	10189	4721
8985		9609	10188	4721
8985		9608	10188	4720

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8984		9608	10188	4719
8983		9607	10187	4719
8981		9606	10186	4719
8979		9605	10186	4719
8979		9605	10185	4718
8979		9605	10185	4718
8978		9604	10185	4718
8977		9604	10183	4717
8976		9604	10183	4717
8976		9602	10183	4717
8975		9602	10181	4717
8975		9602	10180	4717
8973		9601	10180	4717
8973		9601	10179	4717
8971		9599	10179	4716
8971		9598	10178	4716
8968		9598	10178	4716
8967		9597	10177	4715
8965		9594	10177	4715
8965		9594	10177	4715
8963		9591	10177	4715
8961		9591	10177	4714
8960		9591	10177	4714
8958		9591	10177	4714
8957		9590	10177	4713
8956		9588	10176	4713
8956		9587	10176	4713
8952		9586	10176	4713
8952		9586	10175	4712
8952		9586	10175	4712
8950		9585	10174	4712
8947		9584	10174	4712
8945		9582	10173	4712
8945		9581	10173	4712

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8943		9581	10173	4712
8941		9581	10173	4712
8941		9581	10173	4711
8941		9579	10172	4711
8940		9578	10172	4711
8940		9577	10172	4711
8938		9576	10172	4710
8937		9575	10172	4710
8937		9575	10172	4710
8937		9575	10171	4709
8935		9573	10171	4709
8934		9573	10170	4709
8934		9573	10170	4708
8933		9572	10170	4708
8932		9571	10170	4707
8931		9571	10170	4707
8930		9571	10170	4707
8929		9570	10169	4707
8929		9568	10169	4707
8927		9567	10169	4706
8926		9564	10168	4706
8926		9563	10168	4705
8926		9561	10167	4705
8921		9560	10166	4705
8921		9559	10166	4705
8920		9558	10166	4705
8916		9558	10165	4705
8916		9557	10165	4705
8914		9557	10165	4704
8914		9557	10164	4704
8912		9556	10164	4703
8911		9556	10164	4703
8911		9554	10164	4703
8911		9551	10164	4703

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8910		9549	10163	4703
8910		9549	10162	4703
8909		9548	10162	4703
8906		9547	10162	4703
8906		9546	10160	4702
8905		9546	10160	4702
8903		9546	10160	4702
8902		9545	10160	4701
8902		9545	10160	4701
8902		9543	10159	4701
8901		9543	10159	4701
8901		9543	10158	4701
8901		9542	10157	4700
8900		9541	10157	4700
8900		9541	10156	4700
8897		9540	10156	4700
8897		9540	10155	4699
8896		9540	10155	4699
8896		9540	10155	4699
8895		9539	10154	4699
8895		9538	10153	4699
8895		9538	10152	4699
8892		9537	10152	4698
8891		9537	10152	4698
8891		9536	10152	4698
8890		9533	10152	4698
8889		9532	10151	4697
8887		9531	10151	4697
8886		9531	10151	4697
8886		9530	10151	4697
8883		9530	10151	4697
8881		9530	10150	4695
8880		9529	10150	4695
8879		9528	10150	4695

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8878		9528	10150	4695
8877		9528	10149	4694
8877		9527	10149	4694
8874		9526	10148	4694
8872		9526	10148	4694
8872		9525	10148	4694
8872		9525	10148	4694
8872		9525	10147	4693
8871		9525	10147	4693
8870		9524	10147	4693
8869		9522	10147	4693
8869		9522	10146	4692
8868		9522	10146	4691
8867		9521	10145	4691
8867		9520	10145	4691
8865		9519	10145	4691
8865		9518	10144	4691
8864		9518	10144	4690
8864		9518	10144	4690
8864		9517	10144	4689
8863		9515	10144	4689
8862		9514	10142	4689
8860		9513	10142	4689
8860		9512	10142	4689
8859		9512	10141	4688
8859		9511	10140	4688
8858		9511	10140	4688
8857		9510	10140	4688
8856		9506	10140	4688
8855		9505	10139	4688
8855		9504	10139	4688
8854		9503	10139	4687
8854		9502	10139	4687
8854		9501	10139	4687

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8853		9500	10138	4687
8851		9500	10138	4687
8850		9499	10138	4687
8849		9497	10138	4687
8849		9496	10138	4687
8849		9495	10137	4687
8848		9492	10137	4687
8847		9492	10137	4687
8847		9492	10136	4686
8842		9492	10136	4686
8842		9491	10134	4685
8842		9488	10134	4685
8841		9486	10134	4685
8841		9486	10133	4684
8839		9485	10133	4684
8838		9485	10132	4684
8838		9484	10132	4684
8838		9483	10131	4684
8837		9482	10130	4683
8837		9481	10130	4683
8837		9476	10130	4683
8836		9476	10129	4682
8835		9475	10129	4682
8835		9475	10129	4682
8835		9473	10129	4681
8834		9473	10129	4680
8833		9472	10128	4680
8833		9472	10128	4680
8833		9471	10128	4679
8832		9471	10127	4679
8832		9471	10126	4679
8831		9470	10126	4678
8831		9469	10126	4678
8829		9469	10126	4678

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8828		9468	10126	4678
8827		9467	10126	4677
8826		9466	10125	4677
8825		9465	10125	4677
8825		9464	10125	4677
8823		9464	10124	4677
8823		9461	10123	4676
8820		9460	10121	4676
8820		9457	10120	4676
8820		9455	10120	4676
8818		9453	10120	4675
8817		9452	10120	4675
8817		9452	10120	4674
8816		9450	10120	4674
8814		9449	10118	4674
8813		9448	10117	4673
8813		9448	10117	4673
8813		9447	10117	4673
8812		9442	10116	4672
8811		9442	10116	4672
8809		9442	10115	4672
8809		9439	10115	4672
8809		9439	10115	4671
8808		9438	10115	4671
8807		9438	10115	4670
8807		9438	10115	4670
8806		9435	10115	4670
8806		9435	10114	4669
8804		9434	10114	4669
8803		9434	10114	4669
8803		9434	10113	4669
8802		9431	10113	4668
8801		9431	10113	4668
8800		9430	10113	4668

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8797		9430	10113	4667
8797		9429	10113	4667
8795		9427	10113	4667
8793		9425	10112	4667
8793		9424	10112	4667
8793		9424	10112	4666
8792		9424	10112	4666
8791		9424	10111	4666
8791		9422	10111	4666
8790		9422	10111	4665
8788		9421	10110	4665
8788		9418	10110	4665
8787		9417	10109	4664
8786		9416	10109	4664
8785		9416	10108	4664
8785		9416	10108	4663
8784		9415	10108	4662
8783		9415	10108	4662
8783		9414	10108	4662
8781		9413	10108	4662
8781		9413	10107	4661
8781		9413	10107	4661
8780		9412	10106	4661
8779		9410	10106	4660
8779		9409	10106	4660
8779		9408	10106	4660
8778		9406	10106	4660
8778		9405	10106	4659
8776		9402	10105	4659
8776		9402	10103	4659
8775		9400	10102	4658
8775		9397	10102	4658
8775		9396	10102	4658
8773		9396	10101	4658

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8772		9395	10101	4658
8772		9395	10101	4658
8772		9393	10099	4658
8772		9393	10099	4658
8770		9393	10099	4657
8768		9391	10099	4657
8768		9391	10098	4657
8768		9390	10096	4657
8767		9390	10096	4657
8767		9389	10096	4657
8766		9387	10095	4657
8766		9386	10095	4657
8763		9386	10094	4657
8762		9385	10094	4656
8761		9385	10093	4656
8759		9384	10093	4656
8758		9383	10093	4656
8757		9380	10092	4656
8756		9380	10092	4656
8755		9378	10092	4654
8754		9378	10091	4654
8754		9377	10091	4654
8753		9377	10091	4653
8752		9376	10090	4653
8750		9374	10090	4653
8750		9373	10090	4651
8749		9372	10090	4651
8748		9371	10089	4651
8748		9370	10089	4651
8748		9370	10089	4651
8748		9369	10089	4650
8748		9369	10088	4650
8747		9368	10087	4650
8747		9368	10087	4650

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8746		9367	10087	4650
8745		9366	10087	4650
8740		9364	10086	4650
8739		9363	10086	4649
8738		9359	10085	4649
8738		9357	10085	4648
8738		9356	10085	4648
8737		9354	10084	4648
8735		9353	10084	4648
8735		9353	10084	4648
8735		9352	10084	4648
8733		9351	10084	4648
8731		9349	10084	4647
8731		9349	10083	4647
8730		9349	10083	4647
8730		9349	10083	4647
8729		9349	10083	4646
8728		9348	10083	4646
8727		9347	10083	4646
8727		9345	10082	4645
8725		9345	10082	4645
8724		9345	10082	4645
8721		9345	10081	4645
8721		9342	10081	4645
8720		9342	10080	4645
8719		9341	10080	4645
8718		9340	10079	4645
8718		9339	10079	4645
8718		9337	10079	4644
8718		9336	10078	4643
8717		9336	10078	4643
8716		9335	10077	4643
8711		9335	10076	4643
8708		9334	10076	4643

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8708		9333	10075	4642
8707		9333	10075	4642
8706		9332	10074	4642
8705		9330	10073	4642
8704		9330	10072	4642
8701		9329	10072	4642
8701		9327	10071	4641
8697		9327	10071	4640
8696		9325	10070	4640
8693		9324	10070	4640
8693		9322	10070	4640
8692		9320	10070	4639
8692		9318	10070	4639
8692		9318	10069	4639
8691		9317	10069	4639
8690		9315	10069	4639
8689		9315	10069	4638
8689		9315	10068	4638
8689		9314	10068	4638
8689		9313	10068	4637
8688		9313	10068	4637
8687		9313	10067	4637
8683		9313	10067	4637
8681		9312	10067	4636
8679		9312	10067	4636
8679		9312	10066	4635
8679		9312	10065	4635
8678		9310	10064	4635
8676		9310	10064	4635
8674		9310	10064	4635
8673		9307	10064	4635
8671		9307	10063	4633
8670		9306	10063	4633
8670		9305	10063	4633

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8668		9304	10063	4633
8668		9303	10063	4632
8667		9303	10062	4632
8666		9302	10062	4632
8664		9301	10061	4631
8663		9301	10061	4631
8662		9299	10061	4631
8661		9298	10061	4631
8659		9298	10060	4631
8659		9298	10060	4631
8658		9297	10060	4630
8658		9297	10060	4630
8657		9297	10059	4629
8655		9296	10059	4629
8652		9296	10059	4629
8652		9295	10058	4629
8650		9295	10058	4629
8650		9295	10058	4629
8649		9293	10057	4628
8649		9292	10056	4628
8648		9292	10056	4628
8647		9291	10056	4628
8647		9291	10056	4627
8646		9289	10056	4627
8646		9288	10055	4627
8643		9288	10054	4627
8642		9288	10054	4626
8641		9287	10054	4626
8641		9287	10053	4626
8641		9287	10052	4626
8640		9287	10051	4626
8640		9286	10051	4625
8640		9285	10051	4625
8637		9284	10050	4625

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8637		9284	10050	4624
8637		9282	10050	4624
8637		9281	10049	4624
8637		9281	10049	4624
8636		9280	10048	4624
8635		9280	10048	4624
8634		9279	10048	4623
8634		9279	10046	4623
8632		9279	10045	4623
8631		9277	10045	4622
8630		9276	10045	4621
8630		9271	10045	4621
8629		9271	10045	4621
8629		9271	10044	4621
8629		9270	10044	4621
8627		9270	10042	4621
8627		9269	10042	4621
8627		9266	10042	4621
8626		9266	10042	4620
8626		9266	10042	4620
8625		9266	10042	4619
8625		9265	10042	4619
8622		9264	10041	4619
8622		9263	10041	4619
8622		9262	10040	4619
8621		9261	10040	4619
8620		9260	10039	4618
8619		9260	10039	4618
8618		9258	10038	4618
8617		9258	10037	4617
8617		9258	10037	4617
8616		9257	10037	4617
8616		9257	10037	4617
8616		9253	10037	4617

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8613		9251	10036	4617
8613		9251	10036	4616
8613		9251	10036	4616
8613		9251	10035	4616
8612		9249	10034	4616
8612		9247	10034	4615
8612		9246	10034	4615
8611		9244	10033	4615
8611		9244	10033	4615
8611		9242	10033	4615
8609		9242	10032	4614
8609		9241	10032	4614
8607		9239	10031	4614
8606		9238	10030	4614
8603		9238	10030	4613
8601		9237	10029	4613
8601		9236	10028	4613
8601		9235	10028	4612
8601		9234	10028	4612
8599		9234	10028	4612
8598		9234	10028	4612
8598		9234	10027	4612
8597		9233	10027	4611
8595		9232	10027	4611
8593		9232	10026	4611
8593		9231	10026	4611
8592		9231	10026	4611
8592		9231	10025	4611
8591		9230	10025	4610
8591		9229	10024	4610
8590		9228	10024	4610
8590		9226	10024	4610
8589		9226	10024	4610
8589		9225	10023	4610

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8588		9221	10023	4610
8587		9220	10023	4609
8587		9220	10022	4609
8584		9220	10022	4609
8583		9218	10022	4608
8583		9217	10020	4608
8582		9216	10020	4608
8579		9216	10020	4608
8579		9216	10020	4607
8577		9215	10019	4607
8576		9212	10019	4607
8576		9211	10019	4606
8576		9208	10018	4606
8575		9207	10018	4606
8574		9206	10018	4605
8572		9206	10018	4605
8571		9205	10017	4605
8571		9204	10017	4605
8569		9202	10016	4604
8569		9202	10016	4604
8569		9201	10016	4604
8569		9201	10016	4604
8566		9198	10016	4603
8565		9198	10016	4603
8564		9198	10016	4603
8563		9198	10016	4603
8562		9197	10015	4603
8562		9196	10015	4603
8561		9195	10015	4603
8560		9193	10013	4602
8555		9193	10013	4602
8553		9192	10013	4602
8552		9190	10012	4602
8552		9188	10012	4602

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8550		9188	10012	4602
8547		9187	10012	4601
8547		9186	10012	4601
8546		9185	10012	4601
8544		9181	10011	4601
8544		9181	10011	4601
8544		9180	10011	4601
8543		9180	10011	4601
8541		9179	10011	4600
8540		9178	10010	4600
8538		9178	10009	4600
8537		9176	10009	4599
8535		9174	10009	4599
8533		9173	10009	4599
8532		9173	10009	4599
8531		9172	10009	4598
8530		9172	10008	4598
8530		9172	10008	4598
8529		9172	10008	4598
8527		9171	10008	4598
8526		9170	10008	4598
8525		9169	10007	4597
8524		9169	10007	4597
8523		9166	10007	4597
8522		9165	10006	4597
8522		9165	10006	4597
8521		9164	10005	4596
8521		9164	10005	4596
8520		9162	10005	4596
8519		9162	10005	4595
8519		9161	10004	4595
8519		9160	10004	4595
8516		9159	10003	4594
8514		9159	10003	4594

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8514		9159	10002	4594
8513		9158	10002	4594
8512		9158	10002	4593
8511		9156	10002	4593
8510		9155	10002	4593
8509		9155	10001	4593
8509		9154	10001	4593
8509		9154	10001	4592
8504		9153	10001	4592
8503		9152	10000	4592
8501		9152	9999	4592
8500		9152	9999	4591
8499		9151	9999	4591
8498		9151	9999	4591
8498		9150	9998	4591
8498		9149	9998	4591
8498		9146	9998	4590
8497		9145	9997	4590
8497		9144	9997	4590
8496		9143	9997	4590
8496		9142	9997	4590
8495		9142	9997	4589
8495		9141	9997	4589
8495		9139	9995	4589
8494		9137	9994	4589
8494		9136	9994	4589
8494		9136	9993	4589
8493		9135	9993	4589
8490		9133	9993	4587
8490		9133	9993	4587
8490		9133	9993	4587
8488		9132	9992	4587
8487		9131	9992	4587
8486		9130	9992	4586

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8486		9129	9992	4586
8485		9128	9991	4586
8484		9127	9991	4586
8484		9127	9990	4586
8483		9127	9990	4586
8483		9126	9989	4586
8482		9125	9989	4585
8482		9124	9989	4585
8481		9124	9988	4585
8480		9124	9988	4585
8479		9124	9988	4585
8478		9124	9988	4584
8478		9122	9987	4584
8477		9122	9987	4584
8475		9122	9987	4584
8473		9122	9987	4584
8472		9122	9986	4584
8471		9121	9986	4583
8471		9120	9986	4583
8468		9120	9985	4582
8466		9120	9985	4582
8466		9119	9984	4581
8465		9119	9984	4581
8464		9119	9984	4581
8463		9119	9983	4581
8463		9119	9983	4581
8463		9119	9983	4581
8463		9118	9983	4581
8462		9118	9983	4581
8462		9118	9982	4581
8459		9118	9982	4580
8459		9117	9982	4580
8458		9116	9981	4580
8457		9115	9981	4580

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8453		9115	9981	4579
8453		9114	9980	4579
8452		9114	9980	4578
8452		9113	9979	4578
8451		9110	9979	4578
8451		9110	9979	4578
8450		9108	9979	4578
8449		9107	9978	4578
8448		9107	9978	4578
8448		9107	9976	4577
8446		9105	9976	4577
8445		9104	9975	4577
8445		9104	9975	4577
8444		9103	9975	4576
8444		9103	9975	4576
8443		9102	9974	4576
8442		9101	9974	4576
8441		9100	9973	4575
8441		9099	9973	4575
8441		9098	9973	4575
8440		9097	9972	4575
8439		9097	9972	4575
8439		9095	9972	4574
8439		9092	9971	4574
8438		9090	9971	4574
8437		9090	9971	4574
8437		9089	9971	4573
8437		9088	9970	4573
8437		9087	9970	4573
8434		9086	9970	4573
8432		9085	9969	4572
8431		9085	9969	4571
8431		9083	9969	4571
8430		9083	9969	4571

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8430		9082	9969	4571
8430		9082	9969	4571
8430		9082	9968	4571
8429		9081	9968	4569
8429		9080	9967	4569
8429		9080	9966	4569
8428		9078	9966	4569
8426		9077	9965	4569
8425		9076	9964	4568
8422		9074	9964	4568
8422		9074	9964	4568
8421		9073	9964	4568
8421		9073	9963	4568
8421		9073	9963	4567
8420		9073	9963	4567
8420		9072	9963	4566
8419		9068	9963	4566
8418		9068	9963	4565
8418		9066	9962	4565
8418		9065	9962	4564
8417		9064	9962	4564
8416		9062	9961	4564
8416		9061	9960	4563
8414		9060	9960	4563
8412		9060	9959	4563
8411		9059	9959	4563
8411		9057	9959	4562
8411		9055	9959	4562
8411		9055	9958	4562
8411		9054	9957	4562
8411		9053	9957	4561
8411		9053	9957	4561
8410		9052	9956	4561
8409		9051	9956	4561

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8409		9051	9956	4560
8408		9050	9955	4560
8408		9049	9955	4560
8408		9049	9955	4560
8407		9049	9955	4560
8406		9048	9955	4560
8406		9045	9954	4560
8405		9044	9954	4560
8402		9044	9953	4560
8402		9043	9953	4559
8401		9043	9952	4559
8400		9043	9952	4559
8398		9041	9952	4558
8397		9040	9951	4558
8397		9039	9951	4558
8397		9037	9951	4558
8396		9037	9950	4557
8396		9035	9949	4557
8394		9035	9949	4557
8394		9034	9948	4556
8394		9034	9948	4556
8393		9033	9948	4556
8393		9033	9948	4556
8393		9031	9948	4556
8391		9030	9947	4555
8388		9030	9947	4555
8388		9029	9946	4555
8388		9028	9945	4555
8387		9027	9944	4554
8386		9027	9944	4554
8385		9026	9944	4554
8385		9026	9942	4554
8385		9025	9942	4553
8384		9024	9941	4553

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8384		9024	9940	4553
8383		9024	9939	4553
8382		9022	9938	4553
8378		9021	9938	4553
8378		9018	9937	4552
8378		9017	9936	4552
8378		9016	9936	4551
8377		9015	9935	4551
8377		9014	9935	4550
8377		9011	9935	4550
8376		9011	9935	4550
8376		9010	9933	4550
8376		9010	9933	4550
8374		9010	9933	4550
8373		9010	9933	4549
8373		9007	9933	4549
8372		9005	9932	4549
8372		9005	9932	4549
8372		9005	9932	4549
8370		9004	9931	4548
8370		9002	9931	4548
8364		9001	9931	4548
8363		9000	9930	4547
8362		9000	9930	4547
8362		8999	9930	4547
8361		8998	9929	4546
8360		8998	9929	4546
8360		8998	9928	4546
8360		8995	9928	4546
8357		8994	9927	4546
8356		8993	9927	4546
8356		8992	9927	4545
8355		8991	9926	4545
8352		8990	9926	4545

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8352		8990	9926	4545
8351		8990	9926	4544
8350		8989	9926	4544
8350		8987	9925	4543
8350		8986	9925	4543
8349		8985	9925	4543
8349		8985	9925	4542
8348		8983	9925	4542
8347		8982	9924	4542
8345		8982	9924	4542
8344		8981	9924	4542
8343		8978	9923	4541
8342		8978	9923	4541
8342		8976	9923	4541
8341		8976	9923	4541
8340		8975	9923	4541
8340		8975	9922	4541
8340		8975	9922	4541
8340		8974	9922	4541
8340		8973	9922	4541
8339		8973	9922	4540
8338		8972	9921	4539
8337		8971	9921	4539
8337		8971	9921	4538
8336		8971	9921	4538
8334		8969	9920	4538
8332		8968	9920	4538
8332		8967	9919	4538
8332		8967	9919	4538
8332		8967	9919	4537
8331		8966	9919	4537
8330		8966	9918	4537
8329		8966	9917	4537
8327		8964	9917	4537

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8327		8963	9917	4536
8326		8962	9917	4536
8326		8961	9917	4536
8325		8961	9917	4536
8325		8961	9916	4536
8325		8960	9916	4536
8324		8958	9916	4536
8323		8956	9916	4536
8323		8955	9915	4535
8323		8953	9915	4535
8323		8953	9915	4535
8322		8953	9915	4534
8322		8952	9914	4534
8321		8952	9914	4534
8320		8951	9914	4534
8320		8949	9914	4534
8319		8948	9914	4533
8319		8946	9914	4533
8318		8946	9914	4533
8317		8945	9913	4533
8316		8945	9913	4533
8315		8945	9913	4533
8315		8943	9913	4532
8315		8943	9912	4532
8314		8943	9912	4532
8313		8940	9911	4531
8312		8939	9911	4531
8310		8938	9911	4531
8310		8938	9910	4530
8309		8938	9909	4530
8309		8936	9908	4530
8308		8936	9908	4530
8308		8934	9908	4530
8307		8932	9907	4530

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8306		8930	9907	4529
8306		8930	9907	4529
8305		8930	9906	4529
8304		8928	9905	4528
8303		8927	9905	4528
8302		8927	9905	4528
8301		8926	9905	4528
8301		8925	9903	4528
8299		8925	9903	4528
8299		8924	9903	4527
8297		8920	9903	4527
8296		8919	9903	4527
8295		8919	9901	4527
8294		8915	9901	4527
8293		8913	9899	4527
8292		8913	9899	4526
8292		8912	9898	4526
8291		8912	9898	4525
8290		8910	9898	4525
8288		8910	9898	4525
8287		8910	9897	4524
8287		8908	9897	4524
8287		8908	9897	4524
8286		8907	9897	4524
8286		8906	9896	4524
8285		8906	9896	4524
8284		8904	9896	4523
8284		8904	9896	4523
8283		8904	9896	4523
8283		8904	9896	4523
8283		8901	9895	4523
8282		8901	9895	4523
8282		8901	9894	4522
8282		8900	9894	4522

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8281		8899	9894	4522
8280		8899	9894	4522
8279		8899	9893	4522
8277		8898	9893	4521
8276		8898	9892	4521
8276		8898	9892	4521
8274		8895	9890	4521
8274		8894	9890	4521
8271		8894	9890	4521
8270		8894	9888	4519
8270		8893	9888	4519
8269		8893	9888	4519
8269		8893	9887	4519
8268		8893	9886	4518
8267		8893	9886	4518
8267		8892	9886	4517
8266		8891	9886	4517
8265		8889	9886	4517
8265		8887	9886	4517
8264		8887	9886	4517
8263		8886	9885	4517
8262		8885	9884	4517
8262		8885	9884	4517
8262		8883	9883	4517
8262		8882	9883	4517
8260		8880	9883	4516
8258		8880	9882	4516
8257		8880	9882	4516
8257		8880	9881	4516
8255		8877	9881	4515
8255		8877	9881	4515
8255		8876	9881	4515
8255		8875	9881	4515
8254		8872	9881	4515

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8254		8870	9880	4514
8252		8868	9879	4514
8251		8863	9879	4514
8251		8863	9878	4514
8250		8861	9878	4514
8250		8861	9878	4514
8249		8860	9878	4514
8248		8859	9878	4514
8247		8856	9878	4514
8247		8855	9878	4513
8247		8854	9877	4513
8247		8853	9877	4513
8246		8853	9874	4513
8244		8853	9873	4513
8240		8852	9873	4512
8240		8852	9873	4512
8240		8851	9873	4512
8239		8851	9873	4512
8239		8850	9873	4512
8238		8850	9873	4512
8238		8849	9873	4511
8237		8848	9873	4511
8235		8848	9872	4511
8235		8847	9872	4511
8235		8846	9872	4510
8234		8846	9872	4510
8233		8845	9871	4510
8233		8845	9870	4510
8233		8843	9870	4509
8231		8843	9870	4509
8230		8843	9870	4509
8230		8843	9870	4508
8229		8843	9870	4508
8229		8842	9869	4508

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8228		8841	9869	4508
8226		8840	9869	4507
8225		8840	9868	4506
8223		8837	9868	4506
8220		8837	9867	4506
8219		8837	9867	4506
8218		8834	9867	4506
8218		8834	9866	4506
8217		8831	9866	4506
8216		8831	9866	4506
8215		8831	9866	4506
8215		8830	9865	4505
8214		8829	9865	4505
8213		8829	9864	4505
8212		8828	9863	4504
8212		8828	9862	4504
8212		8828	9862	4504
8210		8826	9862	4504
8209		8826	9861	4503
8209		8825	9861	4503
8209		8824	9860	4503
8208		8822	9860	4503
8208		8822	9859	4503
8207		8820	9858	4503
8207		8820	9858	4503
8206		8820	9858	4502
8205		8820	9858	4501
8205		8820	9857	4501
8205		8817	9857	4500
8204		8816	9856	4500
8204		8815	9856	4500
8204		8814	9856	4500
8204		8814	9855	4500
8203		8814	9853	4500

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8203		8814	9852	4499
8201		8813	9852	4499
8200		8812	9852	4499
8199		8811	9851	4499
8197		8810	9851	4499
8197		8810	9851	4499
8196		8809	9851	4499
8196		8808	9851	4498
8193		8808	9851	4498
8193		8808	9851	4498
8193		8806	9851	4498
8193		8805	9851	4498
8193		8803	9851	4497
8193		8800	9850	4497
8192		8799	9850	4497
8191		8799	9850	4497
8191		8798	9850	4496
8189		8797	9850	4496
8189		8796	9850	4496
8189		8795	9849	4496
8188		8794	9849	4495
8188		8794	9849	4495
8187		8794	9849	4494
8187		8793	9848	4494
8186		8793	9848	4494
8186		8793	9848	4494
8186		8790	9847	4494
8186		8788	9847	4494
8185		8786	9846	4493
8184		8786	9846	4493
8184		8785	9845	4493
8184		8782	9845	4493
8184		8782	9845	4492
8182		8780	9844	4492

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8182		8780	9844	4492
8181		8779	9844	4492
8181		8778	9844	4491
8180		8777	9843	4490
8178		8777	9843	4490
8178		8776	9843	4490
8178		8775	9841	4489
8177		8774	9840	4489
8177		8773	9840	4489
8177		8772	9840	4489
8176		8772	9840	4489
8175		8771	9839	4488
8174		8771	9839	4488
8173		8770	9839	4488
8172		8769	9838	4488
8171		8769	9838	4487
8171		8766	9838	4487
8171		8766	9838	4487
8169		8765	9837	4487
8169		8764	9837	4487
8167		8763	9837	4486
8167		8761	9836	4486
8167		8760	9836	4486
8167		8759	9836	4485
8166		8759	9836	4485
8165		8757	9835	4485
8165		8756	9833	4485
8165		8756	9833	4485
8164		8756	9833	4485
8164		8754	9833	4484
8162		8754	9832	4484
8160		8753	9832	4484
8160		8753	9832	4484
8158		8752	9832	4483

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8157		8752	9832	4483
8156		8752	9832	4483
8156		8751	9832	4483
8155		8747	9832	4483
8154		8747	9832	4482
8153		8746	9831	4482
8152		8745	9831	4482
8150		8745	9831	4482
8149		8745	9831	4481
8148		8745	9831	4481
8146		8743	9830	4481
8146		8743	9830	4481
8145		8741	9830	4481
8144		8740	9830	4481
8143		8739	9830	4479
8141		8739	9829	4479
8141		8738	9829	4478
8139		8738	9829	4478
8139		8737	9828	4478
8138		8736	9828	4478
8138		8736	9828	4477
8137		8735	9827	4477
8137		8734	9826	4477
8137		8734	9826	4477
8135		8733	9825	4477
8135		8733	9825	4476
8134		8733	9825	4476
8134		8730	9824	4476
8132		8729	9824	4476
8131		8729	9822	4476
8131		8728	9822	4475
8130		8728	9822	4475
8130		8727	9822	4475
8127		8726	9822	4475

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8126		8725	9821	4475
8126		8725	9821	4474
8126		8724	9821	4474
8126		8723	9821	4474
8126		8722	9821	4474
8124		8722	9820	4474
8122		8722	9820	4474
8122		8721	9819	4474
8121		8719	9819	4473
8121		8718	9817	4473
8121		8717	9817	4473
8121		8717	9817	4472
8118		8717	9817	4472
8118		8716	9817	4472
8118		8716	9816	4472
8118		8715	9816	4472
8116		8715	9814	4472
8115		8715	9814	4471
8115		8713	9813	4471
8114		8713	9813	4471
8113		8712	9812	4471
8112		8711	9812	4471
8112		8711	9811	4471
8110		8711	9811	4471
8110		8707	9810	4470
8110		8706	9810	4470
8109		8704	9810	4470
8109		8704	9809	4470
8108		8703	9809	4470
8107		8703	9809	4470
8105		8703	9809	4470
8105		8702	9809	4470
8105		8702	9809	4470
8103		8702	9808	4470

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8102		8701	9808	4470
8101		8700	9808	4469
8101		8700	9808	4469
8101		8699	9808	4469
8101		8699	9807	4469
8101		8699	9807	4469
8100		8698	9806	4468
8100		8698	9806	4468
8099		8698	9805	4468
8099		8697	9805	4467
8099		8697	9804	4467
8098		8693	9804	4467
8098		8693	9803	4467
8097		8692	9803	4467
8097		8692	9803	4467
8097		8691	9803	4467
8096		8689	9802	4466
8094		8689	9802	4466
8094		8688	9802	4466
8094		8688	9801	4465
8093		8688	9801	4465
8093		8688	9800	4464
8093		8688	9800	4464
8093		8685	9800	4464
8091		8685	9800	4464
8091		8683	9800	4464
8091		8682	9799	4464
8090		8679	9799	4464
8089		8679	9799	4464
8088		8678	9798	4464
8088		8677	9798	4464
8087		8675	9798	4463
8087		8675	9796	4463
8087		8671	9796	4463

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8087		8670	9796	4463
8086		8670	9796	4463
8086		8670	9795	4463
8085		8670	9795	4463
8085		8670	9795	4463
8085		8668	9795	4463
8083		8667	9794	4463
8083		8666	9794	4462
8082		8665	9794	4462
8081		8664	9794	4462
8080		8664	9793	4461
8080		8663	9793	4461
8079		8662	9791	4461
8077		8661	9791	4461
8077		8661	9790	4461
8077		8660	9790	4461
8075		8660	9790	4460
8075		8658	9790	4460
8074		8658	9789	4460
8073		8657	9789	4459
8073		8657	9788	4459
8071		8654	9788	4459
8071		8654	9787	4459
8071		8653	9787	4459
8069		8651	9787	4459
8069		8650	9787	4459
8069		8650	9786	4459
8069		8650	9786	4459
8068		8650	9786	4458
8068		8648	9785	4458
8068		8647	9785	4458
8068		8647	9784	4458
8067		8647	9784	4458
8066		8645	9784	4458

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8066		8644	9784	4458
8065		8644	9783	4457
8064		8640	9783	4456
8064		8639	9781	4456
8064		8639	9781	4456
8064		8638	9780	4456
8063		8637	9780	4455
8062		8636	9780	4455
8062		8635	9780	4455
8061		8633	9780	4454
8059		8633	9779	4454
8059		8632	9779	4454
8058		8630	9778	4453
8058		8628	9778	4453
8058		8628	9778	4453
8057		8626	9778	4452
8057		8626	9778	4452
8057		8626	9778	4452
8056		8626	9778	4452
8055		8625	9777	4452
8054		8624	9777	4452
8054		8623	9776	4452
8054		8623	9775	4452
8054		8623	9775	4451
8054		8621	9775	4451
8051		8621	9775	4451
8050		8620	9775	4450
8050		8619	9774	4450
8049		8619	9773	4450
8048		8617	9773	4449
8046		8617	9773	4449
8045		8614	9773	4449
8045		8613	9772	4448
8045		8613	9772	4447

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8044		8613	9771	4447
8044		8612	9771	4447
8040		8610	9771	4447
8040		8607	9771	4446
8038		8606	9771	4446
8038		8606	9770	4446
8038		8603	9770	4446
8038		8603	9770	4445
8038		8602	9770	4444
8037		8602	9770	4443
8035		8600	9769	4443
8034		8600	9769	4443
8034		8599	9769	4443
8033		8598	9769	4442
8032		8597	9768	4442
8032		8597	9768	4442
8032		8596	9768	4441
8031		8594	9768	4441
8031		8593	9767	4440
8031		8593	9767	4440
8030		8592	9766	4440
8029		8591	9766	4440
8029		8589	9766	4440
8028		8588	9765	4440
8028		8588	9765	4440
8027		8588	9765	4440
8026		8588	9765	4440
8026		8587	9764	4439
8024		8586	9764	4439
8023		8586	9764	4439
8022		8584	9764	4439
8022		8582	9764	4438
8020		8582	9763	4437
8020		8581	9762	4437

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
8019		8580	9761	4437
8019		8579	9760	4437
8019		8579	9760	4437
8018		8579	9760	4437
8017		8577	9759	4437
8017		8575	9759	4437
8016		8575	9759	4436
8016		8574	9759	4436
8015		8574	9758	4436
8014		8573	9758	4436
8014		8571	9758	4436
8013		8570	9758	4435
8010		8569	9757	4435
8009		8566	9757	4435
8007		8565	9757	4434
8006		8564	9757	4434
8006		8564	9756	4434
8005		8563	9754	4433
8004		8561	9754	4433
8004		8559	9753	4433
8004		8558	9753	4433
8004		8557	9752	4433
8003		8557	9751	4433
8002		8557	9750	4432
8002		8556	9750	4432
8001		8556	9750	4432
8001		8554	9750	4432
8001		8554	9749	4432
8000		8553	9749	4431
7999		8553	9749	4430
7998		8553	9749	4430
7998		8552	9748	4430
7998		8551	9746	4430
7998		8548	9746	4429

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7998		8547	9746	4429
7997		8547	9746	4429
7997		8546	9745	4429
7997		8545	9745	4429
7996		8545	9745	4429
7995		8544	9744	4428
7995		8542	9744	4428
7995		8540	9744	4428
7995		8539	9744	4427
7994		8539	9744	4427
7994		8539	9743	4427
7993		8538	9743	4427
7993		8538	9743	4427
7993		8537	9742	4426
7992		8537	9742	4426
7991		8535	9741	4426
7990		8535	9741	4425
7988		8534	9741	4425
7987		8533	9740	4425
7987		8533	9739	4425
7987		8531	9739	4425
7985		8527	9738	4425
7984		8527	9738	4425
7984		8526	9738	4425
7984		8525	9738	4424
7984		8525	9738	4424
7984		8524	9737	4424
7984		8523	9737	4423
7984		8523	9735	4423
7984		8523	9735	4422
7984		8522	9735	4422
7983		8520	9735	4422
7983		8519	9734	4421
7982		8519	9734	4421

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7982		8518	9734	4420
7982		8517	9733	4420
7980		8517	9733	4420
7980		8516	9733	4420
7979		8514	9732	4419
7978		8514	9732	4419
7977		8513	9732	4419
7976		8512	9731	4418
7976		8510	9731	4417
7976		8508	9730	4417
7976		8508	9729	4417
7976		8507	9729	4417
7976		8506	9728	4417
7973		8504	9727	4417
7973		8504	9726	4417
7972		8504	9726	4417
7971		8504	9725	4417
7971		8503	9725	4417
7969		8503	9725	4416
7968		8502	9724	4416
7968		8501	9723	4416
7968		8498	9723	4415
7967		8497	9723	4415
7965		8496	9723	4415
7964		8494	9723	4415
7964		8494	9722	4415
7963		8494	9722	4414
7963		8493	9722	4414
7961		8492	9720	4413
7961		8490	9720	4413
7961		8490	9720	4413
7959		8488	9719	4412
7959		8486	9719	4412
7959		8486	9718	4412

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7957		8486	9718	4412
7957		8485	9718	4412
7957		8485	9717	4412
7956		8482	9717	4411
7956		8480	9717	4410
7956		8479	9716	4410
7956		8478	9716	4410
7953		8478	9716	4409
7953		8477	9715	4409
7952		8476	9715	4409
7951		8476	9715	4409
7950		8476	9714	4408
7950		8475	9714	4408
7950		8475	9714	4408
7950		8474	9714	4408
7949		8474	9714	4408
7949		8474	9713	4407
7949		8471	9713	4407
7948		8470	9713	4407
7947		8470	9713	4406
7945		8469	9713	4405
7945		8468	9712	4405
7945		8468	9712	4405
7944		8465	9712	4405
7944		8465	9711	4405
7944		8464	9711	4405
7943		8463	9710	4405
7943		8462	9710	4404
7942		8462	9709	4403
7941		8461	9709	4403
7940		8460	9709	4403
7940		8459	9708	4403
7940		8459	9708	4402
7940		8459	9708	4402

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7940		8456	9708	4402
7938		8455	9707	4402
7938		8455	9707	4402
7937		8453	9707	4402
7935		8453	9707	4402
7935		8452	9707	4402
7934		8451	9706	4402
7933		8450	9706	4402
7933		8449	9705	4401
7933		8449	9704	4401
7933		8448	9704	4401
7932		8448	9703	4401
7930		8448	9703	4401
7929		8448	9702	4401
7929		8447	9702	4400
7928		8447	9702	4400
7928		8446	9701	4400
7928		8443	9701	4400
7926		8443	9701	4399
7925		8443	9701	4399
7924		8441	9701	4399
7924		8440	9701	4398
7923		8440	9700	4398
7923		8437	9700	4398
7923		8435	9699	4398
7923		8435	9699	4398
7922		8434	9699	4398
7922		8433	9699	4398
7922		8432	9697	4398
7922		8431	9697	4398
7921		8430	9696	4398
7921		8430	9696	4397
7921		8429	9696	4397
7920		8429	9696	4396

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7920		8429	9695	4396
7920		8428	9695	4396
7918		8428	9695	4395
7918		8428	9695	4395
7917		8427	9694	4395
7917		8426	9693	4395
7917		8426	9693	4395
7917		8424	9693	4395
7917		8423	9693	4394
7916		8422	9693	4394
7916		8421	9693	4394
7915		8421	9692	4394
7914		8420	9692	4394
7914		8420	9691	4394
7913		8419	9691	4393
7913		8419	9691	4393
7912		8417	9691	4392
7911		8415	9690	4392
7911		8415	9690	4392
7910		8415	9690	4391
7910		8414	9690	4390
7910		8412	9689	4390
7909		8412	9689	4390
7908		8412	9689	4390
7906		8412	9689	4389
7905		8411	9689	4389
7904		8411	9688	4389
7904		8410	9688	4389
7902		8410	9688	4388
7901		8409	9687	4388
7901		8408	9687	4387
7901		8408	9687	4387
7901		8407	9687	4387
7900		8407	9687	4387

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7900		8407	9687	4387
7899		8407	9687	4387
7899		8405	9686	4387
7899		8405	9686	4387
7898		8403	9685	4386
7898		8403	9685	4386
7897		8402	9685	4386
7897		8402	9684	4386
7896		8400	9683	4386
7895		8400	9682	4386
7895		8400	9682	4386
7894		8399	9681	4385
7893		8398	9681	4385
7892		8398	9681	4385
7892		8396	9680	4385
7891		8396	9680	4385
7891		8396	9680	4384
7890		8396	9680	4384
7890		8395	9680	4384
7890		8395	9679	4384
7889		8394	9678	4383
7889		8394	9678	4383
7889		8392	9678	4383
7889		8392	9678	4383
7888		8391	9678	4383
7888		8391	9677	4383
7887		8390	9677	4383
7887		8389	9677	4382
7887		8387	9677	4382
7885		8387	9676	4382
7885		8385	9675	4381
7884		8385	9675	4381
7883		8385	9675	4381
7881		8384	9675	4381

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7880		8384	9674	4381
7880		8384	9674	4381
7879		8384	9674	4380
7878		8384	9673	4380
7878		8383	9673	4380
7878		8383	9673	4380
7877		8382	9673	4379
7877		8379	9672	4379
7877		8379	9672	4378
7876		8378	9672	4378
7875		8377	9671	4378
7875		8377	9671	4378
7874		8377	9670	4378
7873		8377	9670	4377
7872		8375	9669	4376
7872		8374	9669	4376
7872		8374	9668	4376
7872		8372	9668	4376
7871		8372	9668	4376
7871		8372	9667	4376
7871		8369	9666	4376
7871		8369	9665	4376
7871		8368	9664	4376
7870		8366	9664	4376
7867		8366	9664	4376
7867		8365	9663	4376
7867		8365	9662	4375
7867		8363	9661	4375
7867		8363	9661	4375
7866		8362	9661	4374
7866		8362	9660	4374
7866		8361	9660	4374
7864		8361	9660	4373
7863		8359	9660	4373

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7863		8358	9659	4373
7862		8358	9659	4373
7862		8358	9658	4373
7862		8357	9658	4373
7862		8357	9658	4373
7861		8356	9658	4372
7861		8355	9658	4372
7861		8355	9657	4372
7859		8355	9656	4372
7859		8354	9656	4372
7858		8354	9655	4372
7857		8353	9655	4371
7857		8353	9654	4371
7856		8353	9654	4371
7856		8352	9653	4370
7856		8351	9652	4370
7855		8350	9652	4370
7855		8350	9652	4370
7854		8350	9652	4370
7851		8348	9652	4369
7851		8347	9652	4369
7850		8347	9651	4368
7848		8347	9651	4368
7847		8346	9651	4368
7846		8345	9651	4368
7846		8344	9651	4368
7845		8343	9650	4368
7845		8343	9650	4368
7844		8343	9650	4368
7843		8343	9649	4368
7843		8342	9649	4367
7842		8342	9649	4367
7842		8342	9648	4366
7841		8341	9648	4365

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7841		8341	9648	4365
7841		8340	9648	4365
7840		8339	9648	4365
7840		8338	9648	4365
7840		8337	9647	4365
7839		8336	9647	4365
7839		8334	9646	4364
7838		8333	9646	4363
7838		8332	9645	4363
7838		8331	9645	4363
7837		8329	9643	4363
7836		8328	9643	4363
7835		8327	9643	4363
7835		8327	9642	4363
7835		8327	9642	4362
7834		8327	9642	4362
7833		8326	9642	4361
7832		8326	9642	4361
7831		8326	9640	4360
7831		8325	9639	4359
7830		8325	9639	4359
7830		8325	9638	4359
7828		8324	9638	4358
7826		8322	9638	4358
7825		8320	9638	4358
7825		8320	9637	4358
7824		8319	9637	4358
7824		8318	9637	4358
7823		8317	9637	4357
7823		8317	9637	4357
7822		8317	9637	4357
7822		8316	9637	4357
7822		8314	9637	4357
7821		8314	9636	4357

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7821		8313	9636	4355
7821		8312	9636	4354
7821		8312	9636	4353
7821		8311	9636	4353
7820		8310	9635	4353
7820		8308	9635	4353
7820		8308	9635	4352
7820		8308	9634	4352
7819		8307	9634	4352
7819		8305	9634	4352
7818		8305	9634	4351
7818		8304	9633	4351
7817		8304	9633	4350
7817		8303	9633	4350
7816		8302	9633	4350
7815		8302	9633	4350
7815		8301	9632	4350
7815		8300	9631	4350
7814		8300	9631	4350
7813		8297	9631	4350
7813		8297	9630	4349
7813		8296	9629	4349
7812		8296	9628	4349
7811		8296	9628	4348
7810		8295	9627	4348
7809		8294	9627	4348
7808		8293	9627	4347
7808		8293	9626	4347
7806		8292	9626	4346
7806		8290	9626	4346
7806		8290	9625	4346
7804		8290	9625	4346
7804		8290	9625	4346
7803		8288	9625	4346

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7803		8287	9625	4345
7803		8287	9624	4345
7803		8286	9624	4344
7802		8284	9624	4344
7802		8282	9623	4344
7802		8282	9623	4343
7801		8282	9622	4343
7800		8281	9622	4342
7799		8281	9622	4342
7799		8280	9622	4342
7796		8280	9621	4342
7796		8279	9621	4342
7795		8278	9621	4341
7795		8278	9621	4341
7794		8278	9618	4341
7794		8275	9618	4341
7794		8275	9617	4340
7793		8275	9617	4340
7793		8274	9617	4340
7793		8273	9617	4340
7792		8272	9616	4339
7792		8271	9616	4338
7792		8271	9616	4338
7791		8270	9614	4338
7791		8270	9613	4338
7790		8270	9613	4338
7790		8269	9612	4338
7790		8269	9612	4338
7790		8269	9611	4337
7789		8269	9611	4337
7789		8267	9610	4337
7789		8267	9610	4337
7788		8267	9610	4337
7788		8266	9609	4337

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7788		8264	9609	4336
7788		8264	9609	4335
7785		8263	9609	4335
7784		8262	9608	4335
7784		8262	9608	4335
7783		8262	9607	4334
7783		8262	9606	4334
7783		8262	9606	4333
7783		8261	9606	4333
7783		8261	9605	4332
7782		8260	9605	4332
7782		8258	9604	4332
7781		8257	9603	4331
7781		8257	9603	4331
7780		8257	9602	4331
7779		8256	9602	4331
7779		8256	9602	4330
7777		8255	9602	4330
7776		8254	9602	4330
7775		8251	9601	4330
7775		8250	9600	4329
7775		8249	9600	4329
7774		8248	9599	4328
7773		8247	9599	4328
7773		8247	9598	4328
7773		8247	9598	4328
7773		8247	9597	4327
7772		8247	9596	4327
7772		8247	9596	4326
7772		8245	9596	4326
7771		8245	9596	4326
7770		8244	9596	4326
7770		8242	9595	4326
7770		8240	9595	4326

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7769		8239	9595	4325
7769		8238	9595	4325
7768		8238	9593	4324
7767		8236	9593	4323
7766		8236	9593	4323
7766		8236	9593	4323
7766		8235	9593	4323
7766		8235	9592	4323
7765		8235	9592	4323
7765		8234	9591	4323
7764		8234	9591	4323
7764		8233	9591	4322
7763		8233	9590	4322
7762		8233	9590	4322
7761		8233	9589	4322
7761		8232	9589	4322
7760		8232	9589	4321
7760		8231	9589	4321
7760		8231	9588	4320
7758		8231	9588	4320
7755		8231	9587	4320
7754		8230	9587	4319
7753		8229	9587	4319
7751		8229	9587	4319
7751		8229	9586	4318
7750		8228	9586	4318
7749		8227	9586	4317
7748		8227	9586	4317
7748		8227	9585	4316
7747		8226	9585	4316
7746		8226	9585	4316
7746		8225	9584	4315
7745		8225	9583	4315
7745		8224	9583	4315

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7744		8224	9583	4314
7744		8223	9583	4314
7742		8222	9583	4313
7742		8222	9583	4313
7741		8221	9582	4312
7741		8221	9582	4312
7740		8221	9582	4311
7740		8220	9582	4311
7738		8220	9582	4311
7738		8219	9582	4311
7736		8218	9581	4311
7736		8217	9581	4311
7736		8216	9581	4311
7735		8216	9580	4311
7733		8215	9580	4310
7732		8214	9580	4310
7732		8214	9580	4310
7732		8213	9579	4309
7731		8212	9579	4309
7730		8212	9578	4308
7730		8210	9578	4308
7730		8210	9578	4306
7729		8210	9578	4306
7729		8209	9577	4306
7728		8208	9577	4306
7728		8208	9577	4306
7727		8207	9576	4305
7727		8207	9575	4305
7726		8206	9574	4305
7726		8206	9574	4305
7725		8205	9573	4304
7724		8205	9572	4304
7724		8204	9572	4303
7724		8203	9572	4303

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7723		8203	9572	4303
7721		8203	9572	4302
7720		8202	9571	4302
7718		8201	9571	4302
7718		8201	9570	4302
7718		8201	9570	4301
7718		8197	9570	4301
7718		8197	9569	4301
7717		8197	9569	4301
7716		8195	9569	4300
7716		8193	9569	4300
7715		8193	9568	4299
7714		8192	9568	4299
7713		8192	9568	4299
7713		8192	9567	4298
7713		8191	9567	4298
7712		8189	9566	4298
7711		8189	9566	4298
7708		8189	9565	4298
7708		8189	9564	4297
7708		8189	9564	4297
7708		8188	9562	4297
7708		8187	9561	4297
7707		8187	9560	4297
7707		8186	9560	4297
7707		8186	9560	4297
7706		8186	9559	4297
7706		8185	9559	4297
7706		8184	9559	4297
7705		8181	9559	4296
7705		8181	9559	4295
7705		8179	9558	4295
7703		8178	9558	4295
7703		8178	9557	4295

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7703		8177	9557	4295
7703		8176	9557	4294
7702		8176	9557	4294
7702		8176	9557	4294
7701		8176	9556	4293
7701		8175	9555	4293
7700		8175	9555	4293
7700		8175	9554	4293
7700		8175	9554	4293
7699		8175	9553	4292
7699		8174	9553	4292
7698		8173	9553	4292
7695		8172	9552	4292
7695		8172	9552	4292
7695		8171	9552	4292
7694		8171	9552	4292
7694		8171	9551	4291
7693		8171	9550	4291
7693		8170	9550	4291
7692		8170	9549	4291
7691		8170	9549	4290
7691		8169	9549	4290
7691		8168	9549	4290
7690		8168	9548	4290
7689		8168	9547	4290
7688		8168	9547	4289
7688		8168	9547	4289
7687		8167	9547	4288
7687		8167	9546	4288
7687		8167	9546	4288
7686		8166	9546	4288
7685		8166	9546	4287
7685		8164	9544	4287
7684		8164	9544	4287

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7683		8164	9544	4287
7682		8164	9544	4287
7682		8163	9543	4287
7681		8163	9543	4286
7681		8163	9542	4286
7679		8160	9542	4286
7678		8160	9542	4285
7677		8159	9541	4285
7677		8159	9541	4285
7677		8157	9540	4285
7676		8157	9539	4284
7676		8155	9539	4284
7675		8155	9538	4284
7675		8155	9538	4284
7674		8154	9538	4283
7674		8154	9537	4283
7674		8153	9537	4283
7674		8153	9537	4283
7672		8153	9537	4283
7672		8152	9537	4282
7672		8152	9537	4282
7670		8151	9537	4282
7669		8151	9537	4281
7668		8149	9536	4281
7668		8149	9536	4281
7668		8149	9536	4280
7667		8148	9536	4279
7667		8148	9536	4279
7666		8147	9535	4279
7666		8146	9535	4279
7666		8144	9534	4279
7666		8143	9534	4278
7666		8143	9534	4278
7666		8143	9534	4278

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7665		8142	9534	4278
7665		8141	9532	4277
7665		8140	9532	4277
7665		8138	9532	4277
7664		8137	9532	4277
7664		8136	9532	4277
7663		8135	9532	4277
7662		8135	9531	4275
7662		8135	9531	4275
7662		8134	9531	4275
7662		8134	9530	4275
7661		8134	9530	4275
7661		8133	9530	4275
7661		8133	9530	4275
7661		8133	9530	4275
7661		8132	9529	4275
7661		8132	9529	4274
7660		8130	9529	4274
7660		8130	9528	4273
7659		8130	9528	4273
7659		8127	9528	4273
7657		8126	9528	4273
7657		8126	9528	4272
7657		8126	9528	4272
7656		8126	9528	4271
7656		8126	9528	4270
7655		8125	9527	4270
7654		8125	9527	4270
7653		8125	9527	4270
7653		8124	9527	4270
7653		8124	9527	4269
7653		8124	9527	4269
7652		8123	9526	4267
7650		8123	9526	4267

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7649		8123	9526	4266
7647		8123	9525	4266
7647		8123	9525	4266
7647		8122	9524	4266
7646		8121	9524	4266
7646		8121	9523	4265
7646		8121	9523	4265
7646		8120	9523	4265
7646		8120	9522	4265
7645		8120	9522	4264
7644		8119	9521	4264
7644		8119	9521	4263
7644		8118	9520	4263
7640		8118	9520	4263
7639		8118	9520	4263
7639		8117	9519	4262
7638		8116	9519	4262
7638		8114	9518	4261
7638		8114	9517	4261
7638		8113	9517	4261
7638		8113	9516	4260
7637		8112	9516	4260
7635		8112	9516	4259
7635		8112	9516	4259
7635		8112	9516	4259
7634		8112	9515	4258
7634		8111	9515	4257
7633		8111	9515	4257
7633		8111	9515	4257
7633		8111	9515	4257
7632		8111	9515	4256
7632		8110	9514	4256
7631		8109	9514	4256
7631		8108	9513	4256

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7631		8107	9513	4256
7631		8107	9512	4255
7630		8106	9512	4255
7630		8106	9511	4255
7629		8104	9510	4254
7628		8103	9510	4254
7628		8103	9508	4254
7627		8102	9507	4253
7627		8101	9507	4253
7627		8101	9506	4253
7626		8100	9506	4253
7626		8100	9505	4253
7625		8099	9503	4253
7624		8099	9503	4253
7623		8099	9502	4252
7622		8099	9502	4252
7622		8098	9502	4252
7621		8097	9501	4252
7621		8097	9501	4251
7620		8096	9501	4251
7620		8096	9500	4251
7619		8096	9500	4251
7619		8095	9500	4250
7619		8095	9499	4250
7619		8095	9498	4249
7618		8094	9496	4249
7618		8094	9496	4249
7617		8093	9496	4248
7616		8093	9496	4248
7615		8093	9496	4248
7615		8093	9495	4248
7615		8092	9495	4247
7612		8092	9495	4247
7612		8092	9495	4247

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7611		8091	9494	4247
7611		8091	9493	4246
7610		8091	9493	4246
7610		8090	9492	4245
7610		8088	9490	4245
7610		8087	9490	4245
7609		8085	9489	4245
7609		8085	9489	4245
7609		8085	9488	4245
7608		8084	9486	4245
7608		8083	9485	4244
7607		8083	9485	4244
7606		8082	9485	4244
7606		8081	9485	4243
7606		8081	9485	4243
7605		8081	9484	4242
7605		8079	9484	4242
7605		8078	9484	4242
7605		8077	9484	4242
7605		8077	9483	4242
7604		8077	9483	4242
7604		8074	9483	4242
7604		8074	9483	4241
7603		8074	9483	4240
7602		8073	9483	4240
7601		8073	9482	4240
7601		8073	9481	4239
7601		8072	9481	4239
7601		8072	9481	4239
7601		8071	9480	4238
7600		8071	9480	4238
7599		8070	9480	4237
7598		8070	9480	4237
7598		8069	9479	4237

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7596		8068	9479	4237
7596		8067	9479	4237
7596		8066	9478	4237
7595		8065	9477	4237
7595		8065	9477	4236
7595		8065	9476	4236
7594		8062	9476	4236
7594		8062	9476	4236
7590		8062	9476	4235
7590		8062	9476	4235
7589		8061	9475	4234
7589		8060	9475	4234
7589		8060	9475	4234
7589		8060	9475	4234
7589		8060	9474	4234
7589		8060	9473	4234
7587		8059	9473	4233
7587		8059	9472	4233
7585		8058	9471	4233
7585		8058	9471	4231
7585		8056	9471	4231
7585		8056	9471	4231
7584		8056	9471	4230
7584		8055	9471	4230
7584		8054	9470	4230
7584		8054	9469	4229
7583		8054	9469	4229
7583		8053	9469	4228
7582		8053	9469	4228
7582		8053	9469	4228
7582		8053	9468	4228
7581		8051	9468	4228
7580		8051	9468	4227
7580		8051	9467	4227

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7580		8051	9466	4227
7579		8050	9465	4227
7579		8050	9465	4226
7579		8050	9465	4226
7578		8050	9465	4226
7578		8050	9465	4226
7578		8049	9464	4226
7578		8049	9464	4226
7577		8049	9464	4226
7577		8049	9463	4226
7577		8047	9463	4225
7577		8046	9462	4225
7575		8046	9461	4225
7575		8045	9461	4225
7574		8045	9461	4225
7573		8045	9461	4224
7573		8045	9460	4223
7573		8043	9460	4223
7573		8042	9459	4222
7572		8041	9459	4222
7571		8041	9458	4222
7570		8040	9458	4221
7570		8040	9457	4221
7570		8039	9457	4221
7569		8039	9457	4221
7569		8038	9455	4220
7569		8038	9455	4220
7568		8037	9455	4220
7568		8036	9455	4219
7567		8035	9454	4219
7566		8034	9453	4219
7566		8034	9453	4218
7566		8034	9452	4218
7566		8033	9450	4218

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7565		8033	9449	4218
7564		8032	9449	4217
7564		8032	9449	4217
7563		8032	9449	4217
7563		8031	9448	4217
7563		8031	9448	4216
7562		8030	9448	4216
7562		8028	9447	4215
7560		8028	9446	4215
7560		8028	9445	4214
7560		8028	9445	4214
7559		8028	9445	4213
7557		8027	9444	4213
7557		8027	9443	4213
7557		8027	9443	4212
7557		8027	9443	4211
7556		8026	9443	4211
7556		8025	9443	4211
7555		8025	9443	4210
7555		8024	9442	4210
7555		8023	9442	4210
7555		8023	9442	4210
7553		8023	9440	4210
7552		8023	9439	4209
7552		8022	9439	4209
7552		8021	9439	4209
7551		8021	9439	4209
7550		8021	9438	4208
7550		8021	9438	4208
7550		8020	9438	4208
7550		8020	9437	4207
7549		8020	9437	4207
7549		8020	9437	4207
7549		8018	9436	4207

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7548		8017	9434	4207
7548		8017	9434	4207
7546		8016	9433	4206
7546		8016	9433	4206
7546		8016	9432	4206
7545		8015	9432	4206
7545		8015	9431	4206
7544		8014	9431	4206
7544		8014	9431	4205
7544		8014	9431	4205
7544		8014	9429	4205
7542		8014	9429	4205
7540		8013	9428	4205
7538		8013	9428	4204
7538		8012	9428	4204
7536		8012	9428	4204
7535		8012	9427	4204
7534		8010	9427	4203
7534		8010	9426	4203
7534		8009	9426	4202
7534		8008	9426	4202
7533		8008	9426	4202
7532		8007	9426	4202
7532		8007	9426	4201
7532		8007	9426	4200
7532		8006	9425	4200
7531		8006	9425	4200
7531		8006	9425	4200
7531		8003	9425	4200
7531		8003	9424	4200
7531		8003	9424	4200
7530		8002	9423	4200
7530		8001	9423	4199
7530		8000	9423	4199

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7529		8000	9422	4198
7529		8000	9422	4198
7529		7999	9421	4198
7527		7999	9421	4198
7527		7999	9420	4198
7527		7998	9420	4197
7524		7998	9419	4197
7524		7998	9418	4196
7523		7997	9418	4196
7523		7997	9418	4195
7522		7996	9418	4195
7522		7996	9418	4195
7522		7996	9417	4195
7521		7995	9417	4195
7521		7994	9416	4195
7521		7993	9416	4195
7521		7992	9416	4195
7521		7992	9415	4195
7520		7992	9415	4194
7520		7990	9415	4193
7519		7990	9414	4193
7519		7989	9413	4193
7519		7989	9412	4193
7519		7989	9412	4192
7519		7988	9411	4192
7518		7988	9409	4192
7517		7988	9409	4192
7517		7987	9409	4192
7516		7987	9409	4192
7516		7986	9408	4192
7516		7986	9408	4192
7515		7986	9407	4192
7514		7985	9407	4191
7513		7984	9407	4191

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7512		7984	9405	4190
7511		7984	9405	4190
7511		7983	9404	4190
7510		7983	9404	4189
7509		7982	9403	4188
7507		7982	9403	4188
7507		7982	9402	4188
7507		7982	9402	4188
7507		7982	9402	4188
7506		7979	9402	4188
7506		7978	9402	4188
7504		7978	9401	4187
7503		7978	9400	4187
7503		7977	9400	4187
7503		7976	9400	4187
7502		7976	9398	4187
7501		7974	9398	4186
7501		7973	9397	4186
7501		7972	9397	4186
7501		7972	9397	4186
7500		7972	9397	4185
7499		7972	9396	4185
7499		7972	9396	4185
7498		7971	9395	4185
7498		7971	9395	4185
7498		7971	9395	4185
7497		7970	9394	4184
7494		7970	9394	4183
7494		7970	9394	4183
7494		7969	9394	4183
7493		7968	9394	4183
7492		7967	9394	4182
7492		7967	9393	4182
7492		7967	9393	4182

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7492		7966	9393	4181
7492		7966	9392	4181
7491		7965	9392	4181
7491		7965	9391	4181
7491		7965	9391	4181
7491		7963	9390	4180
7488		7963	9390	4180
7487		7963	9389	4179
7487		7963	9389	4179
7487		7962	9389	4179
7486		7961	9388	4179
7486		7961	9388	4179
7486		7960	9387	4179
7485		7960	9386	4179
7484		7959	9386	4178
7484		7958	9385	4178
7483		7958	9385	4178
7483		7957	9385	4177
7482		7957	9385	4177
7482		7957	9384	4177
7482		7956	9384	4177
7481		7955	9383	4177
7481		7955	9383	4176
7479		7955	9382	4176
7479		7954	9382	4176
7479		7954	9382	4175
7478		7953	9381	4175
7478		7953	9381	4175
7478		7952	9380	4174
7477		7952	9380	4174
7477		7952	9380	4174
7476		7951	9380	4173
7476		7951	9380	4173
7475		7950	9379	4173

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7475		7950	9379	4173
7475		7949	9378	4173
7474		7949	9378	4172
7473		7948	9377	4172
7473		7948	9377	4172
7473		7948	9377	4172
7473		7948	9377	4171
7472		7946	9376	4171
7472		7946	9376	4171
7472		7946	9376	4171
7471		7946	9376	4170
7471		7946	9376	4170
7470		7946	9375	4170
7470		7946	9375	4170
7469		7944	9374	4170
7469		7944	9374	4169
7468		7943	9374	4169
7468		7943	9374	4169
7468		7942	9374	4169
7467		7942	9374	4169
7467		7942	9373	4168
7467		7942	9373	4167
7466		7942	9373	4167
7466		7941	9372	4166
7466		7940	9372	4166
7465		7940	9372	4166
7465		7940	9372	4166
7465		7940	9372	4166
7465		7939	9371	4166
7464		7939	9371	4166
7462		7938	9370	4166
7461		7938	9370	4166
7461		7937	9369	4166
7460		7937	9369	4166

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7459		7937	9369	4165
7459		7936	9369	4165
7457		7935	9369	4165
7457		7933	9368	4164
7456		7932	9368	4164
7455		7931	9368	4164
7455		7929	9368	4163
7455		7929	9368	4163
7455		7929	9367	4163
7454		7928	9367	4163
7454		7928	9367	4163
7452		7928	9367	4163
7452		7927	9365	4162
7451		7925	9365	4162
7451		7925	9365	4162
7451		7925	9363	4161
7451		7925	9363	4161
7451		7925	9363	4160
7450		7924	9363	4160
7448		7924	9363	4160
7448		7923	9362	4159
7447		7923	9362	4159
7447		7923	9362	4159
7446		7923	9362	4159
7446		7922	9361	4159
7445		7921	9361	4159
7445		7921	9360	4159
7444		7921	9360	4159
7443		7921	9358	4159
7443		7920	9357	4158
7443		7920	9357	4158
7442		7920	9357	4158
7440		7919	9357	4158
7440		7919	9357	4158

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7438		7918	9357	4157
7438		7918	9356	4156
7437		7916	9356	4156
7437		7916	9356	4156
7437		7916	9356	4155
7437		7915	9355	4155
7436		7915	9355	4155
7436		7915	9355	4155
7436		7915	9354	4154
7435		7914	9353	4154
7434		7913	9352	4153
7433		7913	9352	4153
7432		7912	9352	4153
7431		7912	9352	4153
7431		7911	9351	4152
7429		7910	9351	4152
7429		7909	9351	4152
7427		7909	9351	4152
7427		7909	9351	4152
7427		7908	9350	4151
7426		7908	9350	4151
7426		7908	9350	4151
7424		7906	9349	4151
7424		7905	9349	4150
7421		7905	9349	4150
7420		7905	9349	4150
7420		7904	9348	4150
7420		7904	9347	4149
7419		7904	9347	4148
7418		7903	9347	4148
7418		7901	9347	4147
7416		7901	9347	4147
7414		7901	9346	4147
7414		7899	9345	4145

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7414		7898	9345	4145
7414		7898	9345	4144
7413		7897	9345	4144
7412		7897	9343	4144
7412		7896	9343	4144
7411		7895	9342	4144
7411		7895	9342	4143
7411		7894	9341	4143
7410		7893	9341	4143
7410		7893	9340	4142
7410		7892	9340	4141
7409		7891	9339	4141
7408		7891	9339	4141
7407		7891	9338	4141
7407		7891	9337	4141
7407		7890	9337	4140
7406		7890	9337	4139
7406		7888	9336	4139
7406		7888	9336	4139
7406		7887	9335	4139
7405		7887	9335	4138
7405		7887	9335	4138
7405		7887	9333	4138
7405		7886	9333	4138
7404		7885	9333	4138
7403		7883	9333	4138
7403		7883	9332	4138
7402		7883	9331	4136
7402		7882	9330	4136
7400		7882	9330	4136
7400		7882	9330	4136
7398		7882	9330	4136
7397		7881	9330	4135
7396		7880	9330	4134

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7396		7880	9330	4134
7394		7879	9329	4134
7394		7878	9329	4134
7394		7877	9328	4133
7394		7877	9328	4133
7394		7877	9328	4133
7393		7877	9327	4133
7392		7876	9326	4133
7392		7876	9326	4132
7392		7875	9326	4132
7391		7875	9325	4132
7391		7874	9325	4131
7390		7873	9324	4131
7389		7873	9323	4131
7389		7872	9322	4131
7389		7872	9322	4131
7389		7871	9322	4130
7387		7871	9321	4130
7387		7871	9321	4130
7387		7871	9321	4130
7386		7871	9320	4130
7386		7870	9320	4130
7385		7870	9320	4129
7384		7870	9319	4129
7384		7869	9319	4128
7384		7869	9318	4128
7383		7868	9318	4127
7382		7868	9317	4127
7382		7867	9317	4127
7382		7867	9316	4125
7382		7867	9316	4125
7381		7867	9316	4125
7381		7866	9315	4125
7381		7866	9314	4124

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7380		7866	9313	4124
7380		7866	9313	4124
7380		7865	9312	4124
7379		7865	9312	4123
7378		7865	9312	4123
7378		7865	9311	4123
7378		7865	9311	4122
7376		7865	9311	4122
7376		7864	9311	4122
7375		7864	9310	4122
7374		7864	9309	4122
7372		7863	9309	4122
7372		7863	9308	4122
7372		7863	9308	4122
7371		7863	9308	4122
7371		7863	9307	4121
7371		7861	9307	4121
7371		7860	9307	4121
7371		7860	9307	4121
7371		7860	9305	4121
7371		7859	9305	4121
7370		7859	9305	4120
7370		7859	9304	4120
7369		7859	9303	4119
7369		7859	9303	4119
7369		7858	9303	4119
7369		7858	9303	4119
7369		7857	9303	4119
7368		7856	9303	4118
7368		7855	9302	4118
7367		7853	9302	4118
7367		7853	9301	4118
7366		7852	9301	4118
7365		7852	9301	4118

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7365		7852	9301	4118
7364		7852	9300	4117
7363		7852	9299	4117
7363		7851	9298	4117
7362		7851	9298	4116
7362		7851	9297	4116
7362		7851	9297	4116
7362		7850	9297	4116
7361		7849	9297	4116
7361		7849	9296	4115
7361		7848	9296	4115
7361		7847	9296	4114
7361		7847	9295	4114
7359		7847	9295	4114
7359		7846	9294	4114
7359		7846	9292	4113
7359		7845	9292	4113
7359		7845	9292	4113
7358		7845	9291	4113
7358		7845	9290	4112
7358		7844	9290	4112
7358		7843	9290	4112
7357		7842	9290	4112
7357		7842	9290	4112
7357		7841	9289	4111
7356		7839	9288	4111
7356		7839	9288	4111
7355		7839	9288	4110
7355		7838	9287	4109
7355		7838	9286	4109
7354		7838	9286	4108
7354		7838	9285	4108
7354		7838	9284	4108
7353		7837	9284	4108

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7352		7837	9283	4108
7351		7836	9281	4108
7351		7836	9281	4108
7351		7836	9281	4107
7351		7835	9281	4106
7351		7835	9280	4106
7351		7835	9280	4106
7350		7835	9280	4106
7350		7835	9280	4106
7349		7835	9279	4105
7348		7834	9279	4105
7348		7834	9278	4105
7347		7833	9278	4105
7347		7833	9278	4104
7346		7833	9277	4104
7345		7833	9277	4103
7345		7830	9277	4103
7345		7830	9276	4103
7345		7830	9276	4103
7344		7829	9276	4103
7344		7829	9276	4102
7343		7829	9276	4102
7342		7828	9275	4102
7342		7828	9274	4102
7342		7827	9274	4102
7341		7827	9274	4102
7338		7827	9274	4102
7337		7827	9273	4101
7337		7827	9273	4101
7336		7827	9273	4101
7336		7826	9272	4100
7335		7826	9272	4100
7334		7826	9272	4099
7333		7826	9272	4099

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7333		7826	9271	4099
7332		7825	9270	4099
7331		7825	9270	4098
7331		7825	9270	4098
7330		7825	9269	4098
7330		7824	9269	4098
7329		7824	9268	4098
7329		7824	9268	4097
7329		7823	9268	4097
7329		7822	9267	4097
7328		7822	9267	4096
7327		7822	9267	4096
7327		7820	9266	4096
7327		7820	9266	4096
7326		7820	9266	4096
7325		7820	9266	4095
7324		7819	9266	4095
7324		7819	9266	4095
7323		7818	9265	4094
7323		7818	9264	4094
7323		7818	9264	4094
7322		7817	9264	4094
7322		7816	9263	4094
7321		7815	9263	4093
7319		7815	9263	4093
7318		7815	9263	4093
7317		7815	9263	4092
7317		7815	9262	4091
7316		7814	9261	4091
7316		7814	9261	4091
7312		7814	9261	4091
7312		7814	9261	4090
7311		7813	9261	4090
7311		7813	9260	4090

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7311		7813	9260	4090
7310		7812	9259	4090
7310		7812	9259	4089
7310		7812	9259	4089
7309		7812	9258	4089
7308		7812	9257	4089
7308		7811	9257	4088
7307		7811	9256	4088
7307		7811	9256	4087
7305		7811	9255	4087
7305		7810	9254	4087
7303		7810	9254	4086
7303		7809	9253	4086
7303		7809	9252	4086
7302		7808	9252	4086
7300		7807	9252	4086
7299		7807	9252	4085
7297		7806	9251	4085
7296		7806	9251	4085
7296		7806	9251	4085
7295		7805	9249	4083
7293		7805	9249	4083
7291		7805	9248	4083
7290		7804	9248	4083
7290		7803	9248	4082
7288		7803	9247	4082
7287		7803	9247	4082
7287		7803	9247	4082
7286		7803	9247	4082
7286		7802	9247	4082
7286		7802	9246	4081
7285		7801	9246	4081
7285		7801	9245	4081
7285		7800	9245	4081

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7285		7800	9245	4080
7282		7799	9244	4080
7282		7799	9242	4079
7282		7798	9240	4079
7281		7797	9240	4079
7281		7797	9239	4079
7280		7797	9239	4078
7279		7797	9238	4078
7278		7796	9238	4077
7278		7796	9238	4076
7278		7796	9238	4076
7278		7796	9237	4076
7277		7796	9236	4076
7276		7796	9236	4076
7275		7796	9236	4075
7275		7795	9235	4075
7274		7795	9235	4075
7273		7795	9235	4075
7273		7794	9235	4074
7272		7794	9235	4072
7272		7792	9234	4072
7272		7792	9234	4072
7272		7791	9234	4072
7271		7790	9233	4072
7271		7790	9233	4072
7271		7789	9232	4072
7270		7789	9232	4071
7270		7788	9232	4071
7270		7788	9232	4071
7269		7787	9229	4070
7268		7787	9229	4070
7268		7787	9228	4070
7267		7786	9228	4070
7266		7786	9227	4070

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7265		7786	9227	4069
7265		7785	9227	4069
7265		7785	9226	4068
7264		7784	9225	4068
7264		7783	9225	4068
7264		7783	9225	4068
7262		7783	9225	4068
7261		7783	9225	4068
7261		7783	9225	4067
7260		7782	9225	4067
7259		7782	9224	4067
7258		7781	9222	4067
7258		7781	9222	4067
7257		7781	9222	4067
7257		7780	9222	4066
7257		7780	9221	4066
7256		7779	9220	4066
7256		7778	9220	4066
7256		7777	9220	4066
7256		7777	9220	4066
7255		7777	9219	4066
7254		7777	9219	4065
7254		7776	9219	4065
7254		7776	9219	4065
7253		7775	9219	4065
7251		7774	9218	4065
7248		7774	9217	4065
7247		7774	9217	4065
7246		7773	9217	4064
7245		7773	9217	4064
7244		7773	9216	4064
7241		7772	9216	4064
7241		7772	9216	4063
7240		7772	9215	4063

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7240		7772	9214	4063
7240		7772	9213	4063
7240		7771	9212	4062
7239		7771	9212	4062
7238		7771	9211	4062
7237		7770	9211	4061
7237		7770	9211	4061
7237		7770	9210	4061
7236		7770	9210	4061
7236		7769	9210	4061
7236		7768	9209	4061
7233		7768	9209	4060
7232		7768	9209	4060
7232		7768	9209	4060
7231		7767	9208	4060
7229		7767	9208	4060
7229		7767	9207	4060
7229		7767	9206	4059
7229		7766	9205	4059
7228		7766	9205	4059
7227		7764	9205	4059
7227		7763	9205	4059
7226		7763	9204	4059
7224		7763	9204	4059
7224		7762	9203	4058
7223		7762	9202	4058
7222		7762	9202	4058
7222		7762	9202	4058
7221		7762	9201	4058
7220		7761	9201	4057
7220		7761	9201	4057
7219		7760	9200	4057
7218		7760	9198	4057
7217		7759	9198	4056

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7217		7759	9198	4056
7216		7759	9198	4056
7214		7759	9197	4056
7213		7759	9197	4056
7212		7757	9197	4056
7212		7756	9196	4055
7211		7756	9196	4055
7211		7756	9196	4055
7211		7756	9196	4055
7210		7755	9195	4055
7210		7755	9194	4054
7210		7754	9194	4054
7209		7754	9194	4053
7208		7754	9194	4053
7206		7754	9194	4052
7205		7754	9194	4052
7205		7754	9192	4052
7204		7753	9192	4052
7204		7752	9192	4052
7203		7752	9192	4052
7203		7751	9191	4052
7203		7750	9190	4051
7203		7750	9190	4051
7202		7749	9190	4051
7202		7748	9189	4050
7201		7748	9188	4050
7200		7748	9188	4050
7200		7747	9185	4050
7200		7747	9185	4050
7199		7746	9185	4049
7198		7745	9185	4049
7198		7745	9184	4049
7197		7744	9184	4048
7197		7744	9182	4048

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7195		7744	9182	4048
7195		7744	9181	4048
7195		7743	9181	4048
7194		7741	9181	4047
7193		7741	9181	4047
7193		7740	9180	4046
7192		7740	9180	4046
7192		7739	9180	4046
7191		7737	9179	4045
7191		7737	9179	4044
7190		7736	9179	4044
7189		7736	9178	4044
7189		7736	9178	4043
7189		7736	9178	4043
7188		7735	9177	4043
7187		7735	9177	4043
7187		7734	9177	4042
7186		7734	9176	4042
7186		7734	9176	4042
7186		7733	9176	4042
7186		7733	9175	4041
7185		7732	9175	4040
7185		7732	9174	4040
7185		7731	9173	4040
7184		7730	9173	4040
7184		7728	9171	4040
7183		7728	9171	4040
7183		7727	9171	4039
7182		7727	9171	4039
7182		7727	9171	4039
7181		7726	9170	4039
7180		7726	9170	4039
7180		7726	9169	4038
7179		7725	9168	4038

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7178		7725	9168	4038
7177		7725	9168	4038
7176		7724	9168	4038
7176		7723	9168	4038
7172		7723	9168	4037
7171		7723	9167	4036
7171		7723	9167	4036
7169		7723	9166	4035
7166		7722	9166	4035
7164		7722	9166	4034
7164		7721	9166	4034
7162		7721	9166	4034
7161		7721	9165	4034
7159		7720	9163	4034
7159		7720	9163	4034
7158		7719	9163	4034
7158		7719	9162	4033
7157		7719	9162	4032
7156		7718	9160	4032
7156		7717	9160	4031
7154		7716	9159	4031
7151		7716	9158	4031
7149		7715	9158	4031
7149		7715	9158	4031
7148		7715	9158	4030
7148		7715	9157	4029
7146		7714	9157	4028
7146		7714	9157	4028
7145		7713	9157	4028
7144		7713	9156	4028
7144		7713	9156	4027
7143		7713	9155	4026
7143		7713	9155	4026
7142		7712	9155	4026

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7141		7712	9155	4026
7141		7711	9155	4025
7140		7711	9154	4025
7139		7711	9154	4025
7139		7710	9153	4024
7137		7709	9153	4024
7136		7709	9153	4024
7135		7709	9153	4024
7135		7708	9153	4023
7134		7707	9152	4023
7134		7707	9152	4023
7133		7706	9152	4022
7132		7706	9152	4022
7130		7706	9151	4021
7130		7706	9151	4020
7130		7706	9151	4020
7129		7705	9150	4020
7129		7704	9149	4020
7129		7704	9148	4019
7128		7703	9147	4019
7126		7703	9147	4019
7125		7703	9147	4019
7125		7702	9146	4019
7125		7702	9144	4019
7125		7702	9144	4019
7122		7702	9144	4018
7121		7701	9143	4018
7120		7700	9143	4018
7120		7700	9143	4018
7117		7699	9141	4018
7117		7699	9141	4018
7116		7699	9140	4018
7115		7698	9140	4018
7114		7698	9140	4018

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7114		7698	9140	4017
7114		7698	9139	4017
7113		7698	9138	4017
7109		7698	9138	4017
7105		7697	9137	4016
7104		7697	9137	4016
7103		7695	9136	4016
7103		7695	9134	4016
7103		7695	9134	4016
7101		7695	9133	4016
7100		7694	9133	4016
7098		7694	9133	4016
7097		7694	9131	4016
7097		7693	9131	4015
7094		7693	9130	4015
7093		7693	9130	4015
7092		7693	9130	4015
7091		7691	9130	4015
7089		7691	9129	4015
7087		7690	9129	4014
7086		7689	9129	4014
7086		7689	9128	4014
7085		7689	9126	4013
7083		7689	9126	4013
7080		7689	9125	4012
7080		7687	9124	4012
7080		7686	9124	4012
7079		7686	9123	4012
7078		7686	9123	4012
7078		7686	9122	4011
7077		7685	9120	4011
7076		7685	9120	4010
7073		7685	9119	4010
7072		7684	9119	4008

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7071		7683	9118	4008
7070		7683	9117	4008
7070		7683	9117	4008
7068		7681	9116	4007
7068		7681	9114	4006
7067		7680	9113	4006
7066		7680	9112	4006
7065		7680	9112	4005
7063		7680	9112	4005
7062		7679	9112	4005
7060		7679	9111	4005
7060		7679	9110	4005
7059		7678	9110	4005
7059		7678	9110	4004
7057		7678	9109	4004
7054		7678	9109	4003
7053		7677	9109	4003
7052		7676	9108	4003
7052		7676	9108	4003
7051		7675	9108	4003
7050		7674	9108	4003
7048		7674	9107	4003
7048		7674	9107	4003
7047		7674	9106	4002
7047		7673	9105	4002
7047		7671	9105	4002
7045		7670	9105	4002
7044		7670	9105	4002
7044		7669	9104	4002
7043		7669	9103	4001
7043		7668	9103	4001
7043		7667	9103	4001
7042		7667	9102	4001
7041		7667	9102	4001

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7040		7666	9101	4001
7039		7666	9101	4001
7037		7666	9101	4001
7036		7666	9101	4000
7036		7666	9101	4000
7034		7665	9101	3999
7032		7665	9101	3999
7032		7660	9100	3999
7031		7660	9100	3999
7028		7660	9099	3999
7026		7659	9098	3999
7026		7659	9097	3999
7026		7659	9097	3999
7026		7658	9097	3997
7024		7658	9096	3997
7023		7658	9096	3997
7023		7658	9096	3996
7022		7657	9095	3996
7021		7657	9094	3996
7020		7657	9093	3996
7020		7657	9093	3995
7017		7656	9093	3995
7014		7656	9092	3995
7014		7654	9092	3995
7013		7652	9092	3994
7011		7651	9091	3994
7010		7651	9091	3993
7005		7651	9091	3993
7004		7650	9090	3993
7004		7650	9090	3993
7004		7649	9090	3993
7003		7649	9088	3993
7002		7648	9088	3993
7002		7648	9087	3992

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
7001		7648	9087	3992
6997		7648	9086	3991
6994		7648	9086	3991
6994		7647	9086	3991
6994		7647	9086	3990
6993		7646	9085	3990
6992		7646	9085	3990
6991		7645	9084	3990
6991		7645	9084	3990
6991		7645	9083	3990
6990		7645	9083	3990
6988		7645	9082	3990
6987		7645	9082	3989
6987		7645	9082	3989
6987		7644	9080	3989
6985		7643	9079	3988
6982		7642	9079	3988
6981		7642	9078	3988
6978		7642	9078	3988
6976		7642	9078	3988
6976		7642	9078	3988
6975		7641	9078	3988
6975		7640	9077	3988
6968		7639	9075	3987
6968		7638	9075	3987
6967		7638	9075	3987
6966		7638	9075	3986
6964		7638	9075	3986
6964		7637	9075	3986
6963		7637	9074	3986
6960		7636	9074	3985
6957		7636	9074	3985
6957		7635	9074	3985
6956		7635	9074	3985

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
6956		7635	9073	3985
6954		7635	9073	3984
6953		7634	9072	3984
6951		7633	9071	3983
6951		7632	9071	3983
6951		7632	9071	3983
6947		7632	9070	3983
6945		7631	9070	3983
6943		7631	9069	3982
6943		7631	9069	3982
6942		7630	9069	3982
6941		7629	9068	3982
6940		7629	9068	3982
6938		7629	9068	3982
6935		7629	9068	3982
6928		7628	9067	3982
6926		7628	9067	3982
6925		7628	9067	3981
6921		7628	9064	3981
6915		7627	9063	3981
6915		7627	9063	3980
6913		7627	9062	3980
6912		7626	9060	3980
6911		7626	9059	3980
6907		7625	9059	3979
6905		7625	9059	3979
6905		7624	9058	3979
6905		7624	9058	3978
6902		7623	9058	3977
6901		7622	9058	3977
6898		7621	9057	3977
6898		7621	9056	3977
6896		7620	9056	3976
6895		7620	9055	3976

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
6893		7620	9055	3975
6892		7619	9055	3975
6892		7618	9055	3975
6891		7617	9054	3974
6889		7617	9054	3974
6889		7616	9053	3974
6888		7615	9053	3973
6888		7615	9053	3973
6885		7615	9053	3973
6885		7615	9052	3971
6881		7615	9052	3971
6880		7614	9052	3971
6879		7614	9051	3971
6879		7614	9050	3970
6878		7611	9049	3970
6875		7611	9049	3970
6871		7610	9048	3970
6868		7610	9048	3970
6863		7610	9048	3970
6862		7609	9048	3969
6858		7609	9047	3969
6858		7609	9047	3969
6858		7609	9047	3969
6855		7608	9047	3969
6849		7608	9047	3969
6848		7608	9046	3968
6847		7608	9045	3968
6846		7607	9045	3968
6846		7607	9045	3968
6837		7607	9043	3968
6830		7606	9043	3967
6829		7605	9043	3967
6828		7605	9042	3967
6828		7605	9041	3967

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
6824		7604	9041	3966
6820		7603	9041	3966
6817		7603	9041	3966
6816		7603	9041	3966
6816		7603	9040	3965
6815		7602	9040	3965
6804		7602	9039	3964
6803		7602	9038	3964
6802		7602	9038	3964
6801		7601	9038	3964
6795		7601	9037	3963
6792		7600	9037	3963
6786		7600	9037	3963
6786		7599	9036	3962
6784		7599	9036	3962
6782		7596	9036	3962
6781		7596	9036	3962
6779		7595	9035	3962
6778		7594	9035	3962
6777		7594	9035	3962
6767		7594	9035	3962
6764		7594	9034	3961
6763		7593	9034	3961
6763		7593	9034	3961
6761		7593	9033	3961
6760		7593	9033	3961
6760		7592	9032	3960
6758		7592	9032	3959
6756		7592	9032	3959
6754		7591	9031	3959
6753		7591	9031	3958
6750		7591	9030	3958
6750		7590	9030	3957
6748		7590	9029	3957

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
6747		7590	9028	3957
6747		7590	9028	3957
6744		7589	9027	3957
6739		7589	9027	3957
6737		7589	9026	3957
6732		7588	9026	3956
6724		7588	9025	3956
6723		7588	9025	3956
6723		7587	9023	3956
6720		7586	9021	3956
6718		7586	9020	3955
6716		7586	9020	3955
6714		7586	9020	3955
6713		7586	9019	3955
6712		7585	9019	3954
6712		7585	9019	3954
6712		7585	9019	3954
6711		7584	9017	3954
6709		7584	9017	3953
6707		7584	9017	3953
6706		7583	9016	3952
6693		7581	9015	3952
6688		7581	9015	3952
6683		7580	9015	3952
6682		7580	9015	3951
6678		7580	9015	3951
6678		7579	9014	3951
6671		7579	9014	3951
6671		7578	9013	3950
6668		7577	9013	3950
6668		7577	9012	3950
6667		7576	9012	3950
6666		7576	9012	3949
6664		7576	9011	3948

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
6660		7573	9011	3948
6656		7573	9011	3948
6656		7572	9010	3947
6652		7572	9009	3947
6649		7570	9009	3947
6647		7569	9008	3947
6646		7567	9008	3946
6644		7567	9007	3946
6642		7567	9007	3946
6642		7567	9007	3945
6639		7566	9007	3945
6637		7566	9006	3945
6636		7566	9006	3945
6633		7565	9005	3945
6628		7565	9004	3944
6624		7564	9004	3944
6623		7564	9004	3944
6620		7564	9003	3944
6619		7564	9003	3944
6606		7563	9003	3943
6603		7563	9002	3943
6600		7563	9002	3942
6600		7563	9001	3942
6596		7562	8999	3942
6588		7562	8999	3941
6588		7562	8998	3941
6578		7561	8996	3941
6577		7560	8996	3941
6569		7560	8995	3941
6565		7560	8992	3940
6555		7559	8992	3940
6553		7557	8992	3939
6551		7557	8991	3939
6547		7557	8990	3939

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
6541		7557	8990	3939
6532		7557	8989	3939
6531		7556	8989	3939
6526		7555	8988	3938
6525		7555	8985	3938
6525		7553	8985	3938
6520		7553	8985	3938
6513		7552	8984	3937
6512		7550	8984	3937
6511		7550	8984	3937
6508		7550	8983	3937
6506		7549	8983	3937
6505		7549	8982	3936
6497		7548	8981	3936
6492		7547	8981	3936
6492		7547	8981	3935
6490		7546	8980	3935
6468		7546	8980	3935
6464		7545	8980	3935
6464		7544	8979	3934
6462		7544	8979	3934
6460		7544	8979	3934
6458		7543	8979	3934
6457		7543	8979	3934
6457		7543	8978	3933
6456		7542	8978	3933
6454		7542	8978	3933
6453		7542	8978	3933
6453		7542	8977	3933
6452		7541	8977	3932
6447		7541	8975	3932
6445		7541	8975	3932
6434		7541	8974	3932
6418		7541	8974	3931

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
6413		7540	8974	3931
6407		7540	8973	3930
6406		7538	8973	3930
6396		7538	8972	3930
6395		7537	8972	3930
6387		7537	8972	3930
6384		7537	8972	3929
6377		7537	8971	3929
6376		7536	8971	3929
6373		7535	8971	3928
6365		7533	8970	3928
6360		7533	8970	3928
6360		7533	8970	3928
6358		7532	8968	3927
6356		7531	8967	3927
6339		7531	8966	3926
6335		7531	8966	3926
6333		7530	8965	3926
6330		7530	8964	3926
6324		7530	8964	3926
6321		7530	8963	3926
6321		7530	8962	3926
6317		7529	8960	3925
6315		7529	8960	3925
6311		7529	8960	3924
6309		7529	8960	3924
6302		7528	8959	3924
6301		7528	8958	3924
6296		7528	8958	3923
6293		7527	8957	3923
6291		7527	8956	3923
6286		7527	8956	3922
6285		7527	8955	3922
6284		7525	8955	3921

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
6282		7525	8954	3920
6281		7524	8954	3920
6281		7524	8954	3920
6273		7524	8954	3919
6271		7523	8952	3919
6267		7523	8952	3919
6260		7523	8951	3918
6251		7523	8951	3918
6250		7522	8951	3918
6249		7522	8951	3917
6244		7522	8950	3917
6240		7522	8950	3916
6232		7521	8950	3916
6231		7521	8950	3916
6225		7521	8949	3916
6225		7520	8949	3916
6218		7520	8949	3915
6217		7520	8949	3915
6216		7519	8949	3915
6211		7518	8947	3914
6202		7518	8947	3914
6199		7517	8947	3914
6193		7517	8946	3914
6192		7517	8946	3914
6191		7516	8946	3913
6189		7516	8945	3912
6188		7516	8944	3912
6188		7515	8944	3912
6179		7515	8944	3912
6168		7514	8943	3911
6168		7514	8943	3911
6166		7513	8943	3911
6162		7513	8940	3911
6153		7513	8939	3911

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
6149		7512	8938	3911
6146		7512	8937	3910
6137		7511	8937	3910
6136		7511	8937	3910
6130		7511	8936	3909
6127		7511	8935	3908
6126		7510	8935	3908
6123		7509	8934	3908
6120		7509	8934	3908
6120		7509	8934	3908
6120		7508	8933	3907
6115		7508	8933	3907
6111		7508	8931	3906
6109		7507	8930	3906
6104		7507	8930	3906
6101		7507	8929	3906
6100		7506	8928	3905
6096		7503	8928	3904
6085		7503	8927	3904
6084		7503	8927	3904
6083		7501	8927	3904
6071		7501	8926	3904
6069		7500	8926	3903
6068		7500	8925	3902
6062		7499	8925	3902
6057		7499	8924	3901
6049		7498	8924	3901
6048		7498	8923	3901
6037		7497	8923	3901
6036		7497	8922	3900
6031		7496	8921	3900
6018		7495	8921	3900
6017		7495	8921	3900
6012		7495	8921	3899

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
6000		7493	8920	3899
6000		7493	8920	3899
5991		7493	8919	3898
5982		7492	8919	3897
5982		7492	8919	3897
5981		7492	8917	3897
5977		7490	8916	3897
5974		7490	8916	3896
5971		7489	8916	3896
5968		7489	8915	3896
5966		7488	8914	3896
5962		7488	8913	3896
5962		7488	8912	3896
5959		7487	8912	3895
5949		7486	8911	3895
5947		7486	8910	3894
5942		7486	8910	3894
5942		7485	8910	3894
5934		7483	8908	3893
5931		7482	8907	3893
5929		7482	8907	3893
5919		7481	8906	3892
5917		7481	8906	3892
5912		7481	8906	3892
5907		7481	8906	3890
5892		7480	8905	3889
5892		7480	8904	3888
5891		7479	8904	3888
5888		7479	8904	3888
5886		7479	8903	3888
5886		7479	8902	3887
5885		7479	8902	3887
5878		7479	8902	3886
5878		7479	8901	3886

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
5876		7478	8901	3886
5873		7477	8901	3885
5870		7477	8900	3885
5869		7477	8900	3885
5868		7477	8899	3885
5867		7477	8899	3885
5860		7476	8898	3885
5858		7476	8898	3884
5857		7476	8897	3883
5855		7475	8897	3882
5850		7474	8896	3882
5834		7474	8894	3882
5832		7474	8894	3882
5826		7474	8894	3881
5825		7473	8893	3881
5821		7473	8893	3881
5820		7473	8891	3880
5817		7472	8891	3879
5816		7472	8890	3879
5813		7471	8890	3878
5812		7471	8890	3878
5811		7471	8888	3878
5808		7471	8887	3878
5800		7471	8887	3878
5799		7470	8887	3877
5793		7470	8887	3877
5783		7469	8887	3877
5779		7469	8887	3877
5778		7468	8887	3877
5777		7468	8886	3877
5775		7468	8886	3877
5773		7468	8886	3876
5772		7466	8884	3876
5771		7466	8884	3875

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
5769		7466	8884	3875
5768		7465	8883	3875
5766		7465	8882	3875
5765		7464	8882	3874
5763		7463	8882	3874
5761		7463	8880	3874
5757		7462	8880	3874
5753		7462	8880	3873
5750		7462	8880	3873
5746		7461	8880	3873
5740		7461	8880	3873
5740		7460	8879	3873
5736		7459	8879	3872
5731		7459	8879	3871
5731		7459	8879	3870
5723		7458	8878	3869
5719		7458	8877	3869
5714		7458	8877	3869
5711		7457	8876	3868
5710		7457	8876	3868
5704		7457	8875	3868
5704		7457	8875	3867
5703		7457	8875	3866
5692		7456	8873	3866
5687		7456	8872	3866
5681		7455	8872	3866
5677		7454	8872	3866
5669		7453	8871	3865
5668		7453	8871	3865
5667		7452	8871	3865
5662		7452	8871	3865
5662		7452	8870	3865
5658		7451	8870	3865
5640		7450	8870	3864

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
5640		7450	8869	3863
5640		7450	8868	3862
5636		7448	8868	3862
5636		7447	8868	3861
5631		7447	8868	3861
5628		7447	8866	3861
5625		7447	8866	3861
5622		7447	8865	3861
5619		7446	8864	3859
5618		7445	8862	3858
5611		7445	8861	3858
5609		7444	8861	3858
5608		7443	8861	3857
5600		7441	8860	3857
5594		7441	8859	3855
5593		7439	8858	3854
5587		7438	8857	3854
5585		7437	8857	3854
5585		7437	8856	3853
5584		7437	8855	3853
5583		7436	8854	3853
5579		7436	8853	3852
5574		7436	8853	3851
5572		7435	8853	3851
5563		7435	8853	3851
5553		7433	8853	3850
5552		7432	8852	3849
5544		7432	8852	3848
5542		7432	8852	3847
5542		7431	8851	3847
5542		7430	8850	3846
5541		7430	8850	3846
5533		7429	8849	3846
5531		7429	8849	3845

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
5525		7429	8849	3845
5524		7428	8848	3845
5524		7428	8847	3845
5521		7427	8846	3844
5519		7426	8845	3843
5516		7426	8844	3843
5513		7426	8844	3842
5511		7426	8844	3842
5507		7425	8843	3842
5501		7425	8842	3841
5500		7425	8842	3840
5495		7423	8842	3840
5492		7422	8842	3840
5489		7419	8841	3840
5486		7419	8841	3839
5485		7419	8841	3839
5478		7418	8839	3838
5476		7418	8839	3838
5470		7416	8838	3838
5467		7415	8837	3838
5459		7413	8837	3838
5458		7413	8837	3838
5457		7412	8837	3837
5457		7412	8836	3837
5446		7412	8836	3837
5444		7412	8836	3835
5444		7411	8836	3835
5442		7410	8835	3835
5434		7409	8835	3834
5433		7409	8834	3833
5428		7406	8834	3833
5427		7405	8833	3832
5427		7404	8833	3832
5425		7404	8832	3832

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
5425		7402	8832	3832
5424		7402	8830	3831
5420		7402	8829	3830
5420		7401	8829	3830
5419		7400	8828	3829
5418		7399	8827	3829
5418		7399	8826	3829
5418		7398	8826	3828
5417		7397	8824	3828
5413		7397	8824	3828
5412		7397	8824	3828
5410		7396	8823	3827
5409		7395	8823	3826
5402		7395	8822	3826
5401		7393	8821	3826
5398		7393	8821	3825
5395		7393	8821	3825
5387		7393	8820	3824
5386		7391	8819	3824
5385		7391	8819	3824
5382		7391	8818	3824
5382		7390	8818	3824
5371		7389	8817	3823
5371		7389	8817	3822
5370		7389	8816	3822
5370		7387	8816	3821
5369		7387	8814	3821
5367		7387	8814	3821
5357		7387	8813	3820
5356		7387	8813	3820
5355		7386	8813	3819
5354		7386	8812	3819
5349		7385	8812	3819
5345		7384	8812	3819

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
5343		7383	8811	3819
5339		7381	8811	3818
5334		7381	8810	3818
5332		7379	8810	3818
5330		7379	8809	3818
5329		7379	8809	3817
5327		7378	8808	3817
5324		7378	8808	3817
5323		7376	8808	3817
5318		7376	8808	3817
5315		7375	8808	3817
5305		7375	8807	3817
5304		7374	8807	3816
5303		7373	8807	3816
5300		7372	8806	3815
5296		7372	8806	3815
5290		7371	8805	3814
5288		7371	8805	3813
5285		7370	8805	3813
5282		7370	8805	3812
5281		7369	8804	3812
5280		7367	8804	3811
5280		7367	8802	3810
5278		7367	8802	3810
5275		7367	8802	3810
5275		7366	8802	3810
5271		7366	8800	3810
5268		7365	8800	3809
5265		7365	8799	3809
5265		7364	8799	3809
5264		7364	8799	3809
5262		7363	8799	3808
5259		7362	8798	3807
5257		7361	8798	3807

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
5254		7361	8796	3807
5250		7361	8796	3807
5245		7361	8796	3806
5233		7361	8795	3806
5231		7359	8795	3806
5227		7359	8794	3805
5226		7359	8793	3804
5223		7358	8793	3804
5221		7358	8792	3803
5218		7357	8792	3802
5211		7357	8791	3802
5205		7357	8790	3802
5204		7357	8790	3801
5203		7356	8790	3800
5199		7356	8790	3800
5192		7355	8790	3799
5189		7355	8788	3799
5188		7354	8787	3798
5186		7352	8787	3798
5186		7350	8786	3797
5185		7349	8786	3797
5184		7348	8786	3796
5184		7348	8786	3796
5183		7348	8786	3796
5182		7346	8785	3796
5178		7345	8785	3795
5177		7345	8784	3795
5176		7344	8783	3795
5174		7344	8782	3795
5173		7344	8781	3795
5170		7344	8780	3794
5168		7343	8779	3794
5166		7343	8779	3794
5159		7342	8778	3794

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
5159		7342	8778	3793
5157		7342	8778	3792
5157		7342	8777	3792
5148		7342	8777	3792
5148		7341	8777	3791
5147		7341	8775	3791
5145		7341	8775	3790
5143		7340	8772	3790
5143		7339	8771	3790
5141		7338	8770	3790
5141		7338	8770	3789
5137		7338	8770	3787
5133		7338	8769	3786
5123		7337	8769	3786
5123		7337	8769	3785
5122		7336	8768	3785
5121		7335	8768	3785
5117		7335	8768	3784
5117		7335	8767	3784
5112		7335	8767	3784
5111		7334	8765	3783
5109		7333	8765	3783
5108		7332	8764	3783
5105		7332	8764	3783
5105		7331	8763	3782
5099		7331	8762	3781
5095		7331	8762	3780
5093		7329	8762	3780
5081		7329	8761	3780
5079		7328	8761	3779
5076		7327	8761	3779
5075		7325	8761	3778
5073		7325	8760	3778
5072		7325	8760	3777

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
5067		7324	8759	3777
5062		7324	8759	3777
5057		7323	8758	3777
5056		7323	8758	3776
5054		7323	8758	3776
5052		7322	8758	3776
5051		7322	8757	3775
5048		7322	8757	3774
5047		7322	8756	3774
5045		7320	8756	3773
5044		7316	8755	3773
5042		7315	8755	3772
5041		7314	8754	3772
5038		7314	8754	3772
5034		7314	8753	3772
5031		7313	8753	3771
5027		7312	8752	3769
5026		7312	8751	3769
5024		7312	8751	3768
5023		7312	8749	3768
5016		7311	8749	3768
5014		7311	8747	3767
5012		7311	8747	3767
5010		7309	8747	3767
5008		7308	8746	3767
5007		7308	8746	3767
4998		7308	8746	3767
4993		7306	8745	3765
4987		7305	8745	3765
4982		7305	8744	3765
4982		7303	8744	3764
4979		7303	8744	3764
4979		7302	8743	3763
4977		7301	8743	3762

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
4976		7301	8742	3762
4971		7301	8742	3762
4964		7300	8741	3762
4961		7300	8741	3761
4951		7299	8741	3761
4950		7299	8740	3761
4943		7299	8740	3760
4941		7299	8739	3759
4940		7298	8739	3758
4939		7297	8738	3758
4935		7297	8736	3757
4935		7297	8736	3757
4935		7296	8735	3756
4931		7295	8735	3755
4931		7294	8733	3755
4919		7293	8732	3755
4910		7293	8732	3755
4908		7292	8732	3755
4902		7292	8732	3753
4888		7292	8730	3753
4887		7292	8730	3753
4886		7292	8730	3753
4882		7291	8729	3753
4876		7291	8728	3753
4872		7290	8727	3752
4864		7289	8726	3752
4863		7289	8726	3751
4856		7287	8725	3751
4853		7284	8725	3751
4850		7283	8725	3750
4848		7282	8724	3749
4848		7282	8724	3749
4847		7281	8723	3749
4844		7280	8722	3748

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
4840		7280	8722	3748
4825		7278	8720	3747
4817		7278	8720	3746
4812		7278	8719	3746
4806		7277	8718	3745
4796		7277	8718	3744
4791		7277	8718	3743
4788		7276	8718	3743
4782		7274	8718	3742
4780		7273	8717	3741
4774		7272	8716	3741
4765		7271	8716	3741
4762		7270	8714	3740
4757		7270	8714	3739
4755		7270	8714	3739
4755		7270	8713	3738
4741		7269	8713	3738
4739		7269	8713	3738
4737		7269	8711	3737
4730		7268	8711	3737
4729		7267	8711	3737
4725		7265	8710	3737
4725		7265	8710	3737
4724		7265	8709	3735
4724		7263	8709	3735
4721		7263	8708	3735
4716		7263	8708	3735
4711		7262	8708	3735
4708		7260	8706	3735
4708		7259	8706	3734
4703		7259	8705	3734
4701		7258	8705	3733
4698		7258	8705	3732
4693		7257	8704	3732

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
4692		7256	8704	3732
4689		7256	8703	3732
4687		7256	8703	3731
4683		7255	8703	3731
4677		7255	8703	3731
4673		7254	8703	3730
4672		7253	8703	3729
4668		7252	8703	3728
4666		7252	8703	3728
4665		7251	8702	3728
4645		7251	8701	3727
4639		7250	8701	3727
4637		7250	8700	3727
4637		7249	8700	3726
4635		7249	8700	3726
4627		7249	8700	3725
4623		7248	8700	3724
4619		7248	8699	3724
4618		7247	8698	3723
4618		7247	8698	3723
4614		7247	8698	3723
4603		7246	8697	3722
4592		7245	8697	3720
4588		7243	8696	3720
4588		7242	8695	3720
4587		7241	8694	3719
4586		7240	8694	3718
4586		7240	8694	3718
4585		7240	8694	3718
4572		7238	8694	3717
4562		7238	8694	3717
4544		7237	8693	3717
4543		7236	8693	3717
4542		7236	8693	3716

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
4524		7235	8692	3715
4506		7235	8692	3715
4500		7235	8692	3714
4500		7234	8692	3714
4492		7234	8691	3713
4492		7231	8689	3712
4488		7229	8688	3711
4486		7229	8687	3711
4485		7228	8686	3711
4478		7228	8686	3711
4465		7227	8686	3710
4462		7226	8686	3710
4462		7225	8685	3710
4441		7225	8685	3708
4439		7224	8684	3706
4430		7223	8684	3706
4428		7223	8683	3706
4427		7223	8683	3706
4425		7222	8682	3706
4421		7219	8682	3705
4401		7219	8682	3705
4396		7219	8682	3705
4395		7218	8681	3705
4380		7216	8681	3705
4380		7216	8680	3705
4365		7215	8680	3704
4365		7215	8678	3703
4361		7214	8678	3703
4358		7214	8678	3702
4358		7214	8678	3701
4343		7214	8677	3701
4343		7212	8677	3701
4337		7211	8677	3701
4324		7211	8677	3701

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
4308		7210	8676	3701
4295		7207	8676	3701
4283		7207	8676	3700
4279		7206	8675	3700
4278		7206	8675	3699
4275		7205	8675	3699
4270		7204	8674	3698
4253		7203	8672	3698
4247		7203	8672	3698
4240		7200	8672	3697
4227		7199	8671	3697
4209		7199	8669	3696
4190		7197	8668	3695
4188		7196	8668	3695
4187		7196	8667	3694
4184		7196	8667	3694
4177		7195	8667	3693
4173		7194	8666	3693
4171		7193	8666	3693
4140		7193	8664	3692
4138		7193	8664	3692
4136		7192	8663	3691
4123		7191	8663	3691
4110		7191	8663	3691
4096		7191	8662	3691
4096		7188	8662	3690
4095		7187	8662	3689
4089		7185	8662	3689
4078		7184	8661	3689
4067		7183	8661	3688
4058		7182	8661	3688
4057		7181	8661	3687
4055		7181	8660	3686
4049		7179	8660	3686

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
4041		7178	8660	3685
4026		7178	8660	3684
4023		7177	8660	3684
4021		7176	8660	3684
3975		7176	8659	3684
3965		7175	8659	3684
3947		7175	8659	3682
3937		7175	8658	3682
3935		7175	8658	3681
3929		7174	8658	3681
3920		7172	8657	3680
3918		7172	8657	3680
3909		7170	8656	3680
3909		7169	8655	3679
3908		7169	8655	3678
3907		7168	8654	3678
3902		7167	8654	3677
3898		7167	8653	3677
3891		7167	8652	3676
3877		7165	8652	3676
3873		7164	8651	3676
3859		7164	8651	3675
3847		7163	8651	3675
3839		7162	8650	3674
3836		7162	8650	3674
3828		7160	8649	3674
3823		7160	8648	3673
3822		7160	8648	3673
3818		7159	8647	3672
3809		7158	8646	3672
3807		7158	8646	3672
3802		7158	8646	3672
3790		7158	8645	3672
3778		7157	8644	3672

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
3772		7157	8644	3671
3752		7156	8644	3671
3719		7155	8644	3671
3716		7154	8643	3671
3709		7153	8643	3671
3703		7151	8642	3671
3701		7151	8641	3670
3700		7151	8640	3669
3689		7149	8639	3668
3685		7149	8638	3668
3680		7148	8638	3668
3670		7145	8637	3668
3640		7143	8637	3667
3629		7141	8637	3667
3625		7141	8637	3666
3618		7140	8636	3666
3605		7140	8636	3665
3598		7139	8635	3665
3598		7139	8635	3665
3583		7137	8635	3664
3582		7137	8634	3664
3556		7136	8634	3663
3552		7134	8633	3663
3538		7133	8632	3663
3508		7133	8632	3663
3491		7132	8632	3662
3488		7132	8631	3662
3488		7132	8630	3661
3481		7130	8630	3661
3467		7129	8629	3661
3462		7127	8629	3660
3442		7127	8629	3660
3417		7126	8628	3659
3412		7126	8628	3659

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
3410		7125	8628	3659
3405		7124	8628	3656
3404		7124	8627	3656
3403		7123	8627	3656
3401		7122	8627	3656
3371		7121	8626	3656
3303		7120	8625	3656
3257		7120	8622	3656
3217		7120	8621	3655
2598		7120	8621	3655
		7119	8621	3654
		7119	8621	3654
		7119	8621	3654
		7118	8620	3653
		7118	8620	3653
		7118	8619	3652
		7117	8619	3652
		7115	8618	3652
		7113	8618	3652
		7113	8617	3651
		7113	8617	3651
		7113	8617	3651
		7112	8616	3651
		7112	8616	3651
		7112	8616	3651
		7111	8613	3651
		7111	8612	3650
		7110	8612	3649
		7109	8611	3649
		7109	8611	3649
		7108	8610	3649
		7107	8610	3648
		7107	8610	3648
		7107	8609	3648

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		7106	8609	3648
		7105	8609	3648
		7104	8609	3648
		7104	8607	3647
		7103	8606	3647
		7103	8606	3647
		7102	8605	3647
		7101	8604	3647
		7100	8603	3646
		7100	8602	3646
		7099	8602	3646
		7098	8601	3645
		7097	8599	3645
		7095	8599	3644
		7093	8598	3644
		7091	8598	3644
		7089	8598	3643
		7089	8598	3643
		7088	8597	3642
		7087	8597	3642
		7086	8597	3641
		7086	8595	3641
		7085	8595	3641
		7083	8595	3639
		7083	8595	3639
		7080	8595	3638
		7080	8593	3638
		7079	8593	3638
		7079	8592	3637
		7079	8592	3636
		7078	8591	3636
		7078	8591	3636
		7077	8591	3636
		7077	8589	3636

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		7077	8588	3635
		7077	8588	3634
		7076	8587	3634
		7074	8586	3634
		7072	8585	3634
		7072	8585	3634
		7071	8585	3633
		7071	8584	3633
		7071	8584	3632
		7070	8583	3632
		7070	8583	3632
		7069	8583	3632
		7069	8583	3632
		7069	8582	3631
		7068	8582	3631
		7068	8581	3631
		7068	8581	3630
		7067	8581	3630
		7066	8581	3630
		7064	8580	3629
		7063	8580	3629
		7063	8580	3629
		7060	8580	3629
		7058	8579	3628
		7057	8578	3628
		7057	8577	3627
		7056	8576	3626
		7053	8576	3626
		7052	8574	3626
		7051	8573	3625
		7051	8573	3625
		7051	8572	3624
		7050	8570	3624
		7050	8569	3624

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		7048	8569	3624
		7048	8569	3624
		7048	8569	3623
		7047	8568	3623
		7046	8568	3622
		7043	8568	3622
		7043	8567	3622
		7042	8566	3622
		7041	8565	3621
		7037	8565	3620
		7037	8565	3620
		7036	8564	3619
		7034	8564	3619
		7033	8563	3619
		7031	8562	3618
		7030	8561	3618
		7029	8561	3618
		7027	8561	3616
		7026	8561	3615
		7025	8560	3615
		7023	8559	3615
		7021	8558	3614
		7020	8557	3613
		7017	8557	3613
		7016	8557	3613
		7014	8557	3612
		7013	8556	3611
		7013	8555	3610
		7012	8555	3610
		7010	8555	3609
		7010	8555	3609
		7010	8555	3609
		7007	8554	3608
		7006	8554	3608

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		7005	8554	3607
		7003	8552	3606
		7002	8550	3606
		7001	8550	3604
		6999	8550	3604
		6997	8547	3604
		6997	8546	3604
		6994	8546	3603
		6994	8546	3601
		6994	8546	3601
		6993	8543	3601
		6992	8543	3600
		6992	8543	3600
		6990	8542	3600
		6989	8541	3599
		6989	8540	3599
		6987	8539	3599
		6986	8539	3598
		6984	8539	3597
		6981	8538	3596
		6981	8538	3596
		6979	8537	3596
		6978	8536	3595
		6972	8535	3595
		6970	8535	3594
		6967	8535	3594
		6967	8535	3594
		6965	8534	3593
		6965	8534	3593
		6961	8533	3593
		6960	8531	3592
		6958	8531	3592
		6955	8531	3592
		6954	8530	3591

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		6953	8530	3591
		6953	8529	3591
		6952	8529	3590
		6949	8529	3590
		6949	8528	3590
		6949	8527	3589
		6948	8527	3588
		6943	8527	3587
		6941	8526	3587
		6939	8526	3586
		6938	8526	3586
		6938	8526	3586
		6937	8525	3586
		6937	8525	3585
		6937	8524	3585
		6936	8524	3584
		6935	8523	3584
		6931	8523	3584
		6927	8522	3584
		6926	8522	3584
		6925	8521	3582
		6924	8521	3582
		6923	8521	3582
		6923	8517	3582
		6921	8517	3581
		6919	8517	3581
		6919	8516	3580
		6918	8516	3579
		6916	8515	3579
		6916	8513	3579
		6915	8513	3579
		6915	8512	3578
		6915	8512	3577
		6914	8510	3577

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		6913	8510	3576
		6910	8510	3575
		6910	8510	3574
		6909	8509	3573
		6909	8508	3573
		6906	8508	3573
		6905	8508	3573
		6905	8507	3572
		6904	8506	3572
		6903	8506	3571
		6903	8504	3571
		6901	8503	3570
		6900	8503	3570
		6899	8503	3570
		6899	8503	3568
		6897	8501	3568
		6896	8501	3567
		6893	8500	3567
		6890	8500	3567
		6888	8500	3567
		6885	8500	3566
		6882	8499	3565
		6882	8498	3564
		6880	8497	3564
		6880	8497	3563
		6880	8496	3563
		6877	8495	3563
		6876	8495	3562
		6875	8493	3562
		6874	8492	3562
		6874	8492	3561
		6872	8492	3560
		6871	8492	3560
		6869	8491	3560

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		6869	8490	3560
		6866	8490	3559
		6864	8489	3559
		6864	8489	3559
		6863	8489	3558
		6857	8488	3558
		6857	8487	3558
		6852	8487	3558
		6849	8485	3558
		6848	8485	3557
		6846	8485	3556
		6845	8483	3555
		6843	8482	3554
		6841	8482	3553
		6840	8482	3553
		6837	8481	3553
		6836	8480	3553
		6836	8480	3553
		6836	8479	3552
		6835	8479	3552
		6834	8478	3552
		6832	8476	3552
		6831	8476	3551
		6829	8476	3551
		6829	8476	3551
		6825	8476	3551
		6820	8475	3550
		6817	8475	3549
		6816	8474	3549
		6814	8474	3549
		6814	8474	3549
		6813	8473	3549
		6813	8472	3547
		6813	8472	3547

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		6812	8471	3546
		6807	8471	3544
		6804	8471	3544
		6803	8470	3543
		6802	8470	3543
		6801	8470	3543
		6801	8470	3543
		6799	8469	3542
		6798	8469	3542
		6795	8469	3542
		6787	8469	3542
		6785	8468	3542
		6783	8468	3541
		6782	8468	3541
		6778	8468	3541
		6776	8468	3540
		6770	8467	3540
		6769	8467	3540
		6768	8467	3539
		6759	8467	3539
		6753	8466	3538
		6752	8465	3538
		6750	8465	3538
		6740	8463	3537
		6740	8462	3537
		6736	8462	3537
		6735	8462	3537
		6734	8460	3537
		6732	8460	3537
		6723	8459	3536
		6721	8458	3535
		6721	8458	3535
		6720	8458	3535
		6719	8456	3535

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		6719	8455	3535
		6716	8455	3534
		6716	8453	3533
		6708	8453	3532
		6697	8452	3532
		6693	8452	3532
		6692	8452	3531
		6686	8451	3529
		6684	8451	3529
		6681	8451	3529
		6681	8450	3529
		6671	8450	3528
		6671	8449	3527
		6670	8449	3526
		6670	8449	3526
		6668	8449	3526
		6667	8448	3525
		6665	8448	3524
		6662	8446	3523
		6654	8446	3523
		6653	8445	3523
		6648	8444	3522
		6647	8444	3522
		6644	8443	3522
		6644	8443	3522
		6642	8442	3522
		6633	8442	3520
		6631	8442	3520
		6630	8442	3520
		6628	8442	3520
		6627	8441	3519
		6622	8441	3519
		6614	8440	3519
		6612	8439	3518

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		6609	8439	3517
		6603	8439	3517
		6597	8438	3516
		6596	8438	3516
		6596	8438	3515
		6595	8438	3513
		6591	8437	3512
		6587	8437	3512
		6586	8437	3512
		6585	8437	3512
		6583	8437	3512
		6580	8437	3512
		6573	8437	3511
		6573	8436	3510
		6569	8435	3510
		6564	8432	3509
		6561	8430	3508
		6558	8429	3508
		6557	8429	3508
		6556	8429	3507
		6555	8428	3506
		6547	8428	3505
		6544	8427	3505
		6543	8427	3503
		6540	8426	3503
		6539	8426	3502
		6525	8426	3502
		6521	8425	3501
		6510	8425	3500
		6505	8425	3497
		6500	8420	3497
		6499	8420	3496
		6493	8419	3496
		6491	8419	3495

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		6490	8418	3495
		6479	8418	3494
		6476	8418	3494
		6471	8416	3493
		6460	8415	3492
		6460	8414	3492
		6456	8413	3492
		6451	8412	3491
		6450	8412	3490
		6447	8411	3490
		6445	8410	3490
		6442	8409	3488
		6441	8409	3487
		6437	8409	3487
		6434	8409	3486
		6429	8408	3485
		6426	8408	3485
		6422	8408	3485
		6421	8408	3484
		6415	8407	3483
		6411	8407	3483
		6395	8407	3483
		6394	8406	3482
		6385	8406	3481
		6382	8406	3481
		6376	8406	3480
		6367	8405	3480
		6366	8404	3480
		6354	8404	3480
		6349	8404	3478
		6348	8403	3478
		6344	8403	3478
		6339	8402	3477
		6338	8402	3475

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		6337	8401	3475
		6333	8401	3474
		6328	8401	3474
		6327	8401	3474
		6324	8401	3473
		6293	8400	3473
		6288	8400	3473
		6287	8400	3473
		6283	8399	3473
		6281	8398	3472
		6277	8397	3472
		6277	8397	3472
		6274	8397	3471
		6266	8396	3471
		6265	8396	3471
		6263	8394	3470
		6262	8394	3468
		6261	8394	3467
		6260	8392	3467
		6255	8391	3467
		6234	8391	3466
		6227	8390	3465
		6222	8389	3465
		6218	8389	3465
		6211	8389	3464
		6208	8388	3461
		6208	8386	3460
		6202	8386	3460
		6199	8385	3459
		6177	8385	3459
		6172	8385	3459
		6167	8383	3459
		6165	8383	3457
		6164	8383	3456

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		6162	8383	3456
		6159	8382	3455
		6157	8382	3453
		6152	8382	3453
		6143	8381	3453
		6133	8381	3450
		6131	8378	3450
		6128	8378	3449
		6126	8376	3449
		6124	8376	3448
		6124	8376	3447
		6121	8376	3447
		6119	8376	3446
		6105	8375	3446
		6103	8375	3446
		6102	8375	3445
		6097	8373	3444
		6091	8373	3443
		6088	8372	3443
		6086	8370	3442
		6083	8369	3442
		6082	8368	3441
		6082	8368	3440
		6081	8367	3440
		6073	8366	3439
		6063	8366	3438
		6036	8365	3437
		6033	8364	3436
		6025	8363	3435
		6024	8361	3435
		5993	8361	3435
		5988	8360	3435
		5988	8360	3434
		5986	8360	3434

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		5980	8359	3434
		5975	8359	3433
		5962	8359	3433
		5957	8359	3432
		5928	8358	3432
		5914	8358	3432
		5911	8357	3432
		5899	8356	3430
		5889	8356	3430
		5887	8355	3430
		5880	8355	3430
		5850	8355	3430
		5841	8355	3430
		5841	8355	3430
		5840	8353	3429
		5815	8353	3428
		5779	8353	3428
		5776	8352	3427
		5767	8352	3427
		5755	8352	3427
		5750	8351	3426
		5745	8351	3426
		5722	8350	3425
		5703	8350	3423
		5701	8349	3423
		5689	8347	3422
		5675	8347	3421
		5639	8346	3420
		5615	8346	3419
		5611	8346	3418
		5580	8345	3416
		5579	8345	3416
		5567	8344	3416
		5561	8343	3414

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		5557	8342	3414
		5546	8342	3414
		5543	8342	3413
		5540	8341	3413
		5539	8340	3413
		5523	8340	3413
		5521	8340	3412
		5497	8339	3411
		5453	8338	3410
		5452	8338	3410
		5451	8338	3409
		5448	8337	3409
		5445	8337	3408
		5440	8337	3407
		5434	8336	3407
		5422	8335	3407
		5421	8335	3406
		5411	8335	3406
		5408	8334	3406
		5407	8333	3406
		5379	8333	3405
		5376	8333	3404
		5376	8331	3404
		5374	8330	3403
		5373	8330	3402
		5373	8330	3402
		5368	8329	3402
		5368	8329	3401
		5318	8329	3400
		5310	8328	3400
		5293	8327	3400
		5288	8327	3397
		5273	8327	3397
		5265	8327	3397

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		5260	8326	3397
		5259	8326	3397
		5258	8326	3396
		5247	8325	3396
		5243	8325	3394
		5235	8324	3393
		5224	8324	3393
		5217	8324	3393
		5217	8324	3393
		5211	8323	3393
		5199	8323	3392
		5194	8322	3390
		5192	8322	3389
		5191	8322	3387
		5190	8322	3387
		5188	8322	3387
		5187	8321	3386
		5186	8321	3385
		5182	8321	3384
		5176	8320	3383
		5172	8320	3383
		5165	8319	3383
		5159	8319	3383
		5153	8317	3382
		5146	8317	3382
		5130	8316	3382
		5121	8316	3382
		5118	8316	3381
		5113	8315	3380
		5109	8314	3379
		5106	8314	3378
		5104	8313	3375
		5103	8312	3375
		5099	8312	3374

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		5082	8311	3374
		5075	8311	3373
		5074	8311	3373
		5068	8311	3372
		5060	8309	3371
		5059	8308	3371
		5059	8307	3370
		5058	8307	3370
		5057	8306	3370
		5043	8306	3369
		5043	8304	3369
		5031	8304	3369
		5017	8303	3368
		5009	8303	3367
		5009	8303	3367
		5003	8303	3364
		4984	8302	3364
		4981	8302	3364
		4979	8302	3363
		4975	8302	3363
		4974	8302	3363
		4956	8301	3363
		4953	8301	3363
		4949	8300	3362
		4947	8300	3362
		4946	8299	3361
		4943	8299	3361
		4942	8299	3360
		4942	8298	3360
		4941	8298	3360
		4927	8298	3359
		4927	8297	3359
		4917	8297	3357
		4914	8296	3357

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		4914	8296	3356
		4896	8295	3356
		4883	8295	3356
		4870	8295	3355
		4865	8292	3354
		4852	8292	3354
		4852	8291	3353
		4847	8291	3353
		4840	8291	3352
		4829	8291	3350
		4817	8291	3350
		4816	8290	3350
		4802	8290	3350
		4800	8290	3349
		4796	8290	3349
		4781	8289	3349
		4775	8289	3348
		4766	8289	3347
		4763	8289	3347
		4762	8289	3346
		4757	8289	3345
		4742	8288	3345
		4742	8288	3344
		4735	8287	3344
		4723	8287	3344
		4710	8287	3343
		4709	8286	3343
		4706	8286	3343
		4700	8285	3341
		4699	8285	3341
		4691	8284	3341
		4688	8284	3341
		4674	8284	3340
		4654	8283	3340

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		4653	8282	3340
		4653	8282	3340
		4601	8281	3340
		4598	8281	3340
		4590	8280	3339
		4582	8280	3338
		4578	8279	3338
		4558	8278	3338
		4551	8278	3338
		4546	8278	3337
		4542	8277	3337
		4526	8277	3336
		4519	8276	3336
		4516	8276	3335
		4514	8275	3335
		4514	8275	3335
		4490	8274	3334
		4478	8274	3334
		4469	8274	3333
		4467	8274	3333
		4463	8274	3332
		4462	8273	3332
		4462	8273	3331
		4456	8273	3330
		4425	8272	3330
		4418	8272	3330
		4411	8272	3329
		4403	8272	3328
		4396	8271	3327
		4390	8270	3326
		4362	8270	3325
		4359	8270	3324
		4358	8269	3324
		4341	8269	3323

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		4331	8268	3322
		4330	8268	3321
		4316	8267	3321
		4310	8266	3320
		4300	8266	3320
		4284	8266	3319
		4272	8265	3318
		4271	8263	3317
		4232	8263	3316
		4229	8263	3316
		4223	8263	3316
		4217	8261	3316
		4214	8261	3315
		4212	8261	3314
		4209	8261	3314
		4207	8260	3311
		4203	8260	3311
		4198	8260	3309
		4192	8259	3308
		4192	8258	3308
		4181	8257	3307
		4171	8257	3307
		4168	8257	3304
		4163	8255	3303
		4162	8255	3302
		4159	8255	3302
		4145	8255	3302
		4136	8255	3302
		4134	8254	3302
		4134	8254	3301
		4133	8252	3298
		4132	8250	3298
		4129	8249	3298
		4125	8249	3297

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		4117	8249	3296
		4115	8248	3296
		4112	8248	3296
		4112	8247	3294
		4111	8247	3294
		4110	8246	3294
		4109	8246	3292
		4099	8245	3292
		4073	8245	3292
		4072	8245	3291
		4071	8245	3289
		4066	8245	3288
		4054	8244	3287
		4036	8244	3285
		4035	8244	3285
		4000	8244	3285
		3990	8243	3284
		3984	8243	3284
		3973	8243	3283
		3955	8242	3283
		3948	8242	3282
		3862	8241	3280
		3807	8241	3280
		3804	8241	3279
		3765	8241	3278
		3763	8241	3278
		3739	8241	3278
		3729	8240	3277
		3720	8240	3277
		3690	8240	3277
		3690	8240	3276
		3689	8239	3276
		3672	8239	3276
		3652	8238	3275

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
		3638	8235	3275
		3592	8235	3275
		3540	8234	3274
		3509	8234	3274
		3467	8234	3274
		3444	8233	3272
		3374	8233	3270
		3177	8233	3270
		3079	8232	3266
		3034	8232	3265
			8232	3263
			8231	3263
			8231	3262
			8230	3262
			8229	3262
			8228	3262
			8228	3260
			8227	3259
			8223	3259
			8222	3258
			8221	3256
			8221	3255
			8220	3254
			8220	3254
			8220	3253
			8219	3253
			8218	3252
			8218	3251
			8218	3251
			8218	3251
			8218	3249
			8218	3249
			8215	3249
			8215	3248

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8214	3247
			8214	3245
			8213	3245
			8212	3243
			8211	3243
			8211	3242
			8210	3242
			8210	3241
			8210	3238
			8210	3238
			8209	3237
			8209	3236
			8209	3236
			8209	3236
			8208	3234
			8208	3234
			8208	3233
			8207	3233
			8207	3233
			8207	3232
			8206	3232
			8206	3229
			8206	3229
			8205	3228
			8205	3227
			8204	3227
			8203	3221
			8202	3221
			8202	3221
			8202	3220
			8202	3220
			8201	3220
			8201	3219
			8201	3219

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8201	3217
			8200	3217
			8200	3216
			8199	3215
			8199	3213
			8198	3212
			8197	3211
			8196	3209
			8196	3209
			8195	3209
			8193	3208
			8193	3208
			8192	3207
			8192	3207
			8192	3207
			8192	3206
			8191	3206
			8191	3206
			8190	3206
			8190	3205
			8190	3204
			8189	3204
			8189	3204
			8189	3203
			8188	3202
			8188	3202
			8187	3201
			8187	3199
			8186	3198
			8185	3197
			8185	3197
			8185	3195
			8184	3192
			8184	3192

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8184	3190
			8183	3185
			8183	3184
			8183	3184
			8182	3184
			8182	3182
			8182	3182
			8182	3181
			8182	3181
			8181	3180
			8181	3179
			8180	3179
			8180	3174
			8180	3172
			8179	3171
			8179	3171
			8178	3171
			8178	3171
			8178	3170
			8178	3170
			8178	3169
			8178	3168
			8178	3168
			8176	3164
			8175	3163
			8175	3162
			8174	3160
			8173	3159
			8173	3158
			8173	3158
			8173	3157
			8173	3154
			8172	3154
			8172	3154

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8172	3154
			8172	3154
			8171	3153
			8170	3153
			8169	3153
			8169	3150
			8169	3149
			8168	3147
			8167	3146
			8167	3146
			8166	3146
			8166	3142
			8164	3142
			8163	3141
			8161	3138
			8161	3138
			8161	3138
			8160	3136
			8160	3135
			8159	3135
			8159	3134
			8158	3133
			8158	3133
			8156	3131
			8155	3130
			8154	3129
			8154	3129
			8153	3128
			8153	3128
			8153	3127
			8152	3127
			8152	3123
			8152	3121
			8152	3121

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8152	3117
			8151	3117
			8151	3117
			8151	3117
			8150	3116
			8150	3115
			8150	3112
			8149	3109
			8149	3108
			8148	3107
			8148	3104
			8148	3103
			8148	3102
			8148	3101
			8148	3101
			8147	3099
			8147	3097
			8146	3095
			8145	3095
			8145	3094
			8145	3093
			8143	3093
			8142	3091
			8142	3091
			8141	3091
			8141	3090
			8141	3090
			8141	3090
			8141	3086
			8141	3086
			8140	3086
			8140	3086
			8139	3086
			8139	3086

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8139	3085
			8138	3083
			8137	3080
			8137	3078
			8137	3077
			8137	3077
			8136	3076
			8136	3076
			8134	3075
			8132	3075
			8132	3073
			8132	3073
			8132	3071
			8132	3069
			8131	3069
			8130	3068
			8130	3066
			8130	3065
			8130	3065
			8130	3065
			8130	3064
			8129	3062
			8128	3061
			8128	3060
			8128	3059
			8127	3058
			8127	3054
			8124	3051
			8124	3048
			8122	3045
			8122	3045
			8122	3045
			8122	3045
			8122	3043

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8121	3042
			8121	3042
			8121	3040
			8121	3040
			8121	3038
			8120	3038
			8119	3037
			8119	3037
			8118	3037
			8118	3036
			8118	3036
			8117	3036
			8117	3036
			8116	3034
			8116	3034
			8116	3033
			8116	3031
			8115	3030
			8115	3030
			8115	3030
			8115	3029
			8115	3027
			8114	3026
			8113	3026
			8113	3024
			8112	3024
			8111	3021
			8111	3019
			8111	3019
			8110	3018
			8110	3018
			8110	3018
			8110	3017
			8109	3017

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8107	3017
			8107	3014
			8107	3011
			8107	3011
			8107	3009
			8105	3007
			8104	3006
			8104	3005
			8104	3004
			8104	3004
			8103	3000
			8103	3000
			8102	2999
			8101	2998
			8101	2996
			8101	2995
			8101	2994
			8101	2994
			8100	2994
			8100	2993
			8099	2992
			8099	2989
			8098	2988
			8097	2988
			8097	2987
			8096	2987
			8096	2986
			8096	2986
			8096	2985
			8096	2985
			8095	2983
			8094	2981
			8094	2980
			8094	2977

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8092	2976
			8092	2975
			8092	2974
			8092	2974
			8092	2974
			8092	2973
			8091	2972
			8091	2971
			8090	2971
			8089	2968
			8089	2967
			8089	2965
			8089	2963
			8088	2962
			8088	2961
			8088	2961
			8087	2960
			8087	2959
			8087	2958
			8085	2957
			8085	2956
			8084	2955
			8084	2953
			8083	2952
			8083	2952
			8082	2951
			8082	2951
			8081	2950
			8081	2946
			8080	2946
			8080	2945
			8079	2943
			8077	2942
			8077	2942

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8077	2941
			8075	2941
			8073	2940
			8073	2939
			8073	2936
			8072	2934
			8072	2934
			8072	2931
			8071	2929
			8070	2928
			8070	2927
			8070	2926
			8070	2923
			8070	2921
			8068	2919
			8068	2918
			8068	2917
			8067	2917
			8067	2917
			8067	2917
			8067	2915
			8066	2914
			8066	2914
			8065	2913
			8064	2909
			8064	2908
			8064	2906
			8064	2905
			8064	2904
			8063	2903
			8063	2902
			8060	2901
			8059	2898
			8059	2898

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8059	2898
			8059	2897
			8058	2896
			8058	2896
			8058	2894
			8058	2892
			8058	2892
			8057	2890
			8056	2889
			8055	2888
			8055	2886
			8053	2885
			8053	2885
			8052	2884
			8051	2884
			8051	2882
			8051	2880
			8051	2880
			8051	2879
			8051	2877
			8050	2874
			8050	2874
			8050	2873
			8049	2873
			8048	2873
			8047	2873
			8047	2871
			8047	2868
			8046	2865
			8045	2865
			8045	2863
			8045	2862
			8045	2861
			8044	2858

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8044	2857
			8043	2857
			8043	2857
			8043	2857
			8041	2856
			8041	2854
			8041	2854
			8040	2854
			8040	2853
			8040	2853
			8040	2851
			8039	2851
			8039	2851
			8039	2849
			8039	2848
			8038	2847
			8038	2847
			8038	2845
			8038	2844
			8038	2843
			8036	2843
			8036	2843
			8035	2840
			8035	2839
			8035	2837
			8035	2837
			8033	2836
			8033	2834
			8033	2834
			8033	2834
			8032	2832
			8031	2832
			8031	2832
			8030	2831

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8029	2830
			8029	2827
			8028	2826
			8028	2826
			8028	2826
			8028	2823
			8027	2823
			8027	2822
			8026	2822
			8026	2821
			8026	2821
			8026	2821
			8026	2820
			8026	2819
			8025	2817
			8025	2816
			8024	2815
			8022	2813
			8022	2812
			8022	2811
			8021	2810
			8021	2807
			8021	2805
			8021	2805
			8020	2805
			8020	2805
			8020	2805
			8019	2804
			8019	2804
			8019	2803
			8018	2802
			8018	2802
			8018	2802
			8017	2801

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8017	2800
			8017	2800
			8016	2799
			8016	2799
			8016	2799
			8015	2798
			8014	2796
			8014	2794
			8014	2793
			8014	2793
			8014	2793
			8014	2793
			8013	2791
			8013	2791
			8013	2791
			8012	2788
			8012	2788
			8011	2788
			8011	2787
			8009	2785
			8009	2785
			8008	2784
			8008	2783
			8008	2783
			8008	2782
			8007	2782
			8007	2781
			8006	2780
			8005	2780
			8003	2779
			8003	2779
			8003	2779
			8002	2779
			8002	2778

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			8002	2778
			8002	2776
			8002	2775
			8001	2775
			8001	2774
			8000	2774
			7999	2772
			7999	2772
			7999	2769
			7999	2769
			7998	2769
			7998	2767
			7998	2766
			7997	2765
			7997	2765
			7997	2765
			7997	2763
			7997	2760
			7997	2760
			7997	2760
			7996	2758
			7996	2756
			7996	2753
			7995	2752
			7995	2751
			7993	2748
			7993	2748
			7993	2747
			7993	2747
			7993	2746
			7992	2746
			7992	2745
			7992	2743
			7992	2742

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7991	2741
			7991	2739
			7990	2739
			7989	2739
			7988	2738
			7988	2738
			7988	2737
			7988	2737
			7987	2736
			7987	2736
			7987	2736
			7986	2735
			7986	2735
			7985	2735
			7985	2734
			7985	2734
			7984	2733
			7983	2733
			7983	2732
			7983	2732
			7983	2731
			7983	2731
			7982	2728
			7982	2727
			7982	2727
			7981	2727
			7980	2726
			7980	2725
			7978	2724
			7978	2721
			7977	2720
			7977	2720
			7977	2719
			7976	2717

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7976	2715
			7976	2714
			7975	2712
			7975	2711
			7975	2710
			7975	2710
			7974	2709
			7974	2709
			7974	2709
			7973	2709
			7973	2708
			7973	2707
			7973	2706
			7973	2705
			7973	2704
			7972	2703
			7972	2701
			7972	2699
			7971	2699
			7971	2698
			7970	2698
			7969	2695
			7969	2694
			7968	2693
			7968	2693
			7967	2693
			7967	2692
			7967	2691
			7967	2690
			7967	2689
			7966	2688
			7966	2688
			7966	2687
			7966	2687

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7965	2687
			7965	2685
			7965	2685
			7965	2684
			7965	2683
			7965	2681
			7964	2681
			7964	2678
			7964	2677
			7964	2676
			7964	2676
			7963	2674
			7963	2674
			7963	2673
			7962	2670
			7962	2669
			7961	2668
			7961	2667
			7961	2666
			7961	2666
			7961	2665
			7960	2663
			7960	2659
			7959	2659
			7959	2656
			7958	2653
			7958	2651
			7957	2650
			7957	2650
			7957	2644
			7956	2643
			7955	2643
			7954	2642
			7953	2642

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7953	2640
			7953	2639
			7953	2636
			7953	2632
			7952	2628
			7952	2628
			7952	2628
			7952	2627
			7951	2622
			7951	2620
			7951	2619
			7951	2615
			7950	2615
			7950	2613
			7950	2613
			7950	2612
			7950	2612
			7950	2612
			7950	2609
			7949	2608
			7949	2608
			7949	2605
			7949	2602
			7949	2595
			7949	2591
			7948	2587
			7948	2585
			7948	2583
			7948	2583
			7947	2582
			7947	2576
			7946	2576
			7946	2572
			7946	2568

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7946	2565
			7945	2565
			7944	2562
			7944	2561
			7943	2558
			7942	2557
			7942	2556
			7942	2550
			7942	2545
			7942	2542
			7941	2540
			7940	2538
			7940	2537
			7939	2527
			7939	2523
			7939	2521
			7939	2519
			7939	2518
			7938	2516
			7938	2516
			7938	2507
			7937	2506
			7937	2498
			7937	2497
			7935	2496
			7935	2488
			7935	2480
			7934	2478
			7934	2475
			7934	2473
			7934	2472
			7933	2469
			7933	2462
			7933	2455

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7933	2455
			7933	2453
			7932	2447
			7931	2445
			7931	2444
			7931	2443
			7930	2437
			7929	2433
			7929	2427
			7929	2423
			7929	2420
			7928	2405
			7928	2403
			7928	2402
			7927	2393
			7927	2382
			7927	2372
			7926	2368
			7926	2366
			7925	2365
			7925	2363
			7925	2361
			7924	2349
			7924	2348
			7924	2311
			7923	2308
			7923	2251
			7923	2201
			7922	2199
			7922	2101
			7922	2092
			7921	2081
			7921	2048
			7920	2029

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7920	1997
			7920	1992
			7920	1991
			7918	1978
			7918	1952
			7917	1950
			7917	1948
			7917	1939
			7916	1930
			7916	1923
			7916	1893
			7915	1866
			7915	
			7915	
			7915	
			7914	
			7914	
			7913	
			7912	
			7912	
			7911	
			7911	
			7911	
			7910	
			7909	
			7909	
			7909	
			7908	
			7908	
			7908	
			7908	
			7907	
			7906	
			7904	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7904	
			7904	
			7904	
			7903	
			7903	
			7902	
			7902	
			7902	
			7901	
			7901	
			7900	
			7899	
			7899	
			7898	
			7898	
			7898	
			7897	
			7897	
			7897	
			7897	
			7896	
			7895	
			7895	
			7894	
			7894	
			7894	
			7894	
			7893	
			7893	
			7892	
			7892	
			7891	
			7891	
			7890	

Raw Gamma Scan Data

Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7890	
			7890	
			7890	
			7890	
			7890	
			7890	
			7889	
			7889	
			7889	
			7889	
			7889	
			7888	
			7888	
			7887	
			7887	
			7887	
			7887	
			7886	
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			7886	
			7885	
			7885	
			7884	
			7884	
			7884	
			7884	
			7884	
			7884	
			7884	
			7883	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7883	
			7883	
			7883	
			7883	
			7882	
			7881	
			7881	
			7881	
			7880	
			7879	
			7878	
			7878	
			7878	
			7878	
			7878	
			7878	
			7878	
			7878	
			7878	
			7877	
			7877	
			7877	
			7876	
			7876	
			7876	
			7876	
			7876	
			7874	
			7873	
			7873	
			7872	
			7872	
			7872	
			7872	
			7872	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7872	
			7871	
			7871	
			7870	
			7870	
			7870	
			7870	
			7870	
			7870	
			7870	
			7868	
			7867	
			7867	
			7867	
			7866	
			7864	
			7864	
			7863	
			7863	
			7863	
			7863	
			7862	
			7862	
			7862	
			7862	
			7862	
			7861	
			7861	
			7861	
			7861	
			7861	
			7861	
			7861	
			7860	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7859	
			7858	
			7857	
			7857	
			7856	
			7856	
			7855	
			7855	
			7854	
			7854	
			7852	
			7852	
			7851	
			7851	
			7850	
			7850	
			7850	
			7850	
			7849	
			7849	
			7848	
			7848	
			7848	
			7848	
			7846	
			7846	
			7845	
			7845	
			7845	
			7845	
			7844	
			7844	
			7844	
			7843	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7842	
			7842	
			7841	
			7841	
			7841	
			7840	
			7839	
			7838	
			7838	
			7837	
			7837	
			7837	
			7837	
			7837	
			7837	
			7837	
			7837	
			7836	
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			7836	
			7836	
			7835	
			7835	
			7835	
			7834	
			7834	
			7833	
			7833	
			7832	
			7832	
			7832	
			7832	
			7832	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7832	
			7831	
			7830	
			7830	
			7830	
			7829	
			7829	
			7829	
			7829	
			7829	
			7828	
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			7827	
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			7827	
			7826	
			7826	
			7826	
			7826	
			7826	
			7825	
			7825	
			7824	
			7823	
			7823	
			7823	
			7823	
			7822	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7822	
			7821	
			7821	
			7820	
			7820	
			7819	
			7818	
			7818	
			7818	
			7817	
			7817	
			7817	
			7816	
			7816	
			7815	
			7815	
			7815	
			7814	
			7814	
			7813	
			7813	
			7812	
			7812	
			7812	
			7812	
			7811	
			7811	
			7811	
			7811	
			7810	
			7810	
			7810	
			7810	
			7808	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7807	
			7807	
			7806	
			7806	
			7805	
			7805	
			7805	
			7805	
			7804	
			7804	
			7804	
			7803	
			7803	
			7803	
			7803	
			7802	
			7802	
			7802	
			7802	
			7802	
			7801	
			7801	
			7800	
			7800	
			7799	
			7799	
			7799	
			7799	
			7798	
			7798	
			7797	
			7797	
			7796	
			7796	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7796	
			7795	
			7795	
			7795	
			7795	
			7793	
			7793	
			7793	
			7793	
			7793	
			7793	
			7793	
			7792	
			7792	
			7792	
			7791	
			7791	
			7791	
			7790	
			7790	
			7790	
			7789	
			7789	
			7789	
			7789	
			7788	
			7788	
			7787	
			7786	
			7786	
			7786	
			7785	
			7785	
			7785	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7785	
			7784	
			7784	
			7784	
			7783	
			7783	
			7782	
			7781	
			7781	
			7781	
			7781	
			7781	
			7780	
			7779	
			7779	
			7779	
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			7778	
			7778	
			7777	
			7777	
			7775	
			7775	
			7775	
			7775	
			7774	
			7774	
			7774	
			7774	
			7774	
			7773	
			7773	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7772	
			7771	
			7770	
			7770	
			7769	
			7769	
			7769	
			7769	
			7768	
			7768	
			7768	
			7768	
			7766	
			7766	
			7766	
			7765	
			7764	
			7763	
			7763	
			7763	
			7762	
			7760	
			7759	
			7759	
			7759	
			7758	
			7758	
			7758	
			7758	
			7757	
			7757	
			7757	
			7757	
			7756	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7755	
			7755	
			7754	
			7754	
			7753	
			7753	
			7753	
			7753	
			7752	
			7752	
			7752	
			7751	
			7751	
			7751	
			7750	
			7750	
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			7750	
			7750	
			7749	
			7749	
			7748	
			7748	
			7748	
			7748	
			7748	
			7747	
			7747	
			7747	
			7746	
			7746	
			7746	
			7746	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7746	
			7746	
			7745	
			7745	
			7744	
			7744	
			7743	
			7743	
			7743	
			7743	
			7743	
			7742	
			7742	
			7742	
			7742	
			7741	
			7741	
			7740	
			7740	
			7740	
			7740	
			7738	
			7737	
			7737	
			7737	
			7737	
			7737	
			7736	
			7736	
			7736	
			7736	
			7736	
			7736	
			7735	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7734	
			7733	
			7732	
			7732	
			7732	
			7732	
			7732	
			7732	
			7731	
			7731	
			7730	
			7730	
			7730	
			7730	
			7729	
			7728	
			7727	
			7727	
			7726	
			7726	
			7726	
			7726	
			7725	
			7725	
			7725	
			7725	
			7725	
			7724	
			7724	
			7723	
			7723	
			7722	
			7722	
			7722	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7721	
			7721	
			7720	
			7719	
			7719	
			7719	
			7718	
			7717	
			7717	
			7717	
			7717	
			7717	
			7716	
			7715	
			7715	
			7715	
			7714	
			7714	
			7714	
			7713	
			7713	
			7713	
			7713	
			7712	
			7712	
			7712	
			7711	
			7711	
			7710	
			7710	
			7710	
			7710	
			7709	
			7709	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7709	
			7708	
			7708	
			7708	
			7707	
			7707	
			7707	
			7707	
			7707	
			7706	
			7706	
			7706	
			7706	
			7705	
			7705	
			7704	
			7704	
			7704	
			7703	
			7702	
			7702	
			7702	
			7701	
			7701	
			7701	
			7701	
			7700	
			7700	
			7700	
			7700	
			7699	
			7698	
			7698	
			7698	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7697	
			7696	
			7696	
			7696	
			7695	
			7695	
			7694	
			7694	
			7693	
			7693	
			7691	
			7691	
			7691	
			7691	
			7691	
			7691	
			7690	
			7690	
			7690	
			7689	
			7689	
			7689	
			7688	
			7688	
			7688	
			7687	
			7687	
			7687	
			7687	
			7686	
			7685	
			7685	
			7684	
			7684	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7684	
			7684	
			7684	
			7684	
			7683	
			7683	
			7683	
			7683	
			7683	
			7682	
			7682	
			7682	
			7682	
			7682	
			7681	
			7680	
			7680	
			7680	
			7680	
			7680	
			7679	
			7679	
			7679	
			7679	
			7679	
			7678	
			7678	
			7677	
			7677	
			7677	
			7676	
			7676	
			7675	
			7674	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7674	
			7673	
			7672	
			7672	
			7672	
			7672	
			7671	
			7671	
			7671	
			7671	
			7670	
			7670	
			7670	
			7669	
			7669	
			7669	
			7669	
			7668	
			7668	
			7668	
			7668	
			7668	
			7667	
			7667	
			7667	
			7666	
			7665	
			7665	
			7665	
			7664	
			7664	
			7664	
			7661	
			7661	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7660	
			7660	
			7659	
			7659	
			7659	
			7658	
			7658	
			7657	
			7657	
			7657	
			7656	
			7656	
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			7654	
			7654	
			7654	
			7654	
			7654	
			7654	
			7653	
			7653	
			7653	
			7653	
			7652	
			7652	
			7651	
			7650	
			7649	
			7649	
			7649	
			7648	
			7648	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7647	
			7647	
			7647	
			7646	
			7646	
			7646	
			7645	
			7645	
			7644	
			7644	
			7644	
			7644	
			7643	
			7642	
			7641	
			7641	
			7641	
			7641	
			7641	
			7640	
			7639	
			7639	
			7639	
			7639	
			7638	
			7638	
			7638	
			7637	
			7637	
			7637	
			7637	
			7637	
			7637	
			7636	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7636	
			7636	
			7636	
			7635	
			7634	
			7633	
			7633	
			7633	
			7633	
			7632	
			7632	
			7631	
			7631	
			7631	
			7630	
			7630	
			7630	
			7629	
			7629	
			7629	
			7628	
			7628	
			7627	
			7627	
			7626	
			7626	
			7626	
			7625	
			7625	
			7625	
			7625	
			7623	
			7622	
			7622	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7622	
			7621	
			7621	
			7621	
			7621	
			7620	
			7620	
			7619	
			7619	
			7619	
			7618	
			7618	
			7616	
			7616	
			7616	
			7616	
			7615	
			7614	
			7614	
			7613	
			7613	
			7613	
			7612	
			7612	
			7611	
			7611	
			7610	
			7609	
			7608	
			7608	
			7608	
			7607	
			7607	
			7607	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7607	
			7607	
			7605	
			7605	
			7605	
			7605	
			7605	
			7605	
			7604	
			7604	
			7604	
			7604	
			7603	
			7603	
			7603	
			7602	
			7601	
			7601	
			7601	
			7601	
			7601	
			7601	
			7601	
			7601	
			7599	
			7599	
			7598	
			7598	
			7597	
			7597	
			7597	
			7596	
			7595	
			7595	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7595	
			7594	
			7594	
			7593	
			7593	
			7593	
			7593	
			7593	
			7592	
			7591	
			7591	
			7591	
			7590	
			7589	
			7589	
			7588	
			7588	
			7588	
			7588	
			7588	
			7587	
			7587	
			7586	
			7585	
			7585	
			7585	
			7585	
			7585	
			7584	
			7584	
			7584	
			7584	
			7583	
			7583	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7582	
			7582	
			7581	
			7581	
			7580	
			7579	
			7579	
			7578	
			7578	
			7577	
			7577	
			7577	
			7576	
			7575	
			7574	
			7573	
			7573	
			7573	
			7573	
			7572	
			7571	
			7571	
			7571	
			7571	
			7570	
			7569	
			7568	
			7567	
			7567	
			7567	
			7566	
			7566	
			7566	
			7566	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7566	
			7566	
			7566	
			7565	
			7565	
			7564	
			7563	
			7563	
			7563	
			7563	
			7563	
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			7562	
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			7561	
			7561	
			7560	
			7560	
			7560	
			7560	
			7559	
			7558	
			7558	
			7557	
			7557	
			7556	
			7556	
			7556	
			7555	
			7554	
			7554	
			7553	
			7553	
			7553	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7552	
			7552	
			7552	
			7552	
			7552	
			7551	
			7551	
			7551	
			7550	
			7550	
			7550	
			7550	
			7549	
			7549	
			7547	
			7547	
			7546	
			7545	
			7545	
			7545	
			7544	
			7544	
			7544	
			7543	
			7543	
			7542	
			7542	
			7541	
			7541	
			7541	
			7540	
			7540	
			7539	
			7539	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7538	
			7538	
			7537	
			7537	
			7536	
			7536	
			7536	
			7535	
			7534	
			7534	
			7534	
			7534	
			7533	
			7533	
			7533	
			7533	
			7533	
			7531	
			7529	
			7529	
			7528	
			7528	
			7528	
			7528	
			7527	
			7527	
			7526	
			7526	
			7524	
			7523	
			7523	
			7523	
			7523	
			7522	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7522	
			7522	
			7521	
			7520	
			7519	
			7519	
			7519	
			7518	
			7517	
			7517	
			7517	
			7516	
			7516	
			7515	
			7514	
			7513	
			7513	
			7512	
			7511	
			7511	
			7511	
			7511	
			7510	
			7510	
			7509	
			7508	
			7508	
			7507	
			7507	
			7507	
			7507	
			7507	
			7507	
			7507	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7506	
			7506	
			7506	
			7506	
			7506	
			7505	
			7504	
			7503	
			7503	
			7503	
			7502	
			7502	
			7502	
			7501	
			7500	
			7500	
			7499	
			7498	
			7498	
			7498	
			7497	
			7497	
			7495	
			7495	
			7495	
			7494	
			7493	
			7493	
			7492	
			7492	
			7492	
			7492	
			7492	
			7492	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7492	
			7490	
			7490	
			7490	
			7489	
			7489	
			7489	
			7489	
			7489	
			7488	
			7488	
			7488	
			7487	
			7487	
			7486	
			7486	
			7486	
			7485	
			7484	
			7484	
			7484	
			7483	
			7483	
			7483	
			7483	
			7483	
			7483	
			7482	
			7482	
			7481	
			7480	
			7480	
			7479	
			7479	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7479	
			7478	
			7478	
			7477	
			7477	
			7477	
			7476	
			7475	
			7474	
			7474	
			7474	
			7474	
			7473	
			7473	
			7472	
			7472	
			7471	
			7471	
			7470	
			7470	
			7469	
			7468	
			7467	
			7467	
			7467	
			7466	
			7466	
			7466	
			7466	
			7465	
			7464	
			7462	
			7462	
			7462	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7461	
			7461	
			7461	
			7460	
			7459	
			7459	
			7459	
			7459	
			7458	
			7458	
			7457	
			7456	
			7455	
			7455	
			7455	
			7454	
			7454	
			7454	
			7454	
			7454	
			7452	
			7452	
			7452	
			7452	
			7451	
			7451	
			7451	
			7449	
			7449	
			7449	
			7448	
			7447	
			7447	
			7447	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7447	
			7446	
			7446	
			7445	
			7445	
			7444	
			7443	
			7443	
			7443	
			7443	
			7443	
			7442	
			7442	
			7440	
			7440	
			7440	
			7440	
			7440	
			7440	
			7440	
			7439	
			7439	
			7439	
			7439	
			7438	
			7437	
			7435	
			7435	
			7433	
			7432	
			7432	
			7432	
			7430	
			7430	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7429	
			7429	
			7429	
			7428	
			7428	
			7428	
			7427	
			7427	
			7426	
			7426	
			7426	
			7425	
			7425	
			7424	
			7423	
			7423	
			7422	
			7422	
			7421	
			7421	
			7421	
			7421	
			7420	
			7419	
			7418	
			7418	
			7417	
			7417	
			7417	
			7416	
			7416	
			7415	
			7415	
			7414	

Raw Gamma Scan Data

Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7414	
			7414	
			7413	
			7412	
			7412	
			7411	
			7411	
			7410	
			7410	
			7410	
			7410	
			7409	
			7409	
			7407	
			7406	
			7406	
			7406	
			7406	
			7405	
			7404	
			7404	
			7403	
			7403	
			7403	
			7402	
			7402	
			7402	
			7402	
			7402	
			7401	
			7401	
			7400	
			7400	
			7400	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7400	
			7399	
			7398	
			7398	
			7397	
			7397	
			7396	
			7395	
			7395	
			7394	
			7394	
			7393	
			7392	
			7391	
			7391	
			7390	
			7390	
			7390	
			7390	
			7390	
			7389	
			7389	
			7388	
			7387	
			7387	
			7387	
			7387	
			7386	
			7386	
			7386	
			7383	
			7381	
			7381	
			7381	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7380	
			7380	
			7380	
			7380	
			7380	
			7379	
			7379	
			7378	
			7378	
			7378	
			7376	
			7376	
			7376	
			7375	
			7375	
			7374	
			7373	
			7372	
			7371	
			7370	
			7370	
			7368	
			7368	
			7368	
			7367	
			7367	
			7367	
			7367	
			7367	
			7367	
			7366	
			7366	
			7366	
			7365	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7365	
			7364	
			7364	
			7364	
			7363	
			7362	
			7362	
			7361	
			7360	
			7360	
			7360	
			7359	
			7358	
			7357	
			7357	
			7357	
			7356	
			7356	
			7356	
			7355	
			7355	
			7355	
			7354	
			7354	
			7354	
			7353	
			7353	
			7352	
			7351	
			7351	
			7351	
			7350	
			7350	
			7350	

Raw Gamma Scan Data

Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7350	
			7349	
			7349	
			7349	
			7347	
			7346	
			7346	
			7345	
			7345	
			7344	
			7344	
			7344	
			7344	
			7343	
			7343	
			7343	
			7343	
			7343	
			7341	
			7341	
			7340	
			7340	
			7340	
			7340	
			7339	
			7339	
			7338	
			7338	
			7338	
			7338	
			7338	
			7338	
			7338	
			7337	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7337	
			7337	
			7336	
			7336	
			7336	
			7335	
			7335	
			7334	
			7334	
			7333	
			7333	
			7332	
			7332	
			7332	
			7331	
			7331	
			7331	
			7331	
			7330	
			7330	
			7330	
			7329	
			7329	
			7328	
			7328	
			7328	
			7327	
			7327	
			7327	
			7327	
			7327	
			7327	
			7326	
			7326	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7326	
			7325	
			7324	
			7324	
			7323	
			7323	
			7323	
			7321	
			7320	
			7318	
			7318	
			7317	
			7317	
			7317	
			7316	
			7316	
			7316	
			7316	
			7314	
			7313	
			7313	
			7313	
			7313	
			7313	
			7312	
			7312	
			7312	
			7311	
			7310	
			7310	
			7309	
			7309	
			7308	
			7308	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7307	
			7306	
			7305	
			7305	
			7305	
			7303	
			7302	
			7302	
			7302	
			7301	
			7301	
			7301	
			7300	
			7300	
			7299	
			7298	
			7298	
			7298	
			7298	
			7297	
			7297	
			7297	
			7297	
			7296	
			7295	
			7294	
			7292	
			7292	
			7292	
			7291	
			7291	
			7290	
			7290	
			7289	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7288	
			7288	
			7288	
			7287	
			7287	
			7287	
			7286	
			7286	
			7285	
			7284	
			7284	
			7283	
			7283	
			7283	
			7283	
			7283	
			7282	
			7282	
			7282	
			7281	
			7280	
			7280	
			7280	
			7279	
			7279	
			7279	
			7279	
			7278	
			7278	
			7277	
			7277	
			7276	
			7275	
			7275	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7275	
			7274	
			7274	
			7273	
			7273	
			7272	
			7272	
			7272	
			7271	
			7271	
			7270	
			7270	
			7270	
			7270	
			7268	
			7268	
			7268	
			7267	
			7267	
			7267	
			7266	
			7265	
			7264	
			7264	
			7263	
			7263	
			7263	
			7263	
			7262	
			7262	
			7262	
			7262	
			7262	
			7261	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7261	
			7260	
			7260	
			7260	
			7260	
			7259	
			7259	
			7259	
			7257	
			7256	
			7255	
			7253	
			7253	
			7253	
			7253	
			7252	
			7252	
			7250	
			7250	
			7249	
			7248	
			7247	
			7247	
			7247	
			7246	
			7246	
			7245	
			7244	
			7244	
			7244	
			7243	
			7243	
			7242	
			7242	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7242	
			7242	
			7242	
			7242	
			7241	
			7241	
			7241	
			7241	
			7241	
			7240	
			7240	
			7240	
			7238	
			7238	
			7237	
			7237	
			7236	
			7236	
			7236	
			7235	
			7234	
			7234	
			7234	
			7234	
			7232	
			7230	
			7230	
			7227	
			7226	
			7226	
			7226	
			7225	
			7225	
			7225	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7224	
			7224	
			7224	
			7224	
			7224	
			7223	
			7223	
			7221	
			7220	
			7220	
			7219	
			7219	
			7218	
			7217	
			7216	
			7216	
			7216	
			7215	
			7214	
			7214	
			7213	
			7212	
			7211	
			7211	
			7211	
			7210	
			7210	
			7210	
			7210	
			7210	
			7209	
			7209	
			7209	
			7209	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7208	
			7208	
			7207	
			7207	
			7206	
			7206	
			7206	
			7205	
			7202	
			7202	
			7202	
			7201	
			7200	
			7200	
			7198	
			7197	
			7197	
			7197	
			7196	
			7195	
			7195	
			7195	
			7195	
			7194	
			7194	
			7194	
			7194	
			7193	
			7193	
			7193	
			7193	
			7191	
			7191	
			7190	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7189	
			7189	
			7189	
			7189	
			7187	
			7186	
			7186	
			7185	
			7184	
			7183	
			7183	
			7182	
			7182	
			7181	
			7181	
			7181	
			7180	
			7180	
			7180	
			7180	
			7179	
			7178	
			7178	
			7177	
			7177	
			7177	
			7177	
			7176	
			7176	
			7176	
			7175	
			7175	
			7173	
			7172	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7172	
			7171	
			7171	
			7171	
			7171	
			7170	
			7169	
			7169	
			7167	
			7167	
			7166	
			7166	
			7165	
			7165	
			7165	
			7164	
			7164	
			7164	
			7163	
			7163	
			7162	
			7162	
			7162	
			7161	
			7160	
			7160	
			7159	
			7159	
			7159	
			7159	
			7158	
			7157	
			7157	
			7157	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7157	
			7156	
			7155	
			7155	
			7154	
			7154	
			7154	
			7153	
			7150	
			7149	
			7148	
			7148	
			7148	
			7148	
			7148	
			7146	
			7144	
			7144	
			7143	
			7143	
			7143	
			7141	
			7141	
			7140	
			7139	
			7139	
			7139	
			7138	
			7138	
			7137	
			7137	
			7136	
			7135	
			7135	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7135	
			7134	
			7134	
			7132	
			7130	
			7128	
			7128	
			7128	
			7127	
			7127	
			7126	
			7126	
			7126	
			7125	
			7125	
			7124	
			7124	
			7121	
			7120	
			7119	
			7119	
			7119	
			7119	
			7119	
			7118	
			7117	
			7116	
			7114	
			7113	
			7113	
			7113	
			7112	
			7111	
			7111	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7111	
			7111	
			7110	
			7110	
			7110	
			7109	
			7109	
			7108	
			7107	
			7107	
			7106	
			7106	
			7105	
			7104	
			7104	
			7104	
			7104	
			7104	
			7103	
			7102	
			7102	
			7102	
			7102	
			7101	
			7100	
			7100	
			7100	
			7100	
			7100	
			7099	
			7099	
			7098	
			7098	
			7097	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7095	
			7094	
			7093	
			7093	
			7093	
			7093	
			7092	
			7091	
			7091	
			7091	
			7091	
			7090	
			7089	
			7089	
			7086	
			7085	
			7085	
			7084	
			7083	
			7081	
			7081	
			7081	
			7081	
			7080	
			7079	
			7078	
			7078	
			7078	
			7078	
			7077	
			7076	
			7076	
			7076	
			7075	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7075	
			7075	
			7075	
			7075	
			7074	
			7074	
			7073	
			7071	
			7071	
			7070	
			7069	
			7069	
			7068	
			7068	
			7068	
			7067	
			7067	
			7067	
			7066	
			7062	
			7061	
			7060	
			7060	
			7058	
			7058	
			7057	
			7057	
			7056	
			7055	
			7055	
			7054	
			7054	
			7053	
			7053	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7052	
			7052	
			7051	
			7051	
			7049	
			7048	
			7047	
			7047	
			7046	
			7045	
			7045	
			7044	
			7044	
			7043	
			7043	
			7043	
			7043	
			7042	
			7042	
			7042	
			7040	
			7040	
			7039	
			7037	
			7037	
			7036	
			7036	
			7035	
			7035	
			7035	
			7032	
			7032	
			7031	
			7031	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7030	
			7030	
			7029	
			7029	
			7028	
			7027	
			7027	
			7027	
			7026	
			7026	
			7024	
			7024	
			7024	
			7023	
			7022	
			7022	
			7021	
			7021	
			7020	
			7019	
			7018	
			7018	
			7017	
			7017	
			7017	
			7017	
			7016	
			7016	
			7016	
			7015	
			7015	
			7015	
			7015	
			7014	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			7014	
			7013	
			7013	
			7012	
			7012	
			7012	
			7012	
			7012	
			7011	
			7011	
			7011	
			7010	
			7009	
			7008	
			7008	
			7008	
			7008	
			7007	
			7007	
			7005	
			7005	
			7005	
			7005	
			7005	
			7004	
			7004	
			7001	
			7001	
			7000	
			7000	
			6999	
			6998	
			6996	
			6996	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6995	
			6994	
			6990	
			6990	
			6989	
			6989	
			6989	
			6988	
			6987	
			6987	
			6986	
			6984	
			6984	
			6983	
			6982	
			6981	
			6981	
			6979	
			6978	
			6978	
			6978	
			6977	
			6976	
			6975	
			6974	
			6974	
			6973	
			6973	
			6971	
			6970	
			6968	
			6968	
			6967	
			6966	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6965	
			6962	
			6960	
			6959	
			6958	
			6958	
			6957	
			6957	
			6957	
			6955	
			6955	
			6955	
			6954	
			6954	
			6954	
			6952	
			6952	
			6951	
			6951	
			6951	
			6950	
			6950	
			6949	
			6947	
			6946	
			6946	
			6946	
			6945	
			6944	
			6942	
			6941	
			6940	
			6938	
			6938	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6938	
			6937	
			6937	
			6937	
			6935	
			6935	
			6934	
			6934	
			6933	
			6932	
			6932	
			6932	
			6931	
			6931	
			6931	
			6930	
			6930	
			6928	
			6927	
			6927	
			6927	
			6927	
			6926	
			6925	
			6924	
			6923	
			6923	
			6923	
			6922	
			6922	
			6922	
			6919	
			6919	
			6919	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6918	
			6916	
			6915	
			6914	
			6914	
			6911	
			6911	
			6909	
			6908	
			6908	
			6907	
			6907	
			6907	
			6906	
			6906	
			6905	
			6905	
			6903	
			6901	
			6899	
			6899	
			6898	
			6898	
			6898	
			6898	
			6896	
			6896	
			6896	
			6896	
			6894	
			6894	
			6893	
			6892	
			6890	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6889	
			6888	
			6888	
			6888	
			6888	
			6887	
			6887	
			6886	
			6886	
			6886	
			6885	
			6885	
			6885	
			6882	
			6881	
			6877	
			6877	
			6875	
			6875	
			6875	
			6875	
			6874	
			6873	
			6873	
			6871	
			6870	
			6870	
			6869	
			6866	
			6865	
			6865	
			6863	
			6861	
			6861	

Raw Gamma Scan Data

Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6859	
			6859	
			6858	
			6858	
			6856	
			6854	
			6853	
			6853	
			6852	
			6852	
			6845	
			6844	
			6844	
			6844	
			6844	
			6843	
			6843	
			6842	
			6842	
			6841	
			6840	
			6838	
			6838	
			6837	
			6837	
			6837	
			6837	
			6837	
			6836	
			6834	
			6832	
			6831	
			6830	
			6830	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6828	
			6828	
			6827	
			6826	
			6824	
			6824	
			6823	
			6822	
			6821	
			6821	
			6820	
			6818	
			6817	
			6815	
			6815	
			6814	
			6811	
			6809	
			6808	
			6808	
			6807	
			6807	
			6807	
			6805	
			6805	
			6803	
			6802	
			6799	
			6799	
			6798	
			6797	
			6797	
			6797	
			6796	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6795	
			6793	
			6792	
			6792	
			6791	
			6791	
			6791	
			6791	
			6791	
			6789	
			6787	
			6786	
			6784	
			6784	
			6784	
			6783	
			6782	
			6782	
			6782	
			6781	
			6780	
			6778	
			6776	
			6776	
			6774	
			6774	
			6773	
			6772	
			6772	
			6772	
			6772	
			6772	
			6771	
			6770	

Raw Gamma Scan Data

Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6769	
			6768	
			6767	
			6766	
			6766	
			6764	
			6764	
			6764	
			6762	
			6761	
			6761	
			6761	
			6761	
			6760	
			6759	
			6759	
			6758	
			6757	
			6756	
			6756	
			6754	
			6750	
			6750	
			6750	
			6749	
			6748	
			6747	
			6746	
			6746	
			6746	
			6745	
			6744	
			6744	
			6744	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6741	
			6741	
			6740	
			6739	
			6739	
			6739	
			6739	
			6738	
			6738	
			6738	
			6738	
			6736	
			6735	
			6733	
			6731	
			6730	
			6730	
			6729	
			6728	
			6728	
			6725	
			6725	
			6724	
			6724	
			6723	
			6723	
			6721	
			6718	
			6715	
			6714	
			6714	
			6711	
			6711	
			6711	

Raw Gamma Scan Data

Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6710	
			6710	
			6709	
			6708	
			6708	
			6707	
			6703	
			6702	
			6702	
			6701	
			6701	
			6701	
			6700	
			6700	
			6700	
			6698	
			6693	
			6692	
			6691	
			6691	
			6689	
			6689	
			6688	
			6688	
			6687	
			6683	
			6683	
			6683	
			6682	
			6682	
			6681	
			6678	
			6677	
			6677	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6676	
			6674	
			6674	
			6673	
			6673	
			6671	
			6671	
			6670	
			6670	
			6669	
			6668	
			6667	
			6666	
			6665	
			6665	
			6664	
			6664	
			6662	
			6656	
			6656	
			6655	
			6654	
			6651	
			6648	
			6646	
			6646	
			6646	
			6644	
			6644	
			6644	
			6644	
			6643	
			6643	
			6641	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6641	
			6640	
			6640	
			6639	
			6639	
			6639	
			6638	
			6638	
			6637	
			6636	
			6635	
			6634	
			6633	
			6632	
			6632	
			6632	
			6631	
			6631	
			6631	
			6630	
			6629	
			6628	
			6627	
			6627	
			6626	
			6625	
			6625	
			6625	
			6623	
			6622	
			6622	
			6622	
			6621	
			6620	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6620	
			6618	
			6618	
			6618	
			6618	
			6616	
			6615	
			6613	
			6612	
			6611	
			6611	
			6611	
			6608	
			6607	
			6606	
			6605	
			6605	
			6604	
			6604	
			6604	
			6604	
			6602	
			6602	
			6601	
			6600	
			6600	
			6600	
			6600	
			6600	
			6600	
			6599	
			6599	
			6598	
			6597	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6597	
			6597	
			6596	
			6594	
			6592	
			6591	
			6591	
			6591	
			6590	
			6590	
			6588	
			6587	
			6586	
			6586	
			6586	
			6585	
			6585	
			6585	
			6584	
			6583	
			6582	
			6580	
			6579	
			6578	
			6578	
			6577	
			6577	
			6577	
			6575	
			6575	
			6574	
			6573	
			6573	
			6573	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6573	
			6572	
			6571	
			6571	
			6571	
			6569	
			6568	
			6567	
			6567	
			6566	
			6566	
			6566	
			6564	
			6563	
			6563	
			6560	
			6559	
			6559	
			6559	
			6558	
			6557	
			6555	
			6555	
			6553	
			6553	
			6553	
			6551	
			6550	
			6549	
			6549	
			6549	
			6547	
			6547	
			6546	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6546	
			6545	
			6544	
			6544	
			6542	
			6540	
			6538	
			6536	
			6536	
			6536	
			6534	
			6533	
			6533	
			6532	
			6531	
			6530	
			6529	
			6527	
			6526	
			6525	
			6523	
			6522	
			6521	
			6521	
			6521	
			6518	
			6517	
			6516	
			6514	
			6514	
			6514	
			6514	
			6510	
			6509	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6509	
			6508	
			6506	
			6505	
			6505	
			6503	
			6502	
			6502	
			6502	
			6500	
			6497	
			6496	
			6496	
			6495	
			6494	
			6494	
			6490	
			6486	
			6484	
			6483	
			6482	
			6481	
			6480	
			6477	
			6475	
			6474	
			6473	
			6471	
			6471	
			6469	
			6469	
			6468	
			6467	
			6467	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6466	
			6466	
			6465	
			6464	
			6464	
			6463	
			6461	
			6461	
			6460	
			6459	
			6459	
			6459	
			6457	
			6456	
			6455	
			6454	
			6454	
			6453	
			6452	
			6451	
			6450	
			6449	
			6448	
			6448	
			6447	
			6447	
			6445	
			6445	
			6442	
			6441	
			6441	
			6439	
			6437	
			6436	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6433	
			6433	
			6432	
			6432	
			6431	
			6427	
			6427	
			6427	
			6423	
			6423	
			6423	
			6422	
			6421	
			6421	
			6420	
			6420	
			6420	
			6417	
			6416	
			6415	
			6415	
			6415	
			6414	
			6413	
			6413	
			6412	
			6412	
			6412	
			6411	
			6409	
			6408	
			6408	
			6407	
			6405	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6405	
			6404	
			6404	
			6398	
			6397	
			6396	
			6395	
			6395	
			6393	
			6392	
			6391	
			6390	
			6389	
			6387	
			6387	
			6386	
			6384	
			6383	
			6383	
			6382	
			6378	
			6376	
			6375	
			6374	
			6372	
			6372	
			6372	
			6372	
			6372	
			6372	
			6370	
			6367	
			6367	
			6363	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6362	
			6362	
			6360	
			6358	
			6357	
			6357	
			6356	
			6355	
			6355	
			6355	
			6355	
			6352	
			6352	
			6350	
			6349	
			6349	
			6349	
			6349	
			6348	
			6348	
			6347	
			6347	
			6347	
			6345	
			6345	
			6344	
			6343	
			6342	
			6340	
			6340	
			6340	
			6340	
			6340	
			6337	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6337	
			6336	
			6335	
			6335	
			6333	
			6332	
			6331	
			6330	
			6329	
			6328	
			6327	
			6326	
			6323	
			6323	
			6321	
			6317	
			6317	
			6317	
			6315	
			6311	
			6310	
			6310	
			6309	
			6309	
			6307	
			6307	
			6306	
			6306	
			6305	
			6304	
			6303	
			6302	
			6299	
			6299	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6299	
			6298	
			6296	
			6296	
			6294	
			6292	
			6292	
			6291	
			6290	
			6288	
			6287	
			6282	
			6282	
			6282	
			6281	
			6281	
			6278	
			6278	
			6275	
			6273	
			6270	
			6269	
			6269	
			6268	
			6268	
			6267	
			6266	
			6259	
			6259	
			6257	
			6255	
			6255	
			6254	
			6252	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6250	
			6249	
			6249	
			6248	
			6247	
			6241	
			6240	
			6240	
			6239	
			6236	
			6236	
			6235	
			6229	
			6229	
			6226	
			6226	
			6226	
			6226	
			6225	
			6225	
			6224	
			6222	
			6222	
			6221	
			6220	
			6220	
			6220	
			6217	
			6216	
			6215	
			6214	
			6214	
			6208	
			6202	

Raw Gamma Scan Data

Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6201	
			6201	
			6201	
			6199	
			6197	
			6196	
			6191	
			6191	
			6190	
			6189	
			6187	
			6187	
			6187	
			6185	
			6184	
			6184	
			6176	
			6171	
			6168	
			6168	
			6168	
			6164	
			6163	
			6163	
			6163	
			6162	
			6161	
			6160	
			6157	
			6153	
			6152	
			6151	
			6151	
			6148	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6143	
			6142	
			6141	
			6140	
			6140	
			6140	
			6138	
			6138	
			6138	
			6134	
			6132	
			6127	
			6126	
			6126	
			6123	
			6120	
			6118	
			6117	
			6116	
			6116	
			6115	
			6114	
			6112	
			6110	
			6107	
			6106	
			6106	
			6106	
			6099	
			6099	
			6098	
			6097	
			6095	
			6094	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6093	
			6093	
			6091	
			6089	
			6088	
			6087	
			6085	
			6085	
			6082	
			6081	
			6072	
			6070	
			6067	
			6067	
			6063	
			6063	
			6058	
			6058	
			6056	
			6049	
			6049	
			6046	
			6044	
			6042	
			6041	
			6041	
			6040	
			6040	
			6039	
			6035	
			6034	
			6034	
			6032	
			6029	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			6027	
			6027	
			6026	
			6025	
			6024	
			6023	
			6019	
			6017	
			6016	
			6015	
			6014	
			6013	
			6012	
			6011	
			6008	
			6003	
			6003	
			6002	
			5999	
			5998	
			5996	
			5995	
			5995	
			5992	
			5992	
			5992	
			5991	
			5991	
			5989	
			5986	
			5980	
			5980	
			5980	
			5978	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5977	
			5975	
			5973	
			5971	
			5971	
			5971	
			5970	
			5966	
			5964	
			5962	
			5958	
			5955	
			5955	
			5954	
			5954	
			5951	
			5951	
			5950	
			5946	
			5944	
			5943	
			5941	
			5940	
			5938	
			5938	
			5936	
			5935	
			5933	
			5928	
			5927	
			5926	
			5926	
			5925	
			5924	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5923	
			5921	
			5921	
			5921	
			5919	
			5918	
			5915	
			5913	
			5908	
			5907	
			5906	
			5904	
			5901	
			5901	
			5898	
			5898	
			5896	
			5894	
			5893	
			5891	
			5889	
			5888	
			5887	
			5883	
			5883	
			5882	
			5882	
			5881	
			5873	
			5872	
			5872	
			5871	
			5869	
			5868	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5866	
			5865	
			5862	
			5861	
			5858	
			5857	
			5857	
			5854	
			5852	
			5852	
			5850	
			5849	
			5849	
			5849	
			5840	
			5840	
			5838	
			5838	
			5837	
			5837	
			5835	
			5834	
			5833	
			5830	
			5828	
			5823	
			5818	
			5815	
			5812	
			5811	
			5810	
			5809	
			5808	
			5808	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5805	
			5803	
			5802	
			5802	
			5799	
			5797	
			5796	
			5794	
			5791	
			5788	
			5788	
			5785	
			5776	
			5775	
			5775	
			5774	
			5773	
			5772	
			5769	
			5767	
			5766	
			5763	
			5762	
			5760	
			5759	
			5756	
			5752	
			5750	
			5744	
			5735	
			5735	
			5733	
			5726	
			5720	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5718	
			5717	
			5713	
			5713	
			5708	
			5707	
			5701	
			5700	
			5697	
			5696	
			5692	
			5689	
			5687	
			5683	
			5676	
			5675	
			5674	
			5673	
			5672	
			5671	
			5666	
			5665	
			5663	
			5663	
			5660	
			5655	
			5654	
			5651	
			5646	
			5644	
			5639	
			5639	
			5638	
			5638	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5635	
			5635	
			5634	
			5633	
			5632	
			5626	
			5625	
			5623	
			5623	
			5622	
			5621	
			5617	
			5613	
			5611	
			5611	
			5604	
			5604	
			5601	
			5600	
			5600	
			5599	
			5596	
			5594	
			5593	
			5590	
			5589	
			5586	
			5579	
			5575	
			5575	
			5574	
			5573	
			5570	
			5563	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5558	
			5550	
			5546	
			5545	
			5543	
			5541	
			5540	
			5539	
			5539	
			5537	
			5536	
			5534	
			5531	
			5530	
			5530	
			5521	
			5521	
			5517	
			5516	
			5512	
			5510	
			5509	
			5509	
			5507	
			5506	
			5505	
			5504	
			5503	
			5503	
			5498	
			5498	
			5497	
			5485	
			5485	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5484	
			5483	
			5479	
			5477	
			5473	
			5473	
			5471	
			5467	
			5464	
			5460	
			5458	
			5457	
			5455	
			5454	
			5451	
			5447	
			5445	
			5442	
			5439	
			5438	
			5437	
			5437	
			5436	
			5430	
			5426	
			5425	
			5423	
			5422	
			5421	
			5418	
			5412	
			5411	
			5409	
			5409	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5407	
			5407	
			5407	
			5405	
			5404	
			5396	
			5394	
			5391	
			5388	
			5386	
			5386	
			5381	
			5381	
			5381	
			5373	
			5373	
			5372	
			5372	
			5368	
			5364	
			5362	
			5360	
			5358	
			5355	
			5351	
			5351	
			5351	
			5348	
			5345	
			5338	
			5334	
			5332	
			5332	
			5329	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5325	
			5317	
			5316	
			5316	
			5313	
			5304	
			5303	
			5301	
			5299	
			5299	
			5297	
			5297	
			5295	
			5295	
			5295	
			5294	
			5294	
			5290	
			5286	
			5286	
			5286	
			5285	
			5277	
			5275	
			5269	
			5268	
			5265	
			5263	
			5261	
			5255	
			5253	
			5251	
			5251	
			5250	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5241	
			5238	
			5231	
			5229	
			5228	
			5228	
			5226	
			5220	
			5220	
			5219	
			5219	
			5218	
			5215	
			5215	
			5215	
			5206	
			5205	
			5200	
			5200	
			5197	
			5195	
			5192	
			5191	
			5179	
			5176	
			5164	
			5164	
			5163	
			5163	
			5161	
			5161	
			5158	
			5144	
			5141	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5141	
			5140	
			5133	
			5132	
			5125	
			5125	
			5124	
			5123	
			5121	
			5119	
			5112	
			5109	
			5107	
			5106	
			5105	
			5104	
			5103	
			5103	
			5099	
			5095	
			5091	
			5091	
			5089	
			5088	
			5084	
			5079	
			5073	
			5072	
			5070	
			5070	
			5064	
			5063	
			5062	
			5061	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			5061	
			5057	
			5056	
			5051	
			5047	
			5045	
			5039	
			5037	
			5030	
			5030	
			5024	
			5019	
			5019	
			5010	
			5010	
			5002	
			5001	
			5000	
			5000	
			4999	
			4999	
			4998	
			4992	
			4990	
			4988	
			4983	
			4980	
			4978	
			4975	
			4974	
			4964	
			4961	
			4955	
			4954	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			4954	
			4951	
			4950	
			4940	
			4934	
			4929	
			4926	
			4925	
			4916	
			4916	
			4916	
			4913	
			4910	
			4909	
			4906	
			4899	
			4891	
			4890	
			4890	
			4881	
			4874	
			4873	
			4861	
			4858	
			4855	
			4852	
			4840	
			4836	
			4836	
			4835	
			4831	
			4826	
			4824	
			4819	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			4819	
			4818	
			4816	
			4815	
			4809	
			4807	
			4798	
			4796	
			4795	
			4781	
			4781	
			4773	
			4767	
			4761	
			4756	
			4742	
			4732	
			4712	
			4706	
			4678	
			4661	
			4616	
			4616	
			4594	
			4593	
			4582	
			4579	
			4578	
			4574	
			4571	
			4549	
			4538	
			4534	
			4511	

Raw Gamma Scan Data

Survey Units 1-3

SU1 Vertical 44-20	SU1 Berth 61 44-20	SU2 Vertical 44-20	SU3 Drydock 7 44-20	SU3 Berth 62_63 44-20
			4510	
			4508	
			4475	
			4381	
			4366	
			4334	
			4059	
			3821	
			3761	
			3631	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Impellers 44-20	SU2 Impellers 44-20	SU3 Impellers 44-20	SU1 Manholes 44-20	SU2 Manholes 44-20	SU3 Manholes 44-20
12647	13708	12386	10311	11047	12581
12446	13570	12179	9567	10613	12177
12231	13551	11739	9375	10495	12167
12099	13532	11317	9243	10141	12132
11890	13467	11178	9224	10022	11995
11643	13303	11007	9204	9619	11951
11620	13170	10979	9060	9592	11917
11574	12888	10976	9043	9491	11912
11540	12848	10974	8990	9378	11677
11508	12624	10939	8932	9359	11652
11324	12606	10923	8825	9338	11531
11268	12403	10908	8765	9306	11527
11257	12309	10852	8746	9282	11513
11231	12285	10832	8738	9259	11353
11201	12194	10812	8712	9215	11327
11200	12023	10801	8588	9209	11271
11015	12001	10773	8572	9206	11262
11012	11977	10761	8558	9167	11197
10977	11907	10757	8508	9152	11031
10954	11903	10728	8502	9082	10998
10935	11882	10707	8475	9069	10960
10935	11826	10641	8457	9048	10933
10850	11771	10627	8451	9041	10914
10817	11761	10626	8402	8960	10891
10805	11723	10580	8366	8932	10854
10802	11659	10539	8338	8931	10758
10727	11644	10522	8334	8922	10724
10717	11630	10509	8306	8920	10672
10706	11582	10484	8305	8893	10612
10700	11488	10473	8303	8880	10594
10664	11264	10456	8298	8877	10582
10653	11230	10452	8256	8870	10574
10652	11223	10446	8236	8842	10451
10650	11216	10381	8226	8839	10436

Raw Gamma Scan Data
Survey Units 1-3

SU1 Impellers 44-20	SU2 Impellers 44-20	SU3 Impellers 44-20	SU1 Manholes 44-20	SU2 Manholes 44-20	SU3 Manholes 44-20
10560	11181	10361	8201	8826	10282
10558	11175	10321	8175	8794	10266
10537	11153	10257	8107	8782	10022
10502	11071	10234	8083	8768	9946
10469	11071	10186	8074	8763	9904
10460	11050	10158	8036	8750	9902
10451	11036	10105	8030	8734	9683
10440	11034	10089	8006	8725	9527
10439	11015	10053	7995	8714	9456
10426	10998	10021	7986	8713	9410
10384	10994	9965	7982	8702	9386
10357	10957	9926	7979	8685	9384
10331	10931	9900	7957	8681	9380
10323	10929	9886	7943	8658	9342
10272	10924	9861	7931	8632	9005
10258	10897	9828	7907	8614	8960
10231	10883	9823	7866	8613	8900
10218	10880	9775	7864	8606	8890
10153	10871	9772	7783	8576	8868
10137	10855	9750	7762	8576	8850
10136	10848	9738	7755	8531	8840
10119	10812	9705	7749	8522	8784
10113	10811	9693	7734	8495	8756
10096	10792	9689	7718	8493	8700
10091	10791	9685	7709	8487	8680
10091	10773	9636	7703	8475	8592
10087	10767	9608	7637	8461	8583
10075	10715	9588	7586	8447	8567
10052	10683	9584	7560	8435	8383
10036	10677	9497	7555	8430	8346
10030	10668	9467	7551	8425	8342
9960	10549	9465	7538	8418	8333
9951	10537	9456	7432	8416	8319
9937	10526	9441	7376	8411	8282

Raw Gamma Scan Data
Survey Units 1-3

SU1 Impellers 44-20	SU2 Impellers 44-20	SU3 Impellers 44-20	SU1 Manholes 44-20	SU2 Manholes 44-20	SU3 Manholes 44-20
9914	10524	9426	7369	8398	8256
9881	10509	9423	7366	8384	8228
9874	10490	9412	7334	8346	8205
9865	10451	9375	7314	8322	8162
9744	10438	9258	7275	8320	8097
9742	10325	9216	7233	8308	8025
9741	10324	9045	7217	8287	7983
9709	10323	8964	7213	8261	7961
9635	10315	8941	7204	8244	7954
9592	10288	8919	7183	8211	7946
9554	10201	8905	7183	8202	7839
9543	10185	8824	7111	8185	7685
9517	10178	8815	7106	8162	7653
9496	10174	8805	7092	8157	7622
9443	10086	8780	7089	8147	7564
9442	10067	8751	7066	8136	7561
9301	10066	8738	7042	8087	7533
9283	10050	8674	7015	8061	7428
9271	10020	8654	7008	8036	7413
9217	10007	8625	6989	8033	7365
9183	9956	8604	6978	8021	7334
9173	9948	8546	6974	7975	7331
9171	9915	8517	6948	7966	7328
9152	9879	8382	6946	7950	7300
9113	9839	8130	6939	7944	7232
9075	9705	8112	6927	7931	7222
9071	9680	8107	6915	7905	7196
9067	9573	8050	6886	7904	7147
9040	9544	7985	6865	7900	7127
9012	9520	7921	6852	7894	7079
8993	9515	7856	6746	7876	7039
8935	9512	7729	6737	7858	7015
8904	9499	7698	6732	7857	6986
8832	9470	7654	6602	7850	6948

Raw Gamma Scan Data
Survey Units 1-3

SU1 Impellers 44-20	SU2 Impellers 44-20	SU3 Impellers 44-20	SU1 Manholes 44-20	SU2 Manholes 44-20	SU3 Manholes 44-20
8832	9458	7653	6551	7832	6947
8812	9386	7620	6525	7824	6920
8728	9308	7476	6515	7795	6861
8668	9267	7441	6509	7794	6846
8657	9195	7417	6496	7781	6829
8653	9178	7412	6450	7764	6820
8611	9152	7385	6400	7753	6811
8583	9148	7328	6387	7724	6797
8551	9110	7291	6324	7680	6784
8405	9010	7241	6226	7662	6783
8404	8936	7177	6170	7632	6756
8339	8932	7090	6159	7604	6674
8317	8907	7083	6055	7593	6644
8259	8890	7039	6047	7589	6581
8247	8825	6995	6046	7584	6556
8198	8818	6985	6024	7576	6547
8191	8806	6926	6001	7572	6514
8113	8794	6918	5910	7566	6491
8091	8785	6873	5909	7562	6461
8058	8782	6163	5899	7561	6449
8031	8777	6022	5899	7560	6426
7934	8761		5894	7556	6409
7901	8748		5886	7549	6379
7864	8676		5859	7548	6372
7742	8624		5856	7548	6337
7704	8568		5819	7546	6256
7649	8554		5795	7544	6249
7608	8347		5740	7529	6222
7607	8345		5642	7527	
7591	8321		5574	7514	
7504	8314			7499	
7487	8309			7497	
7424	8238			7496	
7393	8215			7488	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Impellers 44-20	SU2 Impellers 44-20	SU3 Impellers 44-20	SU1 Manholes 44-20	SU2 Manholes 44-20	SU3 Manholes 44-20
7310	8211			7480	
7299	8180			7471	
7282	8139			7467	
7133	8112			7457	
7057	8065			7454	
7002	8040			7451	
6990	7901			7430	
6773	7895			7420	
6453	7837			7416	
6115	7810			7411	
	7747			7402	
	7744			7392	
	7718			7364	
	7698			7362	
	7695			7362	
	7694			7362	
	7667			7361	
	7629			7331	
	7597			7312	
	7586			7307	
	7562			7302	
	7540			7282	
	7532			7279	
	7486			7273	
	7485			7243	
	7476			7229	
	7389			7224	
	7385			7220	
	7384			7157	
	7307			7145	
	7294			7142	
	7282			7108	
	7173			7107	
	7155			7086	

Raw Gamma Scan Data
Survey Units 1-3

SU1 Impellers 44-20	SU2 Impellers 44-20	SU3 Impellers 44-20	SU1 Manholes 44-20	SU2 Manholes 44-20	SU3 Manholes 44-20
	7089			7072	
	6903			7069	
	6880			7053	
	6819			7051	
	6631			7043	
	6555			7007	
	6539			6920	
	6445			6903	
	6255			6901	
	6204			6859	
				6858	
				6798	
				6753	
				6704	
				6693	
				6666	
				6639	
				6603	
				6500	
				6463	
				6430	
				6389	
				6293	
				6075	

Summary Statistics for Gamma Scan Survey Data
Survey Units 1-3

General Statistics for Horizontal Scans with the 44-20

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
SU1 Horizontal 44-20	2137	0	4301	12179	7908	7755	1543	33.39	1905	0.15	0.195
SU2 Horizontal 44-20	1879	0	4674	13632	7538	7369	1677	38.68	1330	1.022	0.222
SU3 Horizontal 44-20	2279	0	3706	11590	7491	7286	1732	36.28	1972	0.124	0.231

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1	50%ile(Q2)	75%ile(Q3	80%ile	90%ile	95%ile	99%ile
SU1 Horizontal 44-20	2137	0	5911	6369	6683	7821	9211	9460	10077	10431	11021
SU2 Horizontal 44-20	1879	0	5659	6164	6323	7290	8131	8410	10681	11295	11884
SU3 Horizontal 44-20	2279	0	5197	5801	6124	7385	8803	9225	9988	10354	10943

General Statistics for Horizontal Scans with the RS700

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
SU1 Horizontal RS700	1749	0	1890	2674	2144	2140	120.8	2.888	84.94	1.409	0.0563
SU2 Horizontal RS700	2372	0	2086	2994	2392	2386	165.4	3.397	162.7	0.82	0.0692
SU3 Horizontal RS700	1713	0	1780	2368	2044	2041	112.8	2.726	113.3	0.537	0.0552

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1	50%ile(Q2)	75%ile(Q3	80%ile	90%ile	95%ile	99%ile
SU1 Horizontal RS700	1749	0	2015	2055	2071	2127	2185	2203	2299	2389	2575
SU2 Horizontal RS700	2372	0	2207	2249	2266	2359	2492	2515	2620	2740	2842
SU3 Horizontal RS700	1713	0	1912	1944	1958	2030	2114	2135	2210	2264	2323

General Statistics for Vertical Scans with the 44-20

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
SU1 Vertical 44-20	7558	0	2598	15530	9088	8820	2116	24.34	2196	-0.0913	0.233
SU1 Berth 61 44-20	912	0	5614	12122	9108	8939	1670	55.3	1520	-0.619	0.183
SU2 Vertical 44-20	8306	0	3034	16210	9380	9157	1985	21.78	2285	-0.0315	0.212
SU3 Drydock 7 44-20	12658	0	3631	17480	9116	8930	1801	16.01	1990	0.00962	0.198
SU3 Berth 62_63 44-20	9056	0	1866	15016	4743	4588	1274	13.38	947.4	1.14	0.269

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1	50%ile(Q2)	75%ile(Q3	80%ile	90%ile	95%ile	99%ile
SU1 Vertical 44-20	7558	0	6656	7419	7619	8979	10706	11102	11933	12459	13304
SU1 Berth 61 44-20	912	0	6423	6859	8003	9475	10431	10580	10887	11150	11727
SU2 Vertical 44-20	8306	0	7184	7644	7824	9280	10961	11281	12014	12556	13378
SU3 Drydock 7 44-20	12658	0	6793	7507	7753	9225	10435	10680	11343	11964	13156
SU3 Berth 62_63 44-20	9056	0	3362	3792	3951	4536	5248	5479	6688	7524	8117

General Statistics for Impeller Scans with the 44-20

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
SU1 Impellers 44-20	146	0	6115	12647	9545	9443	1368	113.2	1373	-0.243	0.143
SU2 Impellers 44-20	180	0	6204	13708	9738	9574	1775	132.3	1848	0.0779	0.182
SU3 Impellers 44-20	123	0	6022	12386	9318	9212	1374	123.9	1410	-0.348	0.147

Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1	50%ile(Q2)	75%ile(Q3	80%ile	90%ile	95%ile	99%ile
SU1 Impellers 44-20	146	0	7599	8247	8590	9743	10528	10700	11201	11566	12349
SU2 Impellers 44-20	180	0	7467	7883	8232	9932	10966	11157	11914	12635	13555
SU3 Impellers 44-20	123	0	7298	7882	8256	9588	10454	10564	10848	10979	12082

Summary Statistics for Gamma Scan Survey Data
Survey Units 1-3

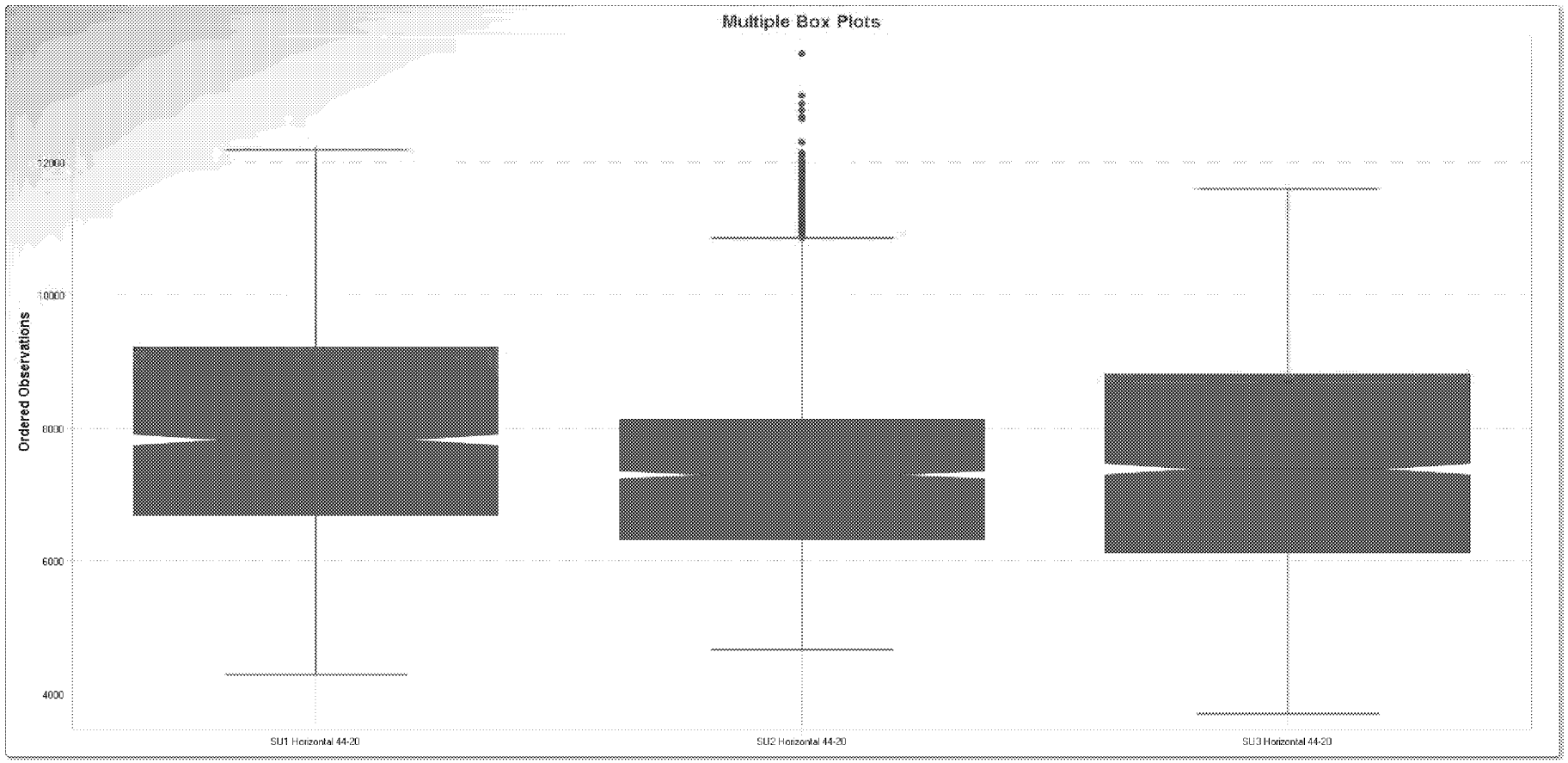
General Statistics for Manhole and Grate Scans with the 44-20

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Geo-Mean	SD	SEM	MAD/0.675	Skewness	CV
SU1 Manholes 44-20	132	0	5574	10311	7458	7390	1007	87.66	1104	0.0777	0.135
SU2 Manholes 44-20	194	0	6075	11047	8010	7964	866.6	62.22	874.7	0.497	0.108
SU3 Manholes 44-20	130	0	6222	12581	8719	8536	1821	159.7	2200	0.42	0.209

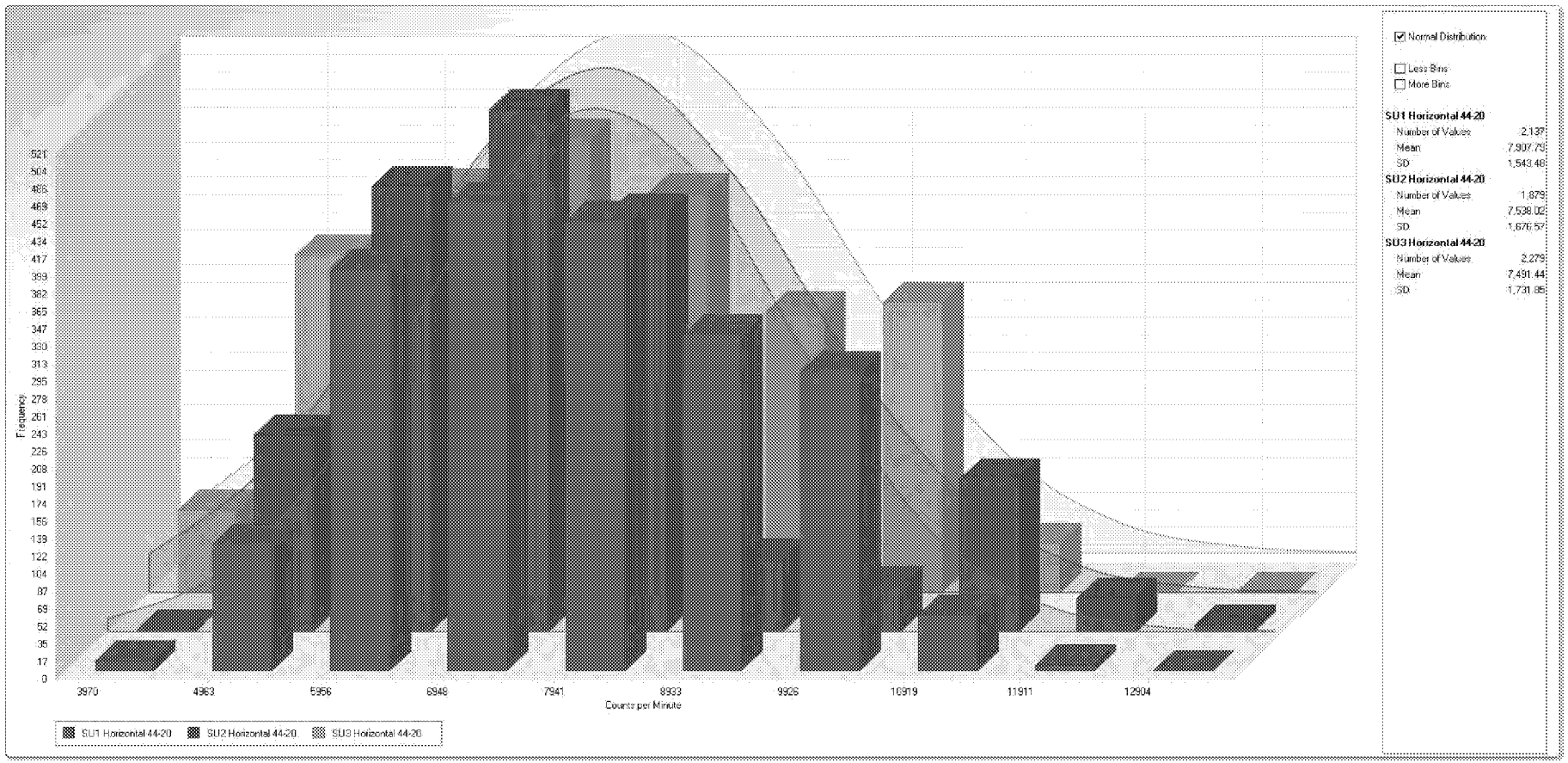
Percentiles for Uncensored Data Sets

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1	50%ile(Q2)	75%ile(Q3	80%ile	90%ile	95%ile	99%ile
SU1 Manholes 44-20	132	0	6003	6510	6744	7485	8229	8328	8735	9051	9507
SU2 Manholes 44-20	194	0	7045	7310	7412	7897	8628	8755	9078	9345	10503
SU3 Manholes 44-20	130	0	6555	6908	7091	8338	10447	10731	11369	11915	12174

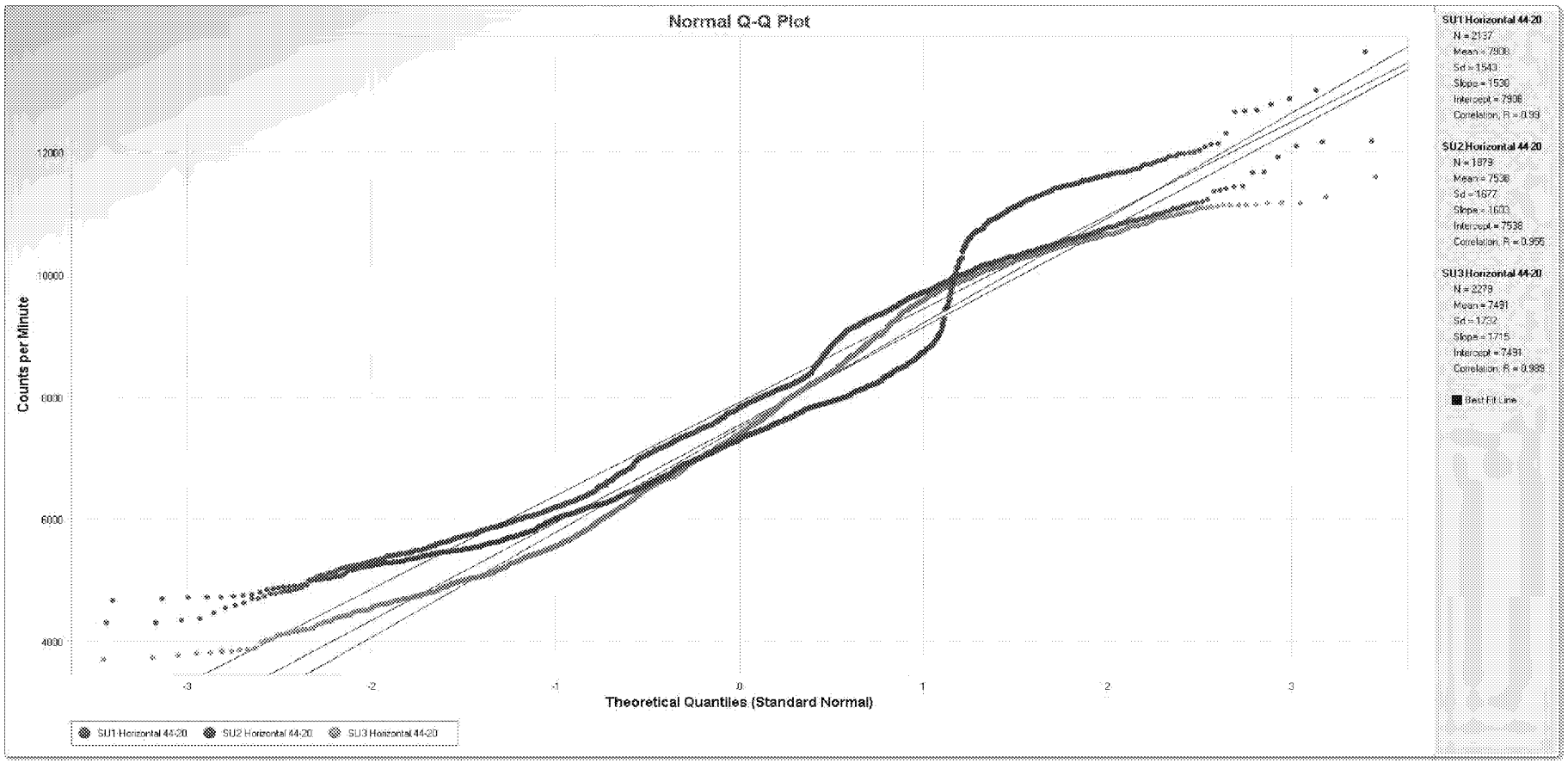
Gamma Scan Survey Data
Horizontal Scans
Survey Units 1-3
Statistical Plots



Gamma Scan Survey Data
Horizontal Scans
Survey Units 1-3
Statistical Plots



Gamma Scan Survey Data
Horizontal Scans
Survey Units 1-3
Statistical Plots



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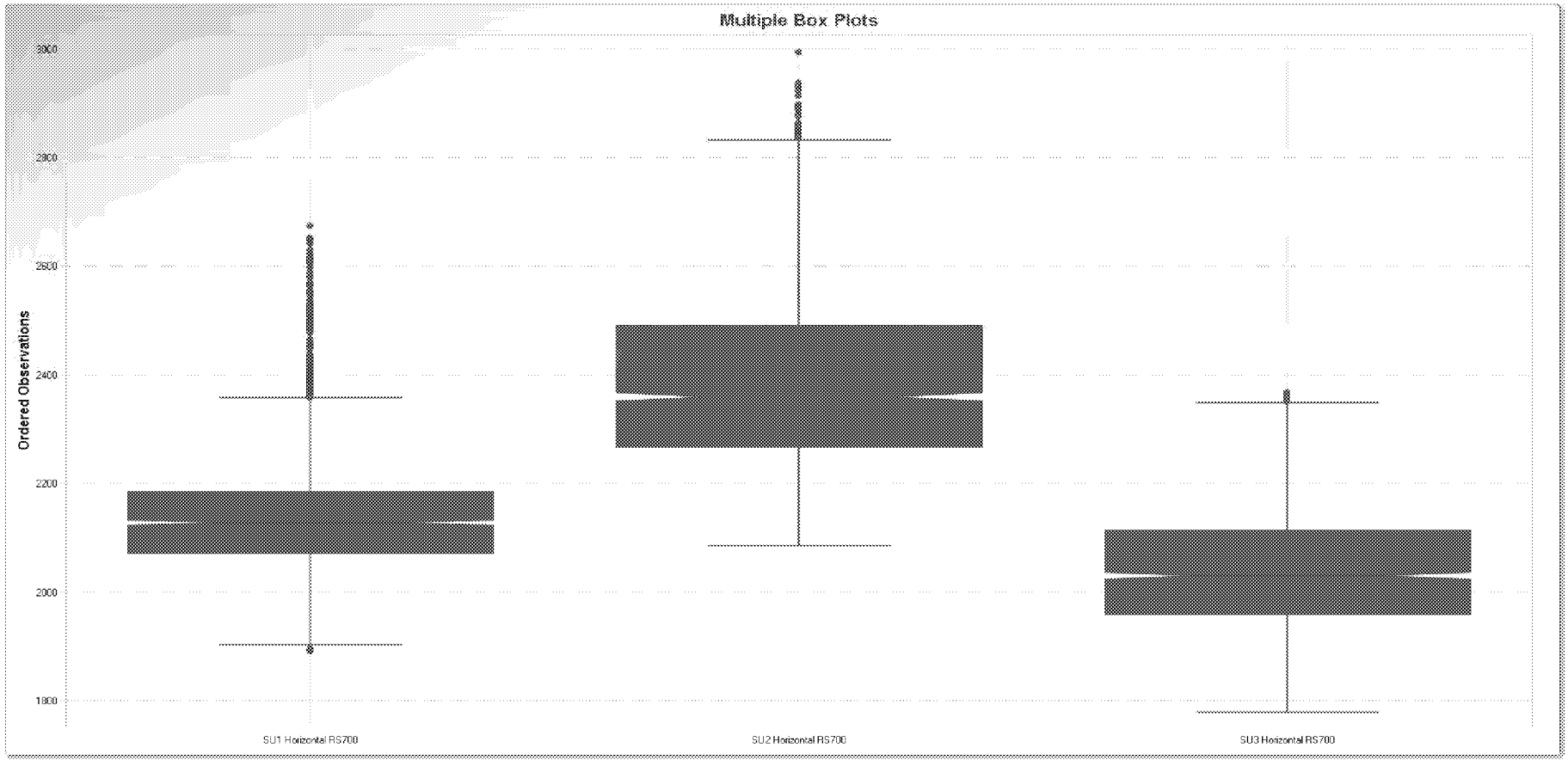
Horizontal Scans
Survey Units 1-3
Statistical Plots



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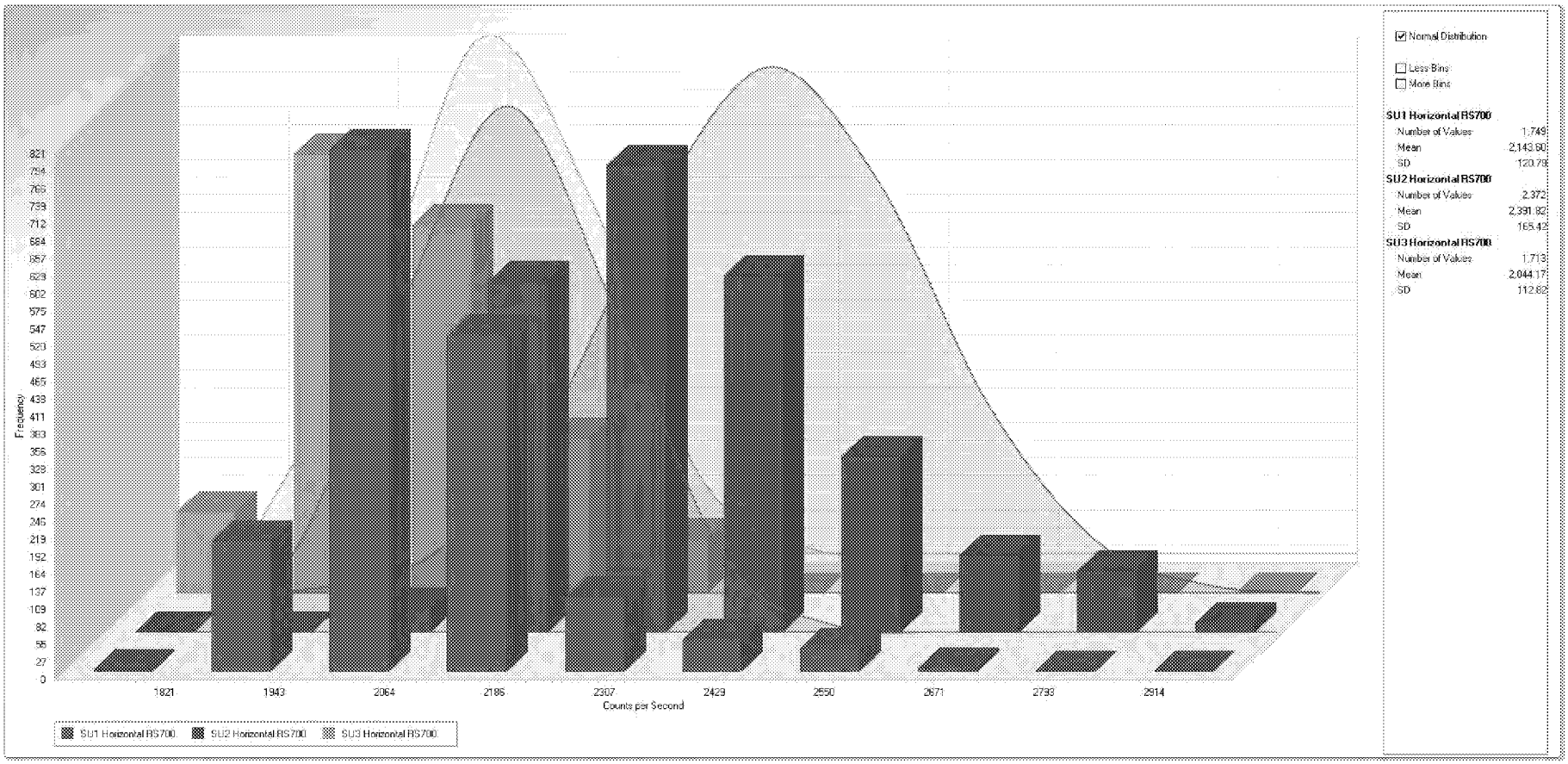
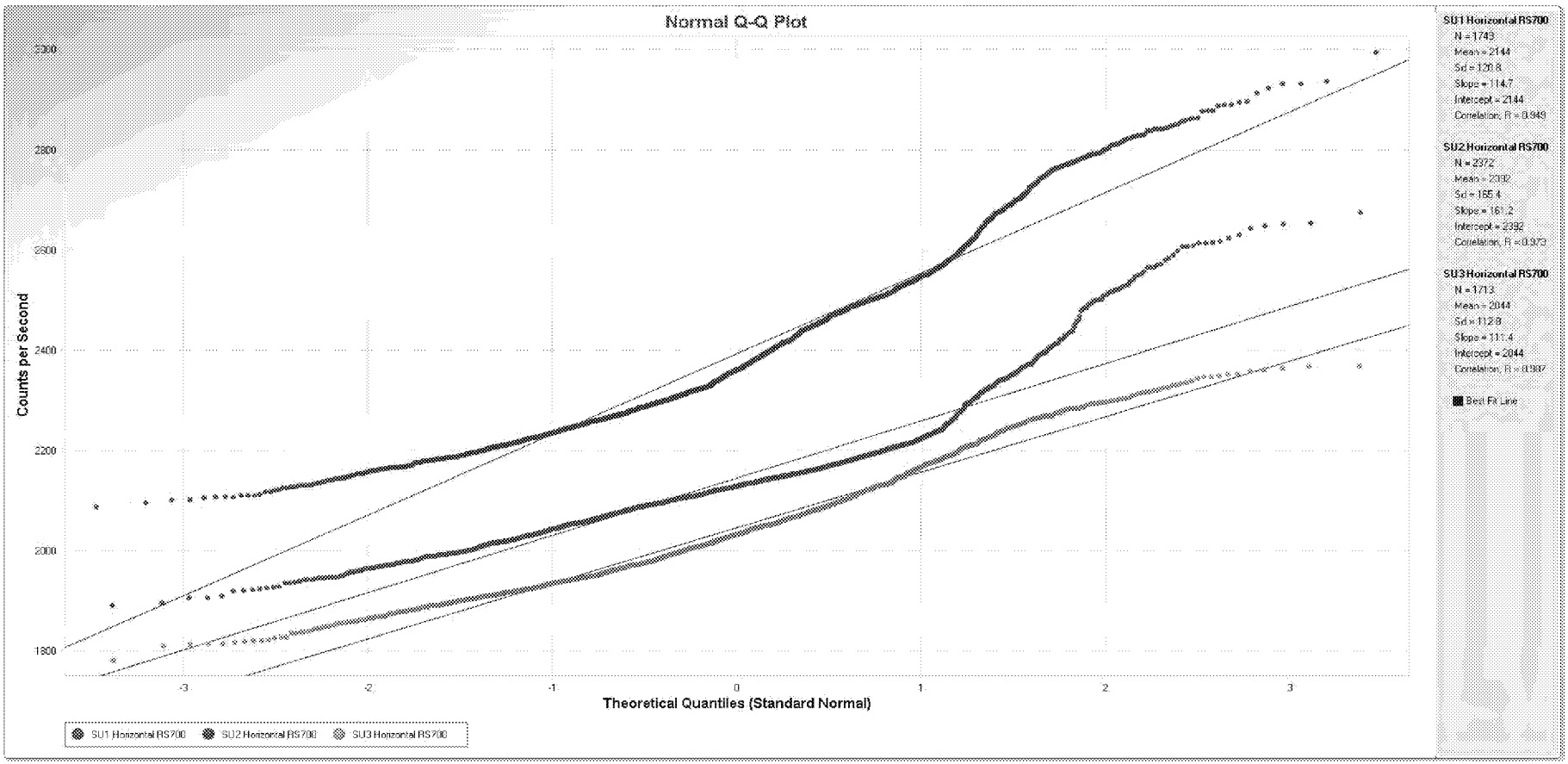
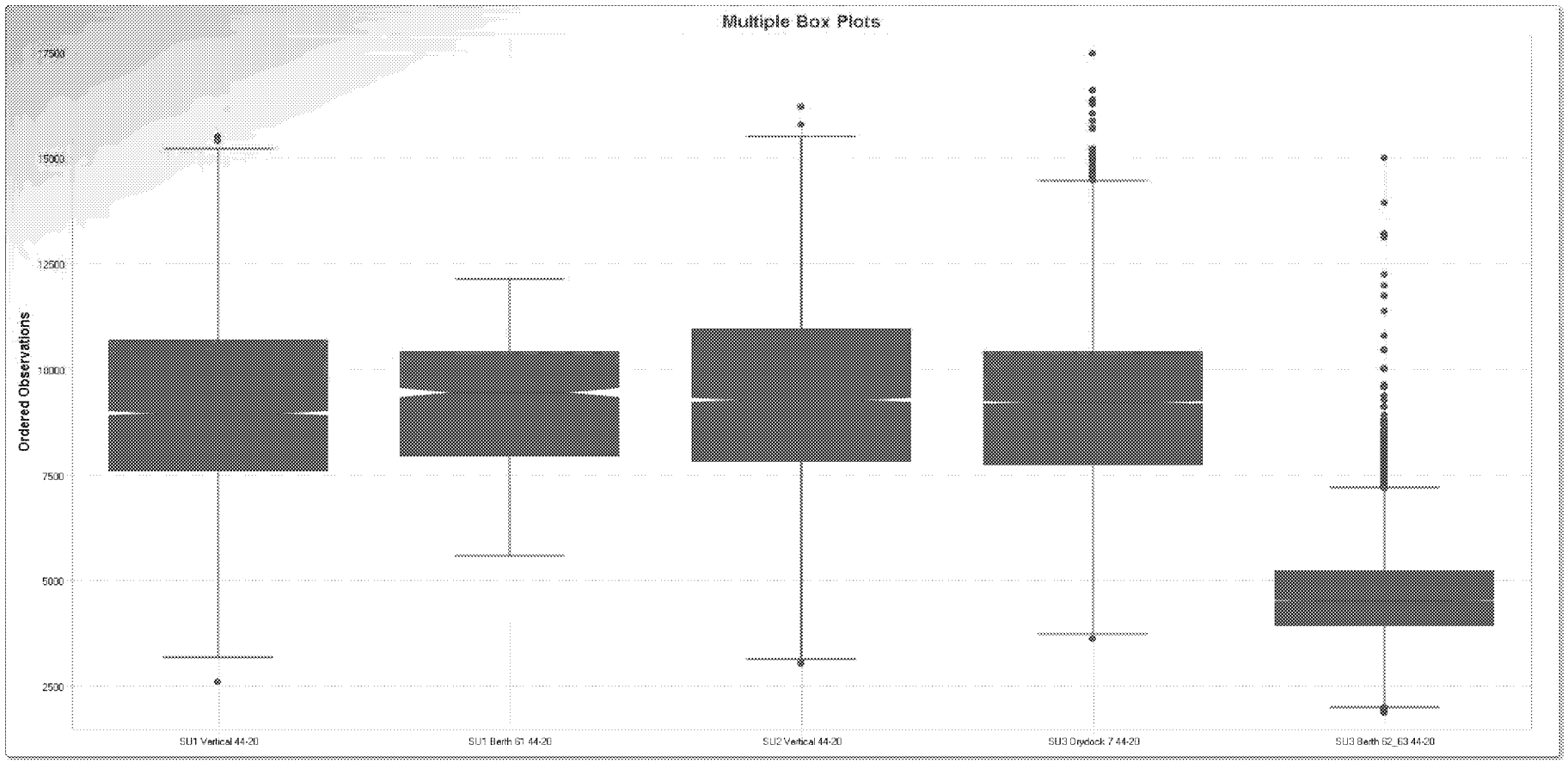
Horizontal Scans
Survey Units 1-3
Statistical Plots



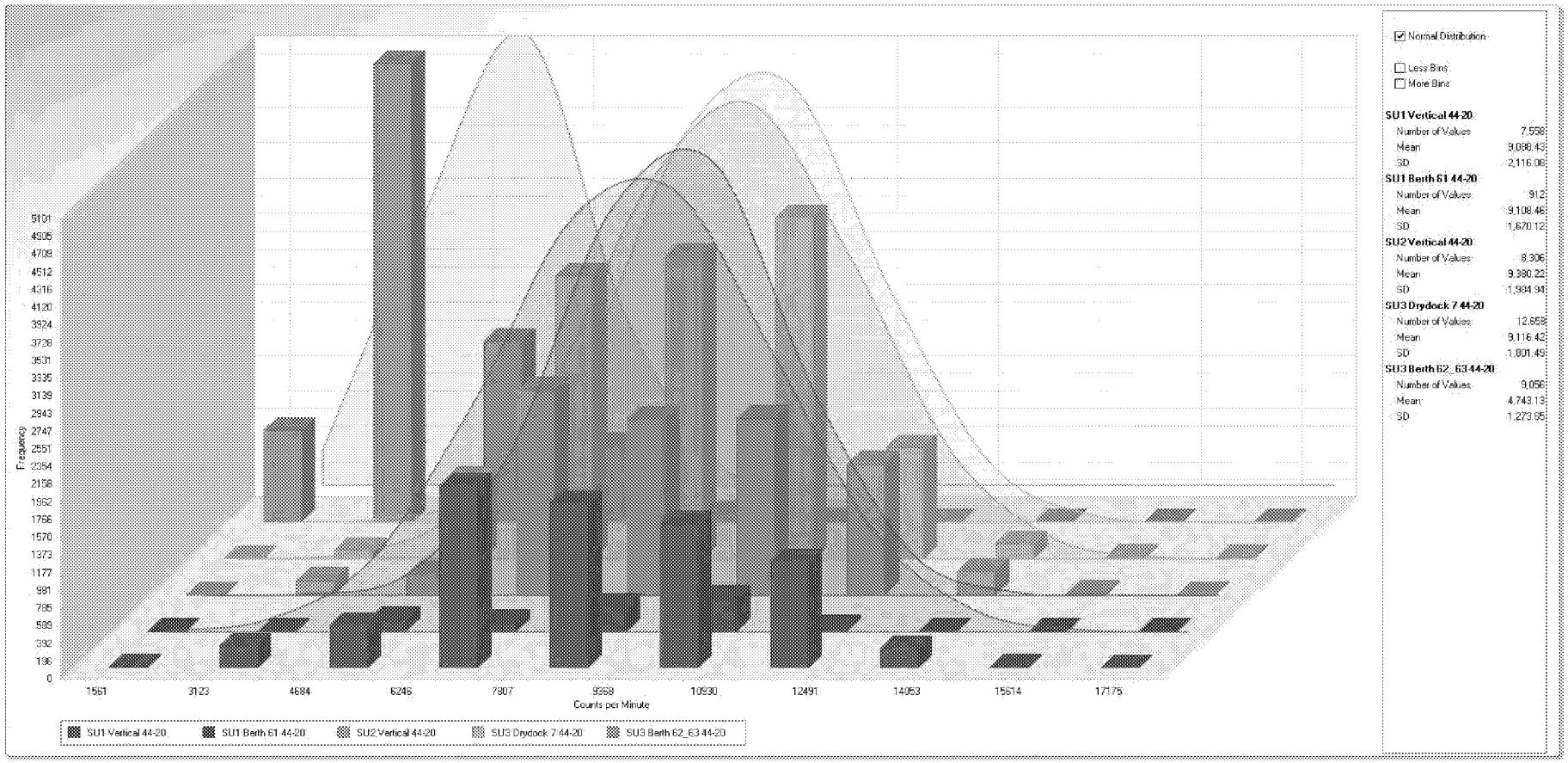
Gamma Scan Survey Data
Horizontal Scans
Survey Units 1-3
Statistical Plots



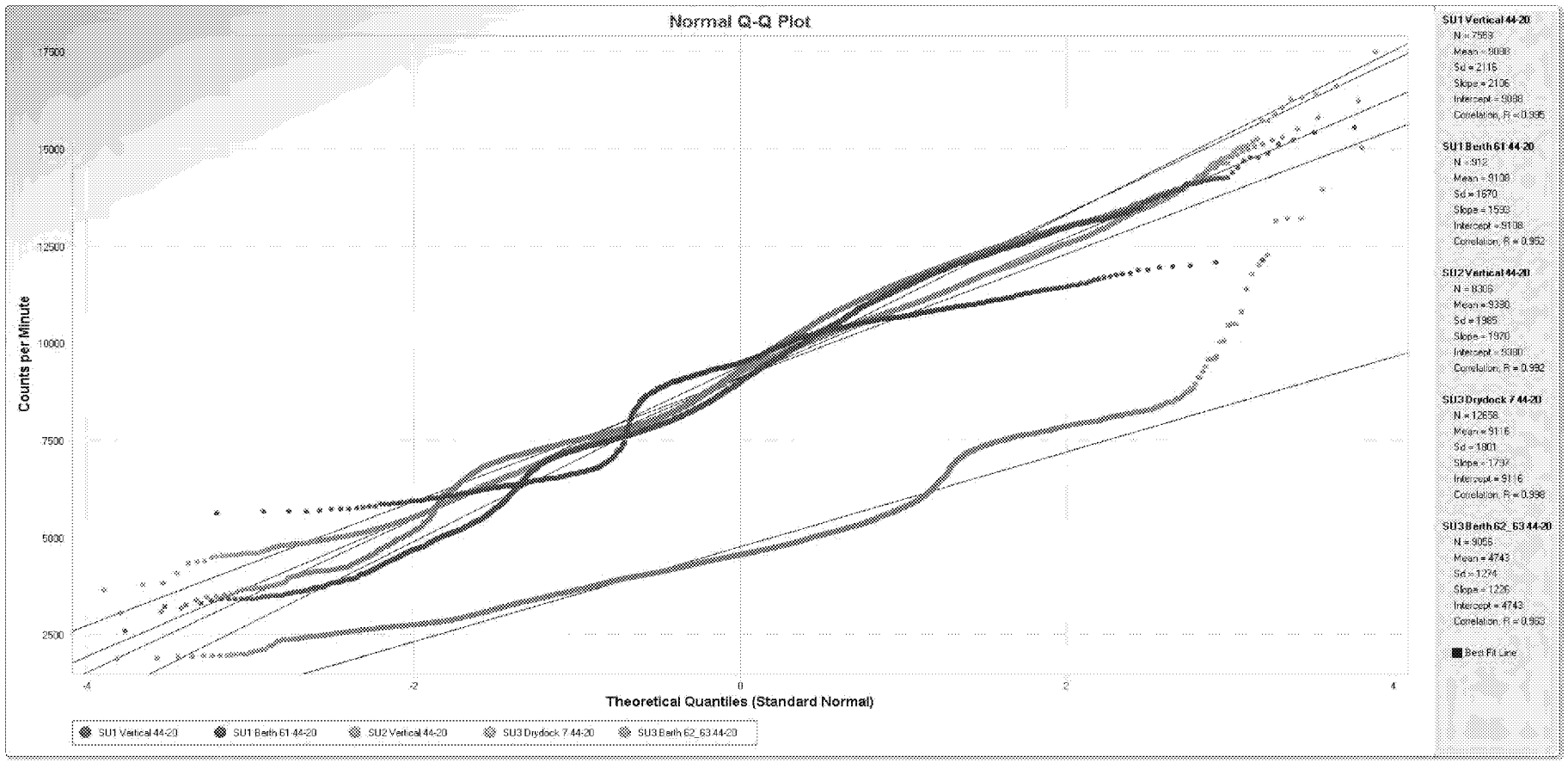
Gamma Scan Survey Data
Vertical Scans
Survey Units 1-3
Statistical Plots



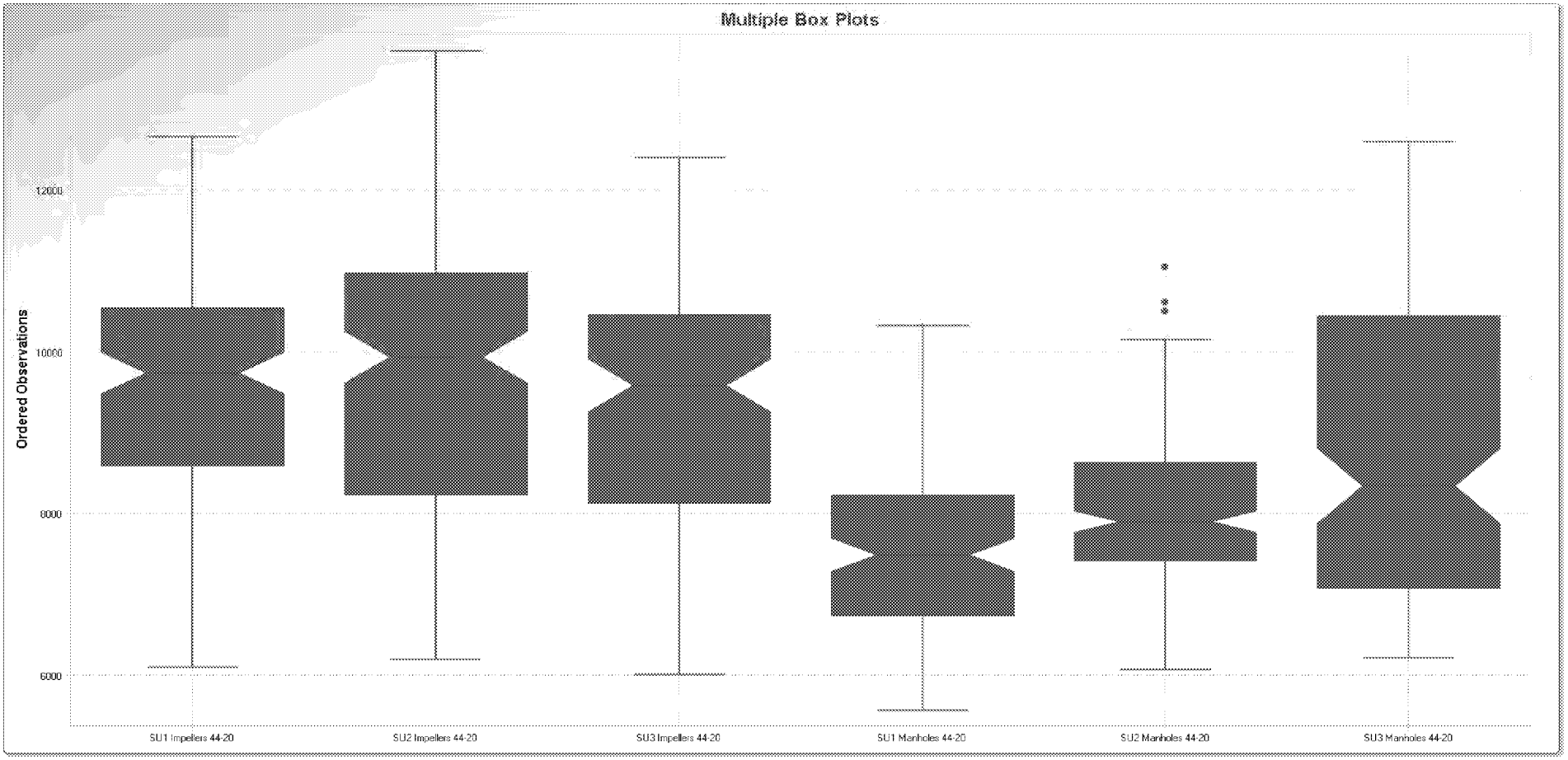
Gamma Scan Survey Data
Vertical Scans
Survey Units 1-3
Statistical Plots



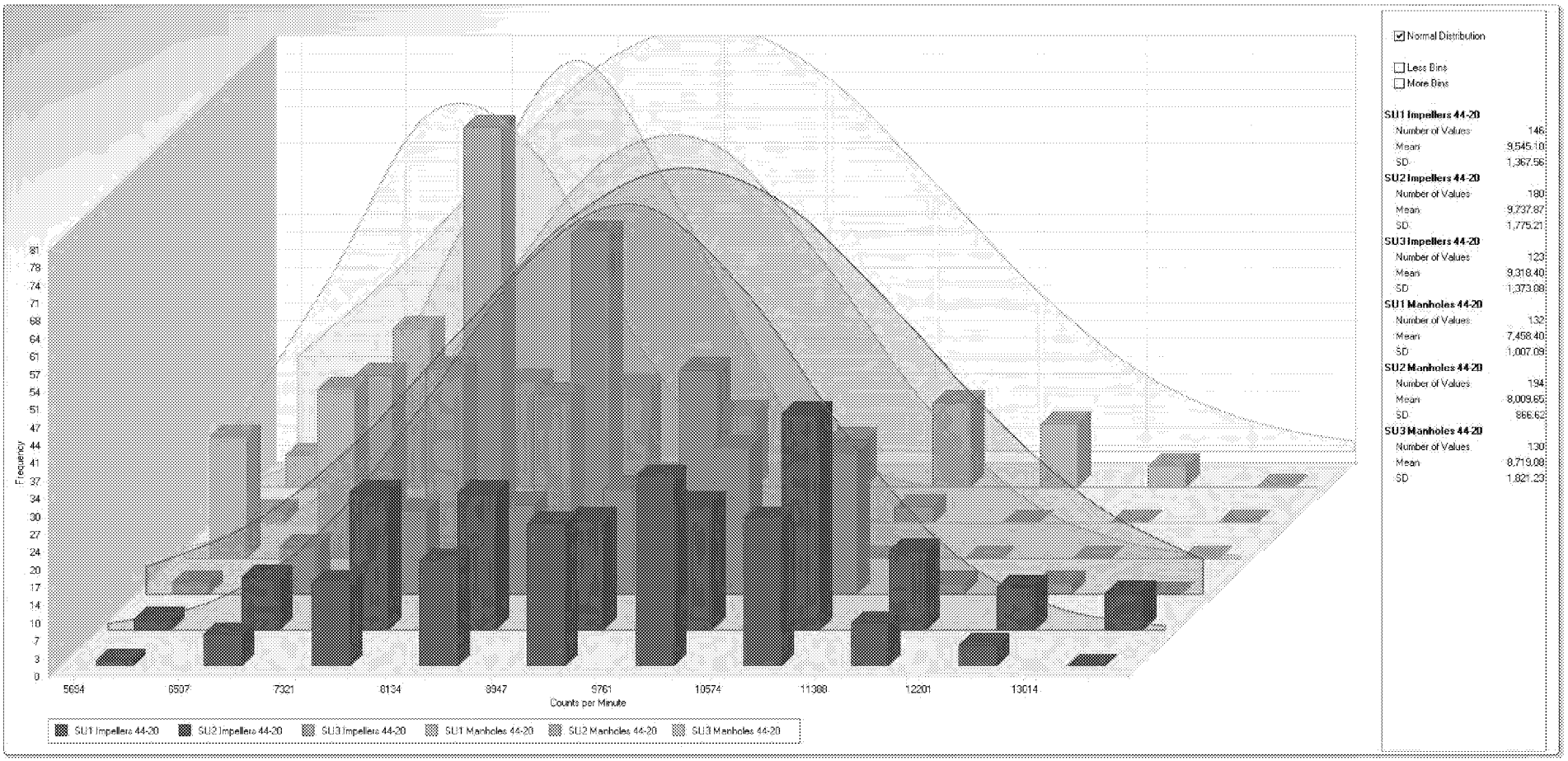
Gamma Scan Survey Data
Vertical Scans
Survey Units 1-3
Statistical Plots



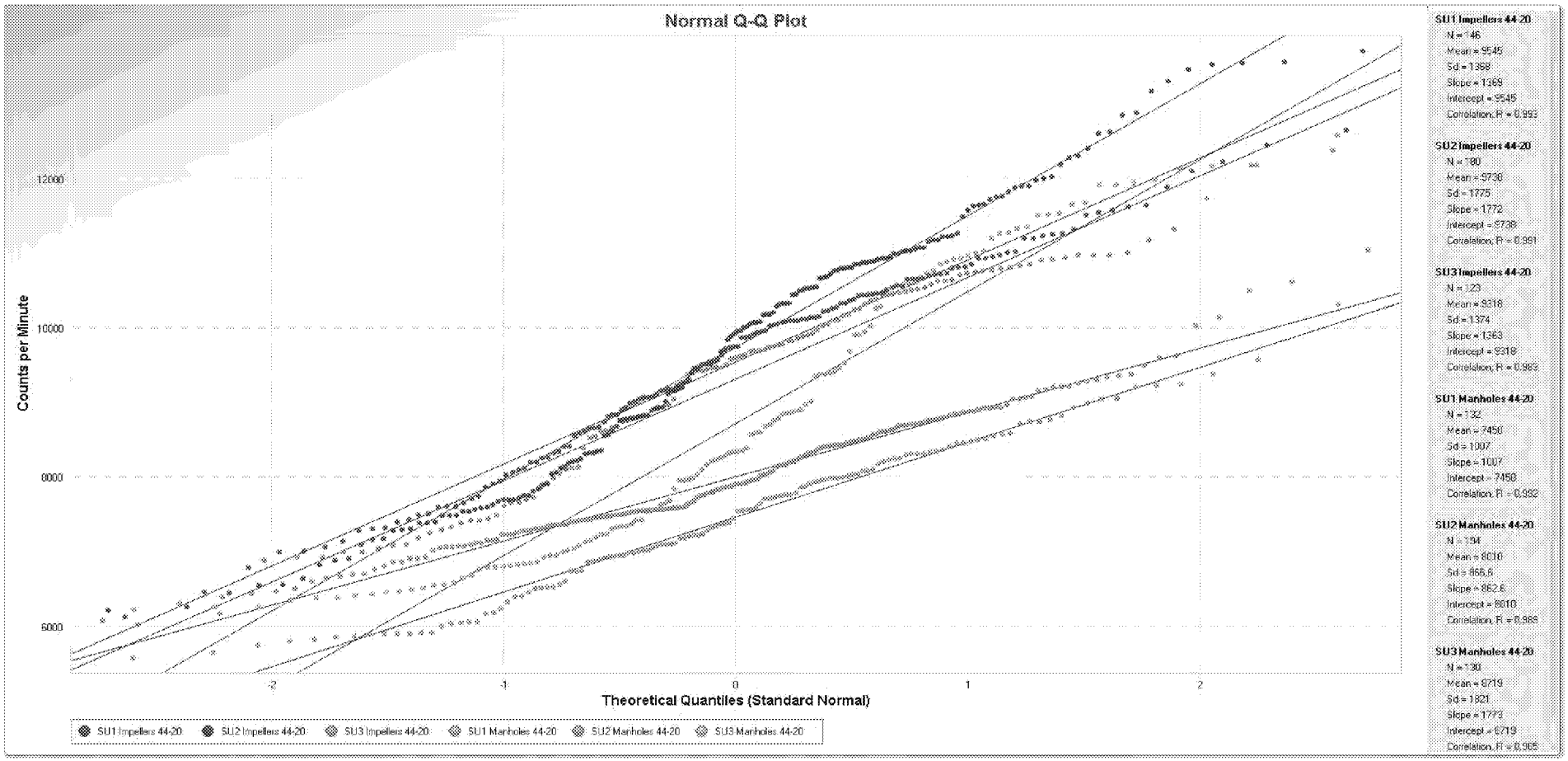
Gamma Scan Survey Data
Impeller and Manhole Scans
Survey Units 1-3
Statistical Plots



Gamma Scan Survey Data
Impeller and Manhole Scans
Survey Units 1-3
Statistical Plots



Gamma Scan Survey Data
Impeller and Manhole Scans
Survey Units 1-3
Statistical Plots



Gamma Scan Survey Data
Survey Units 1-3
Background Threshold Values

Survey Unit	Data Set	Detector	Normal Distribution?	BTV	Basis	Exceedances
1	Horizontal	44-20	No	14637	95% Chebyshev UPL	None
	Horizontal	RS700	No	2670	95% Chebyshev UPL	1
	Vertical Drydock 5	44-20	No	18313	95% Chebyshev UPL	None
	Verical Berth 61	44-20	No	16392	95% Chebyshev UPL	None
	Impellers	44-20	Yes	14105	95% USL	None
	Manholes and Grates	44-20	Yes	10784	95% USL	None
2	Horizontal	44-20	No	14848	95% Chebyshev UPL	None
	Horizontal	RS700	No	3113	95% Chebyshev UPL	None
	Vertical	44-20	No	18033	95% Chebyshev UPL	None
	Impellers	44-20	No	17497	95% Chebyshev UPL	None
	Manholes and Grates	44-20	No	11797	95% Chebyshev UPL	None
3	Horizontal	44-20	No	15042	95% Chebyshev UPL	None
	Horizontal	RS700	No	2536	95% Chebyshev UPL	None
	Vertical Drydock 7	44-20	No	16969	95% Chebyshev UPL	1
	Vertical Berth 62/63	44-20	No	10295	95% Chebyshev UPL	13
	Impellers	44-20	No	15331	95% Chebyshev UPL	None
	Manholes and Grates	44-20	No	16688	95% Chebyshev UPL	None

APPENDIX G
ALPHA BETA SURVEY DATA
(NO CHANGES FROM DRAFT REPORT)

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APPENDIX H
LABORATORY DATA QUALITY ASSESSMENT SUMMARY REPORT

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DCN: APTM-0006-4550-0099

Naval Facilities Engineering Command Southwest
BRAC PMO West
San Diego, CA

Appendix H

Draft Final
Laboratory Data Quality Assessment Summary Report

Radiological Scoping Survey Report

Parcel F Structures—Submarine Pens

Hunters Point Naval Shipyard, CA

October 2020

Deleted: June

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DCN: APTM-0006-4550-0109

Naval Facilities Engineering Command Southwest
BRAC PMO West
San Diego, CA

Appendix H

Draft Final
Laboratory Data Quality Assessment Summary Report
Radiological Scoping Survey Report

Parcel F Structures—Submarine Pens

Hunters Point Naval Shipyard, CA

October 2020

Deleted: June

DCN: APTM-0006-4550-0109

Deleted: 099

Prepared for:
Department of the Navy
Naval Facilities Engineering Command Southwest
BRAC PMO West
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Contract Number: N62473-17-D-0006; Task Order: N6247317F4550

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Acronyms and Abbreviations

EPA ..... U.S. Environmental Protection Agency
Lc ..... critical level
LCS ..... laboratory control sample
Ld ..... detection limit
MDA ..... minimum detectable activity
NIST ..... National Institute of Standards and Technology
QC ..... quality control
RPD ..... relative percent difference

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H.1 Laboratory Data Quality Assessment Report

This laboratory data quality assessment summary report presents the findings of the data review and validation process and is provided to document the quality of analytical data used for project decisions. Sampling procedures and overall quality control (QC) and quality assurance protocols for the project are presented in the project sampling and analysis plan (Appendix A to the *Final Revision 2, Radiological Scoping Surveys Work Plan, Parcel F Structures, Hunters Point Naval Shipyard, San Francisco, California* [Aptim Federal Services LLC, 2019]).

A total of 34 radiological soil samples were collected November 19, 2019 through March 12, 2020, and were sent to off-site laboratories for analysis. The samples were analyzed for the following parameters:

- Gamma spectroscopy—U.S. Environmental Protection Agency (EPA) Method 901.1 MOD/DOE EML HASL 300 Method GA-01-R
- Strontium-90—Environmental Measurements Laboratory Test Method SR-03-RC Modified
- Alpha spectroscopy—DOE EML HASL 300 A-01-R

Sampling associated with the characterization activities include collecting soil samples for boring logs and sediments to meet the objectives established in the *Final Basewide Radiological Removal Action, Action Memorandum—Revision 2006, Hunters Point Shipyard, San Francisco, California* (U.S. Department of the Navy, 2006) and the *Final Revision 2, Radiological Scoping Surveys Work Plan, Parcel F Structures, Hunters Point Naval Shipyard, San Francisco, California* (Aptim Federal Services LLC, 2019).

Soil samples collected for characterization were shipped to Eurofins Test America Labs, Inc., located in St. Louis, Missouri, for analysis. Eurofins Test America Labs, Inc. is a U.S. Department of Defense Environmental Laboratory Accreditation Program-accredited laboratory and State of California Environmental Laboratory Accreditation Program-accredited laboratory.

EPA Stages 2B/Stage 3 verification and validation were conducted by third party data validation company, E-Lab Consultants LLC., located in Magnolia, Texas. Table 1 presents a summary of the samples collected for this project and includes sample delivery group numbers, sample identification numbers, sample locations, sample collection dates, analytical methods, and data review levels. The reviews were

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performed in accordance with guidelines and control criteria specified in the following documents:

- Sampling and analysis plan (Appendix A to the *Final Revision 2, Radiological Scoping Surveys Work Plan, Parcel F Structures, Hunters Point Naval Shipyard, San Francisco, California* [Aptim Federal Services LLC, 2019])
- *Quality System Manual for Environmental Laboratories, Version 5.1* (U.S. Department of Defense, 2017)
- *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP)* (EPA et al., 2004)

With additional guidance from:

- *Radionuclide Data Quality Evaluation Guidance* (U.S. Army Corps of Engineers, 2009)

The following QC elements were included in the Stage 2B data verification and validation review:

- Holding times and preservation
- Laboratory method blanks
- Initial and continuing calibration
- Laboratory control sample (LCS)
- Matrix spike sample
- Relative percent difference (RPD)
- Blanks and background determinations
- Sample-specific chemical tracer recovery
- Sample tracking form run logs
- Theoretical (target) and observed peak energies
- Minimum detectable activity (MDA) and/or analyte/instrument method detection limit
- Matrix density variability

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EPA Stage 3 data verification and validation was performed on three project samples, which met the project requirement for 10 percent Stage 3 validation, and included the preceding and the following QC elements:

- Instrument performance
- Standards traceability logs
- Target compound quantitation (calculation check)

Data were reviewed in terms of precision, accuracy, representativeness, comparability, and completeness. The precision, accuracy, representativeness, comparability, and completeness parameters were evaluated for the analytical data as follows:

- **Accuracy** is important because it is a measure of the true concentration of a parameter for a given analytical procedure. For radiological parameters, the percent difference is used to assess the accuracy of LCS, or blank spike results, and the Z score (EPA et al., 2004) is used to assess the accuracy of matrix spike sample results. Tracers, which are known spikes of either an isotope of the same element as the isotope of interest, or an element that is chemically very similar to the isotope of interest, are added to field samples and batch QC samples and so provide a recovery value for each sample which is indicative of losses or method anomalies that might have affected the isotope of interest.
- **Precision** is expressed as the RPD between the results of replicate sample analyses; for radiological laboratory replicate and field duplicate results, the absolute difference, provides an indication of precision if the average value of the two replicates is less than the action level. If the average value of the two replicates is greater than the action level, the RPD, provides an indication of precision. Precision is important because it is the ability of the laboratory to produce consistent results.
- **Representativeness** of the samples submitted for analysis is ensured by adherence to standard sampling techniques and protocols.
- **Comparability** of sample results is ensured through the use of approved sampling techniques and analysis methods.
- **Completeness** refers to the amount of valid data obtainable (by the specific method the laboratory used with the instrument to be employed) from a measurement system compared to the expected amount of data and is usually expressed as a percentage.

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- **Sensitivity** is the capability of a method or instrument to measure target analyte responses. Several parameters unique to radiochemical analyses are used to describe the sensitivity of the detection systems. They include the critical level (Lc), detection limit (Ld), and MDA. Lc is the net response level (in counts) at which the detector output can be considered above background. Ld is the net response level (in counts) that can be expected to be seen with a detector with a fixed level of certainty. The MDA is the a priori net activity level above the Lc that an instrument can be expected to detect 95 percent of the time.

The following subsections provide a discussion of the EPA Stage 2B/Stage 3 data verification and validation findings. Table 2 presents the definitions of data qualification flags and reason codes applied to the sample results. Table 3 shows the qualified sample data and reason codes.

H.2 Sample Holding Times and Preservation (Reason Code H)

Sample holding times were evaluated by comparing the sample collection dates to the sample analysis dates found in the laboratory raw data (digestion logs and instrument run logs). Radiochemistry analysis do not have EPA method specified holding times.

H.3 Laboratory Method Blanks (Reason Code B1)

The field sample results were evaluated with respect to the laboratory method blanks prepared and analyzed for each analytical batch. A daily blank is analyzed on each detector on every day that samples are analyzed on that detector (gamma spectroscopy and gas flow proportional detectors only). A daily blank consists of a detector count of the same length as that of a regular sample, performed with a blank container in the shielding cave (gamma) or counting chamber (gas proportional counter). Daily blanks are not measured for alpha spectroscopy. At least one method blank is analyzed for every matrix, every batch, or for every 20 samples (5 percent of samples), whichever is more frequent. For solid samples (gamma spectroscopy only), the method blank consists of sand, or a material with equivalent physical and radiological properties, that has been dried, ground, and stirred to homogenize in the same or similar manner as field samples. Background counts (12 hours each for gamma and alpha detectors, and 1000 minutes for gas proportional detectors) are conducted weekly for gamma spectrometer and gas proportional detectors and monthly for alpha spectrometer detectors.

The results of blanks and backgrounds were within acceptable limits.

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H.4 Gamma Spectroscopy Initial Calibration—Energies and Efficiencies (Reason Code C)

A full energy and shape calibration, Peak-to-Compton ratio calibration, and efficiency calibration, the three of which are called an initial calibration is performed annually and after hardware replacement or significant repairs. The initial calibration was performed with a National Institute of Standards and Technology (NIST)-traceable mixed gamma standard, typically a radioactive source with 8 to 10 radionuclides having gamma-ray emissions at energies from approximately 60 kiloelectron volts to 2,000 kiloelectron volts.

The energy and efficiency determination, including calibration curves and instrument backgrounds were reviewed. The review indicated that initial instrument calibrations were within acceptable limits.

H.5 Gamma Spectroscopy Continuing Calibration—Energy and Activities (Reason Code C)

Continuing calibrations are performed daily. The same NIST-traceable mixed gamma standard employed for the initial calibration, is used for continuing calibrations. The activity of each radioisotope in the calibration standard must be within 10 percent relative of the true, decay-corrected activity. The energy of each isotope must be within 1 percent of the true energy. The full width half maximum value will be monitored and must be less than 3 percent of the observed energy for one low energy, one mid-energy, and one high energy calibration radionuclide.

A calibration review indicated that the continuing standard was analyzed on each day for which field and batch QC samples were analyzed, and the calibration standard was analyzed before analysis of samples. Continuing calibration standard radionuclide activities were within acceptable limits for target analytes.

H.6 Gross Alpha/Gross Beta Initial Calibration—Gas Flow Proportional Counter (Reason Code C)

Both initial and continuing calibrations, the alpha spectrometer system is calibrated with a NIST-traceable standard containing five isotopes: uranium-238, uranium-234, thorium-230, plutonium-239, and americium-241. The detector response created by three of these radioisotopes, uranium-238, plutonium-239, and americium-241, are used to calibrate the instrument. An initial energy and efficiency calibration is performed

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annually, or whenever significant equipment changes occurs, such as replacement of a detector. A pulser check must be run before the calibration on the same day of calibration run.

The gross alpha and gross beta initial instrument calibrations consist of 20 or more analyses each of a single paper filter gross alpha standard containing thorium-230 and a single electroplated gross beta standard containing strontium-90/yttrium-90. Average activities and standard deviations are then calculated and used on control charts. These are "zero mass" standards, so that there is little or no attenuation of the alpha or beta energies. The control charts are constructed for each detector using the mean and the ±2 sigma (warning) and the ±3 sigma (control) limits. Subsequent continuing calibration standard checks are made on days of instrument operation and checked against the control chart to ensure acceptable instrument operability prior to measurement of samples. The charts are updated periodically to reflect the most recent calibration checks.

A calibration review indicated that initial calibration results were within the acceptance limits.

H.7 Tracer Compound Recoveries

A tracer is either an isotope of the same element as the isotope of interest, or an isotope of an element different from the element of the isotope of interest, but one that behaves chemically very similar to the isotope of interest. Tracers are added to both field samples and batch QC samples prior to sample preparation. Because the tracer is chemically identical or very similar to the isotope of interest, it provides an indication for every batch QC or field sample of method anomalies such as sample losses due to absorption, reactivity, spillage, etc. or artifacts specific to the measurement step. Thus, the percent recovery of the tracer is used to normalize the measured activity of the isotope of interest.

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The review indicated that tracer recoveries were within the established control limits for samples with the exception noted:

SDG Number	Analyte	Sample	Tracer Recovery (%)	Control Limit (% Recovery)	Qualifier
160-36160	Polonium-210	F-SU3-B14-S001	26.4%	30-110	J-qualify specified result at reported concentration in affected samples

Notes:
% percent
J estimated value

Sample-specific chemical recovery specifies that each sample chemical tracer percent recovery must be recorded and should be plotted on a QC chart for each radionuclide and method and fall within the prescribed limits of ±3σ of the mean recovery. There should be at least 30 points used to establish a control chart for each radionuclide and both the ±2σ warning limits and ±3σ control limits must be displayed.

Although the tracer recovery in sample F-SU3-B14-S001 was below the lower QC limit (30 percent) there are sufficient tracer counts to keep the count uncertainty of the tracer less than 10 percent (2 sigma). Tracer recovery validation specifies that for sample-specific recoveries that fall within ±2σ of the mean recovery, data is acceptable, and no qualifiers are necessary. Sample F-SU3-B14-S001 was J qualified due to low recovery based on professional judgement of the reviewer (reason code P).

H.8 Laboratory Control Sample (Reason Code L)

The LCS serves as a monitor of the overall accuracy and performance of steps in the analysis, including the sample preparation. Please note that for the gamma spectroscopy soil LCS, there is no sample preparation. The LCS is a known radionuclide standard in an analysis geometry and containing isotopes of interest consistent with the samples undergoing analysis. For the following limits to apply, the LCS must contain greater than 10 times the radionuclide's detection limit activity. An LCS analysis was conducted for every analytical batch, and the LCS recoveries met the established accuracy and precision requirements for analyses.

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H.9 Sample Duplicate (Reason Code D1)

For gamma spectroscopy, a sample duplicate was analyzed with each analytical batch to evaluate analytical precision. The RPD between the original results and duplicate results is used to evaluate bias introduced to the method due to matrix heterogeneity. Sample duplicate RPDs were within the method specified control limits.

H.10 Sample Uncertainty (Reason Code P1)

For results detected above the DLC, the total reported uncertainty was compared with the reported result. If the total uncertainty exceeded the reported result, the result was J-qualified based on the professional judgment of the reviewer. J-flags were assigned to the samples show below:

Sample ID	Method	Parameter	Result (pCi/g)	Uncertainty (2σ)	Qualifier
F-SU3-B01-S001	901.1/HASL300	Actinium-228	0.312	0.344	J
F-SU3-B01-S001	901.1/HASL300	Radium 228	0.312	0.344	J
F-SU3-B01-S001	901.1/HASL300	Thorium-232	0.312	0.344	J
F-SU3-B04-S001	901.1/HASL300	Thorium-234	0.707	0.734	J
F-SU3-B04-S001	901.1/HASL300	Uranium-238	0.707	0.734	J
F-SU3-B07-S001	901.1/HASL300	Lead 210	1.91	2.23	J
F-SU3-B09-S001	901.1/HASL300	Lead 210	0.802	1.17	J
F-SU3-B12-S001	901.1/HASL300	Actinium-227	0.540	0.547	J
F-SU3-B14-S001	901.1/HASL300	Lead 210	1.51	1.74	J
F-SU3-B15-S001	A-01-R	Plutonium-239/240	0.0266	0.0309	J
F-SU3-B23-S001	A-01-R	Plutonium-238	0.0359	0.0506	J
F-SU3-B23-S001	901.1/HASL300	Actinium-228	0.186	0.331	J
F-SU3-B23-S001	901.1/HASL300	Radium 228	0.186	0.331	J

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Sample ID	Method	Parameter	Result (pCi/g)	Uncertainty (2σ)	Qualifier
F-SU3-B23-S001	901.1/HASL300	Thorium-232	0.186	0.331	J
F-SU5-B05-S001	901.1/HASL300	Lead 210	1.09	1.43	J
F-SU5-B05-S001	A-01-R	Plutonium-239/240	0.0233	0.0353	J
F-SU3-B52-S001	A-01-R	Plutonium-239/240	0.00756	0.0151	J
F-SU1-B02-S001	A-01-R	Plutonium-238	0.0452	0.0639	J
F-SU1-B02-S001	901.1/HAS L300	Thallium-208	0.116	0.119	J
F-SU1-B02-S001	901.1/HAS L300	Thorium-234	0.559	0.603	J
F-SU1-B02-S001	905	Total Beta Strontium	0.0805	0.0908	J
F-SU1-B02-S001	901.1/HAS L300	Uranium-238	0.559	0.603	J
F-SU1-B12-S001	901.1/HAS L300	Thorium-234	0.446	0.529	J
F-SU1-B12-S001	901.1/HAS L300	Uranium-238	0.446	0.529	J
F-SU1-B15-S001	A-01-R	Plutonium-239/240	0.0160	0.0264	J
F-SU1-B17-S001	A-01-R	Plutonium-239/240	0.0140	0.0273	J
F-SU1-B24-S001	901.1/HAS L300	Lead 210	1.22	1.53	J
F-SU1-B30-S001	905	Total Beta Strontium	0.0642	0.0746	J
F-SU1-B33-S001	A-01-R	Plutonium-239/240	0.0169	0.0305	J
F-SU1-B36-S001	901.1/HAS L300	Thorium-234	0.764	0.923	J
F-SU1-B36-S001	901.1/HAS L300	Actinium-228	0.172	0.313	J
F-SU1-B36-S001	901.1/HAS L300	Radium 228	0.172	0.313	J
F-SU1-B36-S001	901.1/HAS L300	Thorium-232	0.172	0.313	J
F-SU1-B36-S001	901.1/HAS L300	Uranium-238	0.764	0.923	J

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Sample ID	Method	Parameter	Result (pCi/g)	Uncertainty (2σ)	Qualifier
F-SU2-B07-S001	905	Total Beta Strontium	0.0834	0.0855	J
F-SU2-B12-S001	901.1/HAS L300	Lead 210	1.22	1.72	J
F-SU2-B16-S001	905	Total Beta Strontium	0.0758	0.0759	J
F-SU2-B16-S001	901.1/HAS L300	Thorium-234	0.699	0.710	J
F-SU2-B16-S001	901.1/HAS L300	Radium 228	0.256	0.328	J
F-SU2-B16-S001	901.1/HAS L300	Actinium-228	0.256	0.328	J
F-SU2-B16-S001	901.1/HAS L300	Thorium-232	0.256	0.328	J
F-SU2-B27-S001	905	Total Beta Strontium	0.0722	0.0829	J
F-SU2-B27-S001	901.1/HAS L300	Uranium-238	0.552	0.606	J
F-SU2-B27-S001	901.1/HAS L300	Lead 210	0.692	1.05	J
F-SU2-B27-S001	901.1/HAS L300	Thorium-234	0.552	0.606	J
F-SU2-B36-S001	901.1/HAS L300	Lead 210	1.46	1.81	J
F-SU2-B36-S001	901.1/HAS L300	Actinium-228	0.203	0.265	J
F-SU2-B36-S001	901.1/HAS L300	Radium 228	0.203	0.265	J
F-SU2-B36-S001	901.1/HAS L300	Thorium-232	0.203	0.265	J
F-SU2-B27-S001	905	Total Beta Strontium	0.0722	0.0829	J
F-SU2-B27-S001	901.1/HAS L300	Uranium-238	0.552	0.606	J

Notes:

J estimated value

pCi/g picocurie per gram

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H.11 Sample Identification

The objective is to ensure that the reported quantitation results are accurate and that the required detection limits have been met. When detection limit requirements are not met, the data quality objectives may not have been met. Results will be evaluated relative to the uncertainty associated with the analysis and the sample reports will report the uncertainty. Results and uncertainties must be reported for required analyses regardless of the size or sign of the result. The reported uncertainty must include uncertainties associated with the analysis.

H.12 Sample Quantitation

Quantitation reports, chromatograms, and sample preparation/extraction logs were reviewed during Stage 3 data validation to confirm the reported values. Recalculations were performed on samples and QC samples to verify that the laboratory reported results were reproducible. Based on the Stage 3 data validation, no calculation errors or discrepancies were identified.

H.13 Sensitivity—Reporting Limits

Gamma spectroscopic analysis of collected soil samples requires for removal of soil moisture by oven drying overnight at a temperature of 100 degrees Celsius. Oven drying not only minimizes the gamma-ray self-attenuation of soil samples due to the absence of water during the gamma-ray spectroscopic analysis, but also allows for a straightforward calculation of the specific activity of radionuclides in soil, historically based on the sample dry weight. Analytical results were reported on a dry weight basis with applicable corrections to the detection limit, limit of quantitation, and sample-specific decision level concentration. An additional correction factor has been developed for radium-226 gamma spectrometry analyses (applicable to dried soil samples that have had insufficient time to allow for the in-growth of the photon emitting daughters in the radium-226 decay chain).

H.14 Completeness

The following subsection presents a discussion of analytical and technical completeness for the sampling event. Table 4 summarizes completeness calculations for each analytical method.

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H.14.1 Analytical Completeness

Analytical completeness is a quantitative expression of how closely the results adhered to QC requirements based on the number of data points qualified. The analytical completeness goal is 90 percent. Analytical completeness is calculated as follows:

$$\text{\% Analytical Completeness} = \frac{\text{Number of Unqualified Results}}{\text{Total Number of Results}} \times 100$$

Analytical completeness is based on samples qualified and includes target analytes. The analytical completeness goal was met for methods.

H.14.2 Technical Completeness

Technical completeness is a quantitative expression of the data usability based on the number of rejected data. The technical completeness calculation considers data that is not rejected to be usable for project decisions. The technical completeness goal for the project is 95 percent and is calculated as follows:

$$\text{\% Technical Completeness} = \frac{\text{Number of Usable Results}}{\text{Total Number of Results}} \times 100$$

The technical completeness goal was met for methods; therefore, sufficient usable data were obtained to meet the project data quality objectives.

H.15 Summary

Based on the above EPA Stages 2B/Stage 3 verification and validation, although one sample result was flagged as estimated, the data usability was not affected. The data quality issue observed was minor, and no significant. Except where noted, no other data were qualified. Overall, the data are of good technical quality and meet project objectives. The data are usable and available for project decisions.

H.16 References

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TABLES

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Table 1: Summary of Samples Collected, Collection Dates, Analysis Methods, and Data Review Levels

Date Collected	SDG	Field ID	Sample Location	Lab	Analytical Method	Review Level
11/20/19	160-36450	F-SU2-B12-S001	F-SU2-B12-S001	TAMO	901.1/HASL300	
11/20/19	160-36450	F-SU2-B12-S001	F-SU2-B12-S001	TAMO	905	
11/20/19	160-36450	F-SU2-B12-S001	F-SU2-B12-S001	TAMO	A-01-R	
11/20/19	160-36450	F-SU2-B04-S001	F-SU2-B04-S001	TAMO	901.1/HASL300	
11/20/19	160-36450	F-SU2-B04-S001	F-SU2-B04-S001	TAMO	905	
11/20/19	160-36450	F-SU2-B04-S001	F-SU2-B04-S001	TAMO	A-01-R	
11/20/19	160-36450	F-SU2-B16-S001	F-SU2-B16-S001	TAMO	901.1/HASL300	
11/20/19	160-36450	F-SU2-B16-S001	F-SU2-B16-S001	TAMO	905	
11/20/19	160-36450	F-SU2-B16-S001	F-SU2-B16-S001	TAMO	A-01-R	
11/20/19	160-36450	F-SU2-B07-S001	F-SU2-B07-S001	TAMO	901.1/HASL300	
11/20/19	160-36450	F-SU2-B07-S001	F-SU2-B07-S001	TAMO	905	
11/20/19	160-36450	F-SU2-B07-S001	F-SU2-B07-S001	TAMO	A-01-R	
11/20/19	160-36450	F-SU2-B09-S001	F-SU2-B09-S001	TAMO	901.1/HASL300	
11/20/19	160-36450	F-SU2-B09-S001	F-SU2-B09-S001	TAMO	905	
11/20/19	160-36450	F-SU2-B09-S001	F-SU2-B09-S001	TAMO	A-01-R	
11/20/19	160-36450	F-SU1-B36-S001	F-SU1-B36-S001	TAMO	901.1/HASL300	
11/20/19	160-36450	F-SU1-B36-S001	F-SU1-B36-S001	TAMO	905	
11/20/19	160-36450	F-SU1-B36-S001	F-SU1-B36-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B30-S001	F-SU1-B30-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B30-S001	F-SU1-B30-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B30-S001	F-SU1-B30-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B33-S001	F-SU1-B33-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B33-S001	F-SU1-B33-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B33-S001	F-SU1-B33-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B24-S001	F-SU1-B24-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B24-S001	F-SU1-B24-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B24-S001	F-SU1-B24-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B15-S001	F-SU1-B15-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B15-S001	F-SU1-B15-S001	TAMO	905	

Table 1: Summary of Samples Collected, Collection Dates, Analysis Methods, and Data Review Levels

Date Collected	SDG	Field ID	Sample Location	Lab	Analytical Method	Review Level
11/19/19	160-36450	F-SU1-B15-S001	F-SU1-B15-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B16-S001	F-SU1-B16-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B16-S001	F-SU1-B16-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B16-S001	F-SU1-B16-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B17-S001	F-SU1-B17-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B17-S001	F-SU1-B17-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B17-S001	F-SU1-B17-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B07-S001	F-SU1-B07-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B07-S001	F-SU1-B07-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B07-S001	F-SU1-B07-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B06-S001	F-SU1-B06-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B06-S001	F-SU1-B06-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B06-S001	F-SU1-B06-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B12-S001	F-SU1-B12-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B12-S001	F-SU1-B12-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B12-S001	F-SU1-B12-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B02-S001	F-SU1-B02-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B02-S001	F-SU1-B02-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B02-S001	F-SU1-B02-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B11-S001	F-SU1-B11-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B11-S001	F-SU1-B11-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B11-S001	F-SU1-B11-S001	TAMO	A-01-R	
11/19/19	160-36450	F-SU1-B01-S001	F-SU1-B01-S001	TAMO	901.1/HASL300	
11/19/19	160-36450	F-SU1-B01-S001	F-SU1-B01-S001	TAMO	905	
11/19/19	160-36450	F-SU1-B01-S001	F-SU1-B01-S001	TAMO	A-01-R	
10/25/19	160-36159	F-SU3-B52-S001	F-SU3-B52-S001	TAMO	901.1/HASL300	
10/25/19	160-36159	F-SU3-B52-S001	F-SU3-B52-S001	TAMO	905	
10/25/19	160-36159	F-SU3-B52-S001	F-SU3-B52-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU5-B05-S001	F-SU5-B05-S001	TAMO	901.1/HASL300	

Table 1: Summary of Samples Collected, Collection Dates, Analysis Methods, and Data Review Levels

Date Collected	SDG	Field ID	Sample Location	Lab	Analytical Method	Review Level
10/24/19	160-36160	F-SU5-B05-S001	F-SU5-B05-S001	TAMO	905	
10/24/19	160-36160	F-SU5-B05-S001	F-SU5-B05-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU5-B10-S001	F-SU5-B10-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU5-B10-S001	F-SU5-B10-S001	TAMO	905	
10/24/19	160-36160	F-SU5-B10-S001	F-SU5-B10-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU4-B04-S001	F-SU4-B04-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU4-B04-S001	F-SU4-B04-S001	TAMO	905	
10/24/19	160-36160	F-SU4-B04-S001	F-SU4-B04-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B29-S001	F-SU3-B29-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B29-S001	F-SU3-B29-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B29-S001	F-SU3-B29-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B30-S001	F-SU3-B30-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B30-S001	F-SU3-B30-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B30-S001	F-SU3-B30-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B23-S001	F-SU3-B23-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B23-S001	F-SU3-B23-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B23-S001	F-SU3-B23-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B01-S001	F-SU3-B01-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B01-S001	F-SU3-B01-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B01-S001	F-SU3-B01-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B11-S001	F-SU3-B11-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B11-S001	F-SU3-B11-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B11-S001	F-SU3-B11-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B12-S001	F-SU3-B12-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B12-S001	F-SU3-B12-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B12-S001	F-SU3-B12-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B04-S001	F-SU3-B04-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B04-S001	F-SU3-B04-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B04-S001	F-SU3-B04-S001	TAMO	A-01-R	

Table 1: Summary of Samples Collected, Collection Dates, Analysis Methods, and Data Review Levels

Date Collected	SDG	Field ID	Sample Location	Lab	Analytical Method	Review Level
10/24/19	160-36160	F-SU3-B14-S001	F-SU3-B14-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B14-S001	F-SU3-B14-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B14-S001	F-SU3-B14-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B05-S001	F-SU3-B05-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B05-S001	F-SU3-B05-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B05-S001	F-SU3-B05-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B15-S001	F-SU3-B15-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B15-S001	F-SU3-B15-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B15-S001	F-SU3-B15-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B07-S001	F-SU3-B07-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B07-S001	F-SU3-B07-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B07-S001	F-SU3-B07-S001	TAMO	A-01-R	
10/24/19	160-36160	F-SU3-B09-S001	F-SU3-B09-S001	TAMO	901.1/HASL300	
10/24/19	160-36160	F-SU3-B09-S001	F-SU3-B09-S001	TAMO	905	
10/24/19	160-36160	F-SU3-B09-S001	F-SU3-B09-S001	TAMO	A-01-R	
10/02/19	160-35853	F-B01-S002	F-B01-S002	TAMO	901.1/HASL300	
10/02/19	160-35853	F-B01-S002	F-B01-S002	TAMO	905	
10/02/19	160-35853	F-B01-S002	F-B01-S002	TAMO	A-01-R	3
10/02/19	160-35853	F-B01-S001	F-B01-S001	TAMO	901.1/HASL300	
10/02/19	160-35853	F-B01-S001	F-B01-S001	TAMO	905	
10/02/19	160-35853	F-B01-S001	F-B01-S001	TAMO	A-01-R	3

Table H-2: Data Qualification Flags and Reason Codes

Qualifier	Definition
	No qualifier indicates that the data are acceptable both qualitatively and quantitatively.
U	The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J	The analyte was analyzed for and was positively identified, but the reported numerical value may not be consistent with the amount actually present in the environmental sample. Results are estimated although the data are considered usable and may be used as appropriate to meet project objectives. Results are qualitatively acceptable and quantitatively uncertain.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The analyte was analyzed for, but the presence or absence of the analyte has not been verified. Qualifier denotes the data are unusable due to deficiencies in the ability to analyze the sample and meet quality control criteria. Results are rejected and data are unusable for project decisions.

Reason Codes for Data Review and Validation

Reason Code	Description
A	Serial dilution outside criteria (Level IV)
B1	Method blank contamination.
B2	Calibration blank contamination
B2 (Bias flag –)	Calibration blank indicates negative interference, false negatives may be present
C	ICV or CCV percent D outside control limits
C1	Initial calibration RSD outside control limit
C2	Initial continuing calibration RRF outside control limit
C3	Continuing calibration RRF outside control limit
D1	Matrix Duplicate RPD outside control limit
D2	Sample Duplicate RPD outside control limit
E	The sample results exceed the linear calibration range of the instrument
F	Hydrocarbon pattern does not match hydrocarbon pattern in the standard
H	Holding time exceeded
I	Internal standard recovery outside control limit
K1	Equipment rinsate contamination

Deleted: DCN: APTM-0006-4550-0099

Table H-2: Data Qualification Flags and Reason Codes

Reason Code	Description
K2	Ambient blank contamination
K3	Trip blank contamination
L	LCS outside control limits
M	MS outside control limits
M1	MS, MSD, or RPD outside of control limits
O	Interference check sample outside acceptance criteria
P	Analyte qualified based on the professional judgement of the reviewer
S	Surrogate recovery outside control limit
T	Temperature outside acceptance criteria.
Tr	Value reported detected between the DL and LOQ
W	Pesticide breakdown outside criteria (Level IV)
X	Raised reporting limit due to matrix interference or high analyte concentration
Y	Analyte was not confirmed by a second column
Y1	Primary and Confirmation Sample Duplicate RPD outside control limit

Notes:

CCV	continuing calibration verification
DL	detection limit
ICV	initial calibration verification
LOQ	limit of quantification
MS	matrix spike
MSD	matrix spike duplicate
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation

Deleted: DCN: APTM-0006-4550-0099

DCN: APTM-0006-4550-0099

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-B01-S001	N	10/02/19	901.1/HASL300	Thorium-234	160-35853	ND	1.12	1.12	1	pCi/g	U
F-B01-S001	N	10/02/19	901.1/HASL300	Uranium-238	160-35853	ND	1.12	1.12	1	pCi/g	U
F-B01-S001	N	10/02/19	901.1/HASL300	Protactinium 231	160-35853	ND	2.63	2.63	1	pCi/g	U
F-B01-S001	N	10/02/19	905	Total Beta Strontium	160-35853	ND	0.0584	0.0584	1	pCi/g	U
F-B01-S001	N	10/02/19	901.1/HASL300	Actinium-227	160-35853	ND	0.392	0.392	1	pCi/g	U
F-B01-S001	N	10/02/19	901.1/HASL300	Cesium-137	160-35853	ND	0.0665	0.0665	1	pCi/g	U
F-B01-S001	N	10/02/19	901.1/HASL300	Uranium-235	160-35853	ND	0.399	0.399	1	pCi/g	U
F-B01-S001	N	10/02/19	901.1/HASL300	Bismuth-212	160-35853	ND	0.511	0.511	1	pCi/g	U
F-B01-S002	N	10/02/19	901.1/HASL300	Uranium-235	160-35853	ND	0.806	0.806	1	pCi/g	U
F-B01-S002	N	10/02/19	901.1/HASL300	Cesium-137	160-35853	ND	0.0734	0.0734	1	pCi/g	U
F-B01-S002	N	10/02/19	905	Total Beta Strontium	160-35853	ND	0.0715	0.0715	1	pCi/g	U
F-B01-S002	N	10/02/19	901.1/HASL300	Actinium-227	160-35853	ND	0.487	0.487	1	pCi/g	U
F-B01-S002	N	10/02/19	901.1/HASL300	Bismuth-212	160-35853	ND	0.999	0.999	1	pCi/g	U
F-B01-S002	N	10/02/19	901.1/HASL300	Protactinium 231	160-35853	ND	3.21	3.21	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-B01-S002	N	10/02/19	901.1/HASL300	Lead 210	160-35853	ND	1.56	1.56	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0366	0.0366	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0762	0.0762	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0459	0.0459	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.739	0.739	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.43	2.43	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.493	0.493	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	901.1/HASL300	Actinium-228	160-36450	ND	0.176	0.176	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	901.1/HASL300	Radium 228	160-36450	ND	0.176	0.176	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	901.1/HASL300	Thorium-232	160-36450	ND	0.176	0.176	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.417	0.417	1	pCi/g	U
F-SU1-B01-S001	N	11/19/19	901.1/HASL300	Lead 210	160-36450	ND	1.48	1.48	1	pCi/g	U
F-SU1-B02-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0435	0.0435	1	pCi/g	U
F-SU1-B02-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.442	0.442	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B02-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0969	0.0969	1	pCi/g	U
F-SU1-B02-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.406	0.406	1	pCi/g	U
F-SU1-B02-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.76	2.76	1	pCi/g	U
F-SU1-B02-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	1.48	1.48	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0213	0.0213	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0376	0.0376	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0721	0.0721	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.362	0.362	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	901.1/HASL300	Lead 210	160-36450	ND	1.26	1.26	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	905	Total Beta Strontium	160-36450	ND	0.0550	0.055	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.334	0.334	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	901.1/HASL300	Actinium-228	160-36450	ND	0.137	0.137	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	901.1/HASL300	Radium 228	160-36450	ND	0.137	0.137	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	901.1/HASL300	Thorium-232	160-36450	ND	0.137	0.137	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B06-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.29	2.29	1	pCi/g	U
F-SU1-B06-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.729	0.729	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0144	0.0144	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0270	0.027	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.441	0.441	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.828	0.828	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.51	2.51	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0568	0.0568	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	901.1/HASL300	Thorium-234	160-36450	ND	1.14	1.14	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	901.1/HASL300	Uranium-238	160-36450	ND	1.14	1.14	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	905	Total Beta Strontium	160-36450	ND	0.0612	0.0612	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.443	0.443	1	pCi/g	U
F-SU1-B07-S001	N	11/19/19	901.1/HASL300	Lead 210	160-36450	ND	1.68	1.68	1	pCi/g	U
F-SU1-B11-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.431	0.431	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B11-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.469	0.469	1	pCi/g	U
F-SU1-B11-S001	N	11/19/19	901.1/HASL300	Thorium-234	160-36450	ND	1.17	1.17	1	pCi/g	U
F-SU1-B11-S001	N	11/19/19	901.1/HASL300	Uranium-238	160-36450	ND	1.17	1.17	1	pCi/g	U
F-SU1-B11-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0109	0.0109	1	pCi/g	U
F-SU1-B11-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0256	0.0256	1	pCi/g	U
F-SU1-B11-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0759	0.0759	1	pCi/g	U
F-SU1-B11-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.37	2.37	1	pCi/g	U
F-SU1-B11-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.697	0.697	1	pCi/g	U
F-SU1-B11-S001	N	11/19/19	901.1/HASL300	Lead 210	160-36450	ND	1.08	1.08	1	pCi/g	U
F-SU1-B12-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0164	0.0164	1	pCi/g	U
F-SU1-B12-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.673	0.673	1	pCi/g	U
F-SU1-B12-S001	N	11/19/19	901.1/HASL300	Lead 210	160-36450	ND	1.11	1.11	1	pCi/g	U
F-SU1-B12-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0231	0.0231	1	pCi/g	U
F-SU1-B12-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0653	0.0653	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B12-S001	N	11/19/19	905	Total Beta Strontium	160-36450	ND	0.0629	0.0629	1	pCi/g	U
F-SU1-B12-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.392	0.392	1	pCi/g	U
F-SU1-B12-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.327	0.327	1	pCi/g	U
F-SU1-B12-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.44	2.44	1	pCi/g	U
F-SU1-B15-S001	N	11/19/19	905	Total Beta Strontium	160-36450	ND	0.0737	0.0737	1	pCi/g	U
F-SU1-B15-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0326	0.0326	1	pCi/g	U
F-SU1-B15-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0909	0.0909	1	pCi/g	U
F-SU1-B15-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.49	2.49	1	pCi/g	U
F-SU1-B15-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.586	0.586	1	pCi/g	U
F-SU1-B15-S001	N	11/19/19	901.1/HASL300	Thorium-228	160-36450	ND	0.127	0.127	1	pCi/g	U
F-SU1-B15-S001	N	11/19/19	901.1/HASL300	Lead-212	160-36450	ND	0.127	0.127	1	pCi/g	U
F-SU1-B15-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.351	0.351	1	pCi/g	U
F-SU1-B15-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.314	0.314	1	pCi/g	U
F-SU1-B15-S001	N	11/19/19	901.1/HASL300	Thorium-234	160-36450	ND	0.433	0.433	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B15-S001	N	11/19/19	901.1/HASL300	Uranium-238	160-36450	ND	0.433	0.433	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0101	0.0101	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0276	0.0276	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	905	Total Beta Strontium	160-36450	ND	0.0605	0.0605	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.558	0.558	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	3.59	3.59	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0554	0.0554	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Actinium-228	160-36450	ND	0.273	0.273	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Radium 228	160-36450	ND	0.273	0.273	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Thorium-232	160-36450	ND	0.273	0.273	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.567	0.567	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.755	0.755	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Lead 210	160-36450	ND	1.68	1.68	1	pCi/g	U
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Thorium-234	160-36450	ND	0.669	0.669	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B16-S001	N	11/19/19	901.1/HASL300	Uranium-238	160-36450	ND	0.669	0.669	1	pCi/g	U
F-SU1-B17-S001	N	11/19/19	901.1/HASL300	Thorium-234	160-36450	ND	0.928	0.928	1	pCi/g	U
F-SU1-B17-S001	N	11/19/19	901.1/HASL300	Uranium-238	160-36450	ND	0.928	0.928	1	pCi/g	U
F-SU1-B17-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.380	0.38	1	pCi/g	U
F-SU1-B17-S001	N	11/19/19	905	Total Beta Strontium	160-36450	ND	0.0663	0.0663	1	pCi/g	U
F-SU1-B17-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0732	0.0732	1	pCi/g	U
F-SU1-B17-S001	N	11/19/19	901.1/HASL300	Lead 210	160-36450	ND	1.31	1.31	1	pCi/g	U
F-SU1-B17-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.685	0.685	1	pCi/g	U
F-SU1-B17-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0228	0.0228	1	pCi/g	U
F-SU1-B17-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.355	0.355	1	pCi/g	U
F-SU1-B17-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.14	2.14	1	pCi/g	U
F-SU1-B24-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0134	0.0134	1	pCi/g	U
F-SU1-B24-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.575	0.575	1	pCi/g	U
F-SU1-B24-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0344	0.0344	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B24-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0873	0.0873	1	pCi/g	U
F-SU1-B24-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	1.01	1.01	1	pCi/g	U
F-SU1-B24-S001	N	11/19/19	901.1/HASL300	Thorium-234	160-36450	ND	0.992	0.992	1	pCi/g	U
F-SU1-B24-S001	N	11/19/19	901.1/HASL300	Uranium-238	160-36450	ND	0.992	0.992	1	pCi/g	U
F-SU1-B24-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.77	2.77	1	pCi/g	U
F-SU1-B24-S001	N	11/19/19	905	Total Beta Strontium	160-36450	ND	0.0652	0.0652	1	pCi/g	U
F-SU1-B24-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.356	0.356	1	pCi/g	U
F-SU1-B30-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0308	0.0308	1	pCi/g	U
F-SU1-B30-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.934	0.934	1	pCi/g	U
F-SU1-B30-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.466	0.466	1	pCi/g	U
F-SU1-B30-S001	N	11/19/19	901.1/HASL300	Thorium-234	160-36450	ND	1.21	1.21	1	pCi/g	U
F-SU1-B30-S001	N	11/19/19	901.1/HASL300	Uranium-238	160-36450	ND	1.21	1.21	1	pCi/g	U
F-SU1-B30-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	3.02	3.02	1	pCi/g	U
F-SU1-B30-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0159	0.0159	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B30-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.642	0.642	1	pCi/g	U
F-SU1-B30-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0588	0.0588	1	pCi/g	U
F-SU1-B30-S001	N	11/19/19	901.1/HASL300	Lead 210	160-36450	ND	1.39	1.39	1	pCi/g	U
F-SU1-B33-S001	N	11/19/19	905	Total Beta Strontium	160-36450	ND	0.0677	0.0677	1	pCi/g	U
F-SU1-B33-S001	N	11/19/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.592	0.592	1	pCi/g	U
F-SU1-B33-S001	N	11/19/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.40	2.4	1	pCi/g	U
F-SU1-B33-S001	N	11/19/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0418	0.0418	1	pCi/g	U
F-SU1-B33-S001	N	11/19/19	901.1/HASL300	Uranium-235	160-36450	ND	0.497	0.497	1	pCi/g	U
F-SU1-B33-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	ND	0.0329	0.0329	1	pCi/g	U
F-SU1-B33-S001	N	11/19/19	901.1/HASL300	Actinium-227	160-36450	ND	0.354	0.354	1	pCi/g	U
F-SU1-B33-S001	N	11/19/19	901.1/HASL300	Thorium-234	160-36450	ND	0.987	0.987	1	pCi/g	U
F-SU1-B33-S001	N	11/19/19	901.1/HASL300	Uranium-238	160-36450	ND	0.987	0.987	1	pCi/g	U
F-SU1-B33-S001	N	11/19/19	901.1/HASL300	Lead 210	160-36450	ND	1.33	1.33	1	pCi/g	U
F-SU1-B36-S001	N	11/20/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0152	0.0152	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B36-S001	N	11/20/19	A-01-R	Plutonium-238	160-36450	ND	0.0402	0.0402	1	pCi/g	U
F-SU1-B36-S001	N	11/20/19	901.1/HASL300	Uranium-235	160-36450	ND	0.474	0.474	1	pCi/g	U
F-SU1-B36-S001	N	11/20/19	901.1/HASL300	Actinium-227	160-36450	ND	0.578	0.578	1	pCi/g	U
F-SU1-B36-S001	N	11/20/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0642	0.0642	1	pCi/g	U
F-SU1-B36-S001	N	11/20/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.778	0.778	1	pCi/g	U
F-SU1-B36-S001	N	11/20/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.63	2.63	1	pCi/g	U
F-SU2-B04-S001	N	11/20/19	A-01-R	Plutonium-238	160-36450	ND	0.0459	0.0459	1	pCi/g	U
F-SU2-B04-S001	N	11/20/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0589	0.0589	1	pCi/g	U
F-SU2-B04-S001	N	11/20/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.643	0.643	1	pCi/g	U
F-SU2-B04-S001	N	11/20/19	901.1/HASL300	Thorium-234	160-36450	ND	1.37	1.37	1	pCi/g	U
F-SU2-B04-S001	N	11/20/19	901.1/HASL300	Uranium-238	160-36450	ND	1.37	1.37	1	pCi/g	U
F-SU2-B04-S001	N	11/20/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0366	0.0366	1	pCi/g	U
F-SU2-B04-S001	N	11/20/19	905	Total Beta Strontium	160-36450	ND	0.0707	0.0707	1	pCi/g	U
F-SU2-B04-S001	N	11/20/19	901.1/HASL300	Uranium-235	160-36450	ND	0.417	0.417	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU2-B04-S001	N	11/20/19	901.1/HASL300	Actinium-227	160-36450	ND	0.386	0.386	1	pCi/g	U
F-SU2-B04-S001	N	11/20/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.59	2.59	1	pCi/g	U
F-SU2-B04-S001	N	11/20/19	901.1/HASL300	Lead 210	160-36450	ND	1.25	1.25	1	pCi/g	U
F-SU2-B07-S001	N	11/20/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0522	0.0522	1	pCi/g	U
F-SU2-B07-S001	N	11/20/19	901.1/HASL300	Lead 210	160-36450	ND	1.68	1.68	1	pCi/g	U
F-SU2-B07-S001	N	11/20/19	901.1/HASL300	Thorium-234	160-36450	ND	1.42	1.42	1	pCi/g	U
F-SU2-B07-S001	N	11/20/19	901.1/HASL300	Uranium-238	160-36450	ND	1.42	1.42	1	pCi/g	U
F-SU2-B07-S001	N	11/20/19	A-01-R	Plutonium-238	160-36450	ND	0.0496	0.0496	1	pCi/g	U
F-SU2-B07-S001	N	11/20/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0634	0.0634	1	pCi/g	U
F-SU2-B07-S001	N	11/20/19	901.1/HASL300	Uranium-235	160-36450	ND	0.493	0.493	1	pCi/g	U
F-SU2-B07-S001	N	11/20/19	901.1/HASL300	Actinium-227	160-36450	ND	0.398	0.398	1	pCi/g	U
F-SU2-B07-S001	N	11/20/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.579	0.579	1	pCi/g	U
F-SU2-B07-S001	N	11/20/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.53	2.53	1	pCi/g	U
F-SU2-B09-S001	N	11/20/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0416	0.0416	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU2-B09-S001	N	11/20/19	901.1/HASL300	Bismuth-212	160-36450	ND	1.00	1	1	pCi/g	U
F-SU2-B09-S001	N	11/20/19	905	Total Beta Strontium	160-36450	ND	0.114	0.114	1	pCi/g	U
F-SU2-B09-S001	N	11/20/19	901.1/HASL300	Thorium-234	160-36450	ND	0.608	0.608	1	pCi/g	U
F-SU2-B09-S001	N	11/20/19	901.1/HASL300	Uranium-238	160-36450	ND	0.608	0.608	1	pCi/g	U
F-SU2-B09-S001	N	11/20/19	901.1/HASL300	Protactinium 231	160-36450	ND	3.80	3.8	1	pCi/g	U
F-SU2-B09-S001	N	11/20/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0903	0.0903	1	pCi/g	U
F-SU2-B09-S001	N	11/20/19	A-01-R	Plutonium-238	160-36450	ND	0.0394	0.0394	1	pCi/g	U
F-SU2-B09-S001	N	11/20/19	901.1/HASL300	Uranium-235	160-36450	ND	0.368	0.368	1	pCi/g	U
F-SU2-B09-S001	N	11/20/19	901.1/HASL300	Actinium-227	160-36450	ND	0.383	0.383	1	pCi/g	U
F-SU2-B12-S001	N	11/20/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0222	0.0222	1	pCi/g	U
F-SU2-B12-S001	N	11/20/19	901.1/HASL300	Cesium-137	160-36450	ND	0.0635	0.0635	1	pCi/g	U
F-SU2-B12-S001	N	11/20/19	901.1/HASL300	Uranium-235	160-36450	ND	0.335	0.335	1	pCi/g	U
F-SU2-B12-S001	N	11/20/19	901.1/HASL300	Actinium-227	160-36450	ND	0.496	0.496	1	pCi/g	U
F-SU2-B12-S001	N	11/20/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.769	0.769	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU2-B12-S001	N	11/20/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.38	2.38	1	pCi/g	U
F-SU2-B12-S001	N	11/20/19	A-01-R	Plutonium-238	160-36450	ND	0.0391	0.0391	1	pCi/g	U
F-SU2-B12-S001	N	11/20/19	901.1/HASL300	Actinium-228	160-36450	ND	0.199	0.199	1	pCi/g	U
F-SU2-B12-S001	N	11/20/19	901.1/HASL300	Radium 228	160-36450	ND	0.199	0.199	1	pCi/g	U
F-SU2-B12-S001	N	11/20/19	901.1/HASL300	Thorium-232	160-36450	ND	0.199	0.199	1	pCi/g	U
F-SU2-B16-S001	N	11/20/19	A-01-R	Plutonium-239/240	160-36450	ND	0.0144	0.0144	1	pCi/g	U
F-SU2-B16-S001	N	11/20/19	901.1/HASL300	Actinium-227	160-36450	ND	0.501	0.501	1	pCi/g	U
F-SU2-B16-S001	N	11/20/19	901.1/HASL300	Uranium-235	160-36450	ND	0.366	0.366	1	pCi/g	U
F-SU2-B16-S001	N	11/20/19	A-01-R	Plutonium-238	160-36450	ND	0.0269	0.0269	1	pCi/g	U
F-SU2-B16-S001	N	11/20/19	901.1/HASL300	Bismuth-212	160-36450	ND	0.798	0.798	1	pCi/g	U
F-SU2-B16-S001	N	11/20/19	901.1/HASL300	Protactinium 231	160-36450	ND	2.94	2.94	1	pCi/g	U
F-SU3-B01-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.0143	0.0143	1	pCi/g	U
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0924	0.0924	1	pCi/g	U
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.372	0.372	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.591	0.591	1	pCi/g	U
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	ND	1.48	1.48	1	pCi/g	U
F-SU3-B01-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0159	0.0159	1	pCi/g	U
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Thorium-228	160-36160	ND	0.139	0.139	1	pCi/g	U
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Lead-212	160-36160	ND	0.139	0.139	1	pCi/g	U
F-SU3-B01-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0622	0.0622	1	pCi/g	U
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.945	0.945	1	pCi/g	U
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.59	2.59	1	pCi/g	U
F-SU3-B04-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.0147	0.0147	1	pCi/g	U
F-SU3-B04-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0207	0.0207	1	pCi/g	U
F-SU3-B04-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.583	0.583	1	pCi/g	U
F-SU3-B04-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.723	0.723	1	pCi/g	U
F-SU3-B04-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.63	2.63	1	pCi/g	U
F-SU3-B04-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0418	0.0418	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B04-S001	N	10/24/19	901.1/HASL300	Thallium-208	160-36160	ND	0.0638	0.0638	1	pCi/g	U
F-SU3-B04-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.381	0.381	1	pCi/g	U
F-SU3-B04-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	ND	1.22	1.22	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0488	0.0488	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.397	0.397	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0152	0.0152	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.20	2.2	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	1.19	1.19	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	1.19	1.19	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.00760	0.0076	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0645	0.0645	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Actinium-228	160-36160	ND	0.156	0.156	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Radium 228	160-36160	ND	0.156	0.156	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Thorium-232	160-36160	ND	0.156	0.156	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.388	0.388	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.486	0.486	1	pCi/g	U
F-SU3-B05-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	ND	0.967	0.967	1	pCi/g	U
F-SU3-B07-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	0.652	0.652	1	pCi/g	U
F-SU3-B07-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	0.652	0.652	1	pCi/g	U
F-SU3-B07-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.82	2.82	1	pCi/g	U
F-SU3-B07-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0196	0.0196	1	pCi/g	U
F-SU3-B07-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.00741	0.00741	1	pCi/g	U
F-SU3-B07-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0629	0.0629	1	pCi/g	U
F-SU3-B07-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.278	0.278	1	pCi/g	U
F-SU3-B07-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.384	0.384	1	pCi/g	U
F-SU3-B07-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.736	0.736	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.0131	0.0131	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0146	0.0146	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B09-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0653	0.0653	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0845	0.0845	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	0.768	0.768	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	0.768	0.768	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.848	0.848	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.62	2.62	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.398	0.398	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.294	0.294	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	901.1/HASL300	Radium-226	160-36160	ND	0.224	0.224	1	pCi/g	U
F-SU3-B09-S001	N	10/24/19	901.1/HASL300	Bismuth-214	160-36160	ND	0.224	0.224	1	pCi/g	U
F-SU3-B11-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.0128	0.0128	1	pCi/g	U
F-SU3-B11-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.374	0.374	1	pCi/g	U
F-SU3-B11-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0692	0.0692	1	pCi/g	U
F-SU3-B11-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.628	0.628	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B11-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0165	0.0165	1	pCi/g	U
F-SU3-B11-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0524	0.0524	1	pCi/g	U
F-SU3-B11-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.369	0.369	1	pCi/g	U
F-SU3-B11-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	0.333	0.333	1	pCi/g	U
F-SU3-B11-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	0.333	0.333	1	pCi/g	U
F-SU3-B11-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	ND	1.16	1.16	1	pCi/g	U
F-SU3-B11-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.11	2.11	1	pCi/g	U
F-SU3-B12-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.0132	0.0132	1	pCi/g	U
F-SU3-B12-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0565	0.0565	1	pCi/g	U
F-SU3-B12-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.923	0.923	1	pCi/g	U
F-SU3-B12-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	3.15	3.15	1	pCi/g	U
F-SU3-B12-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0132	0.0132	1	pCi/g	U
F-SU3-B12-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0840	0.084	1	pCi/g	U
F-SU3-B12-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.551	0.551	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0836	0.0836	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0223	0.0223	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0626	0.0626	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.338	0.338	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	0.975	0.975	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	0.975	0.975	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.448	0.448	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.84	2.84	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.0182	0.0182	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Thorium-228	160-36160	ND	0.121	0.121	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Lead-212	160-36160	ND	0.121	0.121	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Lead-214	160-36160	ND	0.195	0.195	1	pCi/g	U
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.570	0.57	1	pCi/g	U
F-SU3-B15-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0231	0.0231	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B15-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0665	0.0665	1	pCi/g	U
F-SU3-B15-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.634	0.634	1	pCi/g	U
F-SU3-B15-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0681	0.0681	1	pCi/g	U
F-SU3-B15-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.466	0.466	1	pCi/g	U
F-SU3-B15-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	0.884	0.884	1	pCi/g	U
F-SU3-B15-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	0.884	0.884	1	pCi/g	U
F-SU3-B15-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	ND	1.16	1.16	1	pCi/g	U
F-SU3-B15-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.21	2.21	1	pCi/g	U
F-SU3-B15-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.388	0.388	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.00778	0.00778	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0642	0.0642	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0719	0.0719	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.464	0.464	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.597	0.597	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	3.17	3.17	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Thorium-228	160-36160	ND	0.149	0.149	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Lead-212	160-36160	ND	0.149	0.149	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	0.646	0.646	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	0.646	0.646	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.718	0.718	1	pCi/g	U
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	ND	1.34	1.34	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0679	0.0679	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.123	0.123	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0553	0.0553	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.0528	0.0528	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	0.934	0.934	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	0.934	0.934	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	ND	1.50	1.5	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	1.08	1.08	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.598	0.598	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Thallium-208	160-36160	ND	0.0595	0.0595	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Actinium-228	160-36160	ND	0.242	0.242	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Radium 228	160-36160	ND	0.242	0.242	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Thorium-232	160-36160	ND	0.242	0.242	1	pCi/g	U
F-SU3-B29-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	1.83	1.83	1	pCi/g	U
F-SU3-B30-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	ND	1.14	1.14	1	pCi/g	U
F-SU3-B30-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0640	0.064	1	pCi/g	U
F-SU3-B30-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.366	0.366	1	pCi/g	U
F-SU3-B30-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.704	0.704	1	pCi/g	U
F-SU3-B30-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.44	2.44	1	pCi/g	U
F-SU3-B30-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.0145	0.0145	1	pCi/g	U
F-SU3-B30-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0307	0.0307	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B30-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0633	0.0633	1	pCi/g	U
F-SU3-B30-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.347	0.347	1	pCi/g	U
F-SU3-B30-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	1.12	1.12	1	pCi/g	U
F-SU3-B30-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	1.12	1.12	1	pCi/g	U
F-SU3-B52-S001	N	10/25/19	905	Total Beta Strontium	160-36159	ND	0.0689	0.0689	1	pCi/g	U
F-SU3-B52-S001	N	10/25/19	901.1/HASL300	Actinium-227	160-36159	ND	0.487	0.487	1	pCi/g	U
F-SU3-B52-S001	N	10/25/19	901.1/HASL300	Thorium-234	160-36159	ND	0.894	0.894	1	pCi/g	U
F-SU3-B52-S001	N	10/25/19	901.1/HASL300	Uranium-238	160-36159	ND	0.894	0.894	1	pCi/g	U
F-SU3-B52-S001	N	10/25/19	901.1/HASL300	Protactinium 231	160-36159	ND	2.70	2.7	1	pCi/g	U
F-SU3-B52-S001	N	10/25/19	901.1/HASL300	Cesium-137	160-36159	ND	0.0598	0.0598	1	pCi/g	U
F-SU3-B52-S001	N	10/25/19	A-01-R	Plutonium-238	160-36159	ND	0.0155	0.0155	1	pCi/g	U
F-SU3-B52-S001	N	10/25/19	901.1/HASL300	Bismuth-212	160-36159	ND	0.538	0.538	1	pCi/g	U
F-SU3-B52-S001	N	10/25/19	901.1/HASL300	Uranium-235	160-36159	ND	0.468	0.468	1	pCi/g	U
F-SU3-B52-S001	N	10/25/19	901.1/HASL300	Lead 210	160-36159	ND	1.17	1.17	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU4-B04-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.0107	0.0107	1	pCi/g	U
F-SU4-B04-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0700	0.07	1	pCi/g	U
F-SU4-B04-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.494	0.494	1	pCi/g	U
F-SU4-B04-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.886	0.886	1	pCi/g	U
F-SU4-B04-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	3.22	3.22	1	pCi/g	U
F-SU4-B04-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0302	0.0302	1	pCi/g	U
F-SU4-B04-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0563	0.0563	1	pCi/g	U
F-SU4-B04-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.529	0.529	1	pCi/g	U
F-SU4-B04-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	1.07	1.07	1	pCi/g	U
F-SU4-B04-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	1.07	1.07	1	pCi/g	U
F-SU5-B05-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0455	0.0455	1	pCi/g	U
F-SU5-B05-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0621	0.0621	1	pCi/g	U
F-SU5-B05-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.101	0.101	1	pCi/g	U
F-SU5-B05-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	0.944	0.944	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU5-B05-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	0.944	0.944	1	pCi/g	U
F-SU5-B05-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.52	2.52	1	pCi/g	U
F-SU5-B05-S001	N	10/24/19	901.1/HASL300	Thorium-228	160-36160	ND	0.126	0.126	1	pCi/g	U
F-SU5-B05-S001	N	10/24/19	901.1/HASL300	Lead-212	160-36160	ND	0.126	0.126	1	pCi/g	U
F-SU5-B05-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.273	0.273	1	pCi/g	U
F-SU5-B05-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.362	0.362	1	pCi/g	U
F-SU5-B05-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.738	0.738	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	ND	0.0162	0.0162	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Bismuth-212	160-36160	ND	0.780	0.78	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	905	Total Beta Strontium	160-36160	ND	0.0599	0.0599	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Cesium-137	160-36160	ND	0.0641	0.0641	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	ND	1.39	1.39	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Protactinium 231	160-36160	ND	2.15	2.15	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	ND	0.0204	0.0204	1	pCi/g	U

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	ND	1.14	1.14	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	ND	1.14	1.14	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Uranium-235	160-36160	ND	0.476	0.476	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Actinium-228	160-36160	ND	0.156	0.156	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Radium 228	160-36160	ND	0.156	0.156	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Thorium-232	160-36160	ND	0.156	0.156	1	pCi/g	U
F-SU5-B10-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	ND	0.348	0.348	1	pCi/g	U
Reason Code	**P**										
F-SU3-B14-S001	N	10/24/19	A-01-R	Polonium-210	160-36160	0.699	0.127	0.127	1	pCi/g	J
F-SU5-B10-S001	N	10/24/19	A-01-R	Polonium-210	160-36160	0.73	0.0873	0.0873	1	pCi/g	J
Reason Code	**P1**										
F-B01-S001	N	10/02/19	901.1/HASL300	Thallium-208	160-35853	0.0805	0.0416	0.0416	1	pCi/g	J
F-B01-S002	N	10/02/19	901.1/HASL300	Thorium-234	160-35853	0.814	0.684	0.684	1	pCi/g	J

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B02-S001	N	11/19/19	A-01-R	Plutonium-238	160-36450	0.0452	0.0412	0.0412	1	pCi/g	J
F-SU1-B02-S001	N	11/19/19	905	Total Beta Strontium	160-36450	0.0805	0.0684	0.0684	1	pCi/g	J
F-SU1-B02-S001	N	11/19/19	901.1/HASL300	Thallium-208	160-36450	0.116	0.0588	0.0588	1	pCi/g	J
F-SU1-B02-S001	N	11/19/19	901.1/HASL300	Thorium-234	160-36450	0.559	0.448	0.448	1	pCi/g	J
F-SU1-B02-S001	N	11/19/19	901.1/HASL300	Uranium-238	160-36450	0.559	0.448	0.448	1	pCi/g	J
F-SU1-B12-S001	N	11/19/19	901.1/HASL300	Thorium-234	160-36450	0.446	0.395	0.395	1	pCi/g	J
F-SU1-B12-S001	N	11/19/19	901.1/HASL300	Uranium-238	160-36450	0.446	0.395	0.395	1	pCi/g	J
F-SU1-B15-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	0.016	0.00843	0.00843	1	pCi/g	J
F-SU1-B17-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	0.014	0.0122	0.0122	1	pCi/g	J
F-SU1-B24-S001	N	11/19/19	901.1/HASL300	Lead 210	160-36450	1.22	0.997	0.997	1	pCi/g	J
F-SU1-B30-S001	N	11/19/19	905	Total Beta Strontium	160-36450	0.0642	0.0560	0.056	1	pCi/g	J
F-SU1-B33-S001	N	11/19/19	A-01-R	Plutonium-239/240	160-36450	0.0169	0.0155	0.0155	1	pCi/g	J
F-SU1-B36-S001	N	11/20/19	901.1/HASL300	Actinium-228	160-36450	0.172	0.153	0.153	1	pCi/g	J
F-SU1-B36-S001	N	11/20/19	901.1/HASL300	Radium 228	160-36450	0.172	0.153	0.153	1	pCi/g	J

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU1-B36-S001	N	11/20/19	901.1/HASL300	Thorium-232	160-36450	0.172	0.153	0.153	1	pCi/g	J
F-SU1-B36-S001	N	11/20/19	901.1/HASL300	Thorium-234	160-36450	0.764	0.649	0.649	1	pCi/g	J
F-SU1-B36-S001	N	11/20/19	901.1/HASL300	Uranium-238	160-36450	0.764	0.649	0.649	1	pCi/g	J
F-SU2-B07-S001	N	11/20/19	905	Total Beta Strontium	160-36450	0.0834	0.0645	0.0645	1	pCi/g	J
F-SU2-B12-S001	N	11/20/19	901.1/HASL300	Lead 210	160-36450	1.22	1.10	1.1	1	pCi/g	J
F-SU2-B16-S001	N	11/20/19	905	Total Beta Strontium	160-36450	0.0758	0.0566	0.0566	1	pCi/g	J
F-SU2-B16-S001	N	11/20/19	901.1/HASL300	Actinium-228	160-36450	0.256	0.203	0.203	1	pCi/g	J
F-SU2-B16-S001	N	11/20/19	901.1/HASL300	Radium 228	160-36450	0.256	0.203	0.203	1	pCi/g	J
F-SU2-B16-S001	N	11/20/19	901.1/HASL300	Thorium-232	160-36450	0.256	0.203	0.203	1	pCi/g	J
F-SU2-B16-S001	N	11/20/19	901.1/HASL300	Thorium-234	160-36450	0.699	0.455	0.455	1	pCi/g	J
F-SU2-B16-S001	N	11/20/19	901.1/HASL300	Uranium-238	160-36450	0.699	0.455	0.455	1	pCi/g	J
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Actinium-228	160-36160	0.312	0.198	0.198	1	pCi/g	J
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Radium 228	160-36160	0.312	0.198	0.198	1	pCi/g	J
F-SU3-B01-S001	N	10/24/19	901.1/HASL300	Thorium-232	160-36160	0.312	0.198	0.198	1	pCi/g	J

Table 3: Qualified Data Summary

Sample Reason Code	Sample Type None	Sample Date	Method	Analyte	SDG	Result	DL	LOQ	Dilution	Units	VQ
F-SU3-B04-S001	N	10/24/19	901.1/HASL300	Thorium-234	160-36160	0.707	0.565	0.565	1	pCi/g	J
F-SU3-B04-S001	N	10/24/19	901.1/HASL300	Uranium-238	160-36160	0.707	0.565	0.565	1	pCi/g	J
F-SU3-B07-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	1.91	1.44	1.44	1	pCi/g	J
F-SU3-B09-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	0.802	0.775	0.775	1	pCi/g	J
F-SU3-B12-S001	N	10/24/19	901.1/HASL300	Actinium-227	160-36160	0.54	0.295	0.295	1	pCi/g	J
F-SU3-B14-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	1.51	1.08	1.08	1	pCi/g	J
F-SU3-B15-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	0.0266	0.00987	0.00987	1	pCi/g	J
F-SU3-B23-S001	N	10/24/19	A-01-R	Plutonium-238	160-36160	0.0359	0.0301	0.0301	1	pCi/g	J
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Actinium-228	160-36160	0.186	0.175	0.175	1	pCi/g	J
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Radium 228	160-36160	0.186	0.175	0.175	1	pCi/g	J
F-SU3-B23-S001	N	10/24/19	901.1/HASL300	Thorium-232	160-36160	0.186	0.175	0.175	1	pCi/g	J
F-SU3-B52-S001	N	10/25/19	A-01-R	Plutonium-239/240	160-36159	0.00756	0.00695	0.00695	1	pCi/g	J
F-SU5-B05-S001	N	10/24/19	A-01-R	Plutonium-239/240	160-36160	0.0233	0.0175	0.0175	1	pCi/g	J
F-SU5-B05-S001	N	10/24/19	901.1/HASL300	Lead 210	160-36160	1.09	0.936	0.936	1	pCi/g	J

Table 4: Analytical and Technical Completeness

Analytical Method	Number of Analytes	Number of Samples	Number of Results	Number of Qualified Results	Number of Unqualified Results	Number of Useable Results	Analytical Completeness [Goal = 90%]	Technical Completeness [Goal = 95%]
901.1/HASL300	18	36	648	32	616	648	95%	100%
A-01-R	3	36	90	10	80	90	89%	100%
905	1	36	36	4	32	36	89%	100%

Notes:

Values in bold indicate completeness results that do not meet the project completeness goals.

APPENDIX I
DATA VALIDATION REPORTS

Deleted: DCN: APTM-0006-4550-0099

DCN: APTM-0006-4550-0099

COVER LETTER

September 30, 2020

(revision to the March 7, 2020)

Ref; Eurofins (Test America) SDG 160-36159 (12/03/2019)

Audrey Engel
APTIM
Hunters Point Naval Shipyard
200 Fisher Avenue
San Francisco, CA. 94124

Dear Mrs. Engel:

Enclosed is the data validation report for the Hunters Point Radiological Work Task, Remedial Action, and Maintenance of Remedies at Hunters Point Naval Shipyard, San Francisco, PA, project number 501008. This DVR encompasses the laboratory data produced by Eurofins (formerly TestAmerica Laboratories, Inc.) Table 1-1 describes the samples and analysis listed in this DVR.

The specific sample identifications are listed in the sample identification table(s). The data packages were reviewed per the data validation procedures referenced in the introduction of the report.

Sincerely,

Larry Duty
Data Validation Project Manager

1.0 INTRODUCTION

This Data Validation Report (DVR) contains the results of the validation conducted for samples collected and analyzed as part of the Hunters Point Naval Station Radiological work task, remedial action, and maintenance of remedies. The project was conducted per contract number N62473-17-D-006/N62473-17-F-4550 under EMAC III TO 13 for the Base Realignment and Closure Program Management Office, West Naval Facilities Engineering Command, 1455 Frazee Road, #600, San Diego CA. 92108. This DVR was subcontracted to E-Lab Consultants from Aptim (former Chicago, Bridge, and Iron) to serve third party data assessment purposes and evaluates the laboratory data contained in Sample Delivery Groups (SDGs) list in **Table 1-1** produced by Eurofins (formerly TestAmerica Laboratories, Inc).

These samples were analyzed in accordance with the approved *United States Department of Defense* (DOD) *Quality Systems Manual (QSM) for Environmental Laboratories Version 5.3, 2019* and the analytical methods specified for the analytes requested on the Chain of Custody (COC) documentation. **Table 1-1** provides a list of the samples collected, a laboratory sample number cross-reference, sample matrix, date collected, sample purpose, and analytical methods performed for each sample pertaining to this DVR. This DVR is conducted per the analysis requested on the COC in accordance with the; Final Revision 2 Radiological Scoping Surveys Work Plan, Parcel F Structures May, 2019.(RSSWP), *American National Standard Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation (ANSI/ANS-41.5-2012), Radionuclide Data Quality Evaluation Guidance 9284, Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Organic (NFGO) Data Review (August 2014), NFG for Inorganic (NFGIO) Data Review (August 2014),* and the method specified for the analysis.

The data were evaluated against the quantitative acceptance limits given in the DOD QSM for the data quality parameters of sensitivity, accuracy, precision, and completeness. **Appendix A** contains the Laboratory Data Report Form 1s that has been annotated with qualifiers assigned during the validation process in accordance with the project procedures manual.

In accordance with RSSWP, a review of the data was conducted independent of the laboratory. This review consisted of an evaluation of laboratory performance criteria

from the case narrative, and an evaluation of the sample-specific criteria included in the laboratory data packages analyzed in accordance with the DOD QSM.

The validation consists of an evaluation of the case narrative, chain of custody and associated laboratory sample receipt forms, proper sample preservations, holding times, initial calibration and continuing calibration procedures and results, laboratory control sample (LCS) (and duplicate [LCSD] if reported) accuracy and precision and matrix spike (MS) and matrix spike duplicate (MSD) sample analyses, method blanks, field blanks, and field duplicate precision.

(if required) Additional Stage 2B review included;

- Organic Analysis; internal standards, continuing calibration verification, internal standards, degradation summary, retention times, second column or second detector confirmations, retention time windows,
- Inorganic Analysis; laboratory duplicate precision, instrument tuning, initial calibration, low-level calibration check standards, initial and continuing calibration verification, initial and continuing calibration blanks, interference check sample, internal standards, serial dilution results, post digestion spike recoveries, and interelement correction factors

The results of the independent data review are presented in **Section 2.0**.

Table 1-1
Sample Field and Laboratory ID Numbers

Field ID	Sample Date	Matrix	Purpose	Lab ID	Method	Level
F-SU3-B52-S001	10/25/2019 11:00:00 AM	SC	N	160361591	EPA191.1M EPA905.0M A-Spec A-01R	2B

Following the specifications in the SAP related to the data validation process, the data were annotated with data validation qualifiers and codes on the analytical data sheets that are required qualifier flags as described in the SAP. **Table 1-2** provides definitions of the data qualifiers references, and **Table 1-3** lists and defines the data review qualifier codes.

Table 1-2
Data Qualifier References

Qualifier	Organics	Inorganics
U	The analyte was analyzed for but was not detected above the method detection limit.	The analyte was analyzed for but was not detected above the method detection limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	Not applicable.

UJ	The analyte was not detected above the method detection limit. However, the associated value is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified.	The data are unusable. The sample results are rejected due to serious deficiencies in meeting the Quality Control (QC) criteria. The analyte may or may not be present in the sample.

Table 1-3
Data Review Qualifier Codes

Reason Code	Description
A	Serial dilution outside criteria (Level IV).
B1	Method blank contaminants above reporting limit.
B2	Calibration blank contaminants above reporting limit.
B2 (Bias flag –)	Calibration blank indicates negative interference, false negatives may be present
B3	Trip blank contamination
B4	Equipment rinsate contamination.
B5	Ambient blank contamination
C	ICV or CCV % D outside control limits.
C1	Initial calibration RSD outside control limit.
C2	Initial calibration RRF outside control limit.
C3	Continuing calibration RRF outside control limit.
D1	Sample Duplicate RPD outside control limit.
D2	Matrix Duplicate RPD outside control limit
E	The sample results exceed the linear calibration range of the instrument.
F	Hydrocarbon pattern does not match hydrocarbon pattern in the standard.
H	Holding time exceeded.
I	Internal standard recovery outside control limit.

L	LCS outside control limits.
M	MS outside control limits.
M1	MS, MSD or RPD outside of control limits
O	Interference check sample outside acceptance criteria
P	Analyte qualified based on the professional judgement of the reviewer.
P1	Sample result is ≤ total uncertainty
S	Surrogate recovery outside control limit.
T	Temperature outside acceptance criteria.
Tr	Value reported detected between the DL and LOQ
W	Pesticide breakdown outside criteria (Level IV).
X	Raised reporting limit due to matrix interference or high analyte concentration.
Y	Analyte was not confirmed by a second column.
Y1	Primary and Confirmation Sample Duplicate RPD outside control limit.

2.0 DATA VALIDATION RESULTS

Laboratory Data Package Review

The samples reported, QC designations, and validation level is listed in **Table 1-1**. The data packages were reviewed in accordance with the project procedures manual.

Sample Documentation, Preservation, Handling, and Transport

All samples arrived at the laboratory on time, intact and within preservation requirements. A cross reference of the COC and analytical reports has concluded all extractions and analysis were performed within the required holding times. The validation met all QC requirements listed in the method and data validation requirements of the SAP. None of the data is qualified based on sample documentation, preservation, handing, or transport.

The data is not qualified.

2.1 Total Beta Strontium, EPA 905

2.1.1 Instrument Parameters

Verification included the review of the laboratories most recent efficiency calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Counting uncertainty was ≤ 1/5 the quantitation limits. Efficiency performance checks were verified for each use.

2.1.2 Energy Calibrations

Energy calibrations (Energy Calibration Performance Checks, ECPC) were verified to be at the frequency specified. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.1.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.1.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (<20%). Continuing calibrations were performed on a 12-hour basis. Detection goals for cesium137 were not met in all analysis due to elevated Compton background levels. Natural activity is suspect. None of the data were qualified based on continuing calibrations.

2.1.5 Blanks

Each analytical batch was represented with a method blank. The laboratory reports none of the target compounds were detected in any of the method blanks that would results in sample data qualification (e.g. sample detections were >5X the blank). None of the results are qualified based on data verifications.

2.1.6 Laboratory Control Sample Recovery (Blank Spikes)

The LCS values were validated by recalculating two compounds per LCS. None of the data are qualified based on LCS recoveries.

2.1.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD samples were not submitted for this analysis.

2.1.8 Laboratory Duplicate Recoveries

All laboratory generated duplicate recoveries are within QC limits.

2.1.9 Field QC Samples

Trip, Equipment and Field Blanks

Field blank samples were not submitted for this analysis.

2.1.10 Target Compound Identification

None of the identified target compounds were qualified based compound identification.

2.1.11 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable. The harmonization of the SDG samples could not be thoroughly completed due to rocks within the sample.

2.2 Radium-226 by GAMMA SPEC (21 DAY INGROWTH)

2.2.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.2.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.2.3 Background Determination

Background control logs were verified to insure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.2.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.2.1 Blanks

Each analytical batch was represented with a method blank. The laboratory reports none of the target compounds were detected in any of the method blanks that would results in sample data qualification (e.g. sample detections were >5X the blank or MB was below the 1.65X its CSU). None of the results are qualified based on data verifications.

2.2.2 Laboratory Control Sample Recovery (Blank Spikes)

The LCS values were validated by recalculating two compounds per LCS. None of the data are qualified based on LCS recoveries.

2.2.3 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD samples were not submitted for this analysis.

2.2.4 Laboratory Duplicate Recoveries

All laboratory generated duplicate recoveries are within QC limits.

2.2.5 Field QC Samples

Trip, Equipment and Field Blanks

Field blank samples were not submitted for this analysis.

2.2.6 Target Compound Identification

None of the identified target compounds were qualified based compound identification.

2.2.7 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

2.3 A-01R Polonium

2.3.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.3.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.3.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.3.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.3.5 Blanks

Blanks The laboratory (method) blanks yielded no detectable activities, so no qualifications were applied.

2.3.6 Laboratory Control Sample Recovery (Blank Spikes)

LCS/D analyses provided adequate confirmation of accuracy and precision.

2.3.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD analyses were not performed for these analyses. No qualifications were applied.

2.3.8 Tracers

The tracers yielded fully satisfactory recoveries.

2.3.9 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

2.4 A-01R Plutonium

2.4.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.4.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.4.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.4.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.4.5 Blanks

Blanks The laboratory (method) blanks yielded no detectable activities, so no qualifications were applied.

2.4.6 Laboratory Control Sample Recovery (Blank Spikes)

LCS/D analyses provided adequate confirmation of accuracy and precision.

2.4.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD analyses were not performed for these analyses. No qualifications were applied.

2.4.8 Tracers

The tracers (thorium-229 and uranium-232) yielded fully satisfactory recoveries from all samples. No qualifications were applied.

2.4.9 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

2.5 GAMMA SPECTROSCOPY ANALYSES

2.5.1.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.5.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.5.3 Background Determination

Background control logs were verified to insure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.5.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.5.5 Blanks

Blanks The laboratory (method) blanks yielded no detectable activities, so no qualifications were applied.

2.5.6 Laboratory Control Sample Recovery (Blank Spikes)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

2.5.7 Duplicate Recoveries

Duplicate recoveries were within QC limits.

2.5.8 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

3.0 CONCLUSION

Detected values that are above the DLC and below the total uncertainty are qualified estimated "J" and a reason code P-1.

The following samples were qualified based on this validation.

sample	Lab ID	Ana Meth	chemical name	Result	Error	LQ	VQ	RC
F-SU3-B52-S001	160361591	A-01-R	Plutonium-239/240	0.00756	0.0151		J	P1

Acronyms and Abbreviations

Following is a list of acronyms and abbreviations that may be used in data validation reports and/or data quality assessment reports.

%D	percent difference	DFTPP	decafluorotriphenylphosphine
%R	percent recovery	DOD	Department Of Defense
µg/L	microgram per liter	DQAR	data quality assessment report
mg/L	milligram per liter		
pg/L	picogram per liter	DUP	laboratory duplicate
µg/kg	microgram per kilogram	DVP	data validation procedure
mg/kg	milligram per kilogram	EDB	ethylene dibromide
ng/kg	nanogram per kilogram	EDL	estimated detection limit
pg/g	picogram per gram	EICP	extracted ion current profile
AA	atomic absorption	EPA	Environmental Protection Agency, United States
ARRF	average relative response factor	EB	equipment blank
BFB	bromofluorobenzene	FB	field blank
BNA	base/neutral/acid compounds	GC	gas chromatography
CCB	continuing calibration blank	GC/ECD	gas chromatography/electron capture detector
CCC	calibration check compound	GC/ELCD	gas chromatography/electrolytic conductivity detector (Hall detector)
CCV	continuing calibration verification	GC/FPD	gas chromatography/flame photometric detector
CF	calibration factor	GC/MS	gas chromatography/mass spectrometry

CLP	Contract Laboratory Program	GC/PID	gas chromatography/photoionization detector
COC	chain of custody record	GFAA	graphite furnace atomic absorption
COD	chemical oxygen demand	GPC	gel permeation chromatography
CTO	contract task order	Hg	mercury
CVAA	cold vapor atomic absorption	HPLC	high-performance liquid chromatography
DBCP	dibromochloropropane	HRGC/HRMS	high resolution gas chromatography/high resolution mass spectrometry
DCB	decachlorobiphenyl	RF r2	response factor coefficient of determination
4,4'-DDD	4,4'-dichlorodiphenyldichloroethane	RICRF	reconstructed ion chromatogram response factor
4,4'-DDE	4,4'-dichlorodiphenyldichloroethylene	RLRIC	reporting limit reconstructed ion chromatogram
4,4'-DDT	4,4'-dichlorodiphenyltrichloroethane	RPDRL	relative percent difference reporting limit
ICV	initial calibration verification	RRFRPD	relative response factor relative percent difference
IDL	instrument detection limit	RRTRRF	relative retention time relative response factor
IR	infrared spectroscopy	RSDRRT	relative standard deviation relative retention time
IRP	installation restoration program	RTRSD	retention time relative standard deviation
IS	internal standards	RT	retention time
LCS	laboratory control sample	HT	holding time
MBAS	methyl blue active substance	ICB	initial calibration blank

MDL	method detection limit	ICP	inductively coupled plasma
MS	matrix spike	ICS	interference check sample
MSA	method of standard addition	SDG	sample delivery group
MSD	matrix spike duplicate	SICP	selected ion current profiles
m/z	mass to charge ratio	s/n	signal to noise ratio
NFESC	Naval Facilities Engineering Services Center	SOP	standard operating procedure
OP	organophosphorus	SOW	statement of work
PAH	polynuclear aromatic hydrocarbon	SPCC	system performance check compound
PARCC	precision, accuracy, representativeness, comparability, completeness	SRM	standard reference material
PCB	polychlorinated biphenyl	SVOC	semivolatile organic compound
PCDD	polychlorinated dibenzodioxin	TB	trip blank
PCDF	polychlorinated dibenzofuran	TCDD	tetrachlorodibenzodioxin
PE	performance evaluation	TCX	tetrachloro-m-xylene
PEM	performance evaluation mixture	TDS	total dissolved solids
PFK	perfluorokerosene	TIC	tentatively identified compound
PQO	project quality objective	TOC	total organic carbon
QAPFK	quality assurance perfluorokerosene	TOX	total organic halides
QACQA	quality assurance coordinator quality assurance	TPHE	total petroleum hydrocarbons as extractables
QAPPQAC	quality assurance project plan quality assurance coordinator	UV/VIS	ultraviolet/visible
QCQAPP	quality control quality assurance project plan	VOA	volatile organic analysis

QSM QC	quality system manual quality control	VOC	volatile organic compound
rQSM	correlation coefficient quality system manual	VTSR	validated time of sample receipt
r2r	coefficient of determination correlation coefficient	WDM	window defining mixture

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Job ID: 160-36159-2

Client Sample ID: F-SU3-B52-S001

Lab Sample ID: 160-36159-1

Date Collected: 10/25/19 11:00
Date Received: 10/29/19 09:00

Matrix: Solid

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0531	U U	0.0787	0.0788	0.331	0.0659	pCi/g	11/04/19 09:55	11/23/19 11:02	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	69.7		40 - 110	11/04/19 09:55	11/23/19 11:02	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0132	U U	0.0275	0.0275	1.00	0.0165	pCi/g	11/05/19 18:12	11/14/19 23:57	1
Plutonium-239/240	0.00786	J-P1	0.0151	0.0151	1.00	0.00605	pCi/g	11/05/19 18:12	11/14/19 23:57	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	109		30 - 110	11/05/19 18:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.236		0.0620	0.0651	1.00	0.0630	pCi/g	11/03/19 13:15	11/16/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	68.3		30 - 110	11/03/19 13:15	11/16/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.332		0.244	0.246		0.106	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Actinium-227	-0.403	U U	0.806	0.807		0.467	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Bismuth-212	0.0471	U	0.660	0.660		0.538	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Bismuth-214	0.394		0.103	0.111		0.0158	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Cesium-137	0.0130	U U	0.0740	0.0740	0.0700	0.0608	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Lead-210	0.524	U	1.76	1.77		1.17	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Lead-212	0.302		0.0832	0.0850		0.0413	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Lead-214	0.385		0.134	0.140		0.0619	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Potassium-40	7.39		1.29	1.49		0.130	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Protactinium-231	0.000	U U	0.627	0.627		2.70	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Radium-226	0.394		0.103	0.111	0.500	0.0158	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Radium-228	0.332		0.244	0.246		0.106	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Thallium-208	0.186		0.0517	0.0551		0.00835	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Thorium-228	0.302		0.0832	0.0850		0.0413	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Thorium-232	0.332		0.244	0.246		0.106	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Thorium-234	-0.092	U U	0.781	0.784		0.394	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Uranium-235	0.0636	U	0.185	0.185		0.468	pCi/g	11/01/19 16:18	11/23/19 23:29	1
Uranium-238	-0.692	U	0.761	0.784		0.894	pCi/g	11/01/19 16:18	11/23/19 23:29	1

ED_006061A_00000077-00792

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501003

Job ID: 160-36159-2

Method: 905.0 - Total Beta Strontium (GFPC)
Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Sr Carrier (40-110)
160-36159-1	F-SU3-B52-S001	69.7
160-36159-1 DU	F-SU3-B52-S001	67.7
LCS 160-448589/1-A	Lab Control Sample	85.5
MB 160-448589/19-A	Method Blank	84.6

Tracer/Carrier Legend
Sr Carrier = Sr Carrier

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)
Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)
160-36159-1	F-SU3-B52-S001	100
160-36159-1 DU	F-SU3-B52-S001	81.1
LCS 160-449075/2-A	Lab Control Sample	100
MB 160-449075/1-A	Method Blank	85.0

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)
Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Polonium-209 (30-110)
160-36159-1	F-SU3-B52-S001	88.3
LCS 160-448621/2-A	Lab Control Sample	85.7
MB 160-448621/1-A	Method Blank	80.9

Tracer/Carrier Legend
Polonium-209 = Polonium-209

ED_006061A_00000077-00793

SCOVER LETTER

September 30, 2020
(Revision to the March 7, 2020)
Ref; Eurofins (Test America) SDG 160-36160 (12/04/2019)

Audrey Engel
APTIM
Hunters Point Naval Shipyard
200 Fisher Avenue
San Francisco, CA. 94124

Dear Mrs. Engel:

Enclosed is the data validation report for the Hunters Point Radiological Work Task, Remedial Action, and Maintenance of Remedies at Hunters Point Naval Shipyard, San Francisco, PA, project number 501008. This DVR encompasses the laboratory data produced by Eurofins (formerly TestAmerica Laboratories, Inc.) Table 1-1 describes the samples and analysis listed in this DVR.

The specific sample identifications are listed in the sample identification table(s). The data packages were reviewed per the data validation procedures referenced in the introduction of the report.

Sincerely,

Larry Duty
Data Validation Project Manager

1.0 INTRODUCTION

This Data Validation Report (DVR) contains the results of the validation conducted for samples collected and analyzed as part of the Hunters Point Naval Station Radiological work task, remedial action, and maintenance of remedies. The project was conducted per contract number N62473-17-D-006/N62473-17-F-4550 under EMAC III TO 13 for the Base Realignment and Closure Program Management Office, West Naval Facilities Engineering Command, 1455 Frazee Road, #600, San Diego CA. 92108. This DVR was subcontracted to E-Lab Consultants from Aptim (former Chicago, Bridge, and Iron) to serve third party data assessment purposes and evaluates the laboratory data contained in Sample Delivery Groups (SDGs) list in **Table 1-1** produced by Eurofins (formerly TestAmerica Laboratories, Inc).

These samples were analyzed in accordance with the approved *United States Department of Defense* (DOD) *Quality Systems Manual (QSM) for Environmental Laboratories Version 5.3, 2019* and the analytical methods specified for the analytes requested on the Chain of Custody (COC) documentation. **Table 1-1** provides a list of the samples collected, a laboratory sample number cross-reference, sample matrix, date collected, sample purpose, and analytical methods performed for each sample pertaining to this DVR. This DVR is conducted per the analysis requested on the COC in accordance with the; Final Revision 2 Radiological Scoping Surveys Work Plan, Parcel F Structures May, 2019.(RSSWP), *American National Standard Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation (ANSI/ANS-41.5-2012), Radionuclide Data Quality Evaluation Guidance 9284, Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Organic (NFGO) Data Review (August 2014), NFG for Inorganic (NFGIO) Data Review (August 2014),* and the method specified for the analysis.

The data were evaluated against the quantitative acceptance limits given in the DOD QSM for the data quality parameters of sensitivity, accuracy, precision, and completeness. **Appendix A** contains the Laboratory Data Report Form 1s that has been annotated with qualifiers assigned during the validation process in accordance with the project procedures manual.

In accordance with SAP, a review of the data was conducted independent of the laboratory. This review consisted of an evaluation of laboratory performance criteria

from the case narrative, and an evaluation of the sample-specific criteria included in the laboratory data packages analyzed in accordance with the DOD QSM.

The validation consists of an evaluation of the case narrative, chain of custody and associated laboratory sample receipt forms, proper sample preservations, holding times, initial calibration and continuing calibration procedures and results, laboratory control sample (LCS) (and duplicate [LCSD] if reported) accuracy and precision and matrix spike (MS) and matrix spike duplicate (MSD) sample analyses, method blanks, field blanks, and field duplicate precision.

(if required) Additional Stage 2B review included;

- Organic Analysis; internal standards, continuing calibration verification, internal standards, degradation summary, retention times, second column or second detector confirmations, retention time windows,
- Inorganic Analysis; laboratory duplicate precision, instrument tuning, initial calibration, low-level calibration check standards, initial and continuing calibration verification, initial and continuing calibration blanks, interference check sample, internal standards, serial dilution results, post digestion spike recoveries, and interelement correction factors

The results of the independent data review are presented in **Section 2.0**.

Table 1-1
Sample Field and Laboratory ID Numbers

Field ID	Sample Date	Matrix	Purpose	Lab ID	Method	Level
F-SU3-B01-S001	10/24/2019 11:50:00 AM	SC	N	160361601	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B04-S001	10/24/2019 10:41:00 AM	SC	N	160361602	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B05-S001	10/24/2019 10:08:00 AM	SC	N	160361603	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B07-S001	10/24/2019 9:40:00 AM	SC	N	160361604	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B09-S001	10/24/2019 9:17:00 AM	SC	N	160361605	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B11-S001	10/24/2019 11:32:00 AM	SC	N	160361606	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B12-S001	10/24/2019 11:00:00 AM	SC	N	160361607	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B14-S001	10/24/2019 10:23:00 AM	SC	N	160361608	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B15-S001	10/24/2019 9:52:00 AM	SC	N	160361609	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B23-S001	10/24/2019 1:46:00 PM	SC	N	1603616010	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B29-S001	10/24/2019 2:21:00 PM	SC	N	1603616011	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU3-B30-S001	10/24/2019 2:04:00 PM	SC	N	1603616012	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU4-B04-S001	10/24/2019 3:04:00 PM	SC	N	1603616013	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU5-B05-S001	10/24/2019 3:58:00 PM	SC	N	1603616014	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU5-B10-S001	10/24/2019 3:38:00 PM	SC	N	1603616015	EPA191.1M EPA905.0M A-Spec A-01R	2B

Following the specifications in the SAP related to the data validation process, the data were annotated with data validation qualifiers and codes on the analytical data

sheets that are required qualifier flags as described in the SAP. **Table 1-2** provides definitions of the data qualifiers references, and **Table 1-3** lists and defines the data review qualifier codes.

Table 1-2
Data Qualifier References

Qualifier	Organics	Inorganics
U	The analyte was analyzed for but was not detected above the method detection limit.	The analyte was analyzed for but was not detected above the method detection limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	Not applicable.
UJ	The analyte was not detected above the method detection limit. However, the associated value is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified.	The data are unusable. The sample results are rejected due to serious deficiencies in meeting the Quality Control (QC) criteria. The analyte may or may not be present in the sample.

Table 1-3
Data Review Qualifier Codes

Reason Code	Description
A	Serial dilution outside criteria (Level IV).
B1	Method blank contaminants above reporting limit.
B2	Calibration blank contaminants above reporting limit.
B2 (Bias flag –)	Calibration blank indicates negative interference, false negatives may be present
B3	Trip blank contamination
B4	Equipment rinsate contamination.
B5	Ambient blank contamination
C	ICV or CCV % D outside control limits.
C1	Initial calibration RSD outside control limit.
C2	Initial calibration RRF outside control limit.
C3	Continuing calibration RRF outside control limit.
D1	Sample Duplicate RPD outside control limit.
D2	Matrix Duplicate RPD outside control limit
E	The sample results exceed the linear calibration range of the instrument.
F	Hydrocarbon pattern does not match hydrocarbon pattern in the standard.
H	Holding time exceeded.
I	Internal standard recovery outside control limit.
L	LCS outside control limits.
M	MS outside control limits.
M1	MS, MSD or RPD outside of control limits
O	Interference check sample outside acceptance criteria
P	Analyte qualified based on the professional judgement of the reviewer.
P1	Sample result is ≤ total uncertainty
S	Surrogate recovery outside control limit.
T	Temperature outside acceptance criteria.
Tr	Value reported detected between the DL and LOQ
W	Pesticide breakdown outside criteria (Level IV).
X	Raised reporting limit due to matrix interference or high analyte concentration.
Y	Analyte was not confirmed by a second column.
Y1	Primary and Confirmation Sample Duplicate RPD outside control limit.

2.0 DATA VALIDATION RESULTS

Laboratory Data Package Review

The samples reported, QC designations, and validation level is listed in **Table 1-1**. The data packages were reviewed in accordance with the project procedures manual.

Sample Documentation, Preservation, Handling, and Transport

All samples arrived at the laboratory on time, intact and within preservation requirements. A cross reference of the COC and analytical reports has concluded all extractions and analysis were performed within the required holding times. The validation met all QC requirements listed in the method and data validation requirements of the SAP. None of the data is qualified based on sample documentation, preservation, handing, or transport.

The data is not qualified.

2.1 Total Beta Strontium, EPA 905

2.1.1 Instrument Parameters

Verification included the review of the laboratories most recent efficiency calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Counting uncertainty was ≤ 1/5 the quantitation limits. Efficiency performance checks were verified for each use.

2.1.2 Energy Calibrations

Energy calibrations (Energy Calibration Performance Checks, ECPC) were verified to be at the frequency specified. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.1.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.1.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (<20%). Continuing calibrations were performed on a 12-hour basis. Detection goals for cesium137 were not met in all analysis due to elevated Compton background levels. Natural activity is suspect. None of the data were qualified based on continuing calibrations.

2.1.5 Blanks

Each analytical batch was represented with a method blank. The laboratory reports none of the target compounds were detected in any of the method blanks that would results in sample data qualification (e.g. sample detections were >5X the blank). None of the results are qualified based on data verifications.

2.1.6 Laboratory Control Sample Recovery (Blank Spikes)

The LCS values were validated by recalculating two compounds per LCS. None of the data are qualified based on LCS recoveries.

2.1.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD samples were not submitted for this analysis.

2.1.8 Laboratory Duplicate Recoveries

All laboratory generated duplicate recoveries are within QC limits.

2.1.9 Field QC Samples

Trip, Equipment and Field Blanks

Field blank samples were not submitted for this analysis.

2.1.10 Target Compound Identification

None of the identified target compounds were qualified based compound identification.

2.1.11 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

2.1 Radium-226 by GAMMA SPEC (21 DAY INGROWTH)

2.1.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.1.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.1.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.1.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.1.5 Blanks

Each analytical batch was represented with a method blank. The laboratory reports none of the target compounds were detected in any of the method blanks that would results in sample data qualification (e.g. sample detections were >5X the blank or MB was below the 1.65X its CSU). None of the results are qualified based on data verifications.

2.1.6 Laboratory Control Sample Recovery (Blank Spikes)

The LCS values were validated by recalculating two compounds per LCS. None of the data are qualified based on LCS recoveries.

2.1.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD samples were not submitted for this analysis.

2.1.8 Laboratory Duplicate Recoveries

All laboratory generated duplicate recoveries are within QC limits.

2.1.9 Field QC Samples

Trip, Equipment and Field Blanks

Field blank samples were not submitted for this analysis.

2.1.10 Target Compound Identification

None of the identified target compounds were qualified based compound identification.

2.1.11 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

2.2 A-01R Polonium

2.2.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.2.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.2.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.2.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.2.5 Blanks

Blanks The laboratory (method) blanks yielded no detectable activities, so no qualifications were applied.

2.2.6 Laboratory Control Sample Recovery (Blank Spikes)

LCS/D analyses provided adequate confirmation of accuracy and precision.

2.2.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD analyses were not performed for these analyses. No qualifications were applied.

2.2.8 Tracers

The tracers yielded fully satisfactory recoveries for all samples with the exception of F-SU3-B14-S001 and F-SU5-B10-S001 samples. The tracer recovery is below the lower QC limit (30%). There are sufficient tracer counts to keep the count uncertainty of the tracer <10% (2 sigma), the resolution is within limit, and the client RL was met. However due to low tracer recovery, the samples were qualified:

- The samples are qualified J-P.

2.2.9 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

2.3 A-01R Plutonium

2.3.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.3.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.3.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.3.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.3.5 Blanks

Blanks The laboratory (method) blanks yielded no detectable activities, so no qualifications were applied.

2.3.6 Laboratory Control Sample Recovery (Blank Spikes)

LCS/D analyses provided adequate confirmation of accuracy and precision.

2.3.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD analyses were not performed for these analyses. No qualifications were applied.

2.3.8 Tracers

The tracers yielded fully satisfactory recoveries

2.3.9 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

2.4 GAMMA SPECTROSCOPY ANALYSES

2.4.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.4.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.4.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.4.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.4.5 Blanks

Blanks The laboratory (method) blanks yielded no detectable activities, so no qualifications were applied.

2.4.6 Laboratory Control Sample Recovery (Blank Spikes)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

2.4.7 Duplicate Recoveries

Duplicate recoveries were within QC limits.

2.4.8 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

3.0 CONCLUSION

Detected values that are above the DLC and below the total uncertainty are qualified estimated “J” and a reason code P-1.

The following samples were qualified based on this validation.

sample	Lab ID	Ana Meth	chemical name	Result	Error	LQ	VQ	RC
F-SU3-B01-S001	160361601	901.1/HAS L300	Actinium-228	0.312	0.344		J	P1
F-SU3-B01-S001	160361601	901.1/HAS L300	Radium 228	0.312	0.344		J	P1
F-SU3-B01-S001	160361601	901.1/HAS L300	Thorium-232	0.312	0.344		J	P1
F-SU3-B04-S001	160361602	901.1/HAS L300	Thorium-234	0.707	0.734		J	P1
F-SU3-B04-S001	160361602	901.1/HAS L300	Uranium-238	0.707	0.734		J	P1
F-SU3-B07-S001	160361604	901.1/HAS L300	Lead 210	1.91	2.23		J	P1
F-SU3-B09-S001	160361605	901.1/HAS L300	Lead 210	0.802	1.17		J	P1
F-SU3-B12-S001	160361607	901.1/HAS L300	Actinium-227	0.540	0.547		J	P1
F-SU3-B14-S001	160361608	901.1/HAS L300	Lead 210	1.51	1.74		J	P1
F-SU3-B15-S001	160361609	A-01-R	Plutonium-239/240	0.0266	0.0309		J	P1
F-SU3-B23-S001	1603616010	A-01-R	Plutonium-238	0.0359	0.0506		J	P1
F-SU3-B23-S001	1603616010	901.1/HAS L300	Actinium-228	0.186	0.331		J	P1
F-SU3-B23-S001	1603616010	901.1/HAS L300	Radium 228	0.186	0.331		J	P1
F-SU3-B23-S001	1603616010	901.1/HAS L300	Thorium-232	0.186	0.331		J	P1
F-SU5-B05-S001	1603616014	901.1/HAS L300	Lead 210	1.09	1.43		J	P1
F-SU5-B05-S001	1603616014	A-01-R	Plutonium-239/240	0.0233	0.0353		J	P1
F-SU3-B14-S001	160361608	A-01-R	Polonium-210	0.699	NA		0.127	J
F-SU5-B10-S001	1603616015	A-01-R	Polonium-210	0.730	NA		0.0873	J

Acronyms and Abbreviations

Following is a list of acronyms and abbreviations that may be used in data validation reports and/or data quality assessment reports.

%D	percent difference	DFTPP	decafluorotriphenylphosphine

%R	percent recovery	DOD	Department Of Defense
µg/L	microgram per liter	DQAR	data quality assessment report
mg/L	milligram per liter		
pg/L	picogram per liter	DUP	laboratory duplicate
µg/kg	microgram per kilogram	DVP	data validation procedure
mg/kg	milligram per kilogram	EDB	ethylene dibromide
ng/kg	nanogram per kilogram	EDL	estimated detection limit
pg/g	picogram per gram	EICP	extracted ion current profile
AA	atomic absorption	EPA	Environmental Protection Agency, United States
ARRF	average relative response factor	EB	equipment blank
BFB	bromofluorobenzene	FB	field blank
BNA	base/neutral/acid compounds	GC	gas chromatography
CCB	continuing calibration blank	GC/ECD	gas chromatography/electron capture detector
CCC	calibration check compound	GC/ELCD	gas chromatography/electrolytic conductivity detector (Hall detector)
CCV	continuing calibration verification	GC/FPD	gas chromatography/flame photometric detector
CF	calibration factor	GC/MS	gas chromatography/mass spectrometry
CLP	Contract Laboratory Program	GC/PID	gas chromatography/photoionization detector
COC	chain of custody record	GFAA	graphite furnace atomic absorption
COD	chemical oxygen demand	GPC	gel permeation chromatography
CTO	contract task order	Hg	mercury
CVAA	cold vapor atomic absorption	HPLC	high-performance liquid chromatography

DBCP	dibromochloropropane	HRGC/HRMS	high resolution gas chromatography/high resolution mass spectrometry
DCB	decachlorobiphenyl	RF r2	response factor coefficient of determination
4,4'-DDD	4,4'-dichlorodiphenyldichloroethane	RICRF	reconstructed ion chromatogram response factor
4,4'-DDE	4,4'-dichlorodiphenyldichloroethylene	RLRIC	reporting limit reconstructed ion chromatogram
4,4'-DDT	4,4'-dichlorodiphenyltrichloroethane	RPDRL	relative percent difference reporting limit
ICV	initial calibration verification	RRFRPD	relative response factor relative percent difference
IDL	instrument detection limit	RRTRRF	relative retention time relative response factor
IR	infrared spectroscopy	RSDRRT	relative standard deviation relative retention time
IRP	installation restoration program	RTRSD	retention time relative standard deviation
IS	internal standards	RT	retention time
LCS	laboratory control sample	HT	holding time
MBAS	methyl blue active substance	ICB	initial calibration blank
MDL	method detection limit	ICP	inductively coupled plasma
MS	matrix spike	ICS	interference check sample
MSA	method of standard addition	SDG	sample delivery group
MSD	matrix spike duplicate	SICP	selected ion current profiles
m/z	mass to charge ratio	s/n	signal to noise ratio
NFESC	Naval Facilities Engineering Services Center	SOP	standard operating procedure
OP	organophosphorus	SOW	statement of work
PAH	polynuclear aromatic	SPCC	system performance check

	hydrocarbon		compound
PARCC	precision, accuracy, representativeness, comparability, completeness	SRM	standard reference material
PCB	polychlorinated biphenyl	SVOC	semivolatile organic compound
PCDD	polychlorinated dibenzodioxin	TB	trip blank
PCDF	polychlorinated dibenzofuran	TCDD	tetrachlorodibenzodioxin
PE	performance evaluation	TCX	tetrachloro-m-xylene
PEM	performance evaluation mixture	TDS	total dissolved solids
PFK	perfluorokerosene	TIC	tentatively identified compound
PQO	project quality objective	TOC	total organic carbon
QAPFK	quality assurance perfluorokerosene	TOX	total organic halides
QACQA	quality assurance coordinator quality assurance	TPHE	total petroleum hydrocarbons as extractables
QAPPQAC	quality assurance project plan quality assurance coordinator	UV/VIS	ultraviolet/visible
QCQAPP	quality control quality assurance project plan	VOA	volatile organic analysis
QSM QC	quality system manual quality control	VOC	volatile organic compound
rQSM	correlation coefficient quality system manual	VTSR	validated time of sample receipt
r2r	coefficient of determination correlation coefficient	WDM	window defining mixture

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-1
Matrix: Solid

Client Sample ID: F-SU3-B01-S001

Date Collected: 10/24/19 11:50
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0455	U U	0.0799	0.0798	0.331	0.0622	pCi/g	11/04/19 09:55	11/23/19 11:02	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	74.0		40 - 110	11/04/19 09:55	11/23/19 11:02	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.00561	U U	0.0236	0.0236	1.00	0.0159	pCi/g	11/05/19 18:12	11/14/19 23:56	1
Plutonium-239/240	-0.00776	U	0.00776	0.00779	1.00	0.0143	pCi/g	11/05/19 18:12	11/14/19 23:56	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	93.3		30 - 110	11/05/19 18:12	11/14/19 23:56	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.643		0.104	0.117	1.00	0.0866	pCi/g	11/03/19 13:15	11/16/19 13:58	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	84.8		30 - 110	11/03/19 13:15	11/16/19 13:58	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.312	J-P1	0.343	0.344		0.198	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Actinium-227	-0.383	U U	0.980	0.981		0.591	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Bismuth-212	0.0846	U	1.16	1.16		0.945	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Bismuth-214	0.585		0.209	0.217		0.0814	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Cesium-137	-0.0264	U U	0.109	0.109	0.0700	0.0324	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Lead-210	-0.559	U	2.05	2.05		1.43	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Lead-212	0.0323	U	0.172	0.172		0.139	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Lead-214	0.412		0.166	0.161		0.0831	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Potassium-40	0.14		2.27	2.42		3.765	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Protactinium-231	1.02	U U	3.22	3.22		2.69	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Radium-226	0.566		0.209	0.217	0.500	0.0814	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Radium-228	0.312	J-P1	0.343	0.344		0.198	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Thallium-208	0.149		0.0830	0.0849		0.0146	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Thorium-228	0.0323	U U	0.172	0.172		0.139	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Thorium-232	0.312	J-P1	0.343	0.344		0.198	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Thorium-234	0.885		0.810	0.816		0.515	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Uranium-235	-0.0530	U U	0.444	0.444		0.372	pCi/g	11/01/19 16:18	11/26/19 09:34	1
Uranium-238	0.885		0.810	0.816		0.515	pCi/g	11/01/19 16:18	11/26/19 09:34	1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-2
Matrix: Solid

Client Sample ID: F-SU3-B04-S001

Date Collected: 10/24/19 10:41
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.109		0.0725	0.0729	0.331	0.0513	pCi/g	11/04/19 09:55	11/23/19 11:02	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	86.4		40 - 110	11/04/19 09:55	11/23/19 11:02	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0159	U	0.0110	0.0114	1.00	0.0207	pCi/g	11/05/19 18:12	11/14/19 23:56	1
Plutonium-239/240	-0.00796	U	0.00798	0.00801	1.00	0.0147	pCi/g	11/05/19 18:12	11/14/19 23:56	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	83.8		30 - 110	11/05/19 18:12	11/14/19 23:56	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.499		0.0603	0.0611	1.00	0.0439	pCi/g	11/03/19 13:15	11/15/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	57.2		30 - 110	11/03/19 13:15	11/15/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.427		0.297	0.211		0.150	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Actinium-227	0.197	U	0.403	0.404		0.331	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Bismuth-212	-0.403	U	0.629	0.630		0.723	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Bismuth-214	0.623		0.175	0.180		0.0647	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Cesium-137	0.0241	U	0.0850	0.0851	0.0700	0.0419	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Lead-210	0.343	U	1.66	1.66		1.22	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Lead-212	0.360		0.110	0.116		0.0618	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Lead-214	0.461		0.147	0.154		0.0682	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Potassium-40	9.79		1.64	1.91		0.160	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Protactinium-231	0.000	U	0.626	0.626		2.83	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Radium-226	0.623		0.175	0.188	0.500	0.0647	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Radium-228	0.427		0.207	0.211		0.159	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Thallium-208	0.0522	U	0.125	0.126		0.0638	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Thorium-228	0.360		0.110	0.116		0.0613	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Thorium-232	0.427		0.207	0.211		0.159	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Thorium-234	0.707	J-P1	0.729	0.734		0.565	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Uranium-235	-0.0572	U	0.383	0.383		0.583	pCi/g	11/01/19 16:18	11/23/19 20:23	1
Uranium-238	0.707	J-P1	0.729	0.734		0.565	pCi/g	11/01/19 16:18	11/23/19 20:23	1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-3
Matrix: Solid

Client Sample ID: F-SU3-B05-S001

Date Collected: 10/24/19 10:09
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0136	U	0.0707	0.0797	0.331	0.0545	pCi/g	11/04/19 09:55	11/23/19 11:02	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	71.9		40 - 110	11/04/19 09:55	11/23/19 11:02	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.000	U	0.0165	0.0165	1.00	0.0152	pCi/g	11/05/19 18:12	11/14/19 23:56	1
Plutonium-239/240	0.00620	U	0.0170	0.0170	1.00	0.00760	pCi/g	11/05/19 18:12	11/14/19 23:56	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	81.9		30 - 110	11/05/19 18:12	11/14/19 23:56	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.047		0.0857	0.0861	1.00	0.0595	pCi/g	11/03/19 13:15	11/16/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	56.6		30 - 110	11/03/19 13:15	11/16/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.101	U	0.244	0.244		0.189	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Actinium-227	0.114	U	0.213	0.214		0.398	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Bismuth-212	0.275	U	0.627	0.628		0.486	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Bismuth-214	0.413		0.146	0.153		0.0608	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Cesium-137	-0.0284	U	0.0364	0.0365	0.0700	0.0488	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Lead-210	0.837	U	1.24	1.24		0.867	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Lead-212	0.379		0.096	0.103		0.0478	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Lead-214	0.489		0.117	0.127		0.0698	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Potassium-40	7.87		1.31	1.54		0.325	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Protactinium-231	0.000	U	0.715	0.716		2.20	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Radium-226	0.413		0.146	0.153	0.500	0.0606	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Radium-228	0.101	U	0.244	0.244		0.156	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Thallium-208	0.103		0.0529	0.0568		0.0145	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Thorium-228	0.379		0.096	0.103		0.0478	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Thorium-232	0.101	U	0.244	0.244		0.156	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Thorium-234	0.00459	U	0.0106	0.0105		1.19	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Uranium-235	-0.0323	U	0.0552	0.0553		0.397	pCi/g	11/01/19 16:18	11/23/19 21:08	1
Uranium-238	0.00459	U	0.0106	0.0106		1.19	pCi/g	11/01/19 16:18	11/23/19 21:08	1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-4
Matrix: Solid

Client Sample ID: F-SU3-B07-S001

Date Collected: 10/24/19 09:40
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0772		0.0722	0.0724	0.331	0.0529	pCi/g	11/04/19 09:55	11/23/19 11:03	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	80.2		40 - 110	11/04/19 09:55	11/23/19 11:03	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.00201	U	0.0251	0.0251	1.00	0.0186	pCi/g	11/05/19 18:12	11/14/19 23:57	1
Plutonium-239/240	0.00604	U	0.0166	0.0168	1.00	0.00741	pCi/g	11/05/19 18:12	11/14/19 23:57	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	89.2		30 - 110	11/05/19 18:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.356		0.0753	0.0847	1.00	0.0614	pCi/g	11/03/19 13:15	11/16/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	69.2		30 - 110	11/03/19 13:15	11/16/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.513		0.229	0.230		0.0982	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Actinium-227	0.234	U	0.452	0.453		0.384	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Bismuth-212	0.390	U	0.945	0.946		0.730	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Bismuth-214	0.617		0.171	0.182		0.0430	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Cesium-137	0.0148	U	0.0783	0.0783	0.0700	0.0629	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Lead-210	1.91		2.23	2.23		1.44	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Lead-212	0.238		0.102	0.105		0.0629	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Lead-214	0.485		0.170	0.177		0.0767	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Potassium-40	8.28		1.68	1.76		0.170	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Protactinium-231	-0.0000000	U	3.42	3.42		2.82	pCi/g	11/01/19 16:18	11/23/19 21:09	1
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Radium-226	0.617		0.171	0.182	0.500	0.0430	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Radium-228	0.513		0.229	0.236		0.0982	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Thallium-208	0.215		0.0535	0.0571		0.0109	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Thorium-228	0.239		0.102	0.105		0.0529	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Thorium-232	0.513		0.229	0.235		0.0982	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Thorium-234	-0.532	U	0.761	0.763		0.652	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Uranium-235	0.233	U	0.421	0.421		0.278	pCi/g	11/01/19 16:18	11/23/19 21:09	1
Uranium-238	-0.532	U	0.761	0.763		0.652	pCi/g	11/01/19 16:18	11/23/19 21:09	1

J-P1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-5
Matrix: Solid

Client Sample ID: F-SU3-B09-S001

Date Collected: 10/24/19 09:17
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0185	U	0.0775	0.0775	0.331	0.0969	pCi/g	11/04/19 09:55	11/23/19 11:03	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	65.8		40 - 110	11/04/19 09:55	11/23/19 11:03	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.00287	U	0.00794	0.00797	1.00	0.0146	pCi/g	11/05/19 15:12	11/14/19 23:57	1
Plutonium-239/240	-0.00711	U	0.00711	0.00713	1.00	0.0131	pCi/g	11/05/19 15:12	11/14/19 23:57	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	96.8		30 - 110	11/05/19 15:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.461		0.0732	0.0873	1.00	0.0551	pCi/g	11/03/19 13:15	11/16/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	52.6		30 - 110	11/03/19 13:15	11/16/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.469		0.101	0.197		0.0951	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Actinium-227	0.0526	U	0.645	0.646		0.398	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Bismuth-212	-0.430	U	1.09	1.09		0.846	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Bismuth-214	0.111	U	0.236	0.236		0.224	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Cesium-137	-0.0944	U	0.156	0.156	0.0700	0.0846	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Lead-210	0.802		1.17	1.17		0.776	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Lead-212	0.338		0.101	0.110		0.0499	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Lead-214	0.470		0.128	0.137		0.0406	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Potassium-40	7.59		1.76	1.84		0.413	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Protactinium-231	-0.504	U	3.21	3.21		2.62	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Radium-226	0.111	U	0.236	0.236	0.500	0.224	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Radium-228	0.469		0.181	0.197		0.0951	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Thallium-208	0.155		0.0571	0.0593		0.0121	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Thorium-228	0.338		0.101	0.110		0.0499	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Thorium-232	0.469		0.181	0.197		0.0951	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Thorium-234	-0.213	U	0.923	0.923		0.756	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Uranium-235	0.0680	U	0.363	0.363		0.294	pCi/g	11/01/19 16:18	11/23/19 21:14	1
Uranium-238	-0.213	U	0.923	0.923		0.756	pCi/g	11/01/19 16:18	11/23/19 21:14	1

J-P1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-6
Matrix: Solid

Client Sample ID: F-SU3-B11-S001

Date Collected: 10/24/19 11:32
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Stronium	-0.0487	U	0.0795	0.0796	0.331	0.0992	pCi/g	11/04/19 09:55	11/23/19 11:03	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	69.8		40 - 110	11/04/19 09:55	11/23/19 11:03	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.00602	U	0.0244	0.0244	1.00	0.0166	pCi/g	11/05/19 18:12	11/14/19 23:57	1
Plutonium-239/240	-0.00602	U	0.0096	0.0097	1.00	0.0128	pCi/g	11/05/19 18:12	11/14/19 23:57	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	66.9		30 - 110	11/05/19 18:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.508		0.0902	0.0903	1.00	0.0549	pCi/g	11/03/19 13:15	11/18/19 13:36	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	61.5		30 - 110	11/03/19 13:15	11/18/19 13:36	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.437		0.210	0.214		0.0874	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Actinium-227	-0.0285	U	0.141	0.141		0.374	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Bismuth-212	-0.340	U	0.597	0.598		0.628	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Bismuth-214	0.591		0.144	0.185		0.0522	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Cesium-137	0.0342	U	0.0673	0.0674	0.0700	0.0624	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Lead-210	0.655	U	1.46	1.46		1.16	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Lead-212	0.346		0.0855	0.0865		0.0431	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Lead-214	0.499		0.109	0.115		0.0568	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Potassium-40	8.43		1.33	1.60		0.335	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Protactinium-231	0.001	U	1.98	1.98		2.11	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Radium-226	0.551		0.144	0.185	0.500	0.0522	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Radium-228	0.437		0.210	0.214		0.0874	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Thallium-208	0.0977		0.0646	0.0654		0.0316	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Thorium-228	0.346		0.0855	0.0865		0.0431	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Thorium-232	0.437		0.210	0.214		0.0874	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Thorium-234	0.312	U	0.432	0.433		0.933	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Uranium-235	0.0717	U	0.199	0.200		0.369	pCi/g	11/01/19 16:18	11/23/19 21:47	1
Uranium-238	0.312	U	0.432	0.433		0.333	pCi/g	11/01/19 16:18	11/23/19 21:47	1

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Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-7
Matrix: Solid

Client Sample ID: F-SU3-B12-S001

Date Collected: 10/24/19 11:00
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0586	U U	0.0810	0.0621	0.331	0.0969	pCi/g	11/04/19 09:55	11/23/19 11:03	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	78.1		40 - 110	11/04/19 09:55	11/23/19 11:03	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.00207	U U	0.0180	0.0180	1.00	0.0132	pCi/g	11/05/19 18:12	11/14/19 23:57	1
Plutonium-239/240	-0.00621	U	0.00717	0.00719	1.00	0.0132	pCi/g	11/05/19 18:12	11/14/19 23:57	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	96.0		30 - 110	11/05/19 18:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.487		0.0575	0.0997	1.00	0.0701	pCi/g	11/03/19 13:15	11/18/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	52.0		30 - 110	11/03/19 13:15	11/18/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.287		0.154	0.158		0.0478	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Actinium-227	0.540		0.544	0.547		0.255	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Bismuth-212	-0.469	U U OP1	1.18	1.18		0.623	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Bismuth-214	0.598		0.175	0.185		0.0449	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Cesium-137	0.0627	U U	0.109	0.109	0.0700	0.0840	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Lead-210	2.83		2.11	2.13		1.37	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Lead-212	0.304		0.109	0.114		0.0617	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Lead-214	0.492		0.153	0.161		0.0867	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Potassium-40	9.63		1.75	2.00		0.185	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Protactinium-231	0.000	U U	0.727	0.727		3.15	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Radium-226	0.598		0.175	0.185	0.500	0.0449	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Radium-228	0.287		0.154	0.156		0.0476	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Thallium-208	0.173		0.0594	0.0619		0.0113	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Thorium-228	0.394		0.109	0.114		0.0617	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Thorium-232	0.237		0.154	0.156		0.0478	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Thorium-234	1.34		1.02	1.03		0.624	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Uranium-235	0.130	U U	0.675	0.675		0.551	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Uranium-238	1.34		1.02	1.03		0.624	pCi/g	11/01/19 16:18	11/23/19 21:48	1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-8
Matrix: Solid

Client Sample ID: F-SU3-B14-S001

Date Collected: 10/24/19 10:23
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0281	U	0.0734	0.0734	0.331	0.0628	pCi/g	11/04/19 09:55	11/23/19 11:03	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	74.2		40 - 110	11/04/19 09:55	11/23/19 11:03	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0101	U	0.0202	0.0202	1.00	0.0223	pCi/g	11/06/19 18:12	11/14/19 23:57	1
Plutonium-239/240	0.00405	U	0.0250	0.0250	1.00	0.0183	pCi/g	11/06/19 18:12	11/14/19 23:57	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	105		30 - 110	11/06/19 18:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.699	J-T	0.161	0.171	1.00	0.127	pCi/g	11/03/19 13:15	11/16/19 13:33	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	26.4	Q J-T	30 - 110	11/03/19 13:15	11/16/19 13:33	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.352		0.315	0.317		0.135	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Actinium-227	0.147	U	0.328	0.328		0.570	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Bismuth-212	0.000	U	0.384	0.384		0.448	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Bismuth-214	0.396		0.151	0.159		0.0660	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Cesium-137	-0.00197	U	0.102	0.102	0.0700	0.0836	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Lead-210	1.51	J-P1	1.74	1.74		1.08	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Lead-212	0.0266	U	0.149	0.149		0.121	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Lead-214	0.0487	U	0.151	0.152		0.195	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Potassium-40	5.55		1.51	1.71		0.463	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Protactinium-231	0.000	U	0.927	0.927		2.84	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Radium-226	0.396		0.151	0.159	0.600	0.0660	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Radium-228	0.352		0.315	0.317		0.135	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Thallium-208	0.100		0.117	0.118		0.0472	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Thorium-228	0.0298	U	0.149	0.149		0.121	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Thorium-232	0.352		0.315	0.317		0.135	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Thorium-234	-0.301	U	1.17	1.17		0.975	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Uranium-235	-0.0583	U	0.343	0.343		0.338	pCi/g	11/01/19 16:18	11/23/19 21:48	1
Uranium-238	-0.301	U	1.17	1.17		0.975	pCi/g	11/01/19 16:18	11/23/19 21:48	1

Client Sample Results

Job ID: 160-36160-2

Client: Aplim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 601008

Lab Sample ID: 160-36160-9
Matrix: Solid

Client Sample ID: F-SU3-B15-S001

Date Collected: 10/24/19 09:52
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Stronium	-0.0931	U U	0.0744	0.0747	0.331	0.0881	pCi/g	11/04/19 09:55	11/23/19 11:03	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	76.7		40 - 110	11/04/19 09:55	11/23/19 11:03	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-236	-0.00560	U U	0.0240	0.0249	1.00	0.0231	pCi/g	11/05/19 18:12	11/16/19 09:56	1
Plutonium-239/240	0.0266	J-P1	0.0308	0.0309	1.00	0.00967	pCi/g	11/05/19 18:12	11/16/19 09:56	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	104		30 - 110	11/05/19 18:12	11/16/19 09:56	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.488		0.0843	0.0942	1.00	0.0609	pCi/g	11/03/19 13:15	11/16/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	82.5		30 - 110	11/03/19 13:15	11/16/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.465		0.171	0.178		0.0365	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Actinium-227	0.101	U U	0.180	0.181		0.388	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Bismuth-212	-0.0311	U U	0.676	0.676		0.834	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Bismuth-214	0.388		0.120	0.127		0.0504	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Cesium-137	-0.0174	U U	0.0492	0.0493	0.0700	0.0555	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Lead-210	-0.375	U U	1.67	1.68		1.18	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Lead-212	0.312		0.0796	0.0802		0.0356	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Lead-214	0.431		0.105	0.114		0.0541	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Potassium-40	7.48		1.31	1.52		0.336	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Protactinium-231	-0.839	U U	2.71	2.72		2.21	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Radium-226	0.388		0.120	0.127	0.500	0.0504	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Radium-228	0.465		0.171	0.178		0.0555	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Thallium-208	0.125		0.0550	0.0571		0.0249	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Thorium-228	0.312		0.0796	0.0802		0.0365	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Thorium-232	0.465		0.171	0.178		0.0555	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Thorium-234	-0.353	U U	1.09	1.09		0.834	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Uranium-235	-0.195	U U	0.572	0.573		0.456	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Uranium-238	-0.353	U U	1.09	1.08		0.834	pCi/g	11/01/19 16:18	11/23/19 22:22	1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 601005

Lab Sample ID: 160-36160-10
Matrix: Solid

Client Sample ID: F-SU3-B23-S001

Date Collected: 10/24/19 13:46
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0214	U U	0.0760	0.0760	0.331	0.0942	pCi/g	11/04/19 09:55	11/23/19 19:01	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	75.6		40 - 110	11/04/19 09:55	11/23/19 19:01	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0359	J-P1	0.0506	0.0506	1.00	0.0301	pCi/g	11/05/19 18:12	11/15/19 09:56	1
Plutonium-239/240	-0.00212	U U	0.00423	0.00424	1.00	0.00778	pCi/g	11/05/19 18:12	11/15/19 09:56	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	97.8		30 - 110	11/05/19 18:12	11/15/19 09:56	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.378		0.0883	0.0936	1.00	0.0960	pCi/g	11/03/19 13:15	11/15/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	54.8		30 - 110	11/03/19 13:15	11/15/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.186	J-P1	0.331	0.331		0.175	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Actinium-227	-0.104	U U	0.754	0.754		0.484	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Bismuth-212	0.473	U	0.939	0.939		0.716	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Bismuth-214	0.503		0.162	0.170		0.0622	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Cesium-137	-0.0341	U U	0.0913	0.0913	0.0700	0.0719	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Lead-210	0.705	U	1.80	1.81		1.34	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Lead-212	0.0291	U	0.153	0.153		0.149	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Lead-214	0.617		0.187	0.187		0.0834	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Potassium-40	18.6		1.79	2.09		0.176	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Protactinium-231	0.000	U U	0.244	0.244		3.17	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Radium-226	0.503		0.162	0.170	0.500	0.0522	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Radium-228	0.160	J-P1	0.331	0.331		0.175	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Thallium-208	0.305		0.101	0.105		0.0337	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Thorium-228	0.0291	U U	0.159	0.163		0.149	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Thorium-232	0.186	J-P1	0.331	0.331		0.175	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Thorium-234	0.249	U U	0.809	0.809		0.846	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Uranium-235	-0.263	U	0.427	0.428		0.597	pCi/g	11/01/19 16:18	11/23/19 22:22	1
Uranium-238	0.240	U	0.809	0.809		0.846	pCi/g	11/01/19 16:18	11/23/19 22:22	1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 601008

Lab Sample ID: 160-36160-11
Matrix: Solid

Client Sample ID: F-SU3-B29-S001

Date Collected: 10/24/19 14:21
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0446	U	0.0794	0.0764	0.331	0.0679	pCi/g	11/04/19 09:55	11/23/19 19:01	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	70.7		40 - 110	11/04/19 09:55	11/23/19 19:01	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0562	U	0.0520	0.0523	1.00	0.0553	pCi/g	11/05/19 18:12	11/14/19 23:57	1
Plutonium-239/240	-0.0703	U	0.0431	0.0435	1.00	0.0528	pCi/g	11/05/19 18:12	11/14/19 23:57	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	105		30 - 110	11/05/19 18:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.371		0.0715	0.0780	1.00	0.0854	pCi/g	11/03/19 13:15	11/18/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	63.4		30 - 110	11/03/19 13:15	11/18/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.116	U	0.443	0.443		0.242	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Actinium-227	-0.426	U	0.594	0.598		0.598	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Bismuth-212	-0.423	U	1.36	1.36		1.02	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Bismuth-214	0.223		0.169	0.168		0.171	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Cesium-137	-0.0626	U	0.131	0.131	0.0700	0.123	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Lead-210	-0.342	U	2.09	2.09		1.50	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Lead-212	0.306		0.121	0.126		0.0569	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Lead-214	0.473		0.163	0.171		0.0758	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Potassium-40	6.98		1.85	1.98		0.606	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Protactinium-231	0.727	U	1.64	1.64		1.83	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Radium-226	0.223		0.169	0.183	0.500	0.171	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Radium-228	0.118	U	0.443	0.443		0.242	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Thallium-208	0.0565	U	0.110	0.111		0.0585	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Thorium-228	0.306		0.121	0.128		0.0569	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Thorium-232	0.116	U	0.443	0.443		0.242	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Thorium-234	-0.318	U	1.12	1.12		0.934	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Uranium-235	0.412		0.317	0.319		0.166	pCi/g	11/01/19 16:18	11/23/19 22:23	1
Uranium-238	-0.318	U	1.12	1.12		0.934	pCi/g	11/01/19 16:18	11/23/19 22:23	1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501006

Lab Sample ID: 160-36160-12
Matrix: Solid

Client Sample ID: F-SU3-B30-S001

Date Collected: 10/24/19 14:04
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0593	U	0.0724	0.0725	0.331	0.0640	pCi/g	11/04/19 09:55	11/23/19 19:01	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	78.2		40 - 110	11/04/19 09:55	11/23/19 19:01	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0197	U	0.0449	0.0449	1.00	0.0307	pCi/g	11/05/19 18:12	11/14/19 23:57	1
Plutonium-239/240	0.00788	U	0.0236	0.0236	1.00	0.0146	pCi/g	11/05/19 18:12	11/14/19 23:57	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	88.1		30 - 110	11/05/19 18:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.415		0.0952	0.102	1.00	0.0835	pCi/g	11/03/19 13:15	11/16/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	39.9		30 - 110	11/03/19 13:15	11/16/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.505		0.189	0.196		0.0610	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Actinium-227	-0.0710	U	0.620	0.620		0.366	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Bismuth-212	-0.320	U	0.909	0.909		0.704	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Bismuth-214	0.469		0.146	0.155		0.0596	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Cesium-137	0.0247	U	0.0763	0.0763	0.0700	0.0633	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Lead-210	-0.00897	U	1.38	1.38		1.14	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Lead-212	0.335		0.0963	0.0966		0.0418	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Lead-214	0.484		0.118	0.128		0.0569	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Potassium-40	9.24		1.79	2.02		0.528	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Protactinium-231	0.030	U	0.258	0.258		2.44	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Radium-226	0.488		0.148	0.155	0.500	0.0596	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Radium-228	0.505		0.189	0.196		0.0610	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Thallium-208	0.162		0.0576	0.0597		0.0220	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Thorium-228	0.335		0.0963	0.0966		0.0418	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Thorium-232	0.505		0.189	0.190		0.0610	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Thorium-234	0.378	U	1.39	1.39		1.12	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Uranium-235	0.208	U	0.416	0.417		0.347	pCi/g	11/01/19 16:18	11/23/19 22:55	1
Uranium-238	0.373	U	1.38	1.38		1.12	pCi/g	11/01/19 16:18	11/23/19 22:55	1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-13
Matrix: Solid

Client Sample ID: F-SU4-B04-S001

Date Collected: 10/24/19 15:04
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0379	U	0.0720	0.0720	0.331	0.0563	pCi/g	11/04/19 09:55	11/23/19 19:02	1

Carrier	% Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	83.4		40 - 110	11/04/19 09:55	11/23/19 19:02	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0164	U	0.0434	0.0436	1.00	0.0302	pCi/g	11/05/19 18:12	11/14/19 23:57	1
Plutonium-239/240	-0.00411	U	0.00591	0.00592	1.00	0.0107	pCi/g	11/05/19 18:12	11/14/19 23:57	1

Tracer	% Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	87.1		30 - 110	11/05/19 18:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.610		0.0952	0.0964	1.00	0.0428	pCi/g	11/03/19 13:15	11/16/19 13:38	1

Tracer	% Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	60.1		30 - 110	11/03/19 13:15	11/16/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.477		0.317	0.320		0.135	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Actinium-227	-0.167	U	0.807	0.807		0.494	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Bismuth-212	-0.439	U	1.12	1.12		0.869	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Bismuth-214	0.303		0.198	0.210		0.0367	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Cesium-137	-0.0235	U	0.0877	0.0877	0.0700	0.0700	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Lead-210	2.17		1.92	1.94		1.25	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Lead-212	0.370		0.112	0.119		0.0624	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Lead-214	0.822		0.170	0.198		0.0803	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Potassium-40	4.91		1.45	1.53		0.405	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Protactinium-231	-1.04	U	3.95	3.95		3.22	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Radium-226	0.982		0.188	0.210	0.500	0.0367	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Radium-228	0.477		0.317	0.320		0.135	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Thallium-208	0.281		0.0932	0.0975		0.0369	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Thorium-228	0.379		0.112	0.119		0.0624	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Thorium-232	0.477		0.317	0.320		0.136	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Thorium-234	0.565	U	0.367	0.363		1.07	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Uranium-235	0.0790	U	0.184	0.186		0.529	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Uranium-238	0.565	U	0.367	0.363		1.07	pCi/g	11/01/19 16:18	11/23/19 22:56	1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-14
Matrix: Solid

Client Sample ID: F-SU5-B05-S001

Date Collected: 10/24/19 15:58
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0530	U	0.0700	0.0701	0.331	0.0921	pCi/g	11/04/19 09:55	11/23/19 19:02	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	70.8		40 - 110	11/04/19 09:55	11/23/19 19:02	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0127	U	0.0512	0.0512	1.00	0.0455	pCi/g	11/05/19 18:12	11/14/19 23:57	1
Plutonium-239/240	0.0233	J-P1	0.0353	0.0353	1.00	0.0175	pCi/g	11/05/19 18:12	11/14/19 23:57	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	82.4		30 - 110	11/05/19 18:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.639		0.123	0.135	1.00	0.0980	pCi/g	11/03/19 13:15	11/16/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	38.7		30 - 110	11/03/19 13:15	11/16/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.269		0.131	0.133		0.244	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Actinium-227	0.197	U	0.468	0.469		0.332	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Bismuth-212	0.473	U	0.954	0.956		0.733	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Bismuth-214	0.745		0.205	0.219		0.0977	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Cesium-137	-0.0026	U	0.0534	0.0542	0.0700	0.101	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Lead-210	1.09	J-P1	1.42	1.43		0.936	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Lead-212	0.0332	U	0.156	0.156		0.125	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Lead-214	0.804		0.149	0.159		0.0845	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Potassium-40	5.21		1.79	1.79		0.513	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Protactinium-231	0.000	U	0.541	0.541		2.62	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Radium-226	0.745		0.205	0.219	0.600	0.0977	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Radium-228	0.268		0.131	0.133		0.244	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Thallium-208	0.154		0.0557	0.0579		0.0117	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Thorium-228	0.0332	U	0.156	0.156		0.126	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Thorium-232	0.269		0.131	0.133		0.244	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Thorium-234	-0.600	U	0.707	0.713		0.944	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Uranium-235	0.109	U	0.359	0.360		0.273	pCi/g	11/01/19 16:18	11/23/19 22:56	1
Uranium-238	-0.860	U	0.707	0.713		0.944	pCi/g	11/01/19 16:18	11/23/19 22:56	1

Client Sample Results

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Lab Sample ID: 160-36160-15
Matrix: Solid

Client Sample ID: F-SU5-B10-S001

Date Collected: 10/24/19 15:39
Date Received: 10/29/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0503	U	0.0678	0.0679	0.331	0.0599	pCi/g	11/04/19 09:55	11/23/19 19:02	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	78.1		40 - 110	11/04/19 09:55	11/23/19 19:02	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0157	U	0.0333	0.0334	1.00	0.0204	pCi/g	11/05/19 18:12	11/14/19 23:57	1
Plutonium-239/240	-0.00197	U	0.0180	0.0180	1.00	0.0162	pCi/g	11/05/19 18:12	11/14/19 23:57	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	90.8		30 - 110	11/05/19 18:12	11/14/19 23:57	1

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Polonium-210	0.738		0.144	0.150	1.00	0.0873	pCi/g	11/03/19 13:15	11/16/19 13:38	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Polonium-209	27.8	Q	30 - 110	11/03/19 13:15	11/16/19 13:38	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.130	U	0.255	0.255		0.156	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Actinium-227	0.166	U	0.597	0.598		0.848	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Bismuth-212	-0.0164	U	0.946	0.946		0.780	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Bismuth-214	0.318		0.126	0.129		0.205	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Cesium-137	-0.0539	U	0.114	0.114	0.0700	0.0641	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Lead-210	-0.755	U	1.74	1.74		1.39	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Lead-212	0.417		0.0880	0.103		0.0405	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Lead-214	0.541		0.117	0.130		0.0622	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Potassium-40	9.52		1.12	1.25		0.324	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Protactinium-231	0.600	U	0.714	0.714		2.15	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Radium-226	0.318		0.126	0.129	0.500	0.205	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Radium-228	0.130	U	0.255	0.255		0.156	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Thallium-208	0.179		0.0707	0.0731		0.0293	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Thorium-228	0.417		0.0880	0.103		0.0405	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Thorium-232	0.130	U	0.255	0.255		0.156	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Thorium-234	0.0591	U	0.141	0.141		1.14	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Uranium-235	0.125	U	0.261	0.262		0.476	pCi/g	11/01/19 16:18	11/23/19 23:28	1
Uranium-238	0.0591	U	0.141	0.141		1.14	pCi/g	11/01/19 16:18	11/23/19 23:28	1

Tracer/Carrier Summary

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Method: 905.0 - Total Beta Strontium (GFPC)

Prep Type: Total/NA

Matrix: Solid

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits) Sr Carrier (40-110)
160-36160-1	F-SU3-B01-S001	74.0
160-36160-2	F-SU3-B04-S001	88.4
160-36160-3	F-SU3-B05-S001	71.9
160-36160-4	F-SU3-B07-S001	86.2
160-36160-5	F-SU3-B09-S001	83.5
160-36160-6	F-SU3-B11-S001	69.8
160-36160-7	F-SU3-B12-S001	76.1
160-36160-8	F-SU3-B14-S001	74.2
160-36160-9	F-SU3-B15-S001	76.7
160-36160-10	F-SU3-B23-S001	75.6
160-36160-11	F-SU3-B29-S001	70.7
160-36160-12	F-SU3-B30-S001	78.2
160-36160-13	F-SU4-B04-S001	83.4
160-36160-14	F-SU5-B05-S001	70.6
160-36160-15	F-SU5-B10-S001	76.1
LCS 160-448639/1-A	Lab Control Sample	85.5
MB 160-448639/10-A	Method Blank	84.5

Tracer/Carrier Legend
Sr Carrier = Sr Carrier

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Prep Type: Total/NA

Matrix: Solid

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits) Pu-242 (T) (30-110)
160-36160-1	F-SU3-B01-S001	93.3
160-36160-2	F-SU3-B04-S001	83.5
160-36160-3	F-SU3-B05-S001	81.9
160-36160-4	F-SU3-B07-S001	88.2
160-36160-5	F-SU3-B09-S001	96.8
160-36160-6	F-SU3-B11-S001	86.9
160-36160-7	F-SU3-B12-S001	90.0
160-36160-8	F-SU3-B14-S001	106
160-36160-9	F-SU3-B15-S001	104
160-36160-10	F-SU3-B23-S001	97.8
160-36160-11	F-SU3-B29-S001	105
160-36160-12	F-SU3-B30-S001	88.1
160-36160-13	F-SU4-B04-S001	87.1
160-36160-14	F-SU5-B05-S001	82.4
160-36160-15	F-SU5-B10-S001	90.0
LCS 160-449075/2-A	Lab Control Sample	100
MB 160-449075/1-A	Method Blank	88.9

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

ED_006061A_00000077-00826

Tracer/Carrier Summary

Job ID: 160-36160-2

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F/ 501008

Method: A-01-R - Isotopic Polonium (Alpha Spectrometry)

Prep Type: Total/NA

Matrix: Solid

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)
		sionium-2
		(30-110)
160-36160-1	F-SU3-B01-S001	54.8
160-36160-1 DU	F-SU3-B01-S001	46.2
160-36160-2	F-SU3-B04-S001	57.8
160-36160-3	F-SU3-B05-S001	56.5
160-36160-4	F-SU3-B07-S001	50.2
160-36160-5	F-SU3-B09-S001	58.6
160-36160-6	F-SU3-B11-S001	61.6
160-36160-7	F-SU3-B12-S001	52.0
160-36160-8	F-SU3-B14-S001	26.4 Q
160-36160-9	F-SU3-B15-S001	62.5
160-36160-10	F-SU3-B23-S001	54.8
160-36160-11	F-SU3-B29-S001	53.4
160-36160-12	F-SU3-B30-S001	39.8
160-36160-13	F-SU4-B04-S001	60.1
160-36160-14	F-SU5-B05-S001	39.7
160-36160-15	F-SU5-B10-S001	27.5 Q
LCS 160-446021/2-A	Lab Control Sample	65.7
MB 160-446021/1-A	Method Blank	69.0

Tracer/Carrier Legend
Polonium-209 = Polonium-209

ED_006061A_00000077-00827

COVER LETTER

September 30, 2020
(Revision to the March 7, 2020)
Ref; Eurofins (Test America) SDG 160-36450 (12/17/2019)

Audrey Engle
APTIM
Hunters Point Naval Shipyard
200 Fisher Avenue
San Francisco, CA. 94124

Dear Mrs. Engle:

Enclosed is the data validation report for the Hunters Point Radiological Work Task, Remedial Action, and Maintenance of Remedies at Hunters Point Naval Shipyard, San Francisco, PA, project number 501008. This DVR encompasses the laboratory data produced by Eurofins (formerly TestAmerica Laboratories, Inc.) Table 1-1 describes the samples and analysis listed in this DVR.

The specific sample identifications are listed in the sample identification table(s). The data packages were reviewed per the data validation procedures referenced in the introduction of the report.

Sincerely,

Larry Duty
Data Validation Project Manager

1.0 INTRODUCTION

This Data Validation Report (DVR) contains the results of the validation conducted for samples collected and analyzed as part of the Hunters Point Naval Station Radiological work task, remedial action, and maintenance of remedies. The project was conducted per contract number N62473-17-D-006/N62473-17-F-4550 under EMAC III TO 13 for the Base Realignment and Closure Program Management Office, West Naval Facilities Engineering Command, 1455 Frazee Road, #600, San Diego CA. 92108. This DVR was subcontracted to E-Lab Consultants from Aptim (former Chicago, Bridge, and Iron) to serve third party data assessment purposes and evaluates the laboratory data contained in Sample Delivery Groups (SDGs) list in **Table 1-1** produced by Eurofins (formerly TestAmerica Laboratories, Inc).

These samples were analyzed in accordance with the approved *United States Department of Defense* (DOD) *Quality Systems Manual (QSM) for Environmental Laboratories Version 5.3, 2019* and the analytical methods specified for the analytes requested on the Chain of Custody (COC) documentation. **Table 1-1** provides a list of the samples collected, a laboratory sample number cross-reference, sample matrix, date collected, sample purpose, and analytical methods performed for each sample pertaining to this DVR. This DVR is conducted per the analysis requested on the COC in accordance with the; Final Revision 2 Radiological Scoping Surveys Work Plan, Parcel F Structures May, 2019.(RSSWP), *American National Standard Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation (ANSI/ANS-41.5-2012), Radionuclide Data Quality Evaluation Guidance 9284, Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Organic (NFGO) Data Review (August 2014), NFG for Inorganic (NFGIO) Data Review (August 2014),* and the method specified for the analysis.

The data were evaluated against the quantitative acceptance limits given in the DOD QSM for the data quality parameters of sensitivity, accuracy, precision, and completeness. **Appendix A** contains the Laboratory Data Report Form 1s that has been annotated with qualifiers assigned during the validation process in accordance with the project procedures manual.

In accordance with SAP, a review of the data was conducted independent of the laboratory. This review consisted of an evaluation of laboratory performance criteria

from the case narrative, and an evaluation of the sample-specific criteria included in the laboratory data packages analyzed in accordance with the DOD QSM.

The validation consists of an evaluation of the case narrative, chain of custody and associated laboratory sample receipt forms, proper sample preservations, holding times, initial calibration and continuing calibration procedures and results, laboratory control sample (LCS) (and duplicate [LCSD] if reported) accuracy and precision and matrix spike (MS) and matrix spike duplicate (MSD) sample analyses, method blanks, field blanks, and field duplicate precision.

(if required) Additional Stage 2B review included;

- Organic Analysis; internal standards, continuing calibration verification, internal standards, degradation summary, retention times, second column or second detector confirmations, retention time windows,
- Inorganic Analysis; laboratory duplicate precision, instrument tuning, initial calibration, low-level calibration check standards, initial and continuing calibration verification, initial and continuing calibration blanks, interference check sample, internal standards, serial dilution results, post digestion spike recoveries, and interelement correction factors

The results of the independent data review are presented in **Section 2.0**.

Table 1-1
Sample Field and Laboratory ID Numbers

Field ID	Sample Date	Matrix	Purpose	Lab ID	Method	Level
F-SU1-B01-S001	11/19/2019 10:21:00 AM	SC	N	160364501	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B02-S001	11/19/2019 11:33:00 AM	SC	N	160364502	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B06-S001	11/19/2019 3:00:00 PM	SC	N	160364503	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B07-S001	11/19/2019 3:04:00 PM	SC	N	160364504	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B11-S001	11/19/2019 11:04:00 AM	SC	N	160364505	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B12-S001	11/19/2019 12:02:00 PM	SC	N	160364506	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B15-S001	11/19/2019 3:25:00 PM	SC	N	160364507	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B16-S001	11/19/2019 3:19:00 PM	SC	N	160364508	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B17-S001	11/19/2019 3:11:00 PM	SC	N	160364509	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B24-S001	11/19/2019 3:40:00 PM	SC	N	1603645010	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B30-S001	11/19/2019 3:48:00 PM	SC	N	1603645011	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B33-S001	11/19/2019 3:44:00 PM	SC	N	1603645012	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU1-B36-S001	11/20/2019 9:16:00 AM	SC	N	1603645013	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU2-B04-S001	11/20/2019 9:50:00 AM	SC	N	1603645014	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU2-B07-S001	11/20/2019 9:39:00 AM	SC	N	1603645015	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU2-B09-S001	11/20/2019 9:33:00 AM	SC	N	1603645016	EPA191.1M EPA905.0M A-Spec A-01R	2B

F-SU2-B12-S001	11/20/2019 9:56:00 AM	SC	N	1603645017	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU2-B16-S001	11/20/2019 9:43:00 AM	SC	N	1603645018	EPA191.1M EPA905.0M A-Spec A-01R	2B

Following the specifications in the SAP related to the data validation process, the data were annotated with data validation qualifiers and codes on the analytical data sheets that are required qualifier flags as described in the SAP. **Table 1-2** provides definitions of the data qualifiers references, and **Table 1-3** lists and defines the data review qualifier codes.

Table 1-2
Data Qualifier References

Qualifier	Organics	Inorganics
U	The analyte was analyzed for but was not detected above the method detection limit.	The analyte was analyzed for but was not detected above the method detection limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	Not applicable.
UJ	The analyte was not detected above the method detection limit. However, the associated value is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified.	The data are unusable. The sample results are rejected due to serious deficiencies in meeting the Quality Control (QC) criteria. The analyte may or may not be present in the sample.

Table 1-3
Data Review Qualifier Codes

Reason Code	Description
A	Serial dilution outside criteria (Level IV).
B1	Method blank contaminants above reporting limit.
B2	Calibration blank contaminants above reporting limit.
B2 (Bias flag –)	Calibration blank indicates negative interference, false negatives may be present
B3	Trip blank contamination
B4	Equipment rinsate contamination.
B5	Ambient blank contamination
C	ICV or CCV % D outside control limits.
C1	Initial calibration RSD outside control limit.
C2	Initial calibration RRF outside control limit.
C3	Continuing calibration RRF outside control limit.
D1	Sample Duplicate RPD outside control limit.
D2	Matrix Duplicate RPD outside control limit
E	The sample results exceed the linear calibration range of the instrument.
F	Hydrocarbon pattern does not match hydrocarbon pattern in the standard.
H	Holding time exceeded.
I	Internal standard recovery outside control limit.
L	LCS outside control limits.
M	MS outside control limits.
M1	MS, MSD or RPD outside of control limits
O	Interference check sample outside acceptance criteria
P	Analyte qualified based on the professional judgement of the reviewer.
P1	Sample result is ≤ total uncertainty

S	Surrogate recovery outside control limit.
T	Temperature outside acceptance criteria.
Tr	Value reported detected between the DL and LOQ
W	Pesticide breakdown outside criteria (Level IV).
X	Raised reporting limit due to matrix interference or high analyte concentration.
Y	Analyte was not confirmed by a second column.
Y1	Primary and Confirmation Sample Duplicate RPD outside control limit.

2.0 DATA VALIDATION RESULTS

Laboratory Data Package Review

The samples reported, QC designations, and validation level is listed in **Table 1-1**. The data packages were reviewed in accordance with the project procedures manual.

Sample Documentation, Preservation, Handling, and Transport

All samples arrived at the laboratory on time, intact and within preservation requirements. A cross reference of the COC and analytical reports has concluded all extractions and analysis were performed within the required holding times. The validation met all QC requirements listed in the method and data validation requirements of the SAP. None of the data is qualified based on sample documentation, preservation, handing, or transport.

The data is not qualified.

2.1 Total Beta Strontium, EPA 905

2.1.1 Instrument Parameters

Verification included the review of the laboratories most recent efficiency calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Counting uncertainty was ≤ 1/5 the quantitation limits. Efficiency performance checks were verified for each use.

2.1.2 Energy Calibrations

Energy calibrations (Energy Calibration Performance Checks, ECPC) were verified to be at the frequency specified. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.1.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.1.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (<20%). Continuing calibrations were performed on a 12-hour basis. Detection goals for cesium137 were not met in all analysis due to elevated Compton background levels. Natural activity is suspect. None of the data were qualified based on continuing calibrations.

2.1.5 Blanks

Each analytical batch was represented with a method blank. The laboratory reports none of the target compounds were detected in any of the method blanks that would results in sample data qualification (e.g. sample detections were >5X the blank). None of the results are qualified based on data verifications.

2.1.6 Laboratory Control Sample Recovery (Blank Spikes)

The LCS values were validated by recalculating two compounds per LCS. None of the data are qualified based on LCS recoveries.

2.1.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD samples were not submitted for this analysis.

2.1.8 Laboratory Duplicate Recoveries

All laboratory generated duplicate recoveries are within QC limits.

2.1.9 Field QC Samples

Trip, Equipment and Field Blanks

Field blank samples were not submitted for this analysis.

2.1.10 Target Compound Identification

None of the identified target compounds were qualified based compound identification.

2.1.11 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards.

2.1 Radium-226 by GAMMA SPEC (21 DAY INGROWTH)

2.1.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.1.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.1.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.1.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.1.5 Blanks

Each analytical batch was represented with a method blank. The laboratory reports none of the target compounds were detected in any of the method blanks that would results in sample data qualification (e.g. sample detections were >5X the blank or MB was below the 1.65X its CSU). None of the results are qualified based on data verifications.

2.1.6 Laboratory Control Sample Recovery (Blank Spikes)

The LCS values were validated by recalculating two compounds per LCS. None of the data are qualified based on LCS recoveries.

2.1.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD samples were not submitted for this analysis.

2.1.8 Laboratory Duplicate Recoveries

All laboratory generated duplicate recoveries are within QC limits.

2.1.9 Field QC Samples

Trip, Equipment and Field Blanks

Field blank samples were not submitted for this analysis.

2.1.10 Target Compound Identification

None of the identified target compounds were qualified based compound identification.

2.1.11 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards.

2.2 A-01R Plutonium

2.2.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.2.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.2.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.2.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.2.5 Blanks

Blanks The laboratory (method) blanks yielded no detectable activities, so no qualifications were applied.

2.2.6 Laboratory Control Sample Recovery (Blank Spikes)

LCS/D analyses provided adequate confirmation of accuracy and precision.

2.2.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD analyses were not performed for these analyses. No qualifications were applied. The LCS/D is used for accuracy and precision assessment.

2.2.8 Tracers

The tracers yielded fully satisfactory recoveries

2.2.9 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards.

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2.3 GAMMA SPECTROSCOPY ANALYSES

2.3.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.3.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.3.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.3.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.3.5 Blanks

Blanks The laboratory (method) blanks yielded no detectable activities, so no qualifications were applied.

2.3.6 Laboratory Control Sample Recovery (Blank Spikes)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

2.3.7 Duplicate Recoveries

Duplicate recoveries were within QC limits.

2.3.8 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards.

3.0 CONCLUSION

Detected values that are above the DLC and below the total uncertainty are qualified estimated "J" and a reason code P-1.

The following samples were qualified based on this validation.

sample	Lab ID	Ana Meth	chemical name	Result	Error	LQ	VQ	RC
F-SU1-B02-S001	160364502	A-01-R	Plutonium-238	0.0452	0.0639		J	P1
F-SU1-B02-S001	160364502	901.1/HAS L300	Thallium-208	0.116	0.119		J	P1
F-SU1-B02-S001	160364502	901.1/HAS L300	Thorium-234	0.559	0.603		J	P1
F-SU1-B02-S001	160364502	905	Total Beta Strontium	0.0805	0.0908		J	P1
F-SU1-B02-S001	160364502	901.1/HAS L300	Uranium-238	0.559	0.603		J	P1
F-SU1-B12-S001	160364506	901.1/HAS L300	Thorium-234	0.446	0.529		J	P1
F-SU1-B12-S001	160364506	901.1/HAS L300	Uranium-238	0.446	0.529		J	P1
F-SU1-B15-S001	160364507	A-01-R	Plutonium-239/240	0.0160	0.0264		J	P1
F-SU1-B17-S001	160364509	A-01-R	Plutonium-239/240	0.0140	0.0273		J	P1
F-SU1-B24-S001	1603645010	901.1/HAS L300	Lead 210	1.22	1.53		J	P1

F-SU1-B30-S001	1603645011	905	Total Beta Strontium	0.0642	0.0746		J	P1
F-SU1-B33-S001	1603645012	A-01-R	Plutonium-239/240	0.0169	0.0305		J	P1
F-SU1-B36-S001	1603645013	901.1/HAS L300	Thorium-234	0.764	0.923		J	P1
F-SU1-B36-S001	1603645013	901.1/HAS L300	Actinium-228	0.172	0.313		J	P1
F-SU1-B36-S001	1603645013	901.1/HAS L300	Radium 228	0.172	0.313		J	P1
F-SU1-B36-S001	1603645013	901.1/HAS L300	Thorium-232	0.172	0.313		J	P1
F-SU1-B36-S001	1603645013	901.1/HAS L300	Uranium-238	0.764	0.923		J	P1
F-SU2-B07-S001	1603645015	905	Total Beta Strontium	0.0834	0.0855		J	P1
F-SU2-B12-S001	1603645017	901.1/HAS L300	Lead 210	1.22	1.72		J	P1
F-SU2-B16-S001	1603645018	905	Total Beta Strontium	0.0758	0.0759		J	P1
F-SU2-B16-S001	1603645018	901.1/HAS L300	Thorium-234	0.699	0.710		J	P1
F-SU2-B16-S001	1603645018	901.1/HAS L300	Radium 228	0.256	0.328		J	P1
F-SU2-B16-S001	1603645018	901.1/HAS L300	Actinium-228	0.256	0.328		J	P1
F-SU2-B16-S001	1603645018	901.1/HAS L300	Thorium-232	0.256	0.328		J	P1

Acronyms and Abbreviations

Following is a list of acronyms and abbreviations that may be used in data validation reports and/or data quality assessment reports.

%D	percent difference	DFTPP	decafluorotriphenylphosphine
%R	percent recovery	DOD	Department Of Defense
µg/L	microgram per liter	DQAR	data quality assessment report
mg/L	milligram per liter		

pg/L	picogram per liter	DUP	laboratory duplicate
µg/kg	microgram per kilogram	DVP	data validation procedure
mg/kg	milligram per kilogram	EDB	ethylene dibromide
ng/kg	nanogram per kilogram	EDL	estimated detection limit
pg/g	picogram per gram	EICP	extracted ion current profile
AA	atomic absorption	EPA	Environmental Protection Agency, United States
ARRF	average relative response factor	EB	equipment blank
BFB	bromofluorobenzene	FB	field blank
BNA	base/neutral/acid compounds	GC	gas chromatography
CCB	continuing calibration blank	GC/ECD	gas chromatography/electron capture detector
CCC	calibration check compound	GC/ELCD	gas chromatography/electrolytic conductivity detector (Hall detector)
CCV	continuing calibration verification	GC/FPD	gas chromatography/flame photometric detector
CF	calibration factor	GC/MS	gas chromatography/mass spectrometry
CLP	Contract Laboratory Program	GC/PID	gas chromatography/photoionization detector
COC	chain of custody record	GFAA	graphite furnace atomic absorption
COD	chemical oxygen demand	GPC	gel permeation chromatography
CTO	contract task order	Hg	mercury
CVAA	cold vapor atomic absorption	HPLC	high-performance liquid chromatography
DBCP	dibromochloropropane	HRGC/HRMS	high resolution gas chromatography/high resolution mass spectrometry

DCB	decachlorobiphenyl	RF r2	response factor coefficient of determination
4,4'-DDD	4,4'-dichlorodiphenyldichloroethane	RICRF	reconstructed ion chromatogram response factor
4,4'-DDE	4,4'-dichlorodiphenyldichloroethylene	RLRIC	reporting limit reconstructed ion chromatogram
4,4'-DDT	4,4'-dichlorodiphenyltrichloroethane	RPDRL	relative percent difference reporting limit
ICV	initial calibration verification	RRFRPD	relative response factor relative percent difference
IDL	instrument detection limit	RRTRRF	relative retention time relative response factor
IR	infrared spectroscopy	RSDRRT	relative standard deviation relative retention time
IRP	installation restoration program	RTRSD	retention time relative standard deviation
IS	internal standards	RT	retention time
LCS	laboratory control sample	HT	holding time
MBAS	methyl blue active substance	ICB	initial calibration blank
MDL	method detection limit	ICP	inductively coupled plasma
MS	matrix spike	ICS	interference check sample
MSA	method of standard addition	SDG	sample delivery group
MSD	matrix spike duplicate	SICP	selected ion current profiles
m/z	mass to charge ratio	s/n	signal to noise ratio
NFESC	Naval Facilities Engineering Services Center	SOP	standard operating procedure
OP	organophosphorus	SOW	statement of work
PAH	polynuclear aromatic hydrocarbon	SPCC	system performance check compound
PARCC	precision, accuracy, representativeness, comparability, completeness	SRM	standard reference material

PCB	polychlorinated biphenyl	SVOC	semivolatile organic compound
PCDD	polychlorinated dibenzodioxin	TB	trip blank
PCDF	polychlorinated dibenzofuran	TCDD	tetrachlorodibenzodioxin
PE	performance evaluation	TCX	tetrachloro-m-xylene
PEM	performance evaluation mixture	TDS	total dissolved solids
PFK	perfluorokerosene	TIC	tentatively identified compound
PQO	project quality objective	TOC	total organic carbon
QAPFK	quality assurance perfluorokerosene	TOX	total organic halides
QACQA	quality assurance coordinator quality assurance	TPHE	total petroleum hydrocarbons as extractables
QAPPQAC	quality assurance project plan quality assurance coordinator	UV/VIS	ultraviolet/visible
QCQAPP	quality control quality assurance project plan	VOA	volatile organic analysis
QSM QC	quality system manual quality control	VOC	volatile organic compound
rQSM	correlation coefficient quality system manual	VTSR	validated time of sample receipt
r2r	coefficient of determination correlation coefficient	WDM	window defining mixture

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU1-B01-S001

Lab Sample ID: 160-36450-1
Matrix: Solid

Date Collected: 11/19/19 10:21
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0913		0.0885	0.0888	0.331	0.0860	pCi/g	11/25/19 07:57	12/13/19 07:13	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	70.8		40 - 110	11/25/19 07:57	12/13/19 07:13	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-236	-0.0175	U	0.0506	0.0507	1.00	0.0459	pCi/g	11/25/19 13:20	12/09/19 13:08	1
Plutonium-239/240	-0.00390	U	0.0431	0.0431	1.00	0.0396	pCi/g	11/25/19 13:20	12/09/19 13:08	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	95.1		30 - 110	11/25/19 13:20	12/09/19 13:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.111	U	0.332	0.332		0.178	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Actinium-227	0.119	U	0.390	0.390		0.417	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Bismuth-212	-0.370	U	0.843	0.843		0.730	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Bismuth-214	0.398		0.135	0.141		0.0546	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Cesium-137	-0.0168	U	0.0912	0.0912	0.0700	0.0762	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Lead-210	0.601	U	1.85	1.85		1.48	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Lead-212	0.306		0.108	0.115		0.0579	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Lead-214	0.441		0.123	0.132		0.0569	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Potassium-40	6.67		1.44	1.60		0.346	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Protactinium-231	-0.947	U	2.99	2.99		2.43	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Radium-226	0.398		0.135	0.141	0.500	0.0546	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Radium-228	0.111	U	0.332	0.332		0.178	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Thallium-208	0.174		0.0548	0.0577		0.00952	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Thorium-228	0.386		0.108	0.115		0.0679	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Thorium-232	0.111	U	0.332	0.332		0.176	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Thorium-234	0.731		0.652	0.657		0.500	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Uranium-235	0.0544	U	0.140	0.140		0.493	pCi/g	11/22/19 23:46	12/14/19 10:22	1
Uranium-238	0.731		0.652	0.657		0.500	pCi/g	11/22/19 23:46	12/14/19 10:22	1

Client Sample ID: F-SU1-B02-S001

Lab Sample ID: 160-36450-2
Matrix: Solid

Date Collected: 11/19/19 11:33
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0905		0.0909	0.0908	0.331	0.0884	pCi/g	11/25/19 07:57	12/13/19 07:14	1

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU1-B02-S001

Lab Sample ID: 160-36450-2
Matrix: Solid

Date Collected: 11/19/19 11:33
Date Received: 11/21/19 09:00

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	67.4		40 - 110	11/26/19 07:57	12/13/19 07:14	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0452	J-P1	0.0638	0.0639	1.00	0.0412	pCi/g	11/26/19 13:20	12/09/19 13:08	1
Plutonium-239/240	-0.0216	U U	0.0452	0.0453	1.00	0.0436	pCi/g	11/26/19 13:20	12/09/19 13:08	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	95.9		30 - 110	11/26/19 13:20	12/09/19 13:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.427		0.220	0.224		0.0567	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Actinium-227	0.0627	U U	0.479	0.479		0.408	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Bismuth-212	0.428	U	1.83	1.83		1.48	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Bismuth-214	0.521		0.183	0.191		0.0948	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Cesium-137	0.00811	U U	0.119	0.119	0.0700	0.0969	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Lead-210	1.62		1.37	1.38		0.833	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Lead-212	0.312		0.102	0.110		0.0511	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Lead-214	0.559		0.169	0.178		0.0727	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Potassium-40	7.65		1.73	1.85		0.378	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Protactinium-231	0.206	U U	1.78	1.78		2.76	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Radium-226	0.521		0.183	0.191	0.500	0.0948	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Radium-228	0.427		0.220	0.224		0.0567	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Thallium-208	0.118	J-P1	0.118	0.119		0.0588	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Thorium-228	0.312		0.102	0.110		0.0511	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Thorium-232	0.427		0.220	0.224		0.0567	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Thorium-234	0.559	J-P1	0.600	0.603		0.448	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Uranium-235	-0.236	U U	0.549	0.549		0.442	pCi/g	11/22/19 23:46	12/14/19 10:19	1
Uranium-238	0.559	J-P1	0.600	0.603		0.448	pCi/g	11/22/19 23:46	12/14/19 10:19	1

Client Sample ID: F-SU1-B06-S001

Lab Sample ID: 160-36450-3
Matrix: Solid

Date Collected: 11/19/19 15:00
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0403	U U	0.0710	0.0710	0.331	0.0550	pCi/g	11/26/19 07:57	12/13/19 07:14	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	78.9		40 - 110	11/26/19 07:57	12/13/19 07:14	1

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU1-B06-S001

Lab Sample ID: 160-36450-3
Matrix: Solid

Date Collected: 11/19/19 15:00
Date Received: 11/21/19 09:00

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0430	U	0.0352	0.0355	1.00	0.0370	pCi/g	11/25/19 13:20	12/09/19 13:08	1
Plutonium-239/240	-0.0164	U	0.0116	0.0117	1.00	0.0219	pCi/g	11/25/19 13:20	12/09/19 13:08	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	94.3		30 - 110	11/25/19 13:20	12/09/19 13:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.135	U	0.221	0.221		0.137	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Actinium-227	0.0816	U	0.318	0.318		0.334	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Bismuth-212	0.349	U	0.930	0.930		0.729	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Bismuth-214	0.433		0.145	0.162		0.0693	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Cesium-137	-0.0498	U	0.0927	0.0929	0.0700	0.0721	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Lead-210	-0.602	U	1.72	1.73		1.25	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Lead-212	0.301		0.100	0.107		0.0570	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Lead-214	0.414		0.154	0.159		0.0748	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Potassium-40	6.92		1.48	1.83		0.287	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Protactinium-231	0.241	U	2.79	2.79		2.20	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Radium-226	0.433		0.148	0.162	0.500	0.0693	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Radium-228	0.135	U	0.221	0.221		0.137	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Thallium-208	0.211		0.0670	0.0705		0.0183	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Thorium-228	0.301		0.100	0.107		0.0578	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Thorium-232	0.135	U	0.221	0.221		0.137	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Thorium-234	0.627		0.578	0.582		0.583	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Uranium-235	-0.173	U	0.295	0.295		0.350	pCi/g	11/22/19 23:46	12/14/19 09:48	1
Uranium-238	0.627		0.578	0.582		0.383	pCi/g	11/22/19 23:46	12/14/19 09:48	1

Client Sample ID: F-SU1-B07-S001

Lab Sample ID: 160-36450-4
Matrix: Solid

Date Collected: 11/19/19 15:04
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0503	U	0.0700	0.0704	0.331	0.0812	pCi/g	11/25/19 07:57	12/13/19 07:14	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	72.4		40 - 110	11/25/19 07:57	12/13/19 07:14	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0118	U	0.0266	0.0266	1.00	0.0270	pCi/g	11/25/19 13:20	12/09/19 13:08	1
Plutonium-239/240	-0.00785	U	0.00785	0.00786	1.00	0.0144	pCi/g	11/25/19 13:20	12/09/19 13:08	1

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 601008

Client Sample ID: F-SU1-B07-S001

Lab Sample ID: 160-36450-4
Matrix: Solid

Date Collected: 11/19/19 15:04
Date Received: 11/21/19 09:00

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	64.3		30 - 110	11/25/19 13:20	12/09/19 13:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.498		0.208	0.212		0.134	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Actinium-227	0.0757	U	0.260	0.260		0.443	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Bismuth-212	-0.420	U	1.06	1.06		0.829	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Bismuth-214	0.436		0.135	0.143		0.0547	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Cesium-137	0.00205	U	0.0693	0.0693	0.0700	0.0568	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Lead-210	0.351	U	2.07	2.07		1.68	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Lead-212	0.344		0.0969	0.106		0.0471	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Lead-214	0.624		0.148	0.161		0.0692	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Potassium-40	9.14		1.84	1.88		0.426	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Protactinium-231	0.000	U	0.517	0.517		2.61	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Radium-226	0.436		0.135	0.143	0.800	0.0547	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Radium-228	0.498		0.208	0.212		0.134	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Thallium-208	0.113		0.106	0.107		0.0600	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Thorium-228	0.344		0.0969	0.106		0.0471	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Thorium-232	0.498		0.208	0.212		0.134	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Thorium-234	0.0267	U	0.0493	0.0494		1.14	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Uranium-235	-0.204	U	0.644	0.646		0.441	pCi/g	11/22/19 23:46	12/14/19 09:46	1
Uranium-238	0.0267	U	0.0493	0.0494		1.14	pCi/g	11/22/19 23:46	12/14/19 09:46	1

Client Sample ID: F-SU1-B11-S001

Lab Sample ID: 160-36450-5
Matrix: Solid

Date Collected: 11/19/19 11:04
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0904		0.0783	0.0786	0.331	0.0576	pCi/g	11/25/19 07:57	12/13/19 07:14	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	79.5		40 - 110	11/25/19 07:57	12/13/19 07:14	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0169	U	0.0401	0.0401	1.00	0.0256	pCi/g	11/25/19 13:20	12/09/19 13:08	1
Plutonium-239/240	0.00421	U	0.0178	0.0178	1.00	0.0109	pCi/g	11/25/19 13:20	12/09/19 13:08	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	81.2		30 - 110	11/25/19 13:20	12/09/19 13:08	1

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU1-B11-S001

Lab Sample ID: 160-36450-5
Matrix: Solid

Date Collected: 11/19/19 11:04
Date Received: 11/21/19 09:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.465		0.179	0.192		0.135	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Actinium-227	-0.414	U	1.16	1.16		0.469	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Bismuth-212	0.291	U	0.883	0.884		0.697	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Bismuth-214	0.338		0.144	0.148		0.0569	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Cesium-137	0.0212	U	0.0946	0.0946	0.0700	0.0759	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Lead-210	0.635	U	1.37	1.38		1.08	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Lead-212	0.372		0.104	0.114		0.0570	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Lead-214	0.444		0.116	0.125		0.0646	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Potassium-40	6.99		1.48	1.54		0.346	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Protactinium-231	0.0824	U	1.13	1.13		2.37	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Radium-226	0.338		0.144	0.148	0.500	0.0560	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Radium-228	0.465		0.176	0.182		0.125	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Thallium-208	0.217		0.0611	0.0651		0.00963	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Thorium-228	0.372		0.104	0.114		0.0570	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Thorium-232	0.465		0.176	0.182		0.125	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Thorium-234	-1.48	U	0.712	0.731		1.17	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Uranium-235	-0.0628	U	0.369	0.390		0.431	pCi/g	11/22/19 23:46	12/14/19 09:45	1
Uranium-238	-1.48	U	0.712	0.731		1.17	pCi/g	11/22/19 23:46	12/14/19 09:45	1

Client Sample ID: F-SU1-B12-S001

Lab Sample ID: 160-36450-6
Matrix: Solid

Date Collected: 11/19/19 12:02
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0579	U	0.0816	0.0819	0.331	0.0629	pCi/g	11/25/19 07:57	12/13/19 07:14	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	75.7		40 - 110	11/25/19 07:57	12/13/19 07:14	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0119	U	0.0342	0.0343	1.00	0.0231	pCi/g	11/26/19 13:20	12/09/19 22:14	1
Plutonium-239/240	-0.00199	U	0.0183	0.0183	1.00	0.0164	pCi/g	11/26/19 13:20	12/09/19 22:14	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	84.4		30 - 110	11/26/19 13:20	12/09/19 22:14	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.494		0.196	0.204		0.192	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Actinium-227	0.0751	U	0.174	0.174		0.392	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Bismuth-212	-0.0480	U	0.413	0.413		0.673	pCi/g	11/22/19 23:46	12/14/19 09:44	1

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 601006

Client Sample ID: F-SU1-B12-S001

Lab Sample ID: 160-36450-6
Matrix: Solid

Date Collected: 11/19/19 12:02
Date Received: 11/21/19 09:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	0.322		0.153	0.167		0.0800	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Cesium-137	0.0123	U U	0.0613	0.0613	0.0700	0.0953	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Lead-210	-0.291	U	1.53	1.53		1.11	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Lead-212	0.489		0.105	0.116		0.0474	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Lead-214	0.513		0.161	0.170		0.0761	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Potassium-40	7.69		1.68	1.85		0.342	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Protactinium-231	0.374	U U	1.54	1.54		2.44	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Radium-226	0.322		0.153	0.167	0.800	0.0800	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Radium-228	0.494		0.198	0.204		0.192	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Thallium-208	0.176		0.0683	0.0707		0.0198	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Thorium-228	0.409		0.105	0.118		0.0474	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Thorium-232	0.494		0.198	0.204		0.192	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Thorium-234	0.446	J-P1	0.527	0.529		0.395	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Uranium-235	0.0846	U U	0.213	0.213		0.327	pCi/g	11/22/19 23:46	12/14/19 09:44	1
Uranium-238	0.446	J-P1	0.527	0.529		0.395	pCi/g	11/22/19 23:46	12/14/19 09:44	1

Client Sample ID: F-SU1-B15-S001

Lab Sample ID: 160-36450-7
Matrix: Solid

Date Collected: 11/19/19 15:25
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.00334	U U	0.0693	0.0693	0.321	0.0737	pCi/g	11/25/19 07:57	12/13/19 07:14	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	63.6		40 - 110	11/25/19 07:57	12/13/19 07:14	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0160	U U	0.0314	0.0314	1.00	0.0336	pCi/g	11/26/19 13:20	12/09/19 13:08	1
Plutonium-239/240	0.0190	J-P1	0.0263	0.0264	1.00	0.0843	pCi/g	11/26/19 13:20	12/09/19 13:08	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	76.4		30 - 110	11/26/19 13:20	12/09/19 13:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.358		0.215	0.213		0.148	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Actinium-227	0.216	U U	0.339	0.340		0.314	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Bismuth-212	0.000	U	0.563	0.563		0.686	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Bismuth-214	0.473		0.177	0.184		0.0659	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Cesium-137	-0.0639	U U	0.116	0.116	0.0700	0.0909	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Lead-210	1.76		1.63	1.64		1.07	pCi/g	11/22/19 23:46	12/14/19 09:15	1

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501009

Client Sample ID: F-SU1-B15-S001

Lab Sample ID: 160-36450-7
Matrix: Solid

Date Collected: 11/19/19 15:25
Date Received: 11/21/19 09:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Lead-212	0.0162	U	0.155	0.155		0.127	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Lead-214	0.486		0.147	0.165		0.0849	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Potassium-40	7.02		1.54	1.70		0.311	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Protactinium-231	-0.164	U	3.04	3.04		2.49	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Radium-226	0.473		0.177	0.184	0.500	0.0659	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Radium-228	0.359		0.215	0.216		0.148	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Thallium-208	0.131		0.0590	0.0703		0.0292	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Thorium-228	0.0162	U	0.155	0.155		0.127	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Thorium-232	0.350		0.215	0.218		0.149	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Thorium-234	0.276	U	0.559	0.559		0.433	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Uranium-235	0.0744	U	0.425	0.425		0.351	pCi/g	11/22/19 23:46	12/14/19 09:15	1
Uranium-238	0.276	U	0.559	0.559		0.433	pCi/g	11/22/19 23:46	12/14/19 09:15	1

Client Sample ID: F-SU1-B16-S001

Lab Sample ID: 160-36450-8
Matrix: Solid

Date Collected: 11/19/19 15:19
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0279	U	0.0709	0.0709	0.331	0.0805	pCi/g	11/26/19 07:57	12/13/19 07:14	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	79.4		40 - 110	11/26/19 07:57	12/13/19 07:14	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0213	U	0.0216	0.0216	1.00	0.0276	pCi/g	11/25/19 13:20	12/09/19 13:09	1
Plutonium-239/240	-0.00368	U	0.00549	0.00549	1.00	0.0101	pCi/g	11/25/19 13:20	12/09/19 13:09	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	83.7		30 - 110	11/25/19 13:20	12/09/19 13:09	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.0636	U	0.923	0.923		0.273	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Actinium-227	-0.201	U	0.913	0.914		0.559	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Bismuth-212	0.403	U	0.982	0.982		0.755	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Bismuth-214	0.569		0.193	0.206		0.0876	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Cesium-137	0.0320	U	0.0730	0.0730	0.0700	0.0954	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Lead-210	0.472	U	2.34	2.34		1.68	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Lead-212	0.397		0.121	0.128		0.0513	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Lead-214	0.635		0.154	0.167		0.0934	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Potassium-40	8.38		1.74	1.93		0.211	pCi/g	11/22/19 23:46	12/14/19 09:11	1

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 601008

Client Sample ID: F-SU1-B16-S001

Lab Sample ID: 160-36450-8
Matrix: Solid

Date Collected: 11/19/19 15:19
Date Received: 11/21/19 09:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Protactinium-231	0.000	U	0.719	0.719		3.59	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Radium-228	0.589		0.198	0.206	0.500	0.0870	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Radium-228	0.0936	U	0.523	0.523		0.273	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Thallium-208	0.170		0.113	0.114		0.0488	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Thorium-228	0.397		0.121	0.126		0.0613	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Thorium-232	0.0836	U	0.523	0.523		0.273	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Thorium-234	0.621	U	1.02	1.03		0.669	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Uranium-235	0.160	U	0.320	0.320		0.597	pCi/g	11/22/19 23:46	12/14/19 09:11	1
Uranium-238	0.021	U	1.02	1.03		0.609	pCi/g	11/22/19 23:46	12/14/19 09:11	1

Client Sample ID: F-SU1-B17-S001

Lab Sample ID: 160-36450-9
Matrix: Solid

Date Collected: 11/19/19 15:11
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0314	U	0.0776	0.0776	0.331	0.0683	pCi/g	11/25/19 07:57	12/13/19 07:14	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*70.3*		*40 - 110*	*11/25/19 07:57*	*12/13/19 07:14*	*1*

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0117	U	0.0347	0.0347	1.00	0.0228	pCi/g	11/25/19 13:20	12/09/19 13:08	1
Plutonium-239/240	0.0140		0.0273	0.0273	1.00	0.0122	pCi/g	11/25/19 13:20	12/09/19 13:08	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*76.6*		*30 - 110*	*11/25/19 13:20*	*12/09/19 13:08*	*1*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.265		0.171	0.174		0.107	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Actinium-227	0.0243	U	0.100	0.100		0.355	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Bismuth-212	-0.587	U	0.890	0.892		0.885	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Bismuth-214	0.497		0.128	0.138		0.0439	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Cesium-137	-0.0573	U	0.0934	0.0935	0.0700	0.0732	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Lead-210	-0.169	U	1.45	1.45		1.31	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Lead-212	0.329		0.0929	0.0929		0.0894	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Lead-214	0.375		0.126	0.132		0.0664	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Potassium-40	7.49		1.32	1.53		0.243	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Protactinium-231	0.355	U	1.37	1.37		2.14	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Radium-226	0.497		0.128	0.138	0.500	0.0439	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Radium-228	0.265		0.171	0.174		0.107	pCi/g	11/22/19 23:46	12/14/19 09:10	1

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU1-B17-S001

Lab Sample ID: 160-36450-9
Matrix: Solid

Date Collected: 11/19/19 15:11
Date Received: 11/21/19 09:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Thallium-208	0.144		0.0489	0.0511		0.0102	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Thorium-228	0.329		0.0825	0.0929		0.0394	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Thorium-232	0.265		0.171	0.174		0.107	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Thorium-234	-0.00423	U	0.553	0.558		0.926	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Uranium-235	-0.00992	U	0.482	0.482		0.360	pCi/g	11/22/19 23:46	12/14/19 09:10	1
Uranium-238	-0.00423	U	0.558	0.558		0.928	pCi/g	11/22/19 23:46	12/14/19 09:10	1

Client Sample ID: F-SU1-B24-S001

Lab Sample ID: 160-36450-10
Matrix: Solid

Date Collected: 11/19/19 16:40
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0230	U	0.0319	0.0319	0.331	0.0652	pCi/g	11/25/19 07:57	12/13/19 07:14	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	81.4		40 - 110	11/25/19 07:57	12/13/19 07:14	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0167	U	0.0346	0.0346	1.00	0.0344	pCi/g	11/25/19 13:20	12/09/19 13:08	1
Plutonium-239/240	-0.00829	U	0.00726	0.00726	1.00	0.0134	pCi/g	11/25/19 13:20	12/09/19 13:08	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	85.1		30 - 110	11/25/19 13:20	12/09/19 13:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.355		0.310	0.312		0.138	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Actinium-227	-0.00988	U	0.0174	0.0174		0.575	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Bismuth-212	-0.0548	U	1.10	1.10		1.01	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Bismuth-214	0.484		0.199	0.195		0.0917	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Cesium-137	-0.0339	U	0.118	0.118	0.0700	0.0873	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Lead-210	1.22		1.53	1.53		0.097	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Lead-212	0.351		0.109	0.118		0.0511	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Lead-214	0.361		0.138	0.140		0.0857	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Potassium-40	6.22		2.29	2.38		0.894	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Protactinium-231	-1.13	U	3.43	3.43		2.77	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Radium-226	0.484		0.199	0.195	0.500	0.0917	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Radium-228	0.355		0.310	0.312		0.138	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Thallium-208	0.158		0.111	0.112		0.0402	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Thorium-228	0.351		0.109	0.118		0.0511	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Thorium-232	0.355		0.310	0.312		0.138	pCi/g	11/23/19 01:10	12/14/19 12:31	1

JFP1

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU1-B24-S001

Lab Sample ID: 160-36450-10
Matrix: Solid

Date Collected: 11/19/19 15:40
Date Received: 11/21/19 09:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Thorium-234	-0.553	U	0.902	0.904		0.982	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Uranium-235	0.0506	U	0.446	0.446		0.356	pCi/g	11/23/19 01:10	12/14/19 12:31	1
Uranium-238	-0.553	U	0.902	0.904		0.892	pCi/g	11/23/19 01:10	12/14/19 12:31	1

Client Sample ID: F-SU1-B30-S001

Lab Sample ID: 160-36450-11
Matrix: Solid

Date Collected: 11/19/19 15:48
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0642	J-P1	0.0745	0.0746	0.331	0.0580	pCi/g	11/25/19 07:57	12/13/19 07:14	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	77.4		40 - 110	11/25/19 07:57	12/13/19 07:14	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0238	U	0.0241	0.0242	1.00	0.0308	pCi/g	11/25/19 13:20	12/09/19 13:08	1
Plutonium-239/240	0.00967	U	0.0260	0.0260	1.00	0.0159	pCi/g	11/25/19 13:20	12/09/19 13:08	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	81.0		30 - 110	11/25/19 13:20	12/09/19 13:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.369		0.211	0.214		0.176	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Actinium-227	-0.0735	U	0.765	0.768		0.466	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Bismuth-212	-0.0319	U	1.14	1.14		0.934	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Bismuth-214	0.875		0.190	0.202		0.0727	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Cesium-137	0.0462	U	0.0779	0.0798	0.0700	0.0588	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Lead-210	1.19	U	2.02	2.02		1.39	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Lead-212	0.457		0.111	0.121		0.0466	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Lead-214	0.840		0.195	0.206		0.0776	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Potassium-40	10.2		1.76	2.03		0.177	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Protactinium-231	0.000	U	1.04	1.04		3.02	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Radium-226	0.875		0.190	0.202	0.500	0.0727	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Radium-228	0.369		0.211	0.214		0.176	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Thallium-209	0.233		0.0865	0.0897		0.0399	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Thorium-228	0.457		0.111	0.121		0.0466	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Thorium-232	0.369		0.211	0.214		0.176	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Thorium-234	-1.32	U	1.21	1.21		1.21	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Uranium-235	0.0393	U	0.0654	0.0655		0.042	pCi/g	11/23/19 01:10	12/14/19 12:30	1
Uranium-238	-1.32	U	1.21	1.21		1.21	pCi/g	11/23/19 01:10	12/14/19 12:30	1

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU1-B33-S001

Lab Sample ID: 160-36450-12
Matrix: Solid

Date Collected: 11/19/19 15:44
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0742	U	0.0755	0.0767	0.331	0.0877	pCi/g	11/25/19 07:57	12/13/19 07:15	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	76.0		40 - 110	11/25/19 07:57	12/13/19 07:15	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.00422	U	0.0417	0.0417	1.00	0.0329	pCi/g	11/25/19 13:20	12/09/19 13:08	1
Plutonium-239/240	0.0169	J-P1	0.0304	0.0305	1.00	0.0166	pCi/g	11/25/19 13:20	12/09/19 13:08	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	98.1		30 - 110	11/25/19 13:20	12/09/19 13:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.369		0.157	0.162		0.0450	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Actinium-227	0.160	U	0.352	0.353		0.354	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Bismuth-212	-0.358	U	0.783	0.704		0.592	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Bismuth-214	0.638		0.154	0.158		0.0657	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Cesium-137	0.000	U	0.0431	0.0431	0.0700	0.0416	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Lead-210	0.673	U	1.66	1.66		1.33	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Lead-212	0.340		0.0850	0.0867		0.0368	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Lead-214	0.491		0.116	0.127		0.0656	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Potassium-40	7.74		1.35	1.59		0.367	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Protactinium-231	-0.089	U	2.95	2.95		2.40	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Radium-226	0.638		0.154	0.165	0.500	0.0657	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Radium-228	0.369		0.157	0.162		0.0450	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Thallium-208	0.128		0.0924	0.0933		0.0417	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Thorium-228	0.348		0.0860	0.0957		0.0399	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Thorium-232	0.389		0.157	0.162		0.0450	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Thorium-234	0.222	U	0.547	0.548		0.987	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Uranium-235	0.000	U	0.143	0.143		0.497	pCi/g	11/23/19 01:10	12/14/19 12:29	1
Uranium-238	0.222	U	0.547	0.548		0.987	pCi/g	11/23/19 01:10	12/14/19 12:29	1

Client Sample ID: F-SU1-B36-S001

Lab Sample ID: 160-36450-13
Matrix: Solid

Date Collected: 11/20/19 09:16
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.174		0.0963	0.0971	0.331	0.0886	pCi/g	11/25/19 07:57	12/13/19 07:17	1

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 601008

Client Sample ID: F-SU1-B36-S001

Lab Sample ID: 160-36450-13
Matrix: Solid

Date Collected: 11/20/19 09:16
Date Received: 11/21/19 09:00

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	84.0		40 - 110	11/25/19 07:57	12/13/19 07:17	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0246	U	0.0398	0.0387	1.00	0.0403	pCi/g	11/25/19 13:20	12/09/19 22:14	1
Plutonium-239/240	-0.00827	U	0.00827	0.00830	1.00	0.0162	pCi/g	11/25/19 13:20	12/09/19 22:14	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	84.5		30 - 110	11/25/19 13:20	12/09/19 22:14	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.172		0.312	0.313		0.153	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Actinium-227	-0.476	U	0.962	0.963		0.578	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Bismuth-212	0.429	U	1.00	1.01		0.778	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Bismuth-214	0.380		0.175	0.179		0.0860	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Cesium-137	0.0491	U	0.0846	0.0846	0.0700	0.0842	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Lead-210	3.40		2.39	2.43		1.50	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Lead-212	0.438		0.116	0.124		0.0554	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Lead-214	0.563		0.163	0.172		0.0362	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Potassium-40	9.41		1.74	1.98		0.187	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Protactinium-231	0.761	U	2.40	2.40		2.63	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Radium-226	0.388		0.175	0.179	0.500	0.0860	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Radium-228	0.172		0.312	0.313		0.153	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Thallium-208	0.195		0.0763	0.0818		0.0245	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Thorium-228	0.430		0.116	0.124		0.0554	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Thorium-232	0.172		0.312	0.313		0.153	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Thorium-234	0.764		0.919	0.923		0.649	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Uranium-235	-0.245	U	0.583	0.586		0.474	pCi/g	11/23/19 01:10	12/14/19 11:53	1
Uranium-238	0.764		0.919	0.923		0.649	pCi/g	11/23/19 01:10	12/14/19 11:53	1

Client Sample ID: F-SU2-B04-S001

Lab Sample ID: 160-36450-14
Matrix: Solid

Date Collected: 11/20/19 09:50
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0283	U	0.0883	0.0883	0.331	0.0707	pCi/g	11/25/19 07:57	12/13/19 07:17	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	70.8		40 - 110	11/25/19 07:57	12/13/19 07:17	1

ED_006061A_00000077-00856

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU2-B04-S001

Lab Sample ID: 160-36450-14
Matrix: Solid

Date Collected: 11/20/19 09:50
Date Received: 11/21/19 09:00

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0175	U	0.0507	0.0507	1.00	0.0469	pCi/g	11/25/19 13:20	12/09/19 22:15	1
Plutonium-239/240	0.0117	U	0.0464	0.0464	1.00	0.0365	pCi/g	11/25/19 13:20	12/09/19 22:15	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	94.8		30 - 110	11/25/19 13:20	12/09/19 22:15	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.776		0.208	0.223		0.0929	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Actinium-227	0.169	U	0.464	0.464		0.385	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Bismuth-212	-0.157	U	0.800	0.800		0.843	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Bismuth-214	0.566		0.147	0.156		0.0595	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Cesium-137	-0.0269	U	0.0746	0.0747	0.0700	0.0580	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Lead-210	0.711	U	1.57	1.58		1.25	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Lead-212	0.517		0.109	0.128		0.0511	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Lead-214	0.564		0.150	0.171		0.0576	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Potassium-40	4.82		1.16	1.25		0.390	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Protactinium-231	0.360	U	3.17	3.17		2.59	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Radium-226	0.565		0.147	0.156	0.500	0.0566	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Radium-228	0.776		0.208	0.223		0.0929	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Thallium-208	0.317		0.0724	0.0798		0.0154	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Thorium-228	0.517		0.109	0.128		0.0511	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Thorium-232	0.776		0.208	0.223		0.0929	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Thorium-234	0.0101	U	0.0176	0.0176		1.37	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Uranium-235	0.146	U	0.512	0.512		0.417	pCi/g	11/23/19 01:10	12/14/19 11:52	1
Uranium-238	0.0101	U	0.0176	0.0176		1.37	pCi/g	11/23/19 01:10	12/14/19 11:52	1

Client Sample ID: F-SU2-B07-S001

Lab Sample ID: 160-36450-15
Matrix: Solid

Date Collected: 11/20/19 09:39
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0834	J-P	0.0853	0.0855	0.331	0.0846	pCi/g	11/25/19 07:57	12/13/19 07:17	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	83.6		40 - 110	11/25/19 07:57	12/13/19 07:17	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.000	U	0.0504	0.0504	1.00	0.0496	pCi/g	11/25/19 13:20	12/09/19 22:15	1
Plutonium-239/240	-0.0176	U	0.0590	0.0590	1.00	0.0922	pCi/g	11/25/19 13:20	12/09/19 22:15	1

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU2-B07-S001

Date Collected: 11/20/19 09:39
Date Received: 11/21/19 09:00

Lab Sample ID: 160-36450-15
Matrix: Solid

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	107		30 - 110	11/25/19 13:20	12/09/19 22:15	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.714		0.242	0.252		0.0470	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Actinium-227	0.247	U	0.504	0.505		0.398	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Bismuth-212	0.338	U	0.763	0.763		0.879	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Bismuth-214	0.524		0.175	0.183		0.0856	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Cesium-137	0.00247	U	0.0779	0.0779	0.0700	0.0034	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Lead-210	-1.12	U	1.83	1.83		1.69	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Lead-212	0.421		0.117	0.129		0.0531	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Lead-214	0.500		0.178	0.188		0.0745	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Potassium-40	7.54		1.85	1.83		0.408	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Protactinium-231	0.459	U	1.81	1.81		2.53	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Radium-226	0.624		0.175	0.183	0.500	0.0856	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Radium-228	0.714		0.242	0.252		0.0476	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Thallium-208	0.175		0.0727	0.0749		0.0243	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Thorium-228	0.421		0.117	0.129		0.0531	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Thorium-232	0.714		0.242	0.252		0.0476	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Thorium-234	-1.22	U	1.69	1.69		1.42	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Uranium-235	0.0504	U	0.134	0.134		0.480	pCi/g	11/23/19 01:10	12/14/19 11:50	1
Uranium-238	-1.22	U	1.69	1.69		1.42	pCi/g	11/23/19 01:10	12/14/19 11:50	1

Client Sample ID: F-SU2-B09-S001

Date Collected: 11/20/19 09:33
Date Received: 11/21/19 09:00

Lab Sample ID: 160-36450-16
Matrix: Solid

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.100	U	0.130	0.131	0.331	0.114	pCi/g	11/25/19 07:57	12/13/19 07:17	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	51.7		40 - 110	11/25/19 07:57	12/13/19 07:17	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0103	U	0.0513	0.0513	1.00	0.0394	pCi/g	11/25/19 13:20	12/09/19 22:14	1
Plutonium-239/240	-0.0071	U	0.0304	0.0305	1.00	0.0416	pCi/g	11/25/19 13:20	12/09/19 22:14	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	100		30 - 110	11/25/19 13:20	12/09/19 22:14	1

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU2-B09-S001

Lab Sample ID: 160-36450-16
Matrix: Solid

Date Collected: 11/20/19 09:33
Date Received: 11/21/19 09:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.648		0.266	0.271		0.0695	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Actinium-227	0.165	U	0.437	0.437		0.383	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Bismuth-212	-0.0505	U	0.946	0.948		1.00	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Bismuth-214	0.547		0.236	0.244		0.106	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Cesium-137	0.00858	U	0.111	0.111	0.0700	0.0903	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Lead-210	2.36		2.00	2.02		1.13	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Lead-212	0.297		0.122	0.128		0.0601	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Lead-214	0.372		0.197	0.201		0.112	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Potassium-40	6.81		2.50	2.57		1.03	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Protactinium-231	0.000	U	0.479	0.479		3.60	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Radium-226	0.547		0.236	0.244	0.500	0.106	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Radium-228	0.648		0.266	0.271		0.0695	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Thallium-208	0.151		0.0656	0.0677		0.0184	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Thorium-235	0.297		0.122	0.128		0.0691	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Thorium-232	0.648		0.266	0.271		0.0695	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Thorium-234	-0.306	U	0.715	0.716		0.808	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Uranium-235	0.0821	U	0.301	0.301		0.368	pCi/g	11/23/19 01:10	12/14/19 11:49	1
Uranium-238	-0.306	U	0.715	0.716		0.808	pCi/g	11/23/19 01:10	12/14/19 11:49	1

Client Sample ID: F-SU2-B12-S001

Lab Sample ID: 160-36450-17
Matrix: Solid

Date Collected: 11/20/19 09:56
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.191		0.0930	0.0626	0.331	0.0348	pCi/g	11/25/19 07:57	12/13/19 07:17	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	73.3		40 - 110	11/25/19 07:57	12/13/19 07:17	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.00638	U	0.0486	0.0486	1.00	0.0301	pCi/g	11/26/19 13:20	12/09/19 22:14	1
Plutonium-239/240	-0.00852	U	0.0209	0.0209	1.00	0.0222	pCi/g	11/26/19 13:20	12/09/19 22:14	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	80.5		30 - 110	11/26/19 13:20	12/09/19 22:14	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.0969	U	0.367	0.367		0.186	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Actinium-227	-0.401	U	0.724	0.728		0.456	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Bismuth-212	0.030	U	0.813	0.813		0.769	pCi/g	11/23/19 01:10	12/14/19 10:25	1

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Client Sample ID: F-SU2-B12-S001

Lab Sample ID: 160-36450-17
Matrix: Solid

Date Collected: 11/20/19 09:56
Date Received: 11/21/19 09:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	0.450		0.172	0.176		0.0727	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Cesium-137	-0.0319	U	0.0812	0.0812	0.0700	0.0635	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Lead-210	1.22	J-P1	1.72	1.72		1.10	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Lead-212	0.332		0.110	0.118		0.0646	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Lead-214	0.511		0.137	0.147		0.0862	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Potassium-40	7.51		1.57	1.76		0.303	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Protactinium-231	0.000	U	0.642	0.642		2.39	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Radium-226	0.460		0.172	0.176	0.600	0.0727	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Radium-228	0.0000	U	0.367	0.367		0.199	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Thallium-208	0.160		0.0609	0.0631		0.0193	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Thorium-228	0.332		0.110	0.118		0.0646	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Thorium-232	0.0969	U	0.367	0.367		0.199	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Thorium-234	0.736		0.654	0.659		0.421	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Uranium-235	-0.0474	U	0.353	0.353		0.335	pCi/g	11/23/19 01:10	12/14/19 10:25	1
Uranium-238	0.736		0.654	0.659		0.421	pCi/g	11/23/19 01:10	12/14/19 10:25	1

Client Sample ID: F-SU2-B16-S001

Lab Sample ID: 160-36450-18
Matrix: Solid

Date Collected: 11/20/19 09:43
Date Received: 11/21/19 09:00

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0768	J-P1	0.0767	0.0769	0.331	0.0565	pCi/g	11/25/19 07:57	12/13/19 07:17	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	85.1		40 - 110	11/25/19 07:57	12/13/19 07:17	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0117	U	0.0380	0.0380	1.00	0.0369	pCi/g	11/25/19 13:20	12/09/19 22:14	1
Plutonium-239/240	-0.00784	U	0.00784	0.00788	1.00	0.0144	pCi/g	11/25/19 13:20	12/09/19 22:14	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (7)	84.8		30 - 110	11/25/19 13:20	12/09/19 22:14	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.256	J-P1	0.327	0.328		0.203	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Actinium-227	-0.0132	U	0.806	0.806		0.801	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Bismuth-212	0.482	U	1.06	1.06		0.798	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Bismuth-214	0.410		0.222	0.226		0.118	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Cesium-137	0.226		0.0920	0.0949	0.0700	0.0356	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Lead-210	1.67		1.76	1.77		1.06	pCi/g	11/23/19 01:10	12/16/19 06:24	1

Client Sample Results

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Lab Sample ID: 160-36450-18
Matrix: Solid

Client Sample ID: F-SU2-B16-S001
Date Collected: 11/20/19 09:43
Date Received: 11/21/19 09:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Lead-212	0.347		0.112	0.120		0.0621	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Lead-214	0.415		0.163	0.168		0.0929	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Potassium-40	7.38		1.69	2.04		0.437	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Protactinium-231	0.652	U	2.36	2.36		2.94	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Radium-226	0.419		0.222	0.226	0.500	0.118	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Radium-228	0.256	J-P1	0.327	0.328		0.203	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Thallium-208	0.162		0.0604	0.0621		0.0370	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Thorium-228	0.347		0.112	0.120		0.0621	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Thorium-232	0.256	J-P1	0.327	0.328		0.203	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Thorium-234	0.699	J-P1	0.705	0.710		0.466	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Uranium-235	-0.159	U	0.458	0.459		0.366	pCi/g	11/23/19 01:10	12/16/19 06:24	1
Uranium-238	0.699	J-P1	0.705	0.710		0.465	pCi/g	11/23/19 01:10	12/16/19 06:24	1

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Tracer/Carrier Summary

Job ID: 160-36450-2

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501006

Method: 905.0 - Total Beta Strontium (GFPC)

Prep Type: Total/NA

Matrix: Solid

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Sr Carrier (40-110)
160-36450-1	F-SU1-B01-S001	70.8
160-36450-1 DU	F-SU1-B01-S001	69.0
160-36450-2	F-SU1-B02-S001	67.4
160-36450-3	F-SU1-B06-S001	72.9
160-36450-4	F-SU1-B07-S001	72.4
160-36450-5	F-SU1-B11-S001	79.6
160-36450-6	F-SU1-B12-S001	75.7
160-36450-7	F-SU1-B15-S001	69.6
160-36450-8	F-SU1-B16-S001	79.4
160-36450-9	F-SU1-B17-S001	78.3
160-36450-10	F-SU1-B24-S001	61.4
160-36450-11	F-SU1-B30-S001	77.4
160-36450-12	F-SU1-B33-S001	76.0
160-36450-13	F-SU1-B36-S001	84.0
160-36450-14	F-SU2-B04-S001	70.8
160-36450-15	F-SU2-B07-S001	83.6
160-36450-16	F-SU2-B09-S001	61.1
160-36450-17	F-SU2-B12-S001	73.3
160-36450-18	F-SU2-B16-S001	85.1
LCS 160-451828/1-A	Lab Control Sample	86.5
MB 160-451828/21-A	Method Blank	103

Tracer/Carrier Legend
Sr Carrier = Sr Carrier

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Prep Type: Total/NA

Matrix: Solid

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)
160-36450-1	F-SU1-B01-S001	88.1
160-36450-1 DU	F-SU1-B01-S001	79.2
160-36450-2	F-SU1-B02-S001	96.9
160-36450-3	F-SU1-B06-S001	94.3
160-36450-4	F-SU1-B07-S001	84.3
160-36450-5	F-SU1-B11-S001	81.2
160-36450-6	F-SU1-B12-S001	84.4
160-36450-7	F-SU1-B15-S001	76.4
160-36450-8	F-SU1-B16-S001	83.7
160-36450-9	F-SU1-B17-S001	79.6
160-36450-10	F-SU1-B24-S001	85.1
160-36450-11	F-SU1-B30-S001	91.0
160-36450-12	F-SU1-B33-S001	98.1
160-36450-13	F-SU1-B36-S001	84.5
160-36450-14	F-SU2-B04-S001	94.5
160-36450-15	F-SU2-B07-S001	107
160-36450-16	F-SU2-B09-S001	106
160-36450-17	F-SU2-B12-S001	90.5
160-36450-18	F-SU2-B16-S001	84.6

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS - Parcel F 501008

Job ID: 160-36450-2

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry) (Continued)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits) Pu-242 (T) (30-110)
LCS 160-451891/2-A	Lab Control Sample	91.6
MB 160-451891/1-A	Method Blank	89.7

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

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COVER LETTER

September 30, 2020
(revision to the April 18, 2020)
Ref; Eurofins (Test America) SDG 160-37582 (04/08/2020)

Audrey Engle
APTIM
Hunters Point Naval Shipyard
200 Fisher Avenue
San Francisco, CA. 94124

Dear Mrs. Engle:

Enclosed is the data validation report for the Hunters Point Radiological Work Task, Remedial Action, and Maintenance of Remedies at Hunters Point Naval Shipyard, San Francisco, PA, project number 501008. This DVR encompasses the laboratory data produced by Eurofins (formerly TestAmerica Laboratories, Inc.) Table 1-1 describes the samples and analysis listed in this DVR.

The specific sample identifications are listed in the sample identification table(s). The data packages were reviewed per the data validation procedures referenced in the introduction of the report.

Sincerely,

Larry Duty
Data Validation Project Manager

1.0 INTRODUCTION

This Data Validation Report (DVR) contains the results of the validation conducted for samples collected and analyzed as part of the Hunters Point Naval Station Radiological work task, remedial action, and maintenance of remedies. The project was conducted per contract number N62473-17-D-006/N62473-17-F-4550 under EMAC III TO 13 for the Base Realignment and Closure Program Management Office, West Naval Facilities Engineering Command, 1455 Frazee Road, #600, San Diego CA. 92108. This DVR was subcontracted to E-Lab Consultants from Aptim (former Chicago, Bridge, and Iron) to serve third party data assessment purposes and evaluates the laboratory data contained in Sample Delivery Groups (SDGs) list in **Table 1-1** produced by Eurofins (formerly TestAmerica Laboratories, Inc).

These samples were analyzed in accordance with the approved *United States Department of Defense* (DOD) *Quality Systems Manual (QSM) for Environmental Laboratories Version 5.3, 2019* and the analytical methods specified for the analytes requested on the Chain of Custody (COC) documentation. **Table 1-1** provides a list of the samples collected, a laboratory sample number cross-reference, sample matrix, date collected, sample purpose, and analytical methods performed for each sample pertaining to this DVR. This DVR is conducted per the analysis requested on the COC in accordance with the; Final Revision 2 Radiological Scoping Surveys Work Plan, Parcel F Structures May, 2019.(RSSWP), *American National Standard Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation (ANSI/ANS-41.5-2012), Radionuclide Data Quality Evaluation Guidance 9284, Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Organic (NFGO) Data Review (August 2014), NFG for Inorganic (NFGIO) Data Review (August 2014),* and the method specified for the analysis.

The data were evaluated against the quantitative acceptance limits given in the DOD QSM for the data quality parameters of sensitivity, accuracy, precision, and completeness. **Appendix A** contains the Laboratory Data Report Form 1s that has been annotated with qualifiers assigned during the validation process in accordance with the project procedures manual.

In accordance with SAP, a review of the data was conducted independent of the laboratory. This review consisted of an evaluation of laboratory performance criteria

from the case narrative, and an evaluation of the sample-specific criteria included in the laboratory data packages analyzed in accordance with the DOD QSM.

The validation consists of an evaluation of the case narrative, chain of custody and associated laboratory sample receipt forms, proper sample preservations, holding times, initial calibration and continuing calibration procedures and results, laboratory control sample (LCS) (and duplicate [LCSD] if reported) accuracy and precision and matrix spike (MS) and matrix spike duplicate (MSD) sample analyses, method blanks, field blanks, and field duplicate precision.

(if required) Additional Stage 2B review included;

- Organic Analysis; internal standards, continuing calibration verification, internal standards, degradation summary, retention times, second column or second detector confirmations, retention time windows,
- Inorganic Analysis; laboratory duplicate precision, instrument tuning, initial calibration, low-level calibration check standards, initial and continuing calibration verification, initial and continuing calibration blanks, interference check sample, internal standards, serial dilution results, post digestion spike recoveries, and interelement correction factors

The results of the independent data review are presented in **Section 2.0**.

Table 1-1
Sample Field and Laboratory ID Numbers

Field ID	Sample Date	Matrix	Purpose	Lab ID	Method	Level
F-SU2-B27-S001	3/12/2020 9:25:00 AM	SC	N	160375821	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU2-B35-S001	3/12/2020 10:15:00 AM	SC	N	160375822	EPA191.1M EPA905.0M A-Spec A-01R	2B
F-SU2-B36-S001	3/12/2020 11:15:00 AM	SC	N	160375823	EPA191.1M EPA905.0M A-Spec A-01R	3/4

Following the specifications in the SAP related to the data validation process, the data were annotated with data validation qualifiers and codes on the analytical data sheets that are required qualifier flags as described in the SAP. **Table 1-2** provides definitions of the data qualifiers references, and **Table 1-3** lists and defines the data review qualifier codes.

Table 1-2
Data Qualifier References

Qualifier	Organics	Inorganics
U	The analyte was analyzed for but was not detected above the method detection limit.	The analyte was analyzed for but was not detected above the method detection limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	Not applicable.

UJ	The analyte was not detected above the method detection limit. However, the associated value is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified.	The data are unusable. The sample results are rejected due to serious deficiencies in meeting the Quality Control (QC) criteria. The analyte may or may not be present in the sample.

Table 1-3
Data Review Qualifier Codes

Reason Code	Description
A	Serial dilution outside criteria (Level IV).
B1	Method blank contaminants above reporting limit.
B2	Calibration blank contaminants above reporting limit.
B2 (Bias flag –)	Calibration blank indicates negative interference, false negatives may be present
B3	Trip blank contamination
B4	Equipment rinsate contamination.
B5	Ambient blank contamination
C	ICV or CCV % D outside control limits.
C1	Initial calibration RSD outside control limit.
C2	Initial calibration RRF outside control limit.
C3	Continuing calibration RRF outside control limit.
D1	Sample Duplicate RPD outside control limit.
D2	Matrix Duplicate RPD outside control limit
E	The sample results exceed the linear calibration range of the instrument.
F	Hydrocarbon pattern does not match hydrocarbon pattern in the standard.
H	Holding time exceeded.
I	Internal standard recovery outside control limit.

L	LCS outside control limits.
M	MS outside control limits.
M1	MS, MSD or RPD outside of control limits
O	Interference check sample outside acceptance criteria
P	Analyte qualified based on the professional judgement of the reviewer.
P1	Sample result is ≤ total uncertainty
S	Surrogate recovery outside control limit.
T	Temperature outside acceptance criteria.
Tr	Value reported detected between the DL and LOQ
W	Pesticide breakdown outside criteria (Level IV).
X	Raised reporting limit due to matrix interference or high analyte concentration.
Y	Analyte was not confirmed by a second column.
Y1	Primary and Confirmation Sample Duplicate RPD outside control limit.

2.0 DATA VALIDATION RESULTS

Laboratory Data Package Review

The samples reported, QC designations, and validation level is listed in **Table 1-1**. The data packages were reviewed in accordance with the project procedures manual.

Sample Documentation, Preservation, Handling, and Transport

All samples arrived at the laboratory on time, intact and within preservation requirements. A cross reference of the COC and analytical reports has concluded all extractions and analysis were performed within the required holding times. The validation met all QC requirements listed in the method and data validation requirements of the SAP. None of the data is qualified based on sample documentation, preservation, handing, or transport.

The data is not qualified.

2.1 Total Beta Strontium, EPA 905

2.1.1 Instrument Parameters

Verification included the review of the laboratories most recent efficiency calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Counting uncertainty was ≤ 1/5 the quantitation limits. Efficiency performance checks were verified for each use.

2.1.2 Energy Calibrations

Energy calibrations (Energy Calibration Performance Checks, ECPC) were verified to be at the frequency specified. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.1.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.1.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (<20%). Continuing calibrations were performed on a 12-hour basis. Detection goals for cesium137 were not met in all analysis due to elevated Compton background levels. Natural activity is suspect. None of the data were qualified based on continuing calibrations.

2.1.5 Blanks

Each analytical batch was represented with a method blank. The laboratory reports none of the target compounds were detected in any of the method blanks that would results in sample data qualification (e.g. sample detections were >5X the blank). None of the results are qualified based on data verifications.

2.1.6 Laboratory Control Sample Recovery (Blank Spikes)

The LCS values were validated by recalculating two compounds per LCS. None of the data are qualified based on LCS recoveries.

2.1.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD samples were not submitted for this analysis.

2.1.8 Laboratory Duplicate Recoveries

All laboratory generated duplicate recoveries are within QC limits.

2.1.9 Field QC Samples

Trip, Equipment and Field Blanks

Field blank samples were not submitted for this analysis.

2.1.10 Target Compound Identification

None of the identified target compounds were qualified based compound identification.

2.1.11 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

2.1 Radium-226 by GAMMA SPEC (21 DAY INGROWTH)

2.1.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.1.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.1.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.1.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.1.5 Blanks

Each analytical batch was represented with a method blank. The laboratory reports none of the target compounds were detected in any of the method blanks that would results in sample data qualification (e.g. sample detections were >5X the blank or MB was below the 1.65X its CSU). None of the results are qualified based on data verifications.

2.1.6 Laboratory Control Sample Recovery (Blank Spikes)

The LCS values were validated by recalculating two compounds per LCS. None of the data are qualified based on LCS recoveries.

2.1.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD samples were not submitted for this analysis.

2.1.8 Laboratory Duplicate Recoveries

All laboratory generated duplicate recoveries are within QC limits.

2.1.9 Field QC Samples

Trip, Equipment and Field Blanks

Field blank samples were not submitted for this analysis.

2.1.10 Target Compound Identification

None of the identified target compounds were qualified based compound identification.

2.1.11 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable. Insufficient sample was provided for the following sample to fill a geometry (e.g. tuna can) calibrated for Ra-226 analysis by gamma spectroscopy: F-SU2-B27-S001 (160-37582-1). The use of a different geometry could potentially bias the results low due to the loss of radon into the headspace of the container.

2.2 A-01R Plutonium

2.2.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.2.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.2.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.2.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.2.5 Blanks

Blanks The laboratory (method) blanks yielded no detectable activities, so no qualifications were applied.

2.2.6 Laboratory Control Sample Recovery (Blank Spikes)

LCS/D analyses provided adequate confirmation of accuracy and precision.

2.2.7 Matrix Spike/Matrix Spike Duplicate Recoveries

MS/MSD analyses were not performed for these analyses. No qualifications were applied. The LCS/D is used for accuracy and precision assessment.

2.2.8 Tracers

The tracers yielded fully satisfactory recoveries

2.2.9 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

2.3 GAMMA SPECTROSCOPY ANALYSES

2.3.1 Instrument Parameters

Verification included the review of the laboratories most recent voltage plateau calibration was performed at the required frequency. As required by the QAPP. The daily efficiency performance check count-rate and/or tolerance charts were verified within established limits. Operating voltages were within set parameters (<5%).

2.3.2 Efficiency Calibrations

Energy calibrations (Efficiency Calibration Performance Checks, ECPC) were verified to be <1%. Daily QC peak centroid or calculated energy performance checks were within limits. ECPC were verified to be analyzed daily.

2.3.3 Background Determination

Background control logs were verified to ensure measurement frequency was performed as required. Count-rates were within tolerance limits, counting rate was analogous to samples, and frequency requirements.

2.3.4 Continuing Calibrations

Continuing calibration average relative response factors were within the DoD QSM requirements (+- 3%). Continuing calibrations were performed on a 12-hour basis.

2.3.5 Blanks

Blanks The laboratory (method) blanks yielded no detectable activities, so no qualifications were applied.

2.3.6 Laboratory Control Sample Recovery (Blank Spikes)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

2.3.7 Duplicate Recoveries

Duplicate recoveries were within QC limits.

2.3.8 Compound Quantitation and Reporting Limits

Reporting limits were verified to be equal to the Level of Detection (LOD). The LODs have been verified to meet or exceed the project required performance standards. Sample dilutions, cleanup concentrations, and moisture correction have been applied to all reportable results. The results are reported on a dry weight basis where applicable.

3.0 CONCLUSION

Detected values that are above the DLC and below the total uncertainty are qualified estimated "J" and a reason code P-1.

The following samples were qualified based on this validation.

sample	Lab ID	Ana Meth	chemical name	Result	Error	LQ	VQ	RC
F-SU2-B27-S001	160375821	905	Total Beta Strontium	0.0722	0.0829		J	P1

sample	Lab ID	Ana Meth	chemical name	Result	Error	LQ	VQ	RC
F-SU2-B27-S001	160375821	GAMMA	Uranium-238	0.552	0.606		J	P1
F-SU2-B27-S001	160375821	GAMMA	Lead 210	0.692	1.05		J	P1
F-SU2-B27-S001	160375821	GAMMA	Thorium-234	0.552	0.606		J	P1
F-SU2-B36-S001	160375823	GAMMA	Lead 210	1.46	1.81		J	P1
F-SU2-B36-S001	160375823	GAMMA	Actinium-228	0.203	0.265		J	P1
F-SU2-B36-S001	160375823	GAMMA	Radium 228	0.203	0.265		J	P1
F-SU2-B36-S001	160375823	GAMMA	Thorium-232	0.203	0.265		J	P1

Acronyms and Abbreviations

Following is a list of acronyms and abbreviations that may be used in data validation reports and/or data quality assessment reports.

%D	percent difference	DFTPP	decafluorotriphenylphosphine
%R	percent recovery	DOD	Department Of Defense
µg/L	microgram per liter	DQAR	data quality assessment report
mg/L	milligram per liter		
pg/L	picogram per liter	DUP	laboratory duplicate
µg/kg	microgram per kilogram	DVP	data validation procedure
mg/kg	milligram per kilogram	EDB	ethylene dibromide
ng/kg	nanogram per kilogram	EDL	estimated detection limit
pg/g	picogram per gram	EICP	extracted ion current profile
AA	atomic absorption	EPA	Environmental Protection Agency, United States
ARRF	average relative response factor	EB	equipment blank
BFB	bromofluorobenzene	FB	field blank
BNA	base/neutral/acid compounds	GC	gas chromatography
CCB	continuing calibration blank	GC/ECD	gas chromatography/electron capture detector
CCC	calibration check compound	GC/ELCD	gas chromatography/electrolytic conductivity detector (Hall detector)
CCV	continuing calibration verification	GC/FPD	gas chromatography/flame photometric detector
CF	calibration factor	GC/MS	gas chromatography/mass spectrometry
CLP	Contract Laboratory Program	GC/PID	gas chromatography/photoionization detector
COC	chain of custody record	GFAA	graphite furnace atomic

			absorption
COD	chemical oxygen demand	GPC	gel permeation chromatography
CTO	contract task order	Hg	mercury
CVAA	cold vapor atomic absorption	HPLC	high-performance liquid chromatography
DBCP	dibromochloropropane	HRGC/HRMS	high resolution gas chromatography/high resolution mass spectrometry
DCB	decachlorobiphenyl	RF r2	response factor coefficient of determination
4,4'-DDD	4,4'-dichlorodiphenyldichloroethane	RICRF	reconstructed ion chromatogram response factor
4,4'-DDE	4,4'-dichlorodiphenyldichloroethylene	RLRIC	reporting limit reconstructed ion chromatogram
4,4'-DDT	4,4'-dichlorodiphenyltrichloroethane	RPDRL	relative percent difference reporting limit
ICV	initial calibration verification	RRFRPD	relative response factor relative percent difference
IDL	instrument detection limit	RRTRRF	relative retention time relative response factor
IR	infrared spectroscopy	RSDRRT	relative standard deviation relative retention time
IRP	installation restoration program	RTRSD	retention time relative standard deviation
IS	internal standards	RT	retention time
LCS	laboratory control sample	HT	holding time
MBAS	methyl blue active substance	ICB	initial calibration blank
MDL	method detection limit	ICP	inductively coupled plasma
MS	matrix spike	ICS	interference check sample
MSA	method of standard addition	SDG	sample delivery group

MSD	matrix spike duplicate	SICP	selected ion current profiles
m/z	mass to charge ratio	s/n	signal to noise ratio
NFESC	Naval Facilities Engineering Services Center	SOP	standard operating procedure
OP	organophosphorus	SOW	statement of work
PAH	polynuclear aromatic hydrocarbon	SPCC	system performance check compound
PARCC	precision, accuracy, representativeness, comparability, completeness	SRM	standard reference material
PCB	polychlorinated biphenyl	SVOC	semivolatile organic compound
PCDD	polychlorinated dibenzodioxin	TB	trip blank
PCDF	polychlorinated dibenzofuran	TCDD	tetrachlorodibenzodioxin
PE	performance evaluation	TCX	tetrachloro-m-xylene
PEM	performance evaluation mixture	TDS	total dissolved solids
PFK	perfluorokerosene	TIC	tentatively identified compound
PQO	project quality objective	TOC	total organic carbon
QAPFK	quality assurance perfluorokerosene	TOX	total organic halides
QACQA	quality assurance coordinator quality assurance	TPHE	total petroleum hydrocarbons as extractables
QAPPQAC	quality assurance project plan quality assurance coordinator	UV/VIS	ultraviolet/visible
QCQAPP	quality control quality assurance project plan	VOA	volatile organic analysis
QSM QC	quality system manual quality control	VOC	volatile organic compound
rQSM	correlation coefficient quality system manual	VTSR	validated time of sample receipt

r2r	coefficient of determination correlation coefficient	WDM	window defining mixture

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F- 501008

Job ID: 160-37582-2

Client Sample ID: F-SU2-B27-S001

Lab Sample ID: 160-37582-1
Matrix: Solid

Date Collected: 03/12/20 09:25
Date Received: 03/13/20 09:03

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0722	J-P1	0.0827	0.0829	0.331	0.0624	pCi/g	03/18/20 13:00	04/06/20 06:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*71.3*		*40 - 110*	*03/18/20 13:00*	*04/06/20 06:53*	*1*

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.00793	U	0.0389	0.0389	1.00	0.0292	pCi/g	03/29/20 18:22	04/07/20 13:32	1
Plutonium-239/240	-0.0179	U	0.0119	0.0120	1.00	0.0219	pCi/g	03/29/20 18:22	04/07/20 13:32	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*89.9*		*30 - 110*	*03/29/20 18:22*	*04/07/20 13:32*	*1*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.267		0.245	0.247		0.126	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Actinium-227	0.0485	U	0.541	0.541		0.335	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Bismuth-212	-0.0291	U	0.828	0.828		0.680	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Bismuth-214	0.501		0.149	0.160		0.0639	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Cesium-137	-0.0467	U	0.0879	0.0881	0.0700	0.0616	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Lead-210	0.692	J-P1	1.05	1.05		0.672	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Lead-212	0.328		0.0875	0.0956		0.0510	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Lead-214	0.508		0.147	0.158		0.0623	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Potassium-40	6.97		1.26	1.49		0.367	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Protactinium-231	-0.486	U	2.94	2.95		2.41	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Radium-226	0.501		0.149	0.160	0.500	0.0639	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Radium-228	0.267		0.245	0.247		0.126	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Thallium-208	0.127		0.0633	0.0650		0.0326	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Thorium-228	0.328		0.0875	0.0956		0.0510	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Thorium-232	0.267		0.245	0.247		0.126	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Thorium-234	0.552	J-P1	0.602	0.606		0.411	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Uranium-235	0.0978	U	0.241	0.241		0.427	pCi/g	03/17/20 08:06	04/07/20 03:11	1
Uranium-238	0.552	J-P1	0.602	0.606		0.411	pCi/g	03/17/20 08:06	04/07/20 03:11	1

Client Sample ID: F-SU2-B35-S001

Lab Sample ID: 160-37582-2
Matrix: Solid

Date Collected: 03/12/20 10:15
Date Received: 03/13/20 09:03

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.112		0.0794	0.0798	0.331	0.0561	pCi/g	03/18/20 13:00	04/06/20 06:53	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F- 501008

Job ID: 160-37582-2

Client Sample ID: F-SU2-B35-S001

Lab Sample ID: 160-37582-2
Matrix: Solid

Date Collected: 03/12/20 10:15
Date Received: 03/13/20 09:03

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	72.6		40 - 110	03/18/20 13:00	04/06/20 06:53	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0107	U	0.0394	0.0394	1.00	0.0360	pCi/g	03/29/20 18:22	04/07/20 13:32	1
Plutonium-239/240	0.000	U	0.0191	0.0191	1.00	0.0157	pCi/g	03/29/20 18:22	04/07/20 13:32	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	83.3		30 - 110	03/29/20 18:22	04/07/20 13:32	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.178	U	0.146	0.147		0.192	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Actinium-227	0.0631	U	0.618	0.618		0.381	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Bismuth-212	-0.590	U	0.986	0.988		0.751	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Bismuth-214	0.525		0.145	0.155		0.0406	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Cesium-137	0.00696	U	0.0566	0.0566	0.0700	0.0453	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Lead-210	0.396	U	1.09	1.09		0.779	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Lead-212	0.325		0.0950	0.0948		0.0348	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Lead-214	0.549		0.147	0.158		0.0509	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Potassium-40	8.02		1.97	2.14		0.675	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Protactinium-231	-0.945	U	3.03	3.03		2.46	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Radium-226	0.525		0.145	0.155	0.500	0.0406	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Radium-228	0.178	U	0.146	0.147		0.192	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Thallium-208	0.132		0.0786	0.0798		0.0377	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Thorium-228	0.325		0.0950	0.0948		0.0348	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Thorium-232	0.178	U	0.146	0.147		0.192	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Thorium-234	-0.447	U	0.530	0.532		0.830	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Uranium-235	0.000	U	0.187	0.187		0.294	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Uranium-238	-0.447	U	0.530	0.532		0.830	pCi/g	03/17/20 08:06	04/07/20 03:16	1

Client Sample ID: F-SU2-B36-S001

Lab Sample ID: 160-37582-3
Matrix: Solid

Date Collected: 03/12/20 11:15
Date Received: 03/13/20 09:03

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0525	U	0.117	0.117	0.331	0.0919	pCi/g	03/18/20 13:00	04/06/20 06:53	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	43.9		40 - 110	03/18/20 13:00	04/06/20 06:53	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Parcel F- 501008

Job ID: 160-37582-2

Client Sample ID: F-SU2-B36-S001

Date Collected: 03/12/20 11:15
Date Received: 03/13/20 09:03

Lab Sample ID: 160-37582-3
Matrix: Solid

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0215	U U	0.0443	0.0444	1.00	0.0296	pCi/g	03/29/20 18:22	04/07/20 13:32	1
Plutonium-239/240	-0.00586	U	0.00676	0.00678	1.00	0.0124	pCi/g	03/29/20 18:22	04/07/20 13:32	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*86.1*		*30 - 110*	*03/29/20 18:22*	*04/07/20 13:32*	*1*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	0.203	J-P1	0.265	0.265		0.152	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Actinium-227	-0.302	U U	0.643	0.644		0.387	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Bismuth-212	0.274	U	0.792	0.792		0.619	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Bismuth-214	0.428		0.134	0.141		0.0497	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Cesium-137	0.0291	U U	0.0621	0.0622	0.0700	0.0475	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Lead-210	1.46	J-P1	1.80	1.81		1.12	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Lead-212	0.320		0.0820	0.0886		0.0385	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Lead-214	0.467		0.109	0.119		0.0360	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Potassium-40	7.72		1.52	1.71		0.264	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Protactinium-231	-0.749	U U	2.75	2.75		2.24	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Radium-226	0.428		0.134	0.141	0.500	0.0497	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Radium-228	0.203	J-P1	0.265	0.265		0.152	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Thallium-208	0.0813		0.0804	0.0808		0.0369	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Thorium-228	0.320		0.0820	0.0886		0.0385	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Thorium-232	0.203	J-P1	0.265	0.265		0.152	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Thorium-234	-0.585	U U	0.548	0.552		0.768	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Uranium-235	0.0220	U	0.201	0.201		0.284	pCi/g	03/17/20 08:06	04/07/20 03:16	1
Uranium-238	-0.585	U	0.548	0.552		0.768	pCi/g	03/17/20 08:06	04/07/20 03:16	1

APPENDIX J
ANALYTICAL LABORATORY DATA PACKAGES
(NO CHANGES FROM DRAFT REPORT)

Deleted: DCN: APTM-0006-4550-0099

DCN: APTM-0006-4550-0099