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FINAL TASK SPECIFIC PLAN FOR THE INSTALLATION RESTORATION SITES 1 AND 3
HAZARDOUS WASTE BURIAL AREA SCOPING SURVEY NAS BRUNSWICK ME
10/01/2014
TETRA TECH EC INC

**DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62470-13-D-8007
CONTRACT TASK ORDER NO. WE09**

**FINAL
TASK-SPECIFIC PLAN FOR THE INSTALLATION RESTORATION SITES 1 AND 3
HAZARDOUS WASTE BURIAL AREA SCOPING SURVEY
FORMER NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE**

October 2014

Prepared for



Department of the Navy
Naval Facilities Engineering Command, Mid-Atlantic
9742 Maryland Avenue, Building Z-14
Norfolk, VA 23511-3095

and

Base Realignment and Closure
Program Management Office, Northeast
4911 South Broad Street
Philadelphia, PA 19112-1303

Prepared by

Tetra Tech EC, Inc.
5250 Challedon Drive
Virginia Beach, VA 23462

<u>Revision</u>	<u>Date</u>	<u>Reviewed by</u>	<u>Approved by</u>	<u>Pages Affected</u>
	10/09/14	N. Smith	E. Abkemeier	All

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ACRONYMS AND ABBREVIATIONS

$\mu\text{R/hr}$	microroentgens per hour
σ	sigma
Co-60	Cobalt-60
Cs-137	Cesium-137
DFW	Definable Features of Work
H-3	Tritium
IR	Installation Restoration
LLRW	low-level radioactive waste
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NASB	Naval Air Station Brunswick
NaI	sodium iodide
Navy	United States Department of the Navy
NORM	Naturally Occurring Radioactive Material
Ra-226	Radium-226
RASO	Radiological Affairs Support Office
RCRA	Resource Conservation and Recovery Act
ROC	radionuclide of concern
RSOR	Radiation Safety Officer Representative
SOP	Standard Operating Procedure
Sr-90	Strontium-90
SU	Survey Unit
Th-232	Thorium-232
TtEC	Tetra Tech EC, Inc.
TSP	Task-Specific Plan
U-238	Uranium-238

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1.0 INTRODUCTION

Tetra Tech EC, Inc. (TtEC) has prepared this Task-Specific Plan (TSP) for the Installation Restoration (IR) Sites 1 and 3 Hazardous Waste Burial Area Scoping Survey located at the former Naval Air Station Brunswick (NASB), Brunswick, Maine for the United States Department of the Navy (Navy), Naval Facilities Engineering Command, Atlantic under a Removal Action Contract, N62470-13-D-8007, Contract Task Order WE09. The survey will be conducted in accordance with the general approach and methodologies provided in the Basewide Radiological Management Plan (TtEC, 2014a) and Standard Operating Procedures (SOPs) provided in Attachment 3 to the Basewide Radiological Management Plan. The surveys will conform to the requirements of the Accident Prevention Plan/Site Safety and Health Plan (TtEC, 2013) and the Radiation Protection Plan, Attachment 2 to the Basewide Radiological Management Plan, prepared for the survey program.

This survey is being performed as a scoping survey to determine whether residual radioactivity is present on the surface prior to expanding the Sites 1 and 3 Resource Conservation and Recovery Act (RCRA)-compliant multilayer cap to accommodate cadmium impacted soil removed from IR Site 7 and institutional controls at IR Sites 1 and 3. The placement of the cadmium impacted soil in the IR Sites 1 and 3 landfill is part of the remedy for addressing the source of cadmium leaching to the groundwater at IR Site 7. The existing cap will be expanded by approximately 0.6 acre and approximately 1,142 cubic yards of IR Site 7 soil will be placed under the cap. The survey of this area has been designed as a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) NUREG-1575 survey (DoD et.al, 2000).

1.1 Site Description and Historical Summary

IR Site 1 (Orion Street Landfill North) and IR Site 3 (Hazardous Waste Burial Area) are co-located in the central portion of NASB. IR Sites 1 and 3 are located immediately north of Building 642 and are approximately 10 acres in size and contain an estimated 300,000 cubic yards of waste. IR Site 1 is an inactive landfill that operated two 20-foot-deep unlined trenches between 1955 and 1975. IR Site 3, located in the southwest portion of IR Site 1, operated between 1960 and 1973 with a historical use similar to IR Site 1. Domestic waste and hazardous materials (such as aircraft parts and construction debris as well as asbestos-containing materials) were disposed of in these sites. The landfill also was used for disposal of waste oil, solvents, pesticides, herbicides, petroleum products, paints, and other various chemicals. These landfills were used as the NASB's primary landfills (NAVSEA, 2014).

In 1995, a 12-acre RCRA multilayer cap was placed over the landfill waste and groundwater treatment/recovery systems were installed (Tetra Tech, Inc., 2012). Waste materials (demolition debris and rubble) from IR Sites 5, 6, and 8 were transferred to this site for use as sub-grade material for the low-permeability cap (NAVSEA, 2014). A soil bentonite slurry wall, placed to divert clean groundwater flow around the landfill, was keyed into an underlying marine clay unit along the western, northern, and eastern perimeter of the landfill footprint (ECC, 2008). The cap was extended over the slurry wall to prevent infiltration within the slurry wall limits. The southern portion (less than 0.3 acres) of IR Site 1 is located within the former Weapons Area

Compound and was not included in the cover system due to base security restrictions that were in effect prior to the 2010 base closure. Investigation activities performed in the fall/winter of 2011/2012 indicate that the waste materials are present from near ground surface to 16 feet below ground surface (Tetra Tech, Inc., 2012). The location of IR Sites 1 and 3 within NASB is shown on Figure A-1

As aircraft parts were known to have been disposed of in the IR Site 1 landfill, but it is unknown exactly what types of other debris were disposed of at this site and at IR Site 3 landfill, it is possible that radiologically contaminated debris, radioluminescent devices, and electronics containing radioisotopes could have been disposed at this site. Further, radioactive material was historically handled by hazardous waste groups and it is possible that radiologically impacted items were mixed with hazardous waste for disposal in this area. No debris or soils have been removed from this site and no radiological characterization has been performed, so there is the potential at this site for disposal of any radionuclides that were utilized at NASB. As such, IR Sites 1 and 3 are considered a potential for radiological impact (NAVSEA, 2014). Per the Historical Radiological Assessment, the radionuclides of concern (ROCs) for Sites 1 and 3 are Cobalt-60 (Co-60), Cesium-137 (Cs-137), Radium-226 (Ra-226), Strontium-90 (Sr-90), Thorium-232 (Th-232), Tritium (H-3), and Uranium-238 (U-238) (NAVSEA, 2014).

2.0 SURVEY DESCRIPTION

Prior to the performance of the scoping survey, TtEC will mark the boundaries of the RCRA cap as well as the approximate uncapped 0.6 acre waste area along the southern edge of the landfill where the IR Site 7 soil will be placed and the cap extended to cover both the waste and soil. Geophysical surveys of the marked area will be conducted. However, prior to the geophysical survey activities, the ground surface of the marked area will undergo a 100 percent health and safety gamma walkover survey in accordance with SOP 001, Radiation and Contamination Surveys using a Ludlum Model 19 (or equivalent) survey meter to ensure no areas exceeding 50 microrentgens per hour ($\mu\text{R/hr}$) exist. If any area exceeds 50 $\mu\text{R/hr}$, the area will be posted as a Radiologically Controlled Area, the Navy will be notified, survey activities will cease, and the site will be re-classified as a Class 1 area. A plan of action, approved by the Navy, addressing remediation of radioactively contaminated soil and items with Class 1 surveys will be developed and approved by the Navy prior to recommencing radiological survey activities. Any areas with more elevated readings will be posted in accordance with SOP 012, Radiologically Controlled Areas and Posting Control.

Upon completion of the health and safety survey confirming that no areas exceed 50 $\mu\text{R/hr}$, surface vegetation removal and clearing will be performed as required to allow performance of the scoping survey. Surface vegetation removal and clearing activities will be performed in a manner that does not disturb the ground surface. Following the clearing activities, a geophysical survey will be performed in the capped and uncapped areas.

Each of the capped and uncapped areas will be surveyed as Class 3 areas using a Navy Radiological Affairs Support Office (RASO) approved towed array system and/or Ludlum Model 2350-1 survey meter equipped with a Ludlum Model 44-10 2-inch by 2-inch sodium

iodide (NaI) detector (or equivalent) to identify areas in which discrete radioactive materials or soils that exhibit elevated gamma readings may be located. The investigation level for each survey unit will be the mean plus 3 sigma (σ) where σ is the standard deviation of the gamma readings of each area. However, as a starting point, areas will be marked (e.g., with flags) based on the mean of the reference area plus 3σ value. After the gamma scans have been completed, the mean of each of the survey unit plus 3σ investigation value will be determined. Marked areas will be reassessed based on this value. At each sample location, a static measurement will be collected. Static measurements will be collected using a Ludlum Model 2350-1 survey meter equipped with a Ludlum Model 44-10 2-inch by 2-inch NaI detector (or equivalent). If the static reading exceeds the investigation level, the onsite Radiation Safety Officer Representative (RSOR) will determine, based on professional judgment, whether further investigation is warranted. If site conditions (i.e., presence of material containing elevated concentrations of Naturally Occurring Radioactive Material [NORM]) are ruled out as the likely source of the elevated gamma readings, the location, if present on a soil surface, will be excavated by hand to a maximum depth of one foot to determine whether a discrete item or significant radiological contamination in a concentrated area may be the cause of the comparatively elevated gamma reading. If a discrete item and/or soils that exhibit elevated gamma readings are present, the items and a minimum of one foot of soil on either side and below the discrete items and/or soils that exhibit elevated gamma readings will be removed as described in a specific Radiation Work Permit. The discrete item and/or soils that exhibit elevated gamma readings will be placed in an appropriate low-level radioactive waste (LLRW) container for subsequent transfer to the Navy's LLRW disposal contractor. Post-remediation soil samples will be collected from the excavation sidewalls and bottom and of the removed soil if a discrete item is discovered. If the elevated gamma readings are on the concrete foundation of the former building shown in Figure A-2 (e.g., a one square foot area with a gamma reading 2 times higher than any other area on the foundation), then the affected portion of the concrete foundation would be removed and further survey and sampling would be required beneath the concrete foundation (see Section 3.2). The impacted portion of the concrete foundation would be placed in an appropriate LLRW container for subsequent transfer to the Navy's LLRW disposal contractor.

3.0 SCOPING SURVEY DESCRIPTION

The Scoping Survey is being performed to assess whether residual activity (if present in the surface soil) is below the project comparison criteria defined in Table 2-1. The Scoping Survey will be sufficient to identify ROC activity concentrations exceeding the project comparison criteria and/or discrete items in the top six inches of soil or immediately beneath the concrete foundation, so that the areas may be remediated prior to implementation of the IR Site 7 groundwater remedy, extension of the RCRA cap over the IR Site 7 soils, and institutional controls at IR Sites 1 and 3.

One hundred percent of the ground surface of the capped Class 3 soil survey unit (SU 1) and the uncapped Class 3 area (SU 2) will be scanned using a Ludlum Model 2350-1 survey meter with a Ludlum Model 44-10 2-inch by 2-inch NaI detector. Alternatively, a RASO-approved drive-over-array system may be used as a replacement for the Ludlum Model 44-10 detector. Additional measurements and samples will be collected if investigation levels or project

comparison criteria are exceeded and identified during the review of data as determined by the RSOR. During the Class 3 soil survey activities, a minimum of 20 gamma static measurements and soil samples will be collected from each survey unit. The location of the Class 3 survey units within IR Sites 1 and 3 are provided on Figure A-2. In the event one or more static measurements are required on the concrete foundation, the concrete above the soil will be removed, and a soil sample will be collected from the soil beneath the pad.

3.1 Project Comparison Criteria

This survey is being performed as a scoping survey to determine whether residual radioactivity is present on the surface prior to implementing the IR Site 7 groundwater remedy, extension of the RCRA cap over the IR Site 7 soils, and institutional controls at IR Sites 1 and 3. For this purpose, survey results will be compared to the established criteria for soil and concrete surfaces, as defined in Table 2-1.

3.2 Reference Area

Prior to performing the survey activities, a background reference area will be established for the IR Sites 1 and 3 survey activities. A non-radiologically impacted soil and concrete background reference area with similar physical, chemical, geological, radiological, and biological characteristics as the IR Sites 1 and 3 soils and concrete foundation will be selected. For debris that is encountered, material-specific background reference areas will be established. Reference areas will be chosen by the RSOR, in consultation with the Navy and appropriate regulatory agencies. A minimum of twenty soil samples will be collected and analyzed for the ROC by a Department of Defense Environmental Laboratory Accreditation Program approved laboratory.

3.3 Investigation Level

For gamma surveys, the investigation level will be established at the survey unit mean plus 3σ , where σ is the standard deviation of the gamma readings in the survey unit. However, as a starting point, areas will be marked (e.g., with flags) based on the mean of the reference area plus 3σ value. After the gamma scans have been completed, the mean of each of the survey units plus 3σ investigation value will be determined. Marked areas will be reassessed based on this value. At each sample location, a static measurement will be collected. Static measurements will be collected using a Ludlum Model 2350-1 survey meter equipped with a Ludlum Model 44-10 2-inch by 2-inch NaI detector (or equivalent) and a Ludlum Model 19 (or equivalent). If the static reading exceeds the investigation level, the onsite RSOR will determine, based on the field conditions, whether further investigation is warranted. If site conditions (i.e., presence of material containing elevated concentrations of NORM) are ruled out as the likely source of the elevated gamma readings, the location, if soil, will be excavated by hand to a maximum depth of one foot to determine whether a discrete item or significant radiological contamination in a concentrated area may be the cause of the comparatively elevated gamma reading. If a discrete item or items and/or soil that exhibit elevated gamma readings are present, the items and a minimum of one foot of soil on either side and below the discrete items and/or soils that exhibit elevated gamma readings will be removed as described in a specific Radiation Work Permit. The discrete item and/or soils that exhibit elevated gamma readings will be placed in an appropriate

LLRW container for subsequent transfer to the Navy's LLRW disposal contractor. Post-remediation soil samples will be collected from the excavation sidewalls and bottom and of the removed soil if a discrete item is discovered. The excavated soil will be placed on plastic, spread out in a maximum 12-inch lift, resurveyed, and a biased soil sample will be collected from the area with the most elevated gamma readings. Any items removed from the soil will be surveyed in accordance with SOP 003, Release of Materials and Equipment from Radiologically Controlled Areas and analyzed in accordance with SOP 015, Use Of The Berkeley Nucleonics Corporation SAM-940-3G Radioisotope Identifier or an equivalent radioisotopic identifier. If no discrete item is located in an area exceeding the investigation level, a soil sample will be collected from the area with the most elevated gamma readings. The excavated ground surface will be resurveyed to confirm the remaining soil meets the investigation level. Survey area preparation activities will be performed under radiological controls established in the SOPs provided in the Basewide Radiological Management Plan (TtEC, 2014a). If the elevated gamma readings are on the concrete foundation of the former building shown in Figure A-2 (e.g., a one square foot area with a gamma reading 2 times higher than any other area on the foundation), then the affected portion of the concrete foundation would be removed and further survey and sampling would be required beneath the concrete foundation. Similar to the soil, the impacted portion of the concrete foundation would be placed in an appropriate LLRW container for subsequent transfer to the Navy's LLRW disposal contractor. In the event any discrete item exceeds any project comparison criteria, the survey operations will cease and the IR Sites 1 and 3 areas will be re-classified as a Class 1 area. A plan of action addressing remediation of radioactively contaminated soils and items will be developed and approved by Navy prior to recommencing survey operations.

3.4 Gamma Scans

The surface areas will be scanned with a RASO-approved drive-over array system or using a Ludlum Model 2350-1 survey meter coupled to a Ludlum 44-10 2-inch by 2-inch NaI detector at a speed not to exceed 0.5 meters per second and will be operated in accordance with the Basewide Radiological Management Plan (TtEC, 2014a). Gamma scans of the surface areas of the site will be logged and submitted with the final report.

3.5 Exposure/Dose Rate Measurements

Prior to conducting any MARSSIM based surveys, a general area gamma exposure/dose rate survey will be conducted in accordance with SOP 001, Radiation and Contamination Surveys for safety and radiological posting purposes, as well as to identify any areas with comparatively elevated gamma exposure rates. If any area exceeds 50 $\mu\text{R/hr}$, the area will be posted as a Radiologically Controlled Area, the Navy will be notified, survey activities will cease, and the site will be re-classified as a Class 1 area. A separate TSP addressing remediation of radioactively contaminated soil and items with Class 1 surveys will be developed and approved by the Navy prior to recommencing radiological survey activities. Ludlum Model 19, Bicon MicroRem, or equivalent, scintillation detectors will be used to perform the measurements. The measurements will be conducted with the instrument at approximately 1 meter from the ground surface. Exposure/dose rate measurements will also be conducted at biased static measurement

locations as described in Section 3.3 for use in determining annual dose from the external exposure pathway.

3.6 Media Samples

Soil samples will be collected at sampling locations and analyzed by gamma spectroscopy. One hundred percent of final soil samples will be analyzed by gamma spectroscopy. All samples will be analyzed by a Department of Defense Environmental Laboratory Accreditation Program approved laboratory. Ten percent of soil samples will be analyzed by Isotopic Uranium, Total Strontium, and liquid scintillation counting for H-3. All samples will also be collected and analyzed in accordance with the Sampling and Analysis Plan (TtEC, 2014b). Any discrete items removed during the soil sampling and survey activities that appear to be radioactive upon survey with a Ludlum 2350-1 survey meter coupled to a Ludlum 44-10 2-inch by 2-inch NaI detector will be surveyed in accordance with SOP 003, Release of Materials and Equipment and analyzed in accordance with SOP 015, Use Of The Berkeley Nucleonics Corporation SAM-940-3G Radioisotope Identifier or an equivalent radioisotopic identifier.

3.7 Dose Modeling in Support for Remedy Implementation

The intent of the IR Sites 1 and 3 Scoping Survey is to determine whether residual radioactivity is present on the surface prior to implementing the IR Site 7 groundwater remedy, extend RCRA cap over the IR Site 7 soils, and institutional controls at IR Sites 1 and 3. In the event that no project comparison criteria exceedances are observed during the performance of the survey and sampling activities detailed in this TSP, the remedy, cap extension, and institutional controls for Sites 1 and 3 may be implemented. If any project comparison criteria exceedances are noted for the ROCs, the radiological data will be assessed to determine whether the concentration for the ROC is indistinguishable from background. This may be accomplished for soil by demonstrating that the survey unit soil ROC sample concentrations are indistinguishable from the corresponding reference area ROC concentrations through statistical analysis using scenario B from NUREG-1505 (NRC 1998). In addition, dose and risk modeling of IR Sites 1 and 3 using the soil analytical results will be performed and documented in the final report. If project comparison criteria are exceeded for any soil samples and indistinguishability from background cannot be established through statistical analysis or radioactive materials removed, additional remedial actions and surveys may be conducted in accordance with a subsequent TSP, after review of the results of this survey.

As the remedy for IR Sites 1 and 3 is a RCRA cap with institutional controls, external exposure is the only viable radiological exposure pathway. The external dose above the mean background reference area external dose in the area with the most elevated reading at the completion of the survey and prior to any additional site restoration will be demonstrated not to cause an annual dose exceeding 12 mrem/year to the maximally exposed individual using conservative occupancy factors. As the remedy provides an additional layer of radiation shielding, this conservative method ensures that the IR Sites 1 and 3 remedy is protective of human health.

4.0 SITE RESTORATION

After the survey and sampling activities have been completed, TtEC will expose the southern edge of the landfill, place and stabilize the excavated IR Site 7 soil over the uncapped buried waste area shown in Figure A-1, and extend the RCRA cap in accordance with the Design Plan (TtEC, 2014c). A radiological survey of the entire capped area will be conducted with a Ludlum 19 or equivalent survey meter to ensure that the external dose above the mean background reference area external dose in the area with the most elevated reading will not cause an annual dose exceeding 12 mrem/year to the maximally exposed individual using conservative occupancy factors.

5.0 QUALITY CONTROL

The data quality objectives for the survey and sampling activities are provided in Table 5-1.

Definable features of work (DFWs) establish the measures required to verify both the quality of work performed and compliance with project requirements. The DFWs and associated phases of quality control for vegetation clearing, geophysical surveys, radiological surveys, RCRA cap extension, and site restoration are provided in Table 3-1 of the Contractor Quality Control Plan (TtEC, 2014d).

6.0 ENVIRONMENTAL PROTECTION

The environmental protection-driven requirements have been addressed in the Environmental Protection Plan (TtEC, 2014e) and the Stormwater Pollution Prevention Plan (TtEC, 2014f). No additional requirements are necessary.

7.0 REFERENCES

- DoD (Department of Defense), Department of Energy, Nuclear Regulatory Commission, and U.S. Environmental Protection Agency. 2000. Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575, Revision 1. August.
- ECC (Environmental Chemical Corporation). 2008. Site Management Plan, A Road Map for Environmental Cleanup, Naval Air Station Brunswick, Brunswick, Maine. December.
- NAVSEA (Naval Sea Systems Command.). 2014. Final Historical Radiological Assessment, History of the Use of General Radioactive Materials 1943 to 2011. March.
- NRC (Nuclear Regulatory Commission). 1998. A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys, NUREG-1505, Revision 1. June.
- TtEC. (Tetra Tech EC, Inc.). 2013. Accident Prevention Plan/Site Safety and Health Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress
- TtEC. 2014a. Basewide Radiological Management Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.

- TtEC. 2014b. Sampling and Analysis Plan, Radiological Remediation/Assessment, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.
- TtEC. 2014c. Design Plan for IR Sites 1 and 3 Cap Extension, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.
- TtEC. 2014d. Contractor Quality Control Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.
- TtEC. 2014e. Environmental Protection Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.
- TtEC. 2014f. Stormwater Pollution Prevention Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.
- Tetra Tech, Inc. 2012. Technical Memorandum, Data Gap Investigations For Sites 1 and 3, Site 2, and Site 7, Former Naval Air Station Brunswick, Brunswick, Maine. May.

TABLES

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**TABLE 2-1
 INSTALLATION RESTORATION SITES 1 AND 3 HAZARDOUS WASTE BURIAL AREA
 PRIMARY RADIATION PROPERTIES AND PROJECT COMPARISON CRITERIA
 FOR RADIONUCLIDES OF CONCERN**

Radionuclide	Primary Radiation Properties		Release Criteria		
	Half-life	Type	Materials, Equipment, and Waste		Soil Samples (pCi/g) ^a
			Total Surface Activity (dpm/100 cm ²)	Removable Activity (dpm/100 cm ²)	
Co-60	5.27 years	Beta	5,000	1,000	2.28
Cs-137	3.01E01 years	Beta	5,000	1,000	6.6
H-3	1.23E01 years	Beta	5,000	1,000	66
Ra-226	1.6E03 years	Alpha	100	20	1.0
Sr-90	2.86E01 years	Beta	1,000	200	1.02 ^b
Th-232	1.41E10 years	Alpha	1,000	200	0.66
U-238	4.47E09 years	Alpha/Beta	5,000	1,000	8.4

Notes:

^a Criteria is above background for those radionuclides found in background soils.

^b Total Strontium analysis is the analytical method used to conservatively quantify Sr-90 concentration.

Abbreviations and Acronyms:

Co-60 – Cobalt-60
 Cs-137 – Cesium-137
 cm² - square centimeters
 dpm - disintegration per minute

H-3 – Tritium
 pCi/g – picocurie per gram
 Ra-226 – Radium-226
 Sr-90 – Strontium-90

Th-232 – Thorium-232
 U-238 – Uranium-238

**TABLE 5-1
 SUMMARY OF DATA QUALITY OBJECTIVES**

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
State the Problem	Identify the Goal of the Study	Identify Information Inputs	Define the Boundaries of the Study	Develop the Analytical Approach	Specify Performance or Acceptance Criteria	Develop the Plan for Obtaining Data
IR Sites 1 and 3 Hazardous Waste Burial Area is designated as an HRA site. The radionuclides of concern are Co-60, Cs-137, H-3, Ra-226, Sr-90, Th-232, and U-238. It must be determined if the site-specific project comparison criteria for the radionuclides have been met or if remediation is warranted.	The primary use of the data expected to result from completion of this TSP is to support the implementation of the IR Site 7 groundwater remedy, cap extension, and institutional controls. Therefore, the decision to be made can be stated as “Do the results of the survey ensure that an annual dose of 15 mrem/year is not exceeded?”	Radiological surveys required to support the Scoping Survey of IR Sites 1 and 3 will include: <ul style="list-style-type: none"> • 100 percent gamma scan survey of the Class 3 survey unit of the capped portion and 100 percent gamma scan survey of the uncapped surface of the Class 3 survey unit using a RASO-approved drive-over array mechanism and/or hand-held instrumentation on soil and concrete (ground) surfaces • A minimum of 20 gamma static measurements and soil samples in each of the Class 3 survey units • Additional measurements and samples to be collected if investigation levels are exceeded during review of the associated scan data 	The lateral and vertical spatial boundaries for this survey effort are confined to the site as shown on the figures in Appendix A.	If the results of the survey meet the project comparison criteria, then the data will be used to support a Scoping Survey. Otherwise, the data will be used for characterization.	Limits on decision errors are set at 5 percent as specified in the Basewide Radiological Management Plan (TtEC, 2014a).	Operation details for the radiological survey process have been developed. The theoretical assumptions are based on guidelines contained in MARSSIM (DoD et al. 2000). Specific assumptions regarding types of radiation measurements, instrument detection capabilities, quantities and locations of data to be collected, and investigation levels are contained in this TSP and the Basewide Radiological Management Plan (TtEC, 2014a).

Abbreviations and Acronyms:

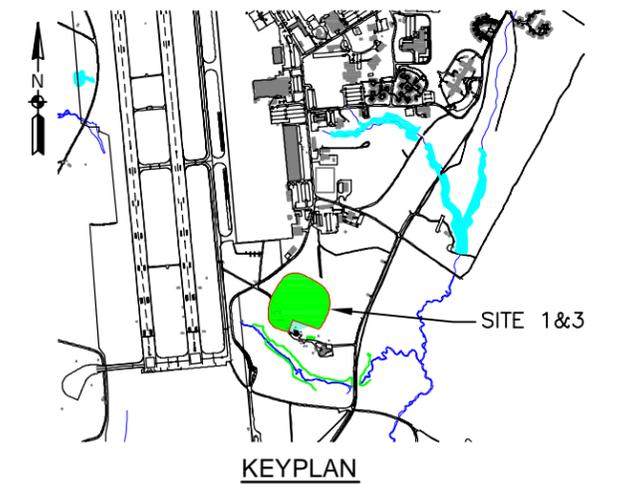
Co – Cobalt-60
 Cs-137 – Cesium-137
 H-3 - Tritium
 HRA – Historical Radiological Assessment
 MARSSIM – Multi-Agency Radiation Survey and Site Investigation Manual

Ra-226 – Radium-226
 Sr-90 – Strontium-90
 Th-232 – Thorium-232
 TSP – Task-specific Plan
 U-238 – Uranium-238

APPENDIX A

FIGURES FOR INSTALLATION RESTORATION SITES 1 AND 3 HAZARDOUS WASTE BURIAL AREA SURVEYS

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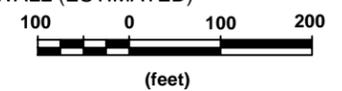


NOTE:

SOURCE: TETRA TECH, INC. 2012. TECHNICAL MEMORANDUM, DATA GAP INVESTIGATIONS FOR SITES 1 AND 3, SITE 2, AND SITE 7, FORMER NAVAL AIR STATION BRUNSWICK, BRUNSWICK, MAINE. MAY.

LEGEND

- EXTRACTION WELL
- SHALLOW PIEZOMETER
- MONITORING WELL
- SHALLOW MONITORING WELL
- DEEP MONITORING WELL
- BEDROCK MONITORING WELL
- LANDFILL CAP AREA
- LAND USE CONTROL BOUNDARY
- SITE 3 BOUNDARY
- APPROXIMATE LOCATION OF LANDFILL TRENCHES
- UNCAPPED BURIED WASTE
- BUILDING
- BUILDING REMOVED, BUT FOUNDATION STILL REMAINS
- GRASS COVERED BUNKER
- ROAD
- STREAM
- WETLAND AREA
- SLURRY WALL (ESTIMATED)



TASK-SPECIFIC PLAN FOR INSTALLATION RESTORATION SITES 1 AND 3
HAZARDOUS WASTE BURIAL AREA SCOPING SURVEY

FIGURE A-1

INSTALLATION RESTORATION SITES 1 AND 3 PLAN VIEW
FORMER NAVAL AIR STATION, BRUNSWICK, MAINE

REVISION: —
AUTHOR: A.CRABTREE
PROJECT NO:
FILE: SEE BELOW



