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FINAL TASK SPECIFIC PLAN IR SITE 12 SOUTH LANDFILL SCOPING SURVEY NAS WILLOW GROVE PA
10/01/2014
TETRA TECH INC

**Final**

# Task Specific Plan
# IR Site 12, South Landfill
# Scoping Survey

## Naval Air Station Joint Reserve Base
## Willow Grove
## Horsham, Pennsylvania

## October 2014

Prepared for:
**Department of the Navy**
**Base Realignment and Closure**
**Program Management Office Northeast**
**Philadelphia, Pennsylvania**

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Prepared under:
**Naval Facilities Engineering Command**
**Contract Number: N62470-08-D-1001**
**Task Order: WE42**

**FINAL**

# TASK SPECIFIC PLAN
# IR SITE 12, SOUTH LANDFILL SCOPING SURVEY

## NAVAL AIR STATION JOINT RESERVE BASE WILLOW GROVE
## HORSHAM, PENNSYLVANIA

**October 2014**

**Contract Task Order WE42**

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## *ACRONYMS AND ABBREVIATIONS*

| | |
|---|---|
| BRAC | Base Realignment and Closure |
| cpm | counts per minute |
| DFW | definable feature of work |
| DoD | Department of Defense |
| DQO | data quality objective |
| ELAP | Environmental Laboratory Accreditation Program |
| EPA | U.S. Environmental Protection Agency |
| FSS | Final Status Survey |
| GPS | Global Positioning System |
| HASP | Health and Safety Plan |
| HRA | Historical Radiological Assessment |
| IRP | Installation Restoration Program |
| JRB | Join Reserve Base |
| LBGR | lower boundary of the gray region |
| LLRW | Low Level Radioactive Waste |
| $m^2$ | square meter |
| MARSSIM | Multi-Agency Radiation Survey and Site Investigation Manual |
| MDC | minimum detectable concentration |
| MDCR | minimum detectable count rate |
| $MDCR_{SURVEYOR}$ | minimum detectable count rate calculated assuming a surveyor efficiency |
| mrem/y | millirem per year |
| NaI | sodium iodide |
| NAS | Naval Air Station |
| NRC | U.S. Nuclear Regulatory Commission |
| OSWER | Office of Solid Waste and Emergency Response |
| pCi/g | picocuries per gram |
| PHP | Project Health Physicist |
| Ra-226 | radium-226 |
| RASO | Radiological Affairs Support Office |
| RCT | Radiological Control Technician |
| RESRAD | Residual Radioactivity computer code |
| RI | Remedial Investigation |
| ROC | radionuclide of concern |
| RWP | Radiation Work Permit |
| SOP | Standard Operating Procedure |
| Sr | strontium |
| Sr-90 | strontium-90 |
| SS | Scoping Survey |

| | |
|---|---|
| SSO | Site Safety Officer |
| TSP | Task-specific Plan |
| U-238 | uranium -238 |

# TASK-SPECIFIC PLAN FOR INSTALLATION RESTORATION SITE 12 SCOPING SURVEY

This Task-specific Plan (TSP) provides the details for the Scoping Surveys of Installation Restoration (IR) Site 12, South Landfill, at the former Naval Air Station (NAS) Joint Reserve Base (JRB) Willow Grove, Pennsylvania. The survey will be conducted in accordance with the general approach, radiological controls and methodologies provided in the Basewide Radiological Management Plan (Management Plan) [Tetra Tech 2014a] and Standard Operating Procedures (SOPs) [Tetra Tech 2014a, Attachment 4]. The survey activities will conform to the requirements of the Health and Safety Plan (HASP) [Tetra Tech 2014b]. No exceptions to the SOPs or HASP are noted.

This survey is being performed, as recommended in the Historical Radiological Assessment (HRA)[Tetra Tech 2013) to determine if residual radioactivity is present in the surface soil (0-6 inches) at IR Site 12. The survey of this area has been designed as a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) NUREG-1575 Class 3 survey [DoD et al. 2000] based on historical records and the little or no potential for delivering a dose above the release criterion. This methodology will allow the use of survey data to assess the risk posed by the presence of residual radioactivity in surficial soils.

## 1.0 SITE DESCRIPTION AND HISTORICAL SUMMARY

Disposal of radioluminescent devices was not controlled by specific Navy procedures until the late 1960s. Prior to that time, it was common practice throughout private industry and the military to dispose of radioluminescent instruments and articles by burial in landfills. Although no specific documentation has been discovered, it can be reasonably assumed that control and disposal of radioactive devices would have been handled in a manner similar to those for radioluminescent devices because they were general commodity items and not controlled as radioactive waste. It was also common practice to leave radioluminescent devices in place on equipment when it was sent to the salvage or scrap yard or processed through smelters. The NAS JRB Willow Grove identified disposal site for survey in this Task Specific Plan (TSP) that could have remnants of equipment with radioactive material is the South Landfill (IRP-12) (Figure 1) [Tetra Tech 2013].

The South Landfill (IRP-12) (Figure 2) was previously investigated under the designation of the Antenna Field Landfill (IRP- 2). The investigation failed to find significant buried waste in that location and Site 2 was determined to need no further action in 2010. The South Landfill is now believed to be located in the area designated as Site 12, which is approximately 11 undeveloped acres located southwest of Runway 10/28 in the southern portion of the Station. This landfill was reportedly used as a disposal area for general compacted wastes and refuse, paint waste, sewage sludge, solvents and aircraft parts from 1948 to 1960. Landfill activities reportedly consisted of trench excavation with subsequent burning and burial of waste material within the trenches [Tetra Tech 2012]. No radiological data has been collected to date at Site 12.

The timeline for operation of this landfill included years when radioactive materials were disposed of by burial. Therefore, it is possible that radioactive materials were buried or burned in this area. During a sampling investigation, construction debris, bottles, china, and aircraft parts were observed in the area. Due to the presence of aircraft parts and the dates of use for this disposal area, is very likely that radioluminescent materials and radioactive electronic components are buried here. The most common ROCs suspected are Ra-226, Sr-90 and U-238 [Tetra Tech 2013].

## 2.0 SCOPING SURVEY

The purpose of this section is to provide guidance for performance of a Scoping Survey (SS) under this TSP. This SS will allow the use of survey data to assess the risk posed by the presence of residual radioactivity in surficial soils.

Prior to commencing radiological survey operations, the area may be cleared of large material, equipment and debris that may adversely impact survey operations. Sorting or screening of debris and equipment may be used to clear items and facilitate the SS. Vegetative overgrowth will be removed so that survey surfaces are clear of excessive debris. Significant tree removal is not expected to be required. During clearing and grubbing activities, radiological monitoring of personnel and equipment for personnel protection purposes will be performed.

All radiological surveys will be performed in accordance with SOP 006, *Radiation and Contamination Surveys.* Alpha and beta radiation surveys will be conducted on the accessible surfaces of suspect materials and equipment. Biased static alpha and beta measurements will be collected from the surfaces. A minimum of one static measurement will be collected at the location exhibiting the highest alpha/beta radiation measurement. Surfaces will also be assessed for transferable contamination. Materials identified as having contamination present above the levels specified in Table 2-1 will be packaged for subsequent decontamination or storage and disposal as LLRW per DODEA.

One hundred percent of the Class 3 survey units will be scanned using a Ludlum Model 2241 (or equivalent) survey meter with a 44-10 2-inch by 2-inch NaI detector. This system will be coupled with a global positioning system (GPS) data collection and data maintenance system [Tetra Tech 2014a]. Additional measurements and samples will be collected if investigation levels or release criteria are exceeded during the review of data. Biased gamma static measurement, exposure rate measurement, and soil sample locations will be based on the results of the gamma walkover survey and on professional judgment.

Soil samples will be analyzed for radium 226 (Ra-226), total strontium (Sr) and isotopic uranium (U) by a Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) approved laboratory. If any total Sr result exceeds the release criterion for Sr-90, that sample will be analyzed for Sr-90, and verified to be less than the Sr-90 release criterion.

## 2.1 RELEASE CRITERIA

This survey is being performed to assess whether residual radioactivity above the established release criteria, as defined on Table 2-1, is present in the area. The site will be modeled using residual radionuclide concentrations to evaluate total dose [Tetra Tech 2014a, Attachment 3].

## 2.2 REFERENCE AREA

The reference area will be selected with the concurrence of the Navy Radiological Affairs Support Office (RASO). The reference area will contain the same physical and geological characteristics as the survey areas and will have no history of radiological operations. A minimum of 15 soil samples will be collected at the 0-6 inch depth. These samples will be analyzed by an offsite DoD ELAP-accredited laboratory for Ra-226, total Sr and isotopic U. A static gamma measurement and a gamma exposure measurement will be obtained from each survey location. A GPS correlated gamma walkover survey will be performed of the reference area. The reference background area results will be included in the survey report.

Additional reference areas may be selected by the Radiation Safety Officer Representative, in consultation with the RASO, if different materials are encountered during the survey.

## 2.3 INVESTIGATION LEVEL

The investigation level for gamma scan surveys will be established at the survey unit mean plus $3\sigma$, where $\sigma$ is the standard deviation of the gamma readings in the survey unit. Survey data will be evaluated using the Z-test and values above the mean will be plotted on a color coded map. Values of $3\sigma$ or above will be investigated by 1) visual inspection, 2) physical inspection and 3) static gamma measurements. If the source of the elevated reading cannot be determined (i.e., geologic sources, naturally occurring observable sources, etc.), a biased soil sample from the location will be considered. Approximately 25% of the areas exceeding the $3\sigma$ value will be sampled. Samples will be biased towards areas within the footprint of the identified burial trenches. Areas exceeding $3\sigma$ will be marked in case laboratory analyses of soil samples indicates that further investigation is warranted.

## 2.4 SURVEY UNITS

Ten (10) survey units have been identified for investigation within IR Site 12(Figure 2). These survey units were determined based on evaluations of geophysical survey and test pit results from RI activities [Tetra Tech 2012]. Adequate buffer areas around the detected anomalies were incorporated to insure that potentially impacted areas associated with burial trenches were investigated. Additional areas within the IR Sites may be investigated based on visual inspections and professional judgment. Areas that display some geophysical signal (color coded areas on Figure 2) that fall outside of a Survey Unit boundary will be visually inspected to determine if additional surveys and/or soil samples are warranted.

## 2.5 ESTABLISHING THE NUMBER OF MEASUREMENTS

To determine the number of measurements, N, to be taken per survey unit/reference area combination when the contaminant is present in background, Equation 5-1 of MARSSIM (NRC 2000) is used:

$$N = \left( \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{3(P_r - 0.5)^2} \right)(1.2)$$

Where:

N = Number of data points

$Z_{1-\alpha}$ = Type I decision error level, 1.645

$Z_{1-\beta}$ = Type II decision error level, 1.645

$P_r$ = random measurement probability, 0.871014

1.2 = 20 percent increase in number of samples over the minimum

The values used in the calculation are from MARSSIM guidance (NRC 2000) and are based on a recommended value for the relative shift ($\Delta/\sigma$) of 1.6 as discussed in Section 5.5.2.2 of MARSSIM (NRC 2000). Type I and Type II decision errors are based on 0.05 false negative and 0.05 false positive rates. The associated Z values are obtained from MARSSIM Table 5.2 (NRC 2000). The random measurement probability, $P_r$, is from MARSSIM Table 5.1 (NRC 2000).

Using the defined values, the equation becomes:

$$N = \left( \frac{(1.645 + 1.645)^2}{3(0.871014 - 0.5)^2} \right)(1.2)$$

The calculation results in a value of N = 31.45366. Therefore, a minimum of 32 measurements will be obtained in each survey unit/reference area combination.

In additional to the systematic measurements, biased sampling locations may be determined based on the results of the gamma walkover survey and field observations/investigations. In cases where survey unit size may not accommodate 32 sampling points (i.e., small total surface area survey units) less than 32 samples may be taken. Each sample location investigation will consist of:

- a soil sample from the 0-6 inch soil layer (SOP 009) [Tetra Tech 2014a, Attachment 4]
- a static 1-minute gamma measurement (SOP 006) [Tetra Tech 2014a, Attachment 4] and

- a gamma exposure rate measurement (SOP 006) [Tetra Tech 2014a, Attachment 4].

GPS coordinates will be obtained for all sample locations.

## 2.6 ALPHA AND BETA STATIC MEASUREMENTS

Alpha and beta static measurements will be obtained with the Ludlum 43-68 detector coupled to the Ludlum 2241 rate meter (or equivalent). The Ludlum 43-68 detector will be used to obtain fixed measurements on suspect exposed debris.

### 2.6.1 Alpha Static Measurements

The limiting alpha emitting ROC is Ra-226.

Static measurements for alpha emissions will require a 2 minute count time for the Ludlum 43-68 (or equivalent) based on Ra-226. The MDC calculation for the specified count time from Equation 7-8 of the management plan (TetraTech 2014a):

***Equation 7-9 from Management Plan*** (TetraTech 2014a)

$$MDC = \frac{3 + 3.29\sqrt{1*2*\left(1+\frac{2}{10}\right)}}{0.25*0.25*\frac{100}{100cm^2}*2}$$

MDC = 64.8 dpm

Where:

$R_B$ = 1 cpm

$T_B$ = 600 sec or 10 min

$T_{S+B}$ = 120 sec or 2 min

$\varepsilon_I$ = 0.25

$\varepsilon_S$ = 0.25

$W_A$ = 126 $cm^2$ (areas greater than 100 $cm^2$ default to 100 $cm^2$)

### 2.6.2 Beta Static Measurements

Static measurement count times for the beta from the limiting ROC, Sr-90, will be 30 seconds for the Ludlum 43-68 with the 2241 rate meter (or equivalent). For the Ludlum 43-68 surveying for Sr-90, the equation becomes:

$$MDC = \frac{3 + 3.29\sqrt{200 * .5 * (1 + \frac{.5}{.5})}}{.52 * .5 * \left(\frac{100}{100}\right) * .5} = 381\ dpm$$

Where: $R_b$ = 200 cpm
$T_{s+b}$ = 30 sec. or 0.5 min
$T_b$ = 30 sec. or 0.5 min
$\varepsilon_i$ = 0.52
$\varepsilon_s$ = 0.5
$W_A$ = 100 $cm^2$

## 2.7 GAMMA SCANS

One hundred percent of each Class 3 survey unit will be scanned with a Ludlum Model 22412241 survey meter (or equivalent) with a Ludlum 44-10 2 inch by 2-inch NaI detector coupled to a GPS data collection and data maintenance system. This process is detailed in the Management Plan [Tetra Tech 2014a]. Gamma scans by survey instruments will be logged, submitted to RASO for review and included in the final report. For the Ludlum 2241 with a 44 10 2-inch by 2-inch NaI detector, scans will be performed at a rate of approximately 0.5 meter per second (1 second scan observation) with the detector held approximately 10 centimeters (4 inches) above the ground. The detector will be moved back and forth across the travel path while scanning, producing a serpentine scan pattern.

### 2.7.1 Minimum Detectable Count Rate for Gamma Surveys (2-inch by 2 inch NaI Probe)

The minimum detectable count rate (MDCR) is the minimum detectable number of net source counts in the scan interval, for an ideal observer, that can be arrived at by multiplying the square root of the number of background counts (in the scan interval) by the detectability value associated with the desired performance (as reflected in d'), as shown in Equation 7-5 from the Management Plan [Tetra Tech 2014a]:

***Equation 7-5 from the Management Plan***

$$MDCR = d'\sqrt{b_i}\left(\frac{60}{i}\right)$$

Where:

| | | |
|---|---|---|
| *MDCR* | = | minimum detectable count rate |
| *d'* | = | index of sensitivity (α and β errors) = 3.28 |
| $b_i$ | = | number of background counts in scan time interval |

| | | |
|---|---|---|
| $i$ | = | scan or observation interval = 1 second |

The calculated MDCR value will be determined after reference background measurements have been obtained. The required rate of true positives is 95 percent, and the rate of false positives is 5 percent. From Table 6.5 of MARSSIM (DoD et al. 2000), the value of d', representing this performance goal, is 3.28.

### 2.7.2 MDCR and Use of Surveyor Efficiency, Gamma (2-inch by 2 inch NaI Probe)

The MDCR calculated assuming a surveyor efficiency ($MDCR_{SURVEYOR}$) can be calculated assuming a surveyor efficiency (P) of 0.5 and the observed background count rate obtained from reference background measurements, using Equation 7-9 from the Management Plan [Tetra Tech 2014a]:

***Equation 7-9 from the Management Plan***

$$MDCR_{SURVEYOR} = \frac{MDCR}{\sqrt{0.5}}$$

## 2.8 STATIC GAMMA MEASUREMENTS

Static gamma measurements will be collected at the sample locations in the survey unit using a Ludlum Model 2241 survey meter with a Ludlum 44-10 2-inch by 2-inch NaI detector. The gamma measurements will be collected in accordance with SOP 006 [Tetra Tech 2014a, Attachment 4].

For gamma surveys, the MDC is calculated in cpm. Equation 7-12 from the Management Plan [Tetra Tech 2014a] is used to calculate the MDC:

***Equation 7-12 from the Management Plan***

$$MDC = \frac{3 + 4.65\sqrt{R_B T_B}}{T_B}$$

Where:

| | | |
|---|---|---|
| 3+4.65 | = | constant factor provided in MARSSIM (DoD et al. 2000) |
| $R_B$ | = | background count rate (cpm) |
| $T_B$ | = | background counting time (minute) = 1 |

Using the inputs observed from the reference background area in Equation 7-12, the MDC for the Ludlum Model 2241 with a 44-10 2-inch by 2-inch NaI detector will be calculated.

## 2.8 EXPOSURE RATE MEASUREMENTS

Exposure rate measurements will be collected using Ludlum Model 19 scintillation detectors from each specified sample location in the survey unit in accordance with SOP 006 [Tetra Tech 2014a, Attachment 4].

## 2.9 MEDIA SAMPLING

Solid soil samples will be collected at the biased sampling locations and analyzed by an offsite DoD ELAP-accredited laboratory for Ra-226, total Sr and isotopic U (GL-RAD-A-004, 011 and 013) [Tetra Tech 2014a, Attachment 3].

## 2.10 DOSE MODELING IN SUPPORT OF A RADIOLOGICAL RISK ASSESSMENT

The intent of the survey is to provide radiological risk analysis for residual contamination in surficial soils (0-6 inches) at IR Site 12. To accomplish this goal, it is necessary to provide a means for calculating residual dose to the critical group; the default residential farmer scenario for RESRAD was selected.

After the residual dose is determined, the Department of the Navy will also determine the excess lifetime cancer risk to the critical group. These values will be provided in the SS report to demonstrate that the net residual dose is less than 15 mrem/y (equivalent to $3 \times 10^{-4}$ excess lifetime cancer risk per Office of Solid Waste and Emergency Response (OSWER) Directive 9200.4-18 [EPA 1997]).

# 3.0 QUALITY CONTROL

The DQOs for the survey are provided on Table 3-1.

Definable features of work (DFWs) establish the measures required to verify both the quality of work performed and compliance with project requirements. The DFW for this task are radiological surveys and the associated sample results. A description of the DFW and the associated phases of quality control are presented in Table 3-2.

# 4.0 ENVIRONMENTAL PROTECTION

Environmental protection-driven requirements addressed in the Management Plan [Tetra Tech 2014a] apply to this TSP. No additional requirements are necessary.

## 5.0 REFERENCES


AEC (Atomic Energy Commission). 1974. Regulatory Guide 1.86. Termination of Operating Licenses for Nuclear Reactors. June.

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.

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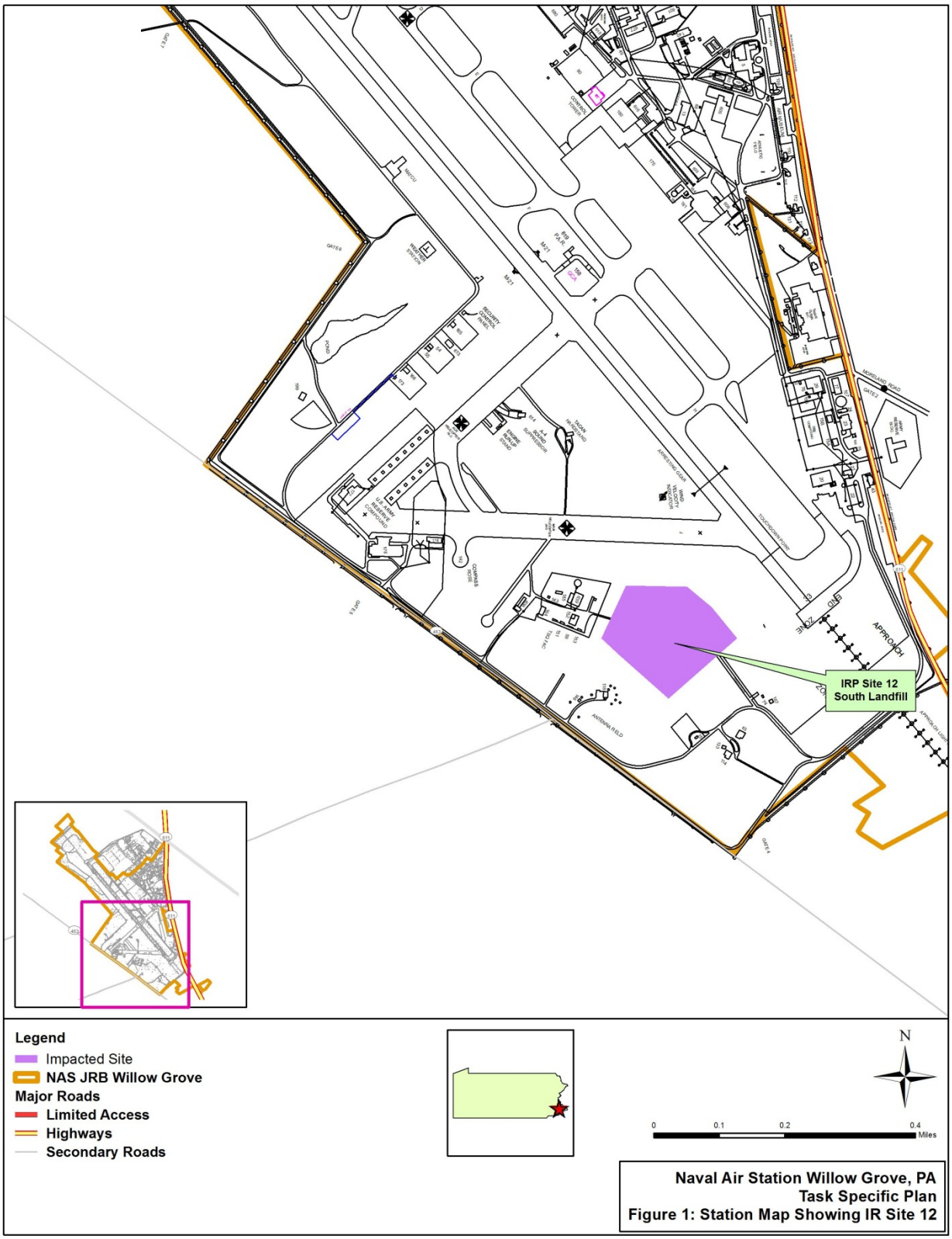
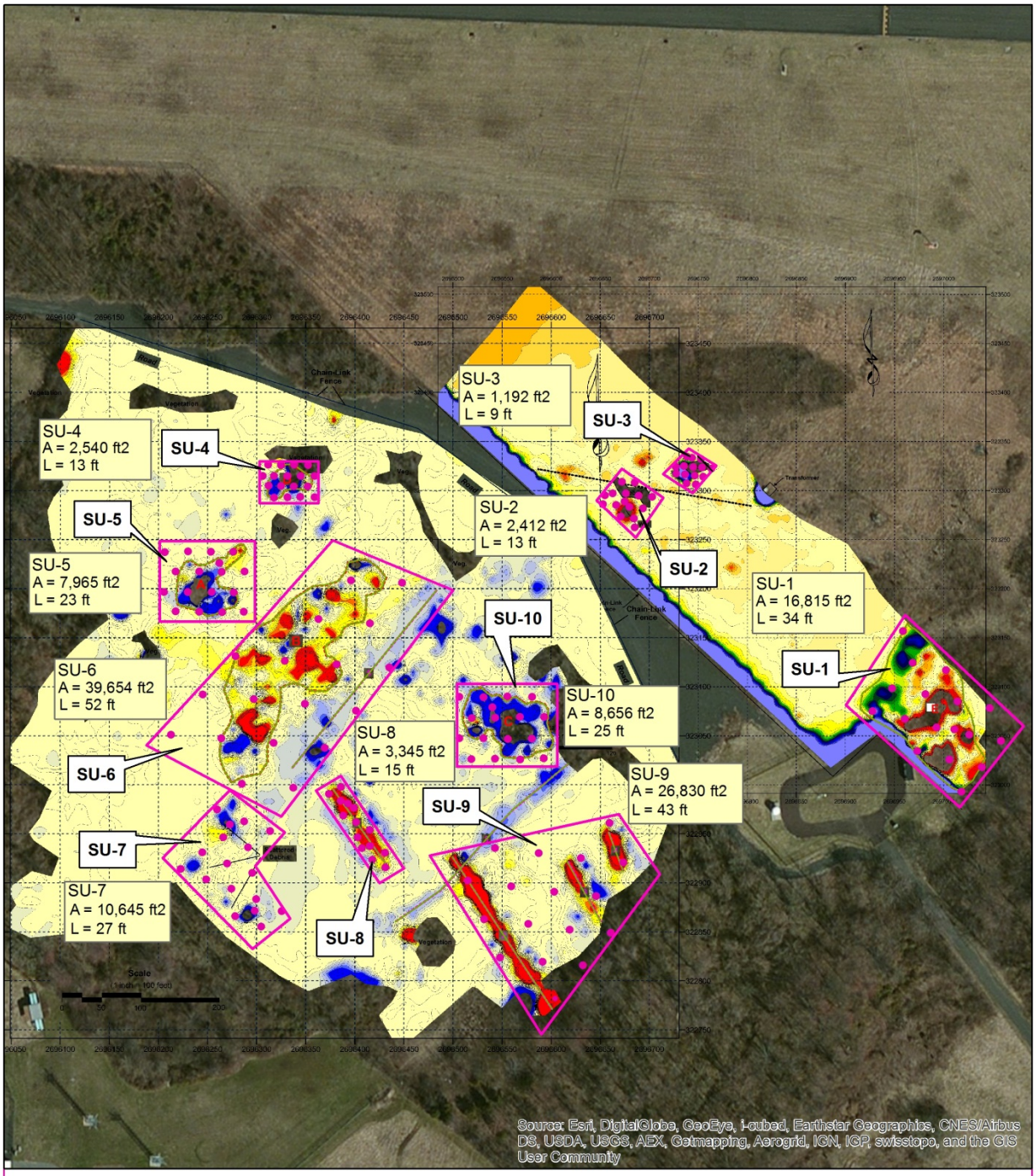
Tetra Tech (Tetra Tech, Inc.). 2014a. Final Basewide Radiological Management Plan, Naval Air Station Joint Reserve Base Willow Grove, Willow Grove, Pennsylvania. March.

Tetra Tech (Tetra Tech, Inc.). 2014b. Health and Safety Plan, Naval Air Station Joint Reserve Base Willow Grove, Willow Grove, Pennsylvania. May.

## *FIGURES*


IRP Site 12
South Landfill
Legend
Impacted Site
NAS JRB Willow Grove
Major Roads
Limited Access
Highways
Secondary Roads
N
0
0.1
0.2
0.4
Miles
Naval Air Station Willow Grove, PA
Task Specific Plan
Figure 1: Station Map Showing IR Site 12




**Legend**

- Anomalies
- Survey Unit (SU)
- Sample Location

N

0 50 100 200 Feet

**Naval Air Station Willow Grove, PA**
**Task Specific Plan**
**Figure 2: Site 12 Survey**

## *TABLES*

## TABLE 2-1 PRIMARY RADIATION PROPERTIES AND RELEASE CRITERIA FOR RADIONUCLIDES OF CONCERN

| Radionuclide | Primary Radiation Properties | | Release Criteria | | |
|---|---|---|---|---|---|
| | | | Materials, Equipment, and Wastes | | Release Criteria for Residential Reuse Solid Samples[c,d] (pCi/g) |
| | Half-life | Type | Total Surface Activity[a,b] | Removable Activity[ab] | |
| Sr-90 | 28.6 y | Beta | 1,000 | 200 | 1.02 |
| Ra-226 | 1,600 y | Alpha<br>Gamma | 100 | 20 | 1.0 |
| U-238 | $4.5e^9$ y | Alpha | 5,000 | 1000 | 8.4 |

***Notes:***

[a] Units are disintegrations per minute per 100 square centimeters.

[b] These limits are based on AEC Regulatory Guide 1.86 (**USAEC 1974**). Values indicate the measured value above background as determined from the reference area. Limits for removable surface activity are 20 percent of these values.

[c] These limits are based on Nuclear Regulatory Commission document NUREG-1757, Consolidated Decommissioning Guidance (**NRC 2006**), whose limits are deemed in compliance with the 25 mrem/y unrestricted dose limit in 10CFR20.1402. Listed values were developed by scaling the NUREG-1757 values to 15 mrem/y unrestricted dose.

[d] Criteria is above background for those radionuclides found in background soils.

***Abbreviations and Acronyms:***

pCi/g – picocuries per gram
Ra-226 – radium-226
Sr-90 – strontium 90
U-238 – uranium 238
y – year

## TABLE 3-1 SUMMARY OF DATA QUALITY OBJECTIVES

| STEP 1 | STEP 2 | STEP 3 | STEP 4 | STEP 5 | STEP 6 | STEP 7 |
|---|---|---|---|---|---|---|
| **Statement of Problem** | **Decisions** | **Inputs to the Decisions** | **Boundaries of the Study** | **Decision Rules** | **Limits on Decision Errors** | **Optimize the Sampling Design** |
| IR Site 12 is listed as an area impacted by radiological activities. Radionuclides of concern for this Site are Sr-90, Ra-226 and U-238.<br>It will be determined if residual contamination in surficial soil meet the site-specific release criteria for these radionuclides. | The primary use of the data expected to result from completion of this TSP is to support the Scoping Survey of IR Site 12. Therefore, the decision to be made can be stated as, "Do the results of the survey meet the release criteria?" | Radiological surveys required to support the Scoping Survey of IR Site 12 will include:<br>• 100 percent gamma scan surveys of the Class 3 survey units using hand-held instrumentation.<br>• Typically, a minimum of 16 biased gamma static measurements, exposure rate measurements, and solid samples will be collected in each of the Class 3 survey units.<br>• Soil samples will be analyzed for total Sr (Sr-90), Ra-226 and total U (U-238). | The boundaries of the survey units are shown in Figure 2. The spatial boundaries are consistent to assess radiological risks associated with residual contamination in surficial soil. | The results of the survey will be used to assess radiological risks from residual contamination in surficial soil. | Limits on decision errors are set at 5 percent, as specified in the Management Plan Revision 1 [Tetra Tech 2014a]. | Operational 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 Management Plan [Tetra Tech 2014a]. |

***Abbreviations and Acronyms:***
MARSSIM – Multi-Agency Radiation Survey and Site Investigation Manual
Ra-226 – radium-226
RASO – Radiological Affairs Support Office
Sr-90 – strontium-90
TSP – Task-specific Plan
U-238 – uranium 238

## TABLE 3-2 DEFINABLE FEATURES OF WORK FOR RADIOLOGICAL SURVEYS

| ACTIVITY | PREPARATORY (Prior to initiating survey activity) | DONE | INITIAL (At outset of survey activity) | DONE | FOLLOW-UP (Ongoing during survey activity) | DONE |
|---|---|---|---|---|---|---|
| Radiological surveys and sampling | • Verify that an approved TSP is in place.<br>• Verify that the Remedial Project Manager, the Radiological Site Manager, and Caretaker Site Office are notified about mobilization.<br>• Verify that an approved RWP is available, if necessary, and has been read and signed by assigned personnel.<br>• Verify that TSP and HASP have been reviewed.<br>• Verify that assigned personnel are trained and qualified.<br>• Verify that personnel have been given an emergency notification procedure.<br>• Verify that workers assigned dosimetry have completed NRC Form 4.<br>• Verify that the relevant SOPs and/or manufacturers' instructions are available and have been reviewed for equipment to be used for radiological surveys.<br>• Verify that equipment is on-site and is in working order (initial daily check). | | • Verify that radiological instruments are as specified in the Basewide Plan and TSP.<br>• Inspect training records.<br>• Verify that a qualified RCT and SSO are present at active work areas.<br>• Verify that site activities are being photographed.<br>• Verify that the reference area measurements have been obtained using the procedure described in the Basewide Plan, which states that the same survey methodology and instruments used to collect the background data will be used to perform measurements within survey units.<br>• Verify that daily checks were performed on all portable survey instruments.<br>• Verify that radiological instrument calibrations and setup are current.<br>• Verify that required dosimetry is being worn.<br>• Verify that field logbooks, proper forms, and chain-of-custody documents are in use.<br>• Verify that samples and measurements are being collected in accordance with the TSP, the Basewide Plan, and relevant SOPs.<br>• Verify that sample handling and analyses are in accordance with the Basewide Plan and applicable SOPs. | | • Verify that site is properly posted and secured, if necessary.<br>• Conduct ongoing inspection of material and equipment.<br>• Verify that a qualified RCT and SSO are present at active work areas.<br>• Verify that daily instrument checks and background measurements were obtained and documented.<br>• Verify that survey and sample analysis results are documented.<br>• Verify that personnel have read and signed the revised RWP, if revision is required.<br>• Inspect sample chain of custody and survey log for completeness.<br>• Verify that survey and analytical activities conform to the TSP.<br>• Verify that survey instruments are recalibrated after repairs or modifications.<br>• Verify that site activities are being photographed.<br>• Verify that survey documentation is reviewed by the PHP. | |

Abbreviations and Acronyms:
HASP – Health and Safety Plan
NRC – Nuclear Regulatory Commission
PHP – Project Health Physicist
RCT – Radiological Control Technician
RWP – Radiation Work Permit
SOP – Standard Operating Procedure
SSO – Site Safety Officer
TSP – Task-specific Plan