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FINAL TASK SPECIFIC PLAN FOR THE DEFENSE REUTILIZATION AND MARKETING OFFICE YARD FINAL STATUS SURVEY FORMER NAS BRUNSWICK ME

08/01/2014

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 DEFENSE REUTILIZATION AND MARKETING OFFICE YARD FINAL STATUS SURVEY FORMER NAVAL AIR STATION BRUNSWICK BRUNSWICK, MAINE

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Prepared for

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ACRONYMS AND ABBREVIATIONS

APP	Accident Prevention Plan
cm^2	square centimeter
cm/s	centimeters per second
Co-60	Cobalt-60
cpm	counts per minute
Cs-137	Cesium-137
CTO	Contract Task Order
DFW	Definable Features of Work
DoD	Department of Defense
dpm	disintegrations per minute
DQO	Data Quality Objectives
DRMO	Defense Reutilization and Marketing Office
FSS	Final Status Survey
H-3	Tritium
HRA	Historical Radiological Assessment
LBGR	Lower Boundary of the Gray Region
LLRW	low-level radioactive waste
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
MDCR	Minimum Detectable Count Rate
NASB	Naval Air Station Brunswick
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
Ra-226	Radium-226
RASO	Radiological Affairs Support Office
RWP	Radiation Work Permit
SOP	Standard Operating Procedure
Sr-90	Strontium-90
SSHP	Site Safety and Health Plan
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 Final Status Survey (FSS) of the Defense Reutilization and Marketing Office (DRMO) Yard adjacent to Building 584 at the former Naval Air Station Brunswick (NASB), Brunswick, Maine for the United States Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC), Atlantic under a Removal Action Contract, N62470-13-D-8007, Contract Task Order (CTO) 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 (APP)/Site Safety and Health Plan (SSHP) (TtEC, 2014b) and the Radiation Protection Plan, Attachment 2 to the Basewide Radiological Management Plan, prepared for the survey program. No exceptions to the Basewide Radiological Management Plan, SOPs, or APP/SSHP are noted.

This survey is being performed to determine whether residual radioactivity is present at the DRMO Yard. 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). This methodology will allow the use of survey data to support an FSS if no residual radioactivity exceeds the release criteria.

1.1 Site Description and Historical Summary

The DRMO Area consists of Building 584 and the adjacent DRMO Yard. Based on overlay of the base map over the DRMO Yard, the Yard is an approximate 103,000 square foot asphalt paved surface adjacent to Building 584. The DRMO coordinated the sale or disposal of the Navy's hazardous waste and surplus material. The location of the DRMO Area within NASB is shown on Figure A-1.

The DRMO Yard has no current radiological use; however, as the DRMO Area has been in use since around 1965 for storage of equipment to be surplused by the Navy and because commodities that contained radioactive materials may have been turned into the DRMO, the DRMO Area is considered a potential for radiological impact (NAVSEA, 2014). Per the Historical Radiological Assessment (HRA), the radionuclides of concern (ROCs) for the DRMO Area are Cobalt-60 (Co-60), Cesium-137 (Cs-137), Radium-126 (Ra-226), Strontium-90 (Sr-90), Thorium-232 (Th-232), Tritium (H-3), and Uranium-238 (U-238) (NAVSEA, 2012). This TSP covers the DRMO Yard. A separate TSP will be developed for Building 584.

2.0 SURVEY DESCRPTION

The asphalt surface covering the DRMO Yard will be surveyed in 50-foot by 50-foot grids using TtEC's Radiological Affairs Support Office (RASO)-approved vehicle towed array system and/or a Ludlum Model 2350-1 survey meter with a 44-10 sodium iodide (NaI) 2-inch by 2-inch

detector. Note that all 50-foot by 50-foot grids will be segregated pending soil sample results from beneath the corresponding asphalt. However, any asphalt exhibiting gamma readings exceeding the investigation level in a discrete area (i.e., less than 100 square feet) indicating a highly contaminated area or device (i.e., gamma readings exceeding mean of the survey unit plus 3 sigma [σ]) will be disposed of as low-level radioactive waste (LLRW). Soil beneath the asphalt will be surveyed and sampled prior to removal of adjacent asphalt in order to minimize cross contamination of asphalt and soil during the asphalt removal process.

Following asphalt removal, the underlying soil will be surveyed as a Class 3 area. The soil surface will be surveyed using TtEC's RASO-approved vehicle towed array system and/or a Ludlum Model 2350-1 survey meter equipped with a Ludlum Model 44-10 2-inch by 2-inch NaI detector (or equivalent). One hundred percent scan surveys for gamma radiation will be conducted on the accessible surfaces. Sampling will be performed as specified in this TSP. Based on the scan data, samples will be collected at areas exceeding the survey unit mean plus 3 σ, where σ is the standard deviation of the gamma readings in the survey unit. At each sample location, a static measurement will be collected. At each sample location, soil samples will be collected from the soil surfaces. 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 soil sampling results are below the release criteria provided in Table 2-1, the asphalt surfaces may be released for reuse, recycle, or disposal as non-LLRW. Otherwise, the RASO will be notified and an approach for surveying the asphalt surfaces will be agreed upon before determining the disposition of these materials.

If there is evidence of potential oil or hazardous waste release noted during the soil survey after asphalt removal, those observations will be recorded during the assessment. The Navy will be notified of the issue and repaving of the area will be postponed until approval from the Navy has been received.

3.0 FINAL STATUS SURVEY DESCRIPTION

The FSS is being performed to assess whether residual activity (if present in the soil) has been removed to levels below the release criteria defined in Table 2-1. The FSS will be sufficient to recommend unrestricted radiological release of the DRMO Yard if no residual contamination is detected in the soil survey units.

One hundred percent of the Class 3 soil survey unit (SU 01) 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 release criteria are exceeded during the review of data. This area will then be sampled using professional judgment. During the Class 3 soil survey activities, 20 gamma static measurements and soil samples will be collected. The location of the Class 3 survey unit within the DRMO Yard is provided on Figure A-1.

Soil samples will be analyzed by gamma spectroscopy for Cs-137, Co-60, Ra-226, and Th-232. Ten percent of soil samples will be analyzed for Isotopic Uranium for U-238, Total Strontium for Sr-90, and liquid scintillation counting for H-3. All samples will be analyzed by a Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) approved laboratory.

3.1 Release Criteria

This survey is being performed to assess whether residual activity above the established release criteria for soil, as defined in Table 2-1, is present in the area.

3.2 Reference Area

Prior to performing the survey activities, material-specific background reference areas will be established for the DRMO Yard survey activities. Non-radiologically impacted soil and asphalt background reference areas with similar physical, chemical, geological, radiological, and biological characteristics as the DRMO Yard soil and asphalt will be selected. Reference areas will be chosen by the Radiation Safety Officer Representative (RSOR), in consultation with RASO.

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. Areas where the investigation levels are exceeded will be subjected to additional scrutiny, such as biased static readings and/or soil sample collection and analysis.

3.4 Survey Units

Survey unit SU 01 is considered a Class 3 area. MARSSIM guidance (DoD et al. 2000) Table 2 indicates that scan surveys and sampling points should be based on professional judgment. As such, in the interest of conservatism, a 100 percent scan survey of the ground surface will be conducted. The location of the Class 3 survey unit within the DRMO Yard is provided on Figure A-1.

At each sample location, a direct surface measurement and soil sample will be obtained. The number of locations has been determined in Section 3.5 to be a minimum of 20.

3.5 Establishing the Number of Measurements

Since the contaminants may be present in the background, N is calculated in the manner specified for the Wilcoxon Rank-Sum test (Equation 5-2 from the Basewide Radiological Management Plan):

Equation 5-2 from the Basewide Radiological Management Plan (TtEC, 2014a)

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

Where:

- $Z_{1-\alpha}$ = Type I decision error level as determined from MARSSIM (1.645)
- $Z_{1-\beta}$ = Type II decision error level as determined from MARSSIM (1.645)
- P_r = random measurement probability, which is based on relative shift discussed in Section 2.6.3
- 1.2 = factor for over-sampling to account for missing or unusable data

The second term in the equation increases the number of data points by 20 percent. The value of 20 percent was selected to account for a reasonable amount of uncertainty in the parameters used to calculate *N* and still allow flexibility to account for some lost or unusable data. While this 20 percent factor assists in meeting all data quality objectives (DQOs) as stated in Table 3-1, it is not required during the data quality assessment to demonstrate compliance with the stated objectives of the statistical tests. The actual number of measurements required for each survey unit will be calculated for the final report.

P_r in Equation 5-2 from the Basewide Radiological Management Plan is based on the relative shift. The relative shift is equal to Δ/σ, where Δ is equal to [derived concentration guideline level (DCGL) – lower boundary of the gray region (LBGR)], and σ is an estimate of the standard deviation of the measured values in a survey unit.

3.5.4 LBGR Determination

The LBGR is the net median concentration of the contaminant in the survey unit. Since this value is unknown, MARSSIM (DoD et al. 2000) suggests using a value for the LBGR of ½ DCGL during planning purposes. However, once the median concentration activity in the survey unit is established, this value will be used as a ratio to the lowest DCGL for the decay method to determine the LBGR.

Equation 6-7 from the Basewide Radiological Management Plan gives the method used to determine the LBGR:

Equation 6-7 from the Basewide Radiological Management Plan (TtEC, 2014a)

$$LBGR = \frac{C_1}{DCGL_1} + \frac{C_2}{DCGL_2} + \frac{C_3}{DCGL_3} + ... + \frac{C_i}{DCGL_i} \leq 1$$

Where:

C_i = concentration of radionuclide "i"
$DCGL_i$ = DCGL of radionuclide "i"

For planning purposes, the LBGR will be set at 0.5.

3.5.5 Standard Deviation

There is also no estimate of the standard deviation of the contaminant in the survey unit, especially if no contaminant is initially expected. Therefore, σ will be assigned the value of the standard deviation of the adjusted measurement values in the survey unit as shown in Equation 6-8 from the Basewide Radiological Management Plan:

Equation 6-8 from the Basewide Radiological Management Plan (TtEC, 2014a)

$$\sigma = \sqrt{\left(\frac{\sigma_{C1}}{DCGL_1}\right)^2 + \left(\frac{\sigma_{C2}}{DCGL_2}\right)^2 + ... + \left(\frac{\sigma_{Ci}}{DCGL_i}\right)^2}$$

Where:

σ_{Ci} = standard deviation from radionuclide "i"
$DCGL_i$ = DCGL of radionuclide "i"

For planning purposes, σ will be set at 0.35. During the FSS, this value will be revised using the actual radionuclide concentrations obtained from the survey data.

3.5.6 Relative Shift

The relative shift is equal to Δ/σ, where Δ is equal to [wide-area ($DCGL_W$) − LBGR] and σ is an estimate of the standard deviation of the measured values in a survey unit (or for planning purposes from the background area). As stated previously, in cases where the unity rule is used, the DCGL is set to 1. The relative shift can be calculated as shown in Equation 5-1 from the Basewide Radiological Management Plan:

Equation 5-1 from the Basewide Radiological Management Plan (TtEC, 2014a)

$$\frac{\Delta}{\sigma} = \frac{DCGL_W - LBGR}{\sigma} = \frac{1 - 0.5}{0.35} = 1.43$$

Using this Δ/σ value of 1.43, from Table 5.1 of MARSSIM, P_r was determined to be 0.838864.

3.5.7 Calculation of N

As P_r for soil determined to be 0.838864, *N* is calculated using Equation 5-2 from the Basewide Radiological Management Plan as follows:

Where:

Type I decision error level (MARSSIM Table 5.2): 1.645
Type II decision error level (MARSSIM Table 5.2): 1.645
Random measurement probability (MARSSIM Table 5.1): 0.838864

$$37.7 = \left\{ \frac{(1.645+1.645)^2}{3(0.838864-0.5)^2} \right\}(1.2)$$

N for surveys is calculated as a minimum of 37.7 total data collection locations. Rounding this number up to an even number would equate to 19 from each survey unit and 19 from the reference area, for a total of 38. However, one additional sample will be collected from the survey units and reference area to provide additional assurance that sufficient data is collected. To maintain the potential for an FSS, data will be continuously analyzed to determine the relationship between each survey unit and the reference area.

3.6 Gamma Scans

One hundred percent of the Class 3 soil unit will be scanned with a RASO-approved drive-over array system or using a Ludlum Model 2350-1 survey meter with a Ludlum 44-10 2-inch by 2-inch NaI detector as detailed in the Basewide Radiological Management Plan (TtEC, 2014a). Gamma scans by the drive-over array or survey instruments will be logged and submitted with the final report. If a Ludlum 2350-1 with a 44-10 2-inch by 2-inch NaI detector is used, scans will be performed at a rate of approximately 0.5 meter per second (6-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. Backgrounds used for gamma scan measurements will be commensurate with the materials encountered throughout the survey units, and will be used for comparison purposes during static gamma measurements. Using a RASO-approved towed array for scanning will result in a minimum detectable concentration (MDC) of less than 1.0 pCi/g of Ra-226 when compared to its background.

3.6.1 MDCR for Gamma Surveys (2-inch by 2-inch NaI Probe)

The 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 Basewide Radiological Management Plan (TtEC, 2014a):

Equation 7-5 from the Basewide Radiological Management Plan (TtEC, 2014a)

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

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 = 96.77 counts per minute (cpm)
i = scan or observation interval = 1 second

For this calculation, the observed background count rate of 5,806 cpm is used. It should be noted that a typical source will remain under the NaI probe for 1 second during the scan; therefore, the average number of background counts in the observation interval is 96.77 [b_i = 5,806 × (1/60)]. 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. Using these inputs, the MDCR is 1,935.92 cpm.

3.6.2 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 of 5,806 cpm, using Equation 7-9 from the Basewide Radiological Management Plan (TtEC, 2014a):

Equation 7-9 from the Basewide Radiological Management Plan (TtEC, 2014a)

$$MDCR_{SURVEYOR} = \frac{MDCR}{\sqrt{P}} = \frac{1{,}935.92}{\sqrt{0.5}} = 2{,}737.81 cpm$$

3.7 Static Gamma Measurements

Static gamma measurements will be collected at the specified locations in the survey unit using a Ludlum Model 2350-1 survey meter with a Ludlum 44-10 2-inch by 2-inch NaI detector. Additional biased measurements may be collected if elevated gamma scan survey results identify measurements above the investigation level. The gamma and exposure rate measurements will be collected in accordance with SOP 001, Radiation and Contamination Surveys.

For gamma surveys, the MDC is calculated in cpm. Equation 7-12 from the Basewide Radiological Management Plan (TtEC, 2014a) is used to calculate the MDC:

Equation 7-12 from the Basewide Radiological Management Plan (TtEC, 2103a)

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

Where:

3+4.65	=	constant factor provided in MARSSIM (DoD et al. 2000)
R_B	=	background count rate (cpm) = 5,806
T_B	=	background counting time (minute) = 1

Using the inputs observed in the reference area (listed above at 5,806 cpm) in Equation 7-12, the calculated MDC for the Ludlum Model 2350-1 with a 44-10 2-inch by 2-inch NaI detector is 357.32 cpm.

3.8 Exposure/Dose Rate Measurements

Prior to conducting any MARSSIM based surveys, a general area gamma exposure/dose rate survey will be conducted for safety and radiological posting purposes, as well as to identify any areas with comparatively elevated gamma exposure rates. Ludlum Model 19, Bicron MicroRem, or equivalent, scintillation detectors will be used to perform the measurements. The measurements will be conducted with the instrument at 1 meter from the ground surface.

3.9 Media Samples

When applicable, general area removable contamination will be assessed using Masslinn® cloths and monitoring the cloths with a Ludlum 43-68 detector coupled to a Ludlum 2360 or 2221 survey meter. The detector will be operated on the alpha plus beta plateau. Areas with a Masslinn® cloth indicating any increase in activity will be rewiped with another Masslinn® cloth to determine the specific area that contains the removable contamination.

Soil samples will be collected at sampling locations and analyzed by gamma and alpha spectroscopy, as well as liquid scintillation counting. Count times for gamma spectroscopy may be increased as directed by the laboratory manager to provide for minimum detectable activities that are below the release criteria. One hundred percent of final soil samples will be analyzed by gamma spectroscopy using definitive methods. Ten percent of soil samples will be analyzed for Isotopic Uranium, Total Strontium and liquid scintillation counting for H-3. Acceptable quality control parameters are listed in Worksheet 28 of the Sampling and Analysis Plan, Attachment 1 to the Basewide Sampling and Analysis Plan (TtEC, 2014)

3.10 Dose Modeling in Support for Unrestricted Release

The intent of the DRMO Yard FSS is to achieve unrestricted release for the site. To accomplish this goal, it is necessary to provide a means for calculating residual dose to the critical group; the resident farmer in RESRAD was selected. The modifications to the default residential farmer

scenario for RESRAD will be to use the actual surface area of the survey unit, change the distance of the length parallel to the aquifer to the square root of the actual surface area for the survey unit, and use the net concentrations above background.

After the residual dose is determined, the Navy will also determine the excess lifetime cancer risk to the critical group. These values will be provided in the final report.

4.0 QUALITY CONTROL

The data quality objectives for the survey are provided in 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 is radiological surveys. Description of this DFW and the associated phases of quality control are presented in Table 4-1.

5.0 ENVIRONMENTAL PROTECTION

The environmental protection-driven requirements have been addressed in the Environmental Protection Plan (TtEC, 2014c). No additional requirements are necessary.

6.0 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.

Matzke et al. 2010. Visual Sample Plan. Upgrade version 6.0 released June 2010. Pacific Northwest National Laboratory. June.

NAVSEA (Naval Sea Systems Command.). 2014. Final Historical Radiological Assessment, History of the Use of General Radioactive Materials from 1943 to 2011 NAS Brunswick ME. March.

TtEC (Tetra Tech EC, Inc.). 2014a. Basewide Radiological Management Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.

TtEC. 2014b. Accident Prevention Plan/Site Safety and Health Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress

TtEC. 2014c. Environmental Protection Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.

TtEC. 2014. Basewide Sampling and Analysis Plan, Former Naval Air Station Brunswick, Brunswick, Maine. In Progress.

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TABLES

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

	Primary Radiation Properties		Release Criteria		
			Materials, Equipment, and Wastes		
Radionuclide	**Half-life**	**Type**	**Total Surface Activity (dpm/100 cm^2)**	**Removable Activity (dpm/100 cm^2)**	**Soil Samples (pCi/g)[a]**
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
cm^2 - square centimeter
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 3-1
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**
DRMO Yard is listed in the HRA as an area impacted by radiological activities. 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 release criteria for these 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 Final Status Survey of the DRMO Yard. 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 Final Status Survey of the DRMO Yard will include: • 100 percent gamma scan surveys of the Class 3 survey unit using a RASO-approved drive-over array mechanism and/or hand-held instrumentation on asphalt and soil surfaces • A minimum of 20 gamma static measurements, and soil samples in the Class 3 soil survey unit • Additional biased 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 paved surface adjacent to Building 584 as shown on the figures in Appendix A.	If the results of the survey meet the release criteria, then the data will be used to support a Final Status 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-60 – 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
SU – survey unit
Th-232 – Thorium-232
TSP – Task-specific Plan
U-238 – Uranium-238

TABLE 4-1
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. • Verify that the Remedial Project Manager, Navy Technical Representative, and the Caretaker Site Office are notified about mobilization. • Verify that an approved RWP, if required, is available and has been read and signed by assigned personnel. • Verify that the Basewide Radiological Management Plan (TtEC, 2014a), APP/SSHP (TtEC, 2014b), and TSP have been reviewed. • Verify that personnel assigned are trained and qualified. • Verify that personnel have been given an emergency notification procedure. • Verify that workers assigned dosimetry have completed NRC Form 4. • Verify that relevant SOPs and/or manufacturers' instructions are available and have been reviewed for equipment to be used. • Verify that equipment is on site and in working order (initial daily check).		• Verify that radiological instruments are as specified in the Basewide Radiological Management Plan (TtEC, 2014a) and TSP. • Inspect Training Records. • Verify that a qualified RCT and SSHO are present in the active work areas. • Verify that reference area measurements have been obtained in accordance with the Basewide Radiological Management Plan (TtEC, 2014a) and this TSP. The same survey methodology and instruments used to collect the background data will be used to perform measurements within survey units. • Verify that daily checks were performed on all survey instruments. • Verify that instrument calibration and setup are current. • Verify that required dosimetry is being worn. • Verify that field logbooks, chain-of-custody documents, and proper forms are in use. • Verify that samples and measurements are being collected in accordance with the TSP, Basewide Radiological Management Plan (TtEC, 2014a), and applicable SOPs. • Verify the sample handling is in accordance with the Basewide Radiological Management Plan (TtEC, 2014a) and applicable SOPs.		• Verify that the site is properly posted and secured, if necessary. • Conduct ongoing inspections of material and equipment. • Verify that a qualified RCT and SSHO are present at active work areas. • Verify that daily instrument checks were obtained and documented. • Verify the survey results were documented. • Verify that personnel have read and signed the revised RWP, if revision is required. • Inspect chain-of-custody and survey logs for completeness. • Verify the survey activities conform to the TSP. • Verify that survey instruments are recalibrated after repairs or modifications. • Verify that site activities are being photographed. • Verify that survey documentation is reviewed by the RSOR.	

Abbreviations and Acronyms:
APP – Accident Prevention Plan
NRC – Nuclear Regulatory Commission
RCT – Radiation Control Technician
RSOR – Radiation Safety Officer Representative
RWP – Radiation Work Permit
SOP – Standard Operating Procedure
SSHO – Site Safety and Health Officer
SSHP – Site Safety and Health Plan
TSP – Task-Specific Plan

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APPENDIX A

FIGURES FOR DRMO YARD SURVEYS

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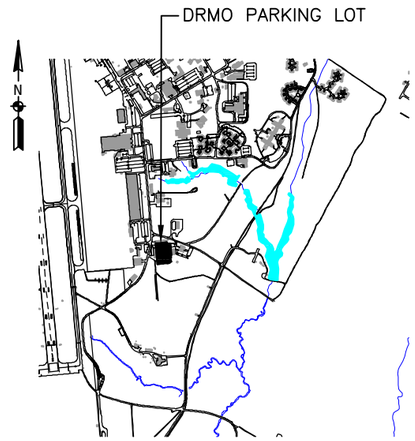

KEYPLAN

LEGEND

SU 1 SURVEY UNIT DESIGNATION

SURVEY UNIT BOUNDARY

30 0 30 60

(feet)

TASK-SPECIFIC PLAN FOR DRMO YARD
FINAL STATUS SURVEY

FIGURE A-1

DRMO YARD PLAN VIEW

FORMER NAVAL AIR STATION, BRUNSWICK, MAINE

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

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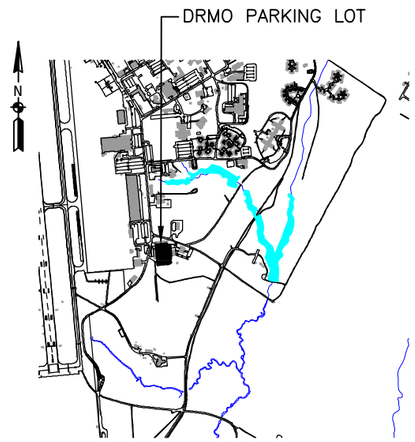
SU 1
CLASS 3
102159.16 m^2 (9490.89 ft^2)

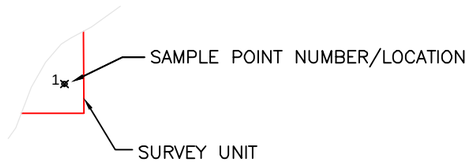
30 0 30 60
(feet)



KEYPLAN

LEGEND

SU 1 SURVEY UNIT DESIGNATION



TASK-SPECIFIC PLAN FOR DRMO YARD
FINAL STATUS SURVEY

FIGURE A-2

DRMO YARD CLASS 3 SURVEY UNIT 1

FORMER NAVAL AIR STATION, BRUNSWICK, MAINE

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

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