



Project Manager's Considerations: Conducting Radiological Investigations and Cleanups

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Presentation Overview

Introduction

- Pre-Fieldwork
- Fieldwork Activities
- Post-Fieldwork
- Special Mention
- Wrap-Up

- Focus and Goal of This Presentation
- Take-Away Messages – Up Front
- Regulations and Guidance for RAD Projects
- DON Policy: Roles and Responsibilities
- Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)
- MARSSIM compatibility with CERCLA
- Historical Radiological Assessments (HRAs)
- How to Build Conceptual Site Models (CSMs)
- Site Model to Demonstrate RAD Investigation

This is an overall outline of our presentation we will be discussing RAD projects in these sections

Focus and Goal of This Presentation

Focus

- Requirements and considerations for conducting radiological (RAD) investigations and cleanups

Goal

- Provide understanding of investigation and cleanup processes to help Remedial Project Managers (RPMs) successfully manage RAD projects in coordination with the Radiological Affairs Support Office (RASO)

Take-Away Messages – Up Front

- Follow the CERCLA process
- NAVFAC RPMs are responsible for RAD investigation/cleanup
- RPMs coordinate with RASO on all aspects of RAD projects following Navy Policy on Roles and Responsibilities
- Coordination reduces Cost and Schedule, and improves Data Quality
- Ensure compliance with QA/QC procedures – avoid re-work
- Visually communicate your conclusions and recommendations – use clear and colorful graphics!

Differences in key considerations and PM responsibilities:

Although PMs are responsible for their projects, they must involve RASO in every step of the process, as spelled out in the DON's policy on Roles and Responsibilities.

Regulations and Guidance for RAD Projects

- **ROLES AND RESPONSIBILITIES: DON Policy on Environmental Restoration Sites Potentially Containing General Radioactive Material (G-RAM) (Feb. 2010)**
- **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**
- **U.S. Environmental Protection Agency (EPA) Regulations**
- **Nuclear Regulatory Commission (NRC) Regulations**
- **Navy Environmental Restoration Program (NERP) Manual (Spring 2016)**
- **Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (Aug. 2000)**

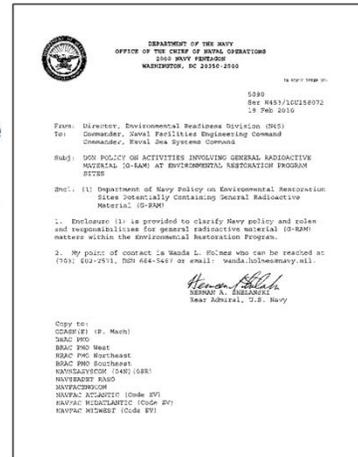
NOTE: References for additional radiological resources are provided at the end of the presentation.

These are regulations and guidance applied to RAD projects...

DON Policy: Roles and Responsibilities

- NAVFAC ensures that RAD investigations and cleanups are conducted appropriately at active installations and BRAC sites
- RASO provides:
 - Complete technical and policy assistance
 - Oversight for Naval Radiation Safety Committee for all types G-RAM
- RASO is responsible for assisting NAVFAC in all aspects of CERCLA investigations and cleanups to ensure CERCLA-listed G-RAM is appropriately addressed

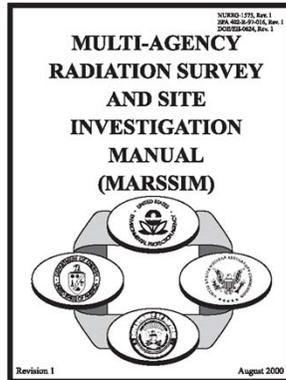
Source: DON Policy on Environmental Restoration Sites Potentially Containing G-RAM (Feb. 2010)



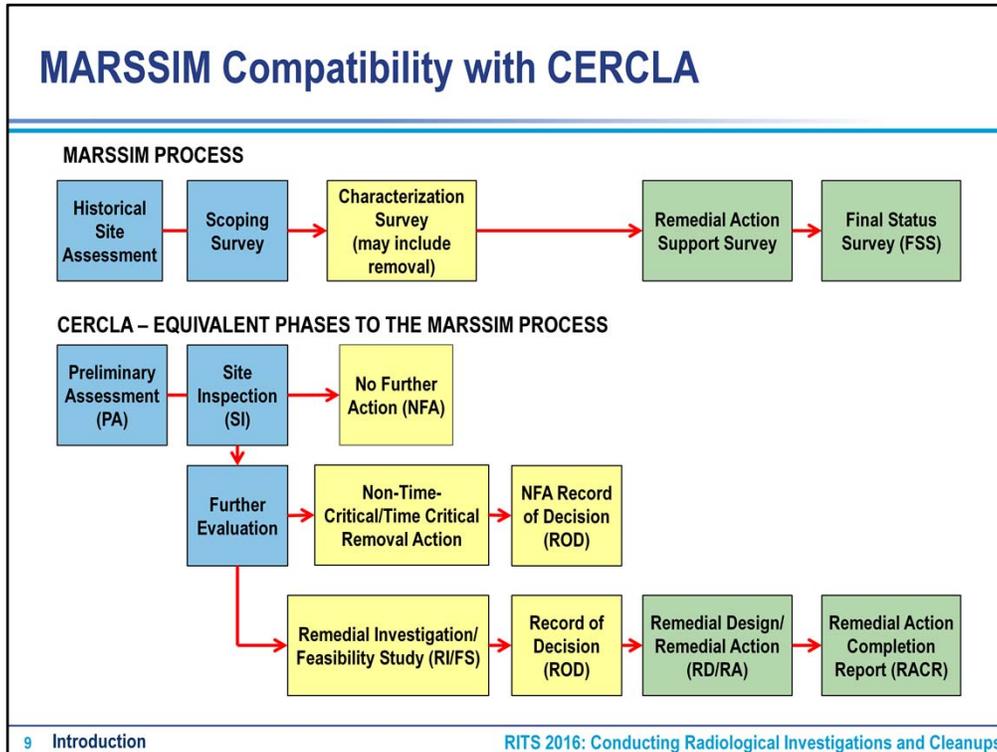
The DON's Policy on Roles and Responsibilities for RAD projects are summarized in the Feb. 2010 document. As you can see, RASO is to be involved in all aspects of CERCLA investigations

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

- Created by a multi-agency committee (DoD, DOE, USEPA, and NRC)
- Provides detailed guidance for planning, implementing, and evaluating RAD surveys to demonstrate compliance with dose- or risk-based regulations <http://www.epa.gov/radiation/marssim/>



Add pdf of MARSSIM cover on bottom portion of slide.



This crosswalk shows how MARSSIM and CERCLA are designed to proceed.

CERCLA

- Regulatory process for investigation/cleanup of sites
- Applicable to all contaminated media, including radionuclides
- Provides for closure of sites when agreed-upon criteria are met

MARSSIM

- Based on and supplement to CERCLA guidance
- Parallels and integrates with CERCLA process

Note that the HRA includes the HSA and Scoping Survey which are equivalent to PA/SI.

What's important is the exit strategies diagrammed here for projects.

If enough info is obtained during the Scoping Survey that can be used to show no further evaluation, then the project can exit the CERCLA process.

However, if Further evaluation is required in the SI, then a removal or remedial action follows with NFA ROD or a RACR.

Need a sentence or two describing RAD only and Commingled contamination.

Historical Radiological Assessments (HRAs)

- **RASO is conducting remaining HRAs**

- HRAs describe site's radiological history and designate whether an area or building is radiologically-impacted
- **Compatible with PA/SI requirements: includes former employee interviews, and review of documents and available data**
- **HRAs may recommend further evaluation for impacted sites**
 - Class 1 Survey (100% sampling coverage)
 - Class 2 Survey (10% – 100% sampling coverage)
 - Class 3 Survey (Judgmental sampling coverage)
- **If data are lacking, may recommend scoping surveys to support Survey Unit classification**

HRAs document the extent of past RAD operations at specific sites and any residual effects these may have had

Scoping surveys may include scans using hand-held Na-I detectors..(true?...what else?)

How to Build Conceptual Site Models (CSMs)

- **Identify potential mechanisms that could contaminate site**
 - Potential for waste discharge to sewer lines
 - Potential for disposal into landfill
 - Likelihood of documented spills
- **Identify potential contaminants**
 - Is RAD contamination commingled
- **Determine whether there is an immediate threat to human health or the environment**

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This is a listing of example questions raised during the CSM process
(give examples here)

Immediate threat to HH&E?: if so, then a removal action (TCRA) may be recommended/required

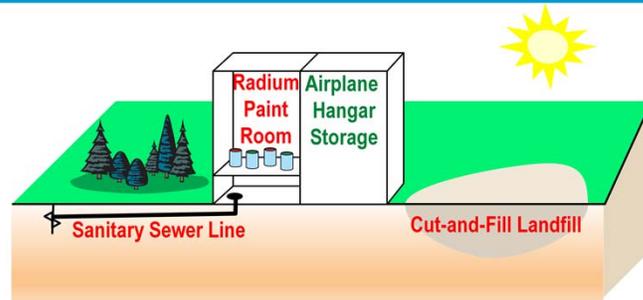
Sanitary Sewers upgradient?:

Mechanism for RAD disposal into landfill?:

Other documented spills?:

Need transitional statement to get to pre-fieldwork

Site Model to Demonstrate RAD Investigation



HRA concludes there is potential for contamination and impacts all four sites....

- Radium Paint Room: Potential for spills during 10-year operation
- Sanitary Sewer Line: Potential waste discharge from Radium Paint Room
- Landfill received waste from onsite incinerator – possible mixed waste

Conclusion	Recommendation
Contamination likely in Paint Room, Sewer Line and Landfill	Perform characterization surveys and remediation, control access
Contamination unlikely in Airplane Hangar Storage Area	Perform scoping survey and prepare Completion Report

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Needs sewer outfall location for later discussion??

Here's a hypothetical case study for demonstrating the investigation and cleanup process for RAD-impacted sites

We assume that the HRA is already completed....the HSA and scoping surveys determined:

- 1) A RAD-paint room was operational
- 2) A sanitary sewer was operationally connected to the paint room
- 3) An airplane hangar storage area adjoined the paint room (held Ra-226 painted instruments and airplanes with those instruments)
- 4) A cut-and-fill landfill was located outside and adjacent to the airplane storage room.

The next step is to prepare a contract for conducting characterization surveys

Presentation Overview

- Introduction

- Pre-Fieldwork – Key Considerations/Responsibilities**

- Fieldwork Activities

- Post-Fieldwork

- Special Mention

- Wrap-Up

- Identify Project Team
- Coordinate with RASO
- Prepare RAD Scope of Work
- Prepare RAD Planning Documents
- Pre-Fieldwork – Key Considerations

So, we're ready to start project planning...we want to cover some of the Key considerations and responsibilities and provide almost a step-by step process.

Identify Project Team

- RASO EPMs
- Public Affairs Officer
- Legal
- ROICC/FEAD
- Contractor



Courtesy U.S. Navy

KEY
POINT

RPMs, EPMs, and PAOs coordinate on ALL communications with regulatory agencies and the public.

First thing you want to do is to assemble your Investigation team, which includes but is not limited to (read listing)

Public Affairs officer is especially important/required for RAD risk communication due to usual intense public interest, need to get out ahead of the project and let folks know what's going on.

Coordinate Activities With RASO

**ON WHICH ACTIVITIES DO RPMs
COORDINATE WITH EPMs?**

Don't Trust To Fate – Coordinate

ALL ACTIVITIES!!!

Working With RASO – An Excellent Resource

- Part of Naval Sea System Command (NAVSEASYSKOM) Detachment – NAVSEADETRASO
- RASO provides technical and policy assistance to RPMs
- Oversight for Naval Radiation Safety Committee
- RASO assists throughout the CERCLA process to ensure CERCLA-listed RAD material is addressed appropriately

**KEY
POINT**

RPMs consult with RASO during contracting, investigations, remedy selection, and removal/remedial actions.

Source: DON Policy on Environmental Restoration Sites Potentially Containing G-RAM (Feb. 2010)

According to the DON's Policy on Roles and Responsibilities, RASO's involvement permeates the entire process.

You want to get them involved early and often, including reporting any RAD incidents involving G-RAM; to make presentations to officials and/or public on G-RAM issues and RAD-impacted sites.

Common Elements in a Scope of Work

- **Clearly state the Contractor's responsibilities**
 - Meet CERCLA risk-based cleanup levels
 - Comply with Federal and State laws
 - Comply with promulgated regulations that qualify as CERCLA Federal or State ARARs (whichever are most stringent)
- **Incorporate QA/QC Requirements**
 - Project success depends on fieldwork QA/QC and data management
 - Scope of Work (SOW) includes QA/QC requirements or may have independent 3rd-party QC oversight contractor

Common Elements in a Scope of Work (cont.)

- **Incorporate project objectives as Contractor requirements**
 - Meet or exceed removal/remedial action goals
 - Meet the remedial action objectives
 - Meet ALARA or “as low as reasonably achievable” DOE requirement
 - Obtain closure
 - Meet or exceed removal/remedial action goals
 - Meet the remedial action objectives

Unique Elements in a RAD Scope of Work

- **Planning Documents**

- **Execution Plan**

- Like a Work Plan – project background, radiation surveys, remediation, and key specific plans as appendices

- **Radiation Protection Plan**

- Details license requirements – especially safety

- **Waste Management Plan**

- LLRW trigger levels; transport and disposal; RASO coordination

- **Final Status Survey (FSS) Plan**

- Describes sampling procedures required for closure

Unique Elements in a RAD Work Scope (cont.)

- **Final Status Survey (FSS) Reports**
 - Demonstrate methods were followed and cleanup goals met
 - Obtain Restricted or Unrestricted Radiological Release
- **RASO review is required for ALL plans**

Prepare RAD Planning Documents

- **Execution Plan**

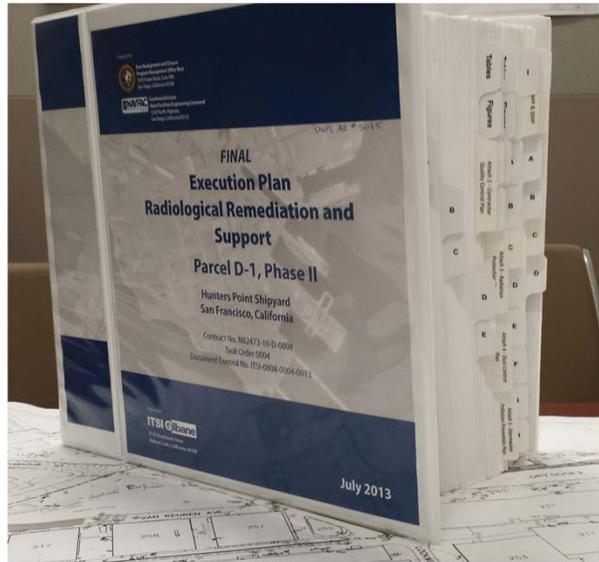
- Like a Work Plan: focus is on surveys and sampling
- Identify sampling locations
- MARSSIM guidance used to determine critical items...number and class of Survey Units, scan speeds, and number of samples
- If RAD is comingled, hybrid Execution Plan addresses both RAD and non-RAD contaminants

**KEY
POINT**

RPM coordinates with RASO for technical support while preparing Plans and for technical reviews of all Plans.

Source: DON Policy on Environmental Restoration Sites Potentially Containing G-RAM (Feb. 2010)

Execution Plan



RAD Planning Documents (Sampling Methods)

- **RAD Sampling and Analysis Plans (SAPs)**

- Similar to SAPs for other contaminants of concern (COCs), follow requirements in EPA's Uniform Federal Policy for Quality Assurance Plans (EPA 2005)
- Include sample collection and transport procedures to laboratory
- Include specific laboratory operating procedures (SOPs) for RAD measurements

**KEY
POINT**

Use RPMs with RAD experience and EPMs to help determine SAP requirements.

RAD Planning Documents (Safety)

- **Radiological Protection Plans (RPPs)**

- **Describes License Requirements: addresses control of potential RAD hazards**
- **Provides specific RAD safety guidance**
- **Identifies RAD personnel and their roles and responsibilities**
 - Licensed RAD Safety Officer (LRSO)
 - Site RAD Safety Officer (SRSO)
 - Health Physics Technicians

**KEY
POINT**

RPM with EPM assistance, reviews RPP to ensure RAD safety requirements are met.

RAD Project Plans (Reporting Results)

• Final Status Survey (FSS) Plan

- Outlines sound and defensible data collection to support conclusions for each Survey Unit
- Equivalent to confirmation sampling for chemical contamination
- RPM and EPM use MARSSIM guidance to develop FSS Plan, including scans, measurements, and sampling
- Scanning locates potential areas for further investigation followed by static measurements, sampling and/or remediation

KEY
POINT

RPM ensures adequate time is provided to RASO EPM to review RAD Project Plans.

26 Pre-Fieldwork

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Soils with pure alpha emitters, surfaces with very low-energy beta emitters or low-energy photon emitters may be difficult or near impossible to detect using scanning.

Because measurements and sampling are done with low density, small/localized elevated activities (hot spots) may be missed.

Scanning provides a measure of confidence that they are found. ---huh?/didn't we just say they may be missed???

Hot spots are not necessarily remediated if the Survey Unit will pass without cleanup. – how is this possible/knowable???

Pre-Fieldwork – Key Considerations

- **RPM Responsibilities**

- Coordinate with EPM and PAO before communicating with regulatory agencies and the public
- Coordinate with EPMs on reviewing Work Scopes
- Use RASO's technical support when preparing and reviewing plans
- Ensure adequate time is provided for EPMs to review Project Plans

- **EPM Responsibilities**

- Provide technical and policy assistance to RPM in developing and preparing Work Scopes and Project Plans

Source: DON Policy on Environmental Restoration Sites Potentially Containing G-RAM (Feb. 2010)

Presentation Overview

- Introduction
- Pre-Fieldwork

Fieldwork – Key Considerations/Responsibilities

- Post-Fieldwork
- Special Mention
- Wrap-Up

- RPM and EPM Responsibilities
- Fieldwork Preparation
- Hypothetical RAD Site
 - Sanitary Sewer Line
 - Radium Paint Room
 - Cut-and-Fill Landfill
- Fieldwork – Key Considerations

Fieldwork – RPM Responsibilities

- **Define who has access to on-site operations**
- **Ensure that proper RAD controls are enforced based on RASO recommendations and the RPP**
- **Contact RASO upon discovery or suspected knowledge of a location that may have RAD contamination**
- **Consult with RASO during all investigations/cleanup**
- **Consult RASO when interacting with regulators and public**

Source: DON Policy on Environmental Restoration Sites Potentially Containing G-RAM (Feb. 2010)

Fieldwork – RASO EPM Responsibilities

- Evaluate on-site work efforts
- Consult on fieldwork results
 - e.g., daily reports, laboratory and survey results
- Evaluate technical compliance with:
 - Project Plans
 - Federal, state, and local regulations
 - RAD controls
 - Health physics practices

Source: DON Policy on Environmental Restoration Sites Potentially Containing G-RAM (Feb. 2010)

RPM and EPM Responsibilities (cont.)

How effectively the RPM and EPM conduct their respective responsibilities directly impacts:

Project Time

Overall Cost

Data Quality

Impacts of Poor Coordination

- **Project delays, increased costs, poor quality result from:**
 - Lack of oversight
 - Non-compliance with Project Plans
 - Insufficient QA/QC of field data
 - Required re-work
 - Unsafe work practices

**KEY
POINT**

RPM and EPM adherence to prescribed responsibilities results in effective fieldwork management.

Fieldwork Preparation

RPM, EPM, and Contractor Fieldwork Discussions

- Health & Safety, especially RAD safety, at morning tailgates
- Proper safety equipment and instruments are on-site and in working condition
- Discuss potential hazards associated with fieldwork and how to mitigate them through RAD controls
- Emphasize QA/QC of field measurements/samples

**KEY
POINT**

Safety of the field crew and data quality are critical for successfully completing fieldwork.

Fieldwork Preparation (cont.)

- **RPM and Contractor assign staging areas for excavation, scabbling, and scanning equipment**
- **Survey equipment and material transported on-site for pre-existing RAD contamination**
- **Implement RAD controls in RPP prior to start of fieldwork**
- **Ensure the RAD equipment storage area is secured for duration of fieldwork**

Fieldwork Preparation (cont.)

- **RPM and EPM ensure RAD controls are implemented by qualified RAD Control Technicians**
- **RAD controls protect workers from potential exposures and prevent spread of radioactive contaminants**
- **RAD control measures include:**
 - **Training**
 - **Access control and monitoring for personnel and equipment**
 - **Proper personal hygiene and equipment decontamination**
 - **Dust control and air monitoring**
 - **Individual RAD meters/dosimeters to determine worker exposure**

35 Fieldwork

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RAD Controls are intended to protect workers from potential exposures and to prevent spread of RAD contamination.

They are identified in the RPP and implemented by RAD Control Techs

They include

Training,

Monitoring individual, air, (portal monitoring may be key to your project)...you don't want a landfill portal monitor going off...

Equipment decon, good hygiene.

Fieldwork Preparation (cont.)

- Contractor ensures there are no unauthorized Site entries
- Contractor establishes RAD Control Area (RCA) and controls access to work area
- Fence entire RCA; locked during non-working hours
- Verify that signage warns of potential RAD hazards

Courtesy U.S. Navy



Fieldwork Preparation (cont.)

- **RPM coordinates with EPM**
 - to ensure site access is controlled
 - that proper RAD controls are in place
 - for any work stoppages and resolutions to resume work
- **RPM provides for additional fieldwork surveillance**
 - Facilities Engineering Acquisition Division (FEAD) and/or
 - Caretaker Site Office (CSO) Representatives
- **RPM may contract for 3rd-Party QA/QC Oversight**

**KEY
POINT**

QA/QC checks are intended to provide scientifically sound & defensible data.

Source: DON Policy on Environmental Restoration Sites Potentially Containing G-RAM (Feb. 2010)

Fieldwork Preparation (cont.)

- **RPM, EPM, and Contractor coordinate to identify un-impacted (reference) areas that are representative of the investigation area's background radiation**
 - Concrete reference should be from buildings constructed at approximately same time and with similar materials
 - Soil reference may be in areas adjacent to RAD projects where no known RAD activities have occurred

PM should oversee reference area (background) measurements.

Fieldwork Preparation (cont.)

Instrumentation depends on contaminant type and fieldwork

- **Pipeline Removal**

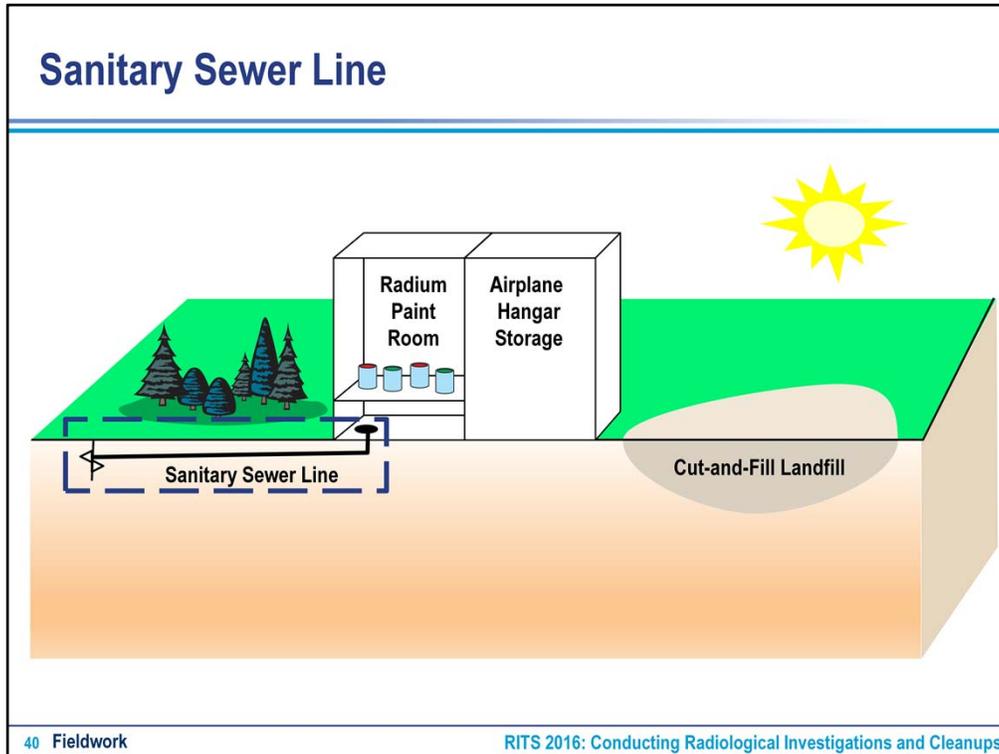
- Generally hand-held instruments
- Used for scanning and static surveys of soil/pipe material

- **Building Surfaces and Soil Excavation**

- Can be hand-held, automated, or hybrid
- Dependent on room size or survey area

- **Contaminant Type (²²⁶radium, ⁹⁰strontium, etc.)**

Need contaminant type here – how about noting scanning for gamma emitters for sub-slab areas...



Needs sewer outfall location for later discussion??

Here's a hypothetical case study for demonstrating the investigation and cleanup process for RAD-impacted sites

We assume that the HRA is already completed....the HSA and scoping surveys determined:

- 1) A RAD-paint room was operational
- 2) A sanitary sewer was operationally connected to the paint room
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The next step is to prepare a contract for conducting characterization surveys

Sanitary Sewer Line (cont.)

- **CSM generally dictates the level of effort**
 - Length of time Radium Paint Room was in operation
 - Activities conducted in Radium Paint Room (painting vs. refurbishment)
 - Potential for radium to be discarded in sewer line
 - Type of sewer system (pressure or gravity-fed)
- **RAD investigation to determine if data supports the CSM**

KEY POINT Fieldwork requires flexibility and creativity when limited information is available.

Outfall not yet part of CSM

Sewer Line Options

Cleanup Options

- **Removal of Sewer System Piping**
 - Excavate soil surrounding sewer pipe
 - Remove sewer pipe
 - Scan excavated soil and sewer pipe
 - Dispose RAD contaminated soil and sewer pipe
- **Hydro-jetting of In-Place Sewer System Piping**
 - Hydro-jet sewer pipeline
 - Camera through sewer pipeline (look for potential cracks)
 - RAD scanner to detect potential radium contamination

Excavate and Remove Sewer Line Site



Removal of sanitary sewer line

Courtesy U.S. Navy

Survey Excavated Soil for RAD Contamination



Scan of soil excavated from around sanitary sewer line on screening pad

Courtesy U.S. Navy

Hydrojet to Clean Sanitary Sewer Line Site



Hydrojetting of the sanitary sewer line

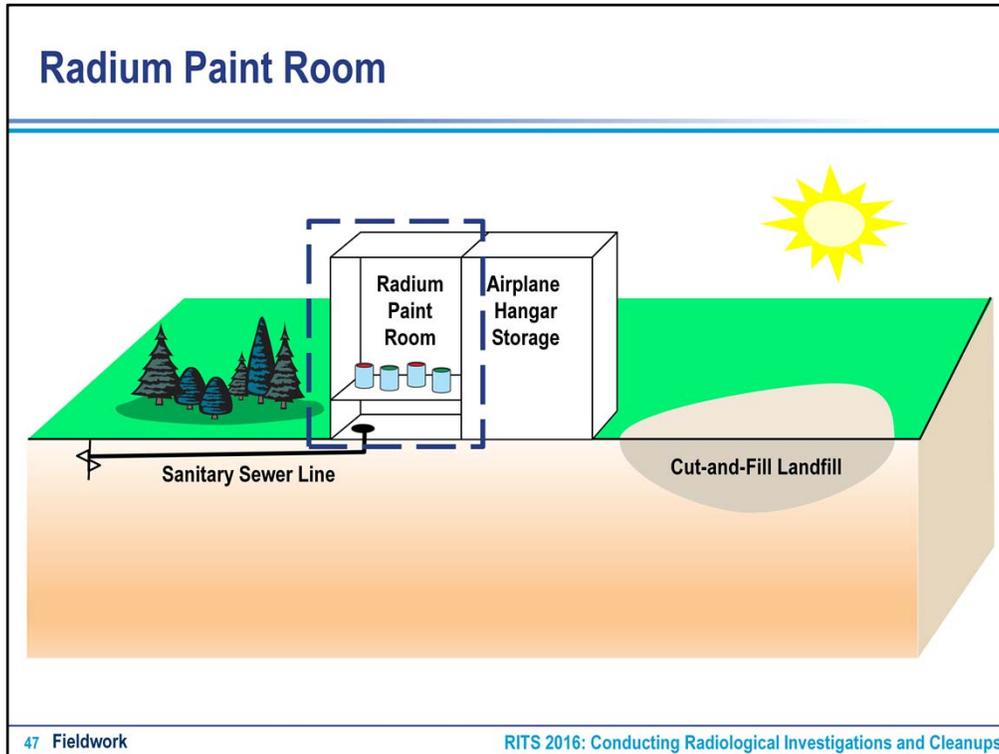
Courtesy U.S. Navy

Combined Video and Scanner for Sanitary Sewer Line



Scanner combined with video camera pulled through sanitary sewer line to identify cracks and identify contamination

Courtesy U.S. Navy



Needs sewer outfall location for later discussion??

Here's a hypothetical case study for demonstrating the investigation and cleanup process for RAD-impacted sites

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The next step is to prepare a contract for conducting characterization surveys

Radium Paint Room (cont.)

- **Radium paint rooms found at many Navy facilities**
- **Documentation of previous activities at radium paint rooms can reduce the investigation and cleanup requirements**
- **Scans and static measurements to be conducted**
 - **Paint Room**
 - **Locations of Known Spills**
 - **Areas of Travel for Paint Room Workers**
 - **Restrooms and Janitor's Closets**

Outfall not yet part of CSM

Radium Paint Room (cont.)

- **Elements of Radium Paint Room Investigation and Cleanup**
- **Remove carpeting and floor tile**
- **Scan and remove ventilation system**
- **Scan and collect static measurements from floors and walls**
- **Collect swipe samples of floors (removable RAD)**
- **Remove RAD-impacted wall material**
- **Scabble RAD-impacted concrete floors**

Radium Paint Room (cont.)



Automated scan of wall associated with paint room

Courtesy U.S. Navy

Radium Paint Room (cont.)

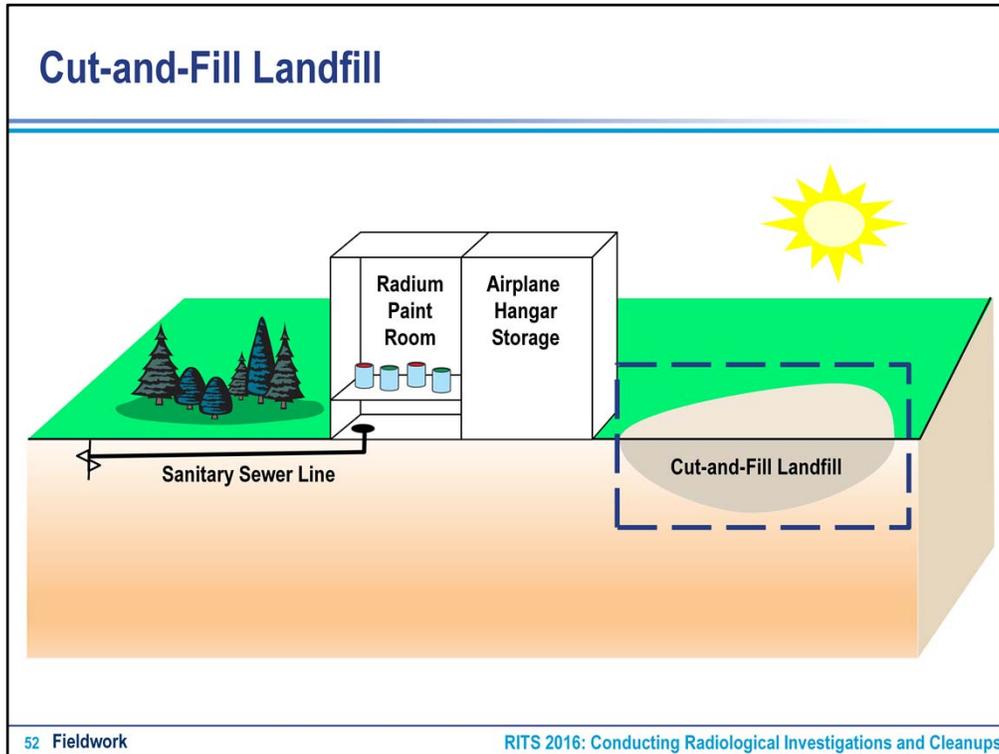


Scanning of floor after removal of floor tile to determine areas of RAD contamination at paint shop

Courtesy U.S. Navy



Paint Room after removal of RAD contaminated wall and scabbled floor where RAD contamination was found



Needs sewer outfall location for later discussion??

Here's a hypothetical case study for demonstrating the investigation and cleanup process for RAD-impacted sites

We assume that the HRA is already completed....the HSA and scoping surveys determined:

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Cut-and-Fill Landfill (cont.)

- Past Navy practices resulted in the disposal of RAD items in landfills
- Items include switches, dials, and markers from ships and aircraft
- Investigations and cleanup includes identifying, cataloging, photographing, and removing RAD items
- Scan methods must be developed that can identify very small items within the landfill material

Courtesy U.S. Navy



Switch removed from landfill

Identifying RAD Waste Material in Cut-and-Fill Landfill



Identification of RAD waste areas (dashed caution tape) within cut-and-fill landfill *Courtesy U.S. Navy*

Scanning Soil to Identify RAD Objects in Landfill



Hybrid scanning methodology developed to identify small RAD items

Courtesy U.S. Navy



RAD contaminated device

Fieldwork – Key Considerations

- **RPMs and EPMs need to effectively coordinate to prevent impacts to:**
 - Project time
 - Overall costs
 - Data quality
- **Safety of the field crew and data quality are both critical for successfully completing fieldwork**
- **QA/QC checks help provide sound and defensible data**
- **Fieldwork requires flexibility and creativity when limited information is known about a site**

Presentation Overview

- Introduction
- Pre-Fieldwork
- Fieldwork Activities

Post-Fieldwork – Key Considerations/Responsibilities

- Special Mention
 - Wrap-Up
- Data Evaluation and Presentation
 - Compliance with Fieldwork Requirements
 - Project Report Preparation
 - Post-Fieldwork – Key Considerations

Data Evaluation and Presentation

- Contractor and RPM responsible for collaborating on data evaluation/presentation – clear, colorful graphics
- EPM provides oversight and recommendations
- Data evaluation conducted in accordance with regulator-approved Work Plan

KEY
POINT

Project reports should present scientifically sound and defensible data that is easily understood and supports conclusions and recommendations.

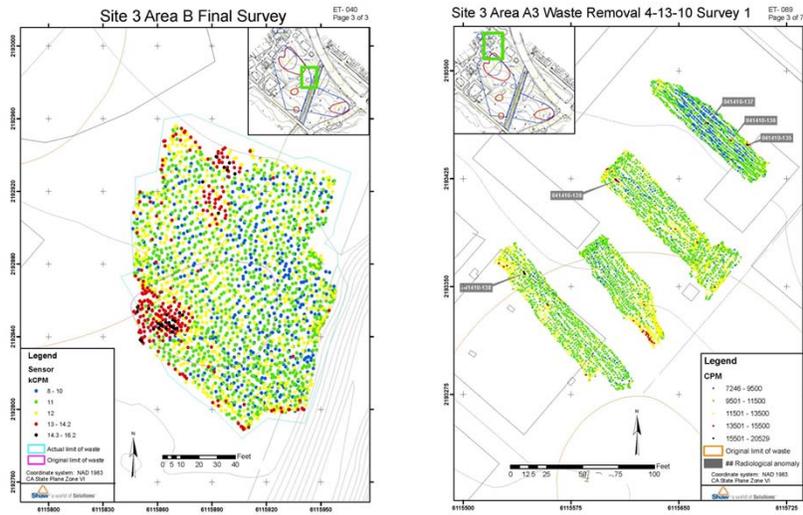
RAD projects result in large amounts of data from scans, static surveys, and soil data collected in the field. The project manager's goal is to be able to present the data in a manner that clearly represents the RAD conditions and/or delineates areas requiring cleanup or areas that were cleaned. RASO can provide oversight and recommendations for data evaluation and presentation based on their experience with other projects. Key consideration is that the report needs to provide scientifically sound and defensible data to support the conclusions.

Data Evaluation and Presentation (cont.)

Best presentation of the data:

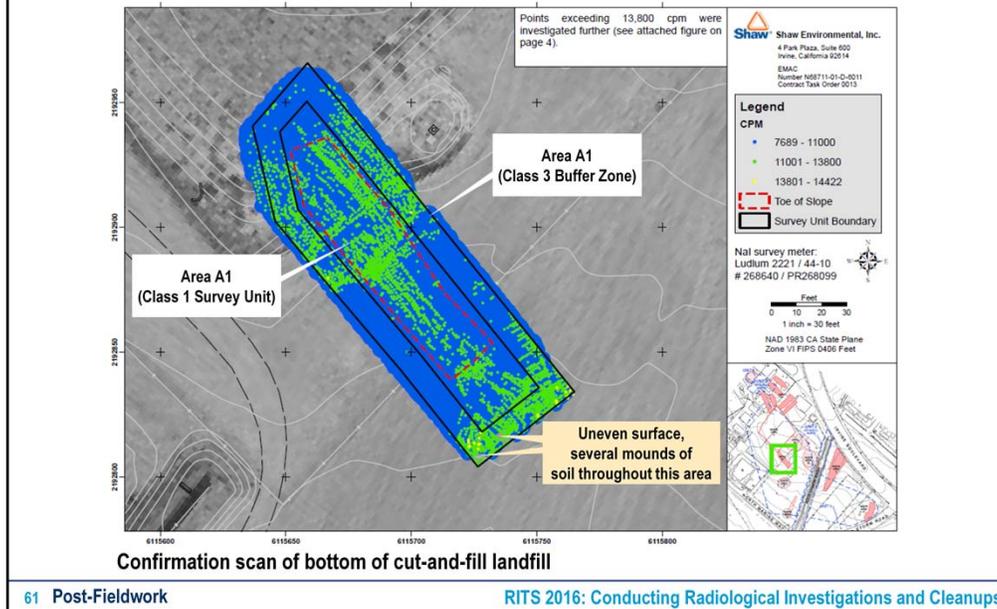
- Clear and colorful graphics
- Supports conclusions and recommendations

Data Evaluation and Presentation (cont.)



Examples of graphical representations of scan data from a landfill

Data Evaluation and Presentation (cont.)



The outdoor scan result presented shows that there was complete coverage of the scan area and identified areas where scans were above the investigation level (areas in yellow). As is shown in the figure, almost all of the area scanned is below the investigation level (either blue or green). Additional biased static scans were conducted in the yellow areas as well as at systematic static scan locations. The figure demonstrates that almost the entire area is below the investigation level and that the static scans will be useful in evaluating the areas identified.

Compliance with Fieldwork Requirements

- RPMs/EPMs are responsible for verifying the following were adhered to in the field and **DOCUMENTED**
 - Scan speeds and survey coverage
 - Field instrument inspections and testing
 - Number and location of measurements and samples
 - Further investigation of survey results exceeding limits
 - Adherence to Standard Operating Procedures

**KEY
POINT**

Non-compliance with these or other QA/QC procedures and methods may require Contractor to conduct re-work.

Project Report Preparation

RADIOLOGICAL REPORT

- Describes field activities completed in accordance with regulator-approved Work Plan
- Provides summary of results obtained during fieldwork
- Provides summary of conclusions and recommendations
- Under CERCLA, RAD results can be provided in an SI Report, RI Report, or in a Remedial Action Closure Report (RACR)

Project Report Preparation (cont.)

FSS REPORT

- Documents past RAD survey efforts
- Documents RAD survey and sampling activities
- Verifies that suitable field and lab measurement techniques were used to collect data
- Includes data evaluation packages to support conclusions and recommendations

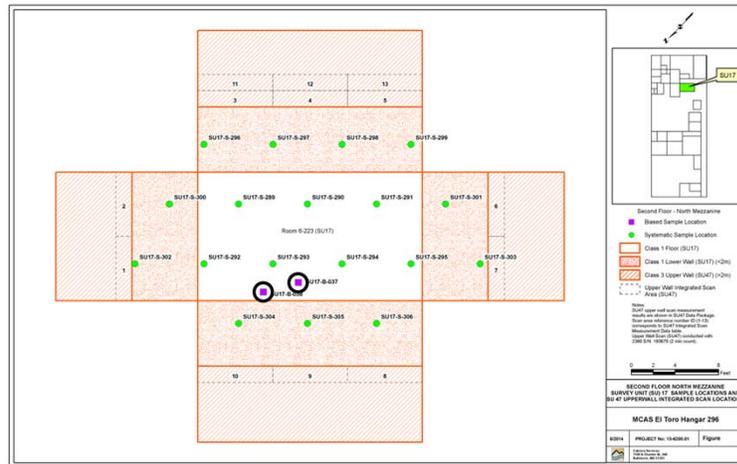
Project Report Preparation (cont.)

- Present data in maps, figures, tables, and graphs
- Demonstrate whether RAOs/release criteria have been met
- RPM and EPM work to ensure data are presented in a clear and concise manner
- Should be self-explanatory and complement conclusions and recommendations in the FSS Report

**KEY
POINT**

Poorly presented data leads to extended review times and delays in approval of recommendations

Project Report Preparation (cont.)



Static sample locations within radium paint room

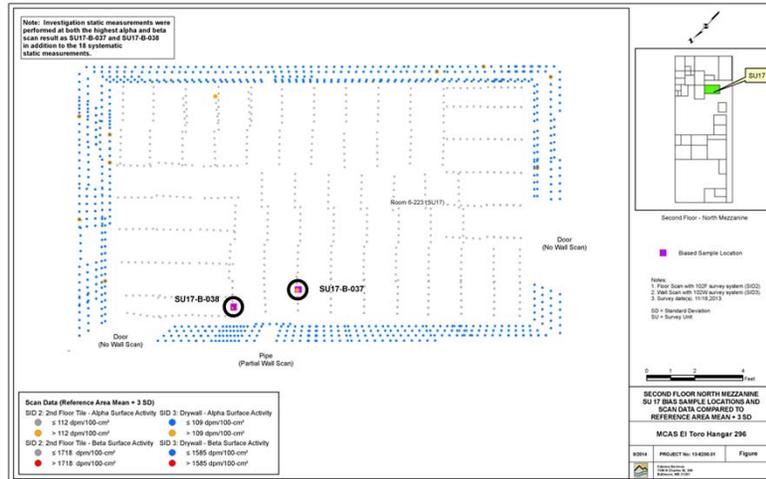
NOTE: Biased survey locations (circled) based on highest alpha and beta measurement from scan surveys.

66 Post-Fieldwork

RITS 2016: Conducting Radiological Investigations and Cleanups

Figure presents a typical representation of locations for static survey locations within a building. The green dots indicate systematic scan locations for the floors and walls of a Class 1 survey unit. Additional biased samples are provided at locations of the highest alpha and beta readings from previously conducted scans. The walls are Class 1 for the lower 3 meters and Class 3 for area above 3m (less likely to be contaminated based on height of the wall/activities potentially conducted).

Project Report Preparation (cont.)



3-D rendering of scan results within room at MCAS EI Toro

67 Post-Fieldwork

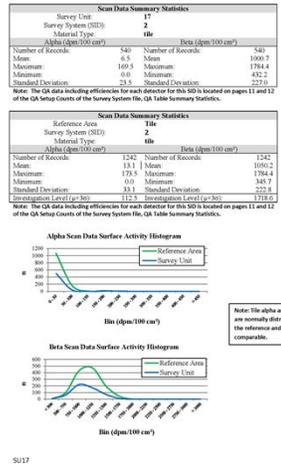
RITS 2016: Conducting Radiological Investigations and Cleanups

Programs are available to be able to present the scan results for the floor and walls of a particular room. In this room, the majority of scan results for the floor and walls are below the investigation level (blue and grey dots). The yellow dots are where the scan data was above the investigation level. This does not necessarily mean that there is contamination but can be utilized in follow up investigation based on the data quality objectives in the regulatory-approved Work Plan.

Project Report Preparation (cont.)

- Min, Max, & Mean
- Standard Deviation
- Reference vs. Survey Areas
- Distribution Histograms

Summary Statistics and Histogram: Survey Unit 17 (North Mezzanine 2nd Floor) SID: 2



Utilization of the raw data can assist in providing multiple-lines of evidence during the evaluation. Comparing the mean, minimum, and maximum for the raw data versus the background data collected is a useful tool in determining if the two data sets are comparable. The standard deviation can be utilized in obtaining an investigation level for a particular substance (e.g., concrete, tile, wood). Distribution histograms can also be used in the overall evaluation of the data.

Post-Fieldwork – Key Considerations

- **Project reports should present scientifically sound and defensible data that is easily understood and supports conclusions and recommendations**
- **Use clear, colorful graphics that are easily understood**
- **Non-compliance with QA/QC methods and procedures may require re-work – DO IT RIGHT THE FIRST TIME!**
- **Poorly presented data leads to extended review times and approval delays**

Presentation Overview

- Introduction
- Pre-Fieldwork
- Fieldwork Activities
- Post-Fieldwork – Key Considerations/Responsibilities
- **Special Mention**
- Wrap-Up

Special Mention

- **Presentation Draft Created by Marc Smits and Jim Callian**
- **Suggestions for Edits Provided by**
 - Steve Doremus, RASO
 - Zachery Edwards, RASO
 - Kenda Neil, EXWC
 - Craig Bias, Battelle
 - Russ Sirabian, Battelle
 - Heather Rectanus, Battelle
 - Vic Saylor, Battelle
 - Jim _____
 - Tony Nelson, NAVFAC EXWC

Presentation Overview

- Introduction
- Pre-Fieldwork
- Fieldwork Activities
- Post-Fieldwork – Key Considerations/Responsibilities
- Special Mention

Wrap-Up

Key Points and Take-Away Messages

- Follow the CERCLA process
- NAVFAC RPMs are responsible for RAD investigation/cleanup
- RPMs coordinate with RASO on all aspects of RAD projects following Navy Policy on Roles and Responsibilities
- Coordination reduces cost, keeps the project on schedule, and improves Data Quality
- Ensure compliance with QA/QC procedures – avoid re-work
- Visually communicate your conclusions and recommendations – use clear and colorful graphics!

Differences in key considerations and PM responsibilities:

Although PMs are responsible for their projects, they must involve RASO in every step of the process, as spelled out in the DON's policy on Roles and Responsibilities.

Additional Radiological Resources

- DOD 4715.6 – [Low Level Radioactive Waste Disposal Program](#)
 - <http://www.dtic.mil/whs/directives/corres/pdf/471506r.pdf>
 - Policy describes implementation of DOD LLRW Disposal Program, applicable to Office of Secretary of Defense, Military Departments, and all other entities within DoD. Document explains purpose and applicability of DoD LLRW Disposal Program, responsibilities of oversight and compliance with law, mechanisms for funding and budgeting for program, and process for requesting waiver from participating in DoD LLRW Disposal Program on case-by-case basis.
- OPNAV M-5090.1 [Environmental Readiness Program Manual](#) – Chapter 29: Low-Level Radioactive Waste Disposal Program
 - <http://doni.daps.dla.mil/SECNAV%20Manuals1/5090.1.pdf>
 - Chapter 29 of Environmental Readiness Program Manual describes policy and procedures by which DON must dispose of LLRW. Chapter defines what constitutes LLRW and describes purpose of program, responsibilities of parties involved in disposal of LLRW, and required training of personnel handling LLRW.

Additional Radiological Resources (cont.)

- NAVSEAINST 5100.18B – [Radiological Affairs Support Program \(RASP\)](#)
 - <http://www.navsea.navy.mil/NAVINST/05100-018B.pdf>
 - Policy describes role and function of Radiological Affairs Support Program (RASP), including basic chain of command and program applicability. Outlines responsibilities of RASP, including responsibility of NAVSEA to coordinate response actions, provide RAD safety training, establish, inspect, maintain, and manage RAD Protection Programs, administer permits, develop control systems, provide facility design review, develop procedures, provide assistance with RASP matters when requested, and act as program manager of RASP Radioactive Waste Disposal Program
- [EPA Superfund Radiation Risk Assessment: A Community Toolkit](#)
 - <http://www.epa.gov/superfund/health/contaminants/radiation/radtoolkit.htm>
 - Toolkit presents collection of 22 fact sheets to help general public understand EPA's risk assessment process used at radioactively-contaminated Superfund sites. Provides overviews on EPA's risk assessment calculators and provides information regarding radionuclides commonly found at Superfund sites

Additional Radiological Resources (cont.)

- [EPA Monitored Natural Attenuation of Inorganic Contaminants in Ground Water Volume 3: Assessment for Radionuclides Including Tritium, Radon, Strontium, Technetium, Uranium, Iodine, Radium, Thorium, Cesium, and Plutonium-Americium](#)
 - <http://nepis.epa.gov/Adobe/PDF/P100EBXW.pdf>
 - Document reviews natural processes that may result in attenuation of radionuclides and data requirements to be met during site characterization. Emphasis placed on characterization of immobilization and/or radioactive decay processes that may control contaminant attenuation, as well as technical approaches to assess performance characteristics of monitored natural attenuation (MNA) remedy
- [Interstate Technology and Regulatory Council \(ITRC\) Radiation Reference Guide: Relevant Organizations and Regulatory Terms](#)
 - <http://www.itrcweb.org/Guidance/GetDocument?documentID=71>
 - Document provides reference for unfamiliar regulatory terms related to radioactive contamination, as well as organizations that manage radiological contaminants

Additional Radiological Resources (cont.)

- [ITRC Decontamination and Decommissioning of Radiologically Contaminated Facilities](#)
 - <http://www.itrcweb.org/Guidance/GetDocument?documentID=75>
 - Document provides step-by-step guide for decontamination and decommissioning of sites contaminated with radioactive materials. Describes processes of deciding fate of facility, determining contaminants of concern and cleanup goals, planning for and performing decontamination and decommission, and transferring/closing facility
- [ITRC Attenuation Processes for Metals and Radionuclides](#)
 - <http://www.itrcweb.org/Guidance/ListDocuments?TopicID=1&SubTopicID=20>
 - Document facilitates implementation of new EPA guidance for monitored natural attenuation (MNA) of metals and radionuclides with framework providing consistent basis for states, stakeholders, federal agencies, and site owners to evaluate and implement attenuation-based remedies