Decommissioning for State of California Licensees "Why it Pays to Plan Ahead!"

Speaker Bio

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- Vice President Radiological Services
- US Navy Nuclear Power Program Submarine Veteran
- BS and MBA
- Over two and a half decades of experience having conducted in excess of 80 facility decommissioning, radiological release, and radioactive materials license termination projects in the State of California
- NYC Emergency Planning and Preparedness and Radiological Advisory Committee Subject Matter Expert
- Author of NYC Emergency Planning and Preparedness Decommissioning Plan
- DNDO experience, FEMA Typed Radiological Support Specialist and member of the ROSS pilot program
- MARSSIM, DOT, OSHA, OSHA Supervisor, and DOE ES&H Certified
- Member
  - Beta Gamma Sigma International Business Honor Society
  - HPS, ANS, and CRCPD
  - Decommissioning Section President
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Roadmap

The Issue

- Overview of the State of California Regulatory History and Personal Experience

Why is this an Issue

- Overview of MARSSIM

How to resolve Issue – Ways to Plan Ahead

- Administrative
- Regulatory
- Contractors/Service Providers
- Site/Facility

Must give credit, where credit is due – Mr. Phil Rutherford for his extensive research on the history of the State of California regulations.

The Issue

By Not Planning Ahead the Licensee May Significantly Increase the Costs incurred covered in the following slides:

The State of California's increased visibility and interest in present and former radioactively contaminated sites:

Interest via – political, legislation, activism, litigation, media, and regulatory

Activist groups have included:

- Committee to Bridge the Gap
- Los Angeles Physicians for Social Responsibility
- Southern California Federation of Scientists
- Natural Resources Defense Council
- Sierra Club
- California League of Conservation Voters
- Heal the Bay
- Green LA, Childhood Cancer Awareness
- Coastal Law Enforcement Action Network
- Pacoima Beautiful

The Issue

The State of California -

- Currently does not possess an approved dose-based release criterion
- Will routinely require service contractor to utilize the ultra conservative rural agriculture land use scenario versus industry standard residential scenario or other open land recreational land use scenarios

The Issue

Currently, release for unrestricted use is approved on a case-by-case basis and in accordance with a reasonable effort as described in Title 17 CCR §30256. Vacating Installation, Records and Notice (k) significantly increasing project durations and thereby incurred costs:

(k): Specific licenses shall be terminated by written notice to the licensee when the Department determines that:

Radioactive Material has been properly disposed of;

Reasonable effort has been made to eliminate residual contamination, if present; and

A radiation survey has been performed which demonstrates that the premises are suitable for release for unrestricted use; or other information submitted by the licensee is sufficient to demonstrate that the premises are suitable for release for unrestricted use.

The Issue

History

In 2001 the State sought to incorporate by reference NRC License Termination Rule 10 CFR 20.1402 Subpart E

In March 2002, multiple activists provided above opposed

Consequence

The State not only discontinued adoption of the order, but also chose to deactivate internal policies RML-00-02 and DECON-1, as DECON-1 has not been a policy since 2002.

At present, CDPH-RHB has no written quantitative criteria to guide staff or licensee, as each release for unrestricted use is determined on a case-by-case basis by the Health Physicist

The State has in essence adopted a no risk, cleanup to background process

Additional Consequence

Executive Order D-62-02 prohibits the disposal of decommissioned materials at Class III or unclassified landfills in the State of California.

All decommissioned materials are to be disposed of as LLRW outside of the State of California

Although reminded of its obligation in D-62-02 to adopt dose-based standards following an Environmental Impact Report, at present time generators are still required to export all decommissioning materials and no dose-based standards exits.

The Issue

Further clarification provided in court submitted declaration statements from CDPH-RHB Branch Chief verified the intent which solidified the potential cost

- ***The Radiologic Health Branch's Policy Number IPM-88-2 was superseded by Policy Number RML-00-02, effective May 1, 2000, and formally rescinded January 1, 2013.***
- ***Decommissioning and termination of Radioactive Materials License is governed by CCR Title 17, Section 30256, subdivision (k), in which Radiologic Health Branch Health Physicists are responsible for making determination whether licensee has made a reasonable effort to eliminate residual contamination and if premises are suitable for release for unrestricted use***
- ***Determinations are made on a case-by-case basis and are not governed by any set policy or required standard, they are at the complete discretion of the Health Physicist professional judgment, including which, if any standards and/or criteria apply or will assist them in making their determination.***
- ***Radiologic Health Branch does not utilize Nuclear Regulatory Commission radiological criteria for license termination set forth in 10 CFR 20.1401-1406, or any similar provisions relating to the establishment of clean-up standards for license termination.***

The Issue

My experience, in over 80 radiological services projects under CDPH – RHB jurisdiction has shown:

- The most recent de facto release for unrestricted use criterion is
  - Residual radiological contamination will be remediated to a level in which survey readings and analytical sample results are not statistically distinguishable from mean reference area background values and ALARA.

They key:

- All decommissioning and release for unrestricted use projects are case-by-case

So:

- To counter the risk of increased time and incurred cost, Licensee's must plan ahead, both internally and with your service contractor. As a Licensee or services contractor, you are allowed to discuss and attain buy-in from the Health Physicist assigned. Remember, this individual is responsible to make the determination. This is best accomplished through technical justification, and use of professional judgment, precedence, the Data Quality Objective (DQO) process described later.

Why is this an Issue

Central to all decommissioning projects is the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and the Multi-Agency Survey and Assessment of Materials and Equipment Manual (MARSAME) prepared by the Nuclear Regulatory Commission, Environmental Protection Agency, and the Department of Energy.

The State of California does apply MARSSIM guidance, although this can sometimes be a difficult and daunting task. To understand requires baseline understanding the overall MARSSIM guidance document as it applies to decommissioning within the State of California.

Why is this an Issue

MARSSIM

- Describes radiological surface contamination characterization methods for building structural surfaces and surface soils
- Does not address survey and release of materials and equipment. Materials and equipment are addressed in MARSAME
- Does not address radiological characterization of subsurface soils (all soils not included in surface soils, i.e. 15cm bgs). Subsurface soils are to be addressed in MARSAS, currently under development.

Why is this an Issue

MARSSIM

- Provides detailed guidance to and focuses on the demonstration of compliance with a dose- or risk-based regulation.
- Includes phases for planning, implementing, assessing, and determining whether a SU meets the established and approved release criterion
- Not without its imperfections and is only a guidance
- Therefore, may require considerable communication between the regulator and licensee/service contractor (highly recommended)
- MARSSIM is routinely coupled with the guidance, recommendations, and equations provided in various regulatory documents. Examples include NUREG 1507 and 1757 for specific instrumentation equations and acceptable dose-based license termination screening values and concentrations respectively.

Why is this an Issue

Various Impacted Equations and Guidance Revolve Around Direct and Scan Survey Minimum Detectable Concentrations

MARSSIM recommends an MDC ≤ 10-50% of the release criterion for scan and total activity direct/static measurements. At a minimum MDC MUST be less than the release criterion. Difficult with no established criteria.

In addition, decommissioning guidance recommends the use of the ISO 7503-1 Standard to account for surface efficiencies, which, when applied to total efficiency, will greatly lower overall efficiency applied to MDC calculations.

Why is this an Issue

Based on the current de facto release for unrestricted use criteria, in relation to industry standards, i.e. release for unrestricted use outside of the State of California

- Significant increase in
  - Total activity (direct/static) measurement count times
  - The minimum number of unbiased measurement and/or analytical samples required
  - Labor required for research and technical justification and regulatory buy-in
  - Labor required for remediation and volume of waste generated
- Significant decreased in
  - Scan rates
  - Allowable total instrument efficiency

Why is this an Issue

- A few examples:
  - For determination of appropriate number of unbiased measurement and/or analytical samples required, MARSSIM uses Tables 5.3 and 5.5 for the WRS and Sign Test respectively. These tables use the selected error rates for Type I (α) and Type II (β) decision errors and the relative shift (Δ/σ) as follows: Δ/σ is equal to [DCGL– Lower Bound Grey Region (LBGR)]/ σ

$$\Delta/\sigma = (\mathbf{DCGL} - \mathbf{LBGR})/\sigma$$

Where:		
DCGL	=	The established and approved release criterion
LBGR	=	Set equal to ½ DCGL based on MARSSIM recommendations
σ	=	An estimate of the standard deviation of the SU (verified during the Assessment Phase utilizing actual FSS results)

  - Due to extremely restrictive release criterion, coupled with extremely large standard deviation, equals smaller than normal Δ/σ as follows:

$$\Delta/\sigma = (\mathrm{DCGL}\downarrow - \mathrm{LBGR}\leftrightarrow)/\sigma\uparrow$$

  - Based on MARSSIM Tables 5.3 and 5.5, results in a significant increase in the minimum number of unbiased measurement and/or analytical samples required.
  - Thereby, increasing the overall duration and associated costs.

Why is this an Issue

Overall impact – Why You Need to Plan Ahead

- Increased
  - Duration for scan and total activity surveys
  - Required remediation
  - Volume of waste
  - Minimum number of unbiased measurement and/or analytical samples
  - Effort for research and technical justification
  - Overall costs to release

How to Resolve

With no established dose-based criteria, and release determined on a case-by-case basis, buy-in and agreement is a MUST for both the investigation and release criterion levels you must plan ahead to:

- Increase both the static and scan MDCs
- Significantly shorten total activity measurement count times
- Increase radiological scan survey speeds
- Decrease the effort required for
  - Number of unbiased measurement and/or analytical samples required
  - Technical justification
  - Remediation, and thereby the volume of decommissioned materials required for export for disposal as LLRW

How to Resolve

Administrative

- As a Licensee requesting decommissioning services
  - RFP MUST:
    - Be transparent, specific and detailed
    - Alleviate the need for service contractor to assume (remember assumptions carry risk and risk carries a cost)
- Have a robust Radiation Protection/Safety Program (RPP/RSP)
- Document, document, document - everything
- Ensure RPP/RSP and license files are transparent and includes any and all self-identification (always better to self-identify than to have others discover)
- For routine and task specific surveys
  - Instrumentation – ensure you have the correct instrument based on the type of emission and adequate detection sensitivity
  - Ensure adequate coverage (Most survey in accessible areas where activities are conducted and areas routinely wiped, while leaving out inaccessible and migratory areas)
  - Apply 5-year Rule for surveys (documentation)
- Robust Receipt and Distribution, and Location and Use records
- Spills – transparent and detailed summaries and documentation
- Radiation Safety Committee meetings and minutes detailed and organized

How to Resolve

Licensee

- Plan ahead and self perform Historical Site Assessment to the degree possible
  - The more robust the RPP/RSP – the more detailed and organized the information, the less time required by the service contractor. This may also mitigate the need for a site visit by the service contractor
  - Prepare
    - Conduct upfront release of materials and equipment
    - Remove all obstructions and unnecessary items
    - Ensure spaces are clutter free and “broom” clean
    - Identify background areas and determinations with an understanding of the materials that may impact and plan for how to overcome or address

How to Resolve

Regulatory

Upfront and often discussions with the regulator, both independent and in concert with service contractor

- Work to attain buy-in on:
  - Release criterion and potential alternatives to the de facto criteria
  - For multiple ROCs, use of most conservative, surrogates, or inferences to forego additional costs associated with expensive analysis. Keep in mind, this will require technical justification.
  - Maximizing the area of Survey Units and thereby minimizing the number of Survey Units
  - Option to apply industry standard criteria or other non de facto levels for requisite calculations (MDCs, minimum number of samples, etc.)
  - Use of DQO Process to your advantage

How to Resolve

DQOs

DQO process will ensure verification and validation of the core essentials for the regulator to ensure technically defensible data of sufficient quality and quantity is acquired when you plan ahead

- Determination and buy-in on
  - Radionuclides of concern whether single, multiple, emission types, and use of most restrictive or total per emission type versus per individual or unity, etc.
  - Site specific investigation and release criterion levels
  - Clear identification of impacted areas of concern and their classifications with removal of non-impacted areas and assignment of lower classification to areas with limited to no known use
  - Use of statistical tests versus independent comparison of individual results
  - Agreement on choice of instrumentation, protocols, and scan and measurement minimum detectable concentrations (MDC)s
  - Decisions on probability of detection error; and
  - Minimum number of unbiased measurement and/or analytical samples required along with reference grid used based on industry standards and levels

Questions?