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## INSPECTION PROCEDURE 83890

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### CLOSEOUT INSPECTION AND SURVEY

Effective Date: 12/30/2022

PROGRAM APPLICABILITY: IMCs 2602, 2801

#### 83890-01 INSPECTION OBJECTIVES

- 01.01 To ensure that the licensee has effectively decommissioned its facility and conducted the Final Status Survey (FSS) as required by U.S. Nuclear Regulatory Commission (NRC) license and regulatory requirements.
- 01.02 To verify that a site or a portion of a site can be released for unrestricted or restricted use, as appropriate, in accordance with NRC requirements.
- 01.03 To ensure that the licensee has taken all actions necessary to support license termination in accordance with NRC requirements.

#### 83890-02 INSPECTION REQUIREMENTS

This Inspection Procedure (IP) provides the requirements and guidance for closeout inspections and radiological surveys at sites licensed under Title 10 of the *Code of Federal Regulations* (10 CFR) Parts 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," 40, "Domestic Licensing of Source Material," and 70, "Domestic Licensing of Special Nuclear Material." This IP applies to fuel cycle, uranium recovery, and materials sites in decommissioning. Because this IP applies to a variety of licensees, some of the inspection requirements and guidance may not be applicable to all sites.

Conduct a performance-based inspection with an emphasis on the activities that have a risk-significant impact on safety and the environment. In accordance with IMC 2602, this IP is specifically focused on risk module (RM-07), the Final Status Survey (FSS). The FSS consists of measurements and sampling to determine the radiological conditions of a site or facility, following completion of decontamination activities (if any) and in preparation for release of the site or facility. If possible, include direct observation of the licensee's implementation of the FSS, supported by confirmatory surveys, side-by-side verification surveys, or other inspection methods as necessary to verify that the facility meets license and regulatory requirements for unrestricted or restricted release.

Prior to the onsite inspection, review the decommissioning plan (DP), reclamation plan, or documents that describe the licensee's approved FSS program. Also, review any changes made to the FSS program since the last inspection.

Uranium recovery facilities may be decommissioned and radiologically surveyed differently than fuel cycle and materials licensed facilities due to the different regulatory and license

requirements applicable to the industry. The regulatory requirements and inspection guidance for uranium recovery facilities are summarized in Section 03.04 of this IP.

#### 02.01 Review of FSS

Select activities and areas for inspection based on survey unit classification and risk significance:

- a. Observe the licensee's implementation of the FSS, if possible.
- b. Conduct side-by-side verification and/or confirmatory surveys in areas with the highest potential for residual radioactive contamination.
- c. Verify that the licensee has developed and implemented a FSS program that meets license and regulatory requirements.

Refer to Appendix A, "Inspection of Final Status Survey Programs," for a detailed inspection checklist for review of the licensee's FSS program.

#### 02.02 Verification That Site Can Be Released

Verify that the site or a portion of the site can be released for unrestricted or restricted use. Verify through document review or by direct observation:

- a. Licensee has implemented the FSS program as stipulated in the license, DP, or reclamation plan.
- b. FSS sample results are less than the NRC-approved release criteria for equipment, building surfaces, and land areas.
- c. Licensee has effectively managed the survey data in accordance with the quality control requirements specified in the FSS plan or NRC guidance such as NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)."
- d. NRC's verification and/or confirmatory survey results, if any, are consistent with the licensee's FSS results.

#### 02.03 Closeout Inspection and License Termination

During the closeout inspection, verify that the licensee has completed all actions necessary to terminate the license. These actions include confirmation that:

- a. The facility meets the release criteria for unrestricted or restricted release per 10 CFR Part 20, Subpart E, "Radiation Protection Programs," (refer to Section 02.02).
- b. Licensed material has been transferred to an authorized recipient or disposed at an authorized location.
- c. Potentially contaminated material and equipment have been surveyed and released from the restricted area in accordance with applicable regulations and license conditions.

- d. Radioactive/contaminated equipment, materials, scrap, etc. are not being used or stored. Ideally, this review should be completed following receipt and evaluation of records required by 10 CFR 30.36, §40.42, and §70.38, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas."
- e. The licensee has transferred decommissioning records to the appropriate NRC Regional Office as required by 10 CFR 30.36, §40.42, or §70.38.

#### 83890-03 INSPECTION GUIDANCE

The decision to conduct an onsite review of the licensee's FSS, verification that a site or a portion of a site can be released, and/or performance of a closeout inspection depends, in part, on the risk significance, complexity, enforcement history, and public interest of the decommissioning project. The inspector should discuss the proposed inspection plan with the associated licensing and/or project manager. The decision to conduct an onsite NRC verification (side-by-side) or confirmatory survey will be made on a case-by-case basis. Facilities that meet the following criteria do not always require a verification or confirmatory survey:

- a. An adequate FSS has been conducted to the satisfaction of the NRC staff.
- b. Radioactive material use was limited to small quantities of radionuclides with half-lives of 120 days or less.
- c. Radioactive material use in an area was limited to sealed sources only, and the sealed sources leak tests have been  $<0.005 \mu\text{Ci}$ .
- d. Activities included use of limited quantities of materials that pose a very low risk to public health and safety. For example, NRC has waived the confirmatory survey for some small research and development facilities that used only hydrogen-3 (tritium) and carbon-14 due to the low hazards presented by these two beta-emitting radionuclides.

Facilities that meet the following criteria should be subjected to a verification or confirmatory survey:

- a. NRC was unable to conduct an in-process inspection during performance of FSS.
- b. Poor operating or enforcement history including repetitive violations involving radioactive materials or the radiation protection program.
- c. Significant interest by the public or Congress, especially if there is a lack of confidence with cleanup efforts at the site.
- d. Identification of significant weaknesses during inspection of the licensee's FSS program.
- e. The radionuclides of concern included unsealed, long-lived alpha-emitters including uranium, thorium, radium, and transuranics.

If the NRC determines that verification and/or confirmatory surveys are to be performed, determine if the NRC staff or an NRC contractor will conduct the survey. A contractor should be used in the following situations:

- a. Licensee's FSS involves unique or complex technical issues.

- b. Survey will include numerous or relatively large survey units.
- c. NRC staff lack the equipment or experience required to perform the surveys. For example, surveys of land areas may require the use of global positioning systems that the NRC inspector may not have access to.

If the NRC decides to use a contractor for the verification or confirmatory survey, the inspector should reach out to the HQ staff who manages the contract with the NRC contractor for radiation surveys as early as possible and provide support the licensing project manager by helping to develop the proposed work plan for the work to be performed. Details of NRC technical assistance requests are provided in IMC 0312, "Technical Assistance for Radiation Safety Inspections at Nuclear Fuel Cycle Facilities and Materials Licensees' Sites." Unless an existing contract is in place, the inspector may be requested to complete NRC Form 305, "Request for Technical Assistance (RFTA)," as described in IMC 0312, "Technical Assistance for Radiation Safety Inspections at Nuclear Fuel Cycle Facilities and Materials Licensees' Sites," for the proposed survey.

The contractor will develop a survey plan that requires NRC review and approval. The inspector and the licensing project manager are expected to review the survey plan and ensure that the survey plan captures the essential aspects of the proposed confirmatory or side-by-side verification survey. The NRC staff will observe the contractor conducting the survey, in part, to act as a liaison between the contractors and the licensee's staff.

If the inspector plans to conduct the verification and/or confirmatory survey, the inspector should prepare for the inspection using the checklist provided in Appendix A, "Inspection of Final Status Survey Programs," to this IP.

### 03.01 Review of FSS

Prior to the onsite inspection, review the licensee's FSS plan and any data collected during implementation of the FSS plan. If the licensee has conducted the FSS or portions of the FSS, compare the licensee's results to the release criteria. In addition, verify the number of samples and the locations of the data points are in accordance with the approved FSS plan. Obtain drawings or maps of the area for review during the inspection.

If the inspection includes a confirmatory or verification (side-by-side) survey, develop a comprehensive inspection and/or survey plan:

- a. Select the areas that will be reviewed, surveyed, or sampled using a risk-informed, performance-based approach. For example, conduct observations and surveys in areas classified by MARSSIM as Class 1 or 2 survey units instead of Class 3 survey units or unimpacted areas.
- b. Determine the types of surveys to be performed (surface scans, fixed-point measurements, ambient gamma radiation measurement), the number of samples to be collected, and whether the samples will be split with the licensee.
- c. Select instrumentation for use during the inspection that will detect the radionuclides of concern and provide the necessary minimum detectable activity of the radionuclides.

During the inspection:

- a. Observe the licensee conducting the FSS, if possible.
- b. Compare the licensee's implementation of the FSS to the instructions and procedures provided in the FSS plan and FSS program.
- c. Conduct the side-by-side or confirmatory survey and collect the samples in accordance with approved procedures. Maintain control of the samples using chain of custody forms (NRC Form 303) as necessary.
- d. Ship the soil, water, and swipe samples to the NRC's contract laboratory for analysis, as necessary, and review the sample results provided by the laboratory.
- e. Evaluate the results of the verification or confirmatory survey. Compare the NRC's results to the licensee's results. Compare all results to the NRC's approved release criteria. This evaluation may include statistical comparison of the NRC's results to the licensee's results as described in MARSSIM.

Refer to Appendix A, "Inspection of Final Status Survey Programs," for a detailed inspection checklist for review of the licensee's FSS program.

#### 03.02 Verification that Site Can Be Released

Verify that the facility, or a portion of the facility, meets the criteria for unrestricted or restricted release. This verification includes confirmation that:

- a. All licensed material at the facility or area to be released has been transferred to an authorized recipient or disposed at an authorized disposal facility.
- b. The site has been adequately surveyed by the licensee, the licensee has effectively controlled the data, and the survey results are less than the NRC-approved release criteria.
- c. The NRC has conducted, or provided with the opportunity to conduct, a side-by-side verification or confirmatory survey. The decision to conduct an independent radiological survey will be based on various factors including the radionuclides of concern.
- d. The NRC's confirmatory survey or side-by-side verification results are consistent with the licensee's FSS results.

The building or land areas to be surveyed should be free of radioactive material. There may be instances when radioactive material may remain in the survey unit (including generally licensed devices), or radioactive material may be located in areas adjacent to the survey unit. This radioactive material may interfere with the survey measurements. The inspector should consider reasonable alternatives, such as use of shielded detectors or temporary relocation of the radioactive material. If the radioactive material cannot be removed and if the results of the survey are impacted by the material, the inspector should make note of this interference in the inspection report.

If the licensee has not submitted the FSS report to the NRC, review the licensee's FSS data during the inspection. Compare the FSS data to the approved release criteria and

FSS plan requirements. If discrepancies are noted, discuss these discrepancies with the licensee's staff.

Occasionally, the NRC may not be offered the opportunity to observe the FSS or conduct independent verification surveys. For example, some nuclear materials licensees (usually Group 1 and 2 sites) may conduct site decommissioning and complete the FSS without prior notification to the NRC. In these situations, discuss the site status with NRC management (regional or program depending on the licensing organization) and the licensing project manager. In these situations, determine whether a closeout inspection and survey should be conducted based on the potential hazards and risks associated with the licensed activities involving radioactive material.

Refer to Appendix A, "Inspection of Final Status Survey Programs," for a detailed inspection checklist for the review of the licensee's FSS program.

### 03.03 Closeout Inspection and License Termination

If the licensee has requested termination of the license, the NRC may elect to conduct a closeout inspection to support the license amendment. As part of this inspection, verify that the licensee has completed site remediation, finished the FSS, and provided all required documents to the NRC to support license termination:

- a. Close Out Inspection. Verify that the licensee has completed all decommissioning as described in the licensee's approved DP, or other approved document as applicable. Compare the decommissioning work completed to the NRC-approved DP or equivalent. For more complex sites (such as Group 4 or above), this review may be conducted in coordination with the NRC's licensing project manager. Also, verify that all licensed radioactive material has been disposed or transferred to authorized recipients.
- b. Review of FSS Results. Review the results of the licensee's FSSs and compare the results with the NRC-approved release criteria. Compare the FSS results to the NRC's verification and confirmatory surveys, as appropriate. If possible, observe the licensee's implementation of its FSS. The purpose of this "in-process" FSS inspection is to provide confidence that the licensee's survey results are accurate and representative of the actual condition at the facility.

Refer to Appendix A, "FSS Program Inspection Areas," for a detailed inspection checklist for review of the licensee's FSS program.

- c. Records transfer. In accordance with 10 CFR 30.36, §40.42, and §70.38, and guidance contained in NUREG-1757, Volume 3, Section 3.3, before a license is terminated, verify that all required records are transferred to the appropriate NRC Regional Office. These records include:
  1. Records of disposal made under 10 CFR 20.2002, "Method for Obtaining Approval of Proposed Disposal Procedures," §20.2003, "Disposal by Release into Sanitary Sewerage," §20.2004, "Treatment or Disposal by Incineration," and §20.2005, "Disposal of Specific Wastes."
  2. Records of measurements and calculations used to evaluate release of radioactive effluents to the environment.

3. Records of spills or other unusual occurrences.
4. As-built drawings and modifications of structures in restricted areas.
5. Lists of all areas designated as restricted areas.
6. Lists in a single document updated every two years of all areas outside restricted areas where spills or other unusual occurrences were known to occur, licensed material was buried, and had the license expired and licensed material were present, the area would require either decontamination and disposal of licensed material or approval under 10 CFR 20.2002.
7. Personnel exposure and monitoring reports required by 10 CFR 20.2206, "Reports of Individual Monitoring," that have been submitted to the NRC for the calendar year in which the license has expired or is being terminated.
8. Reports of personnel exposures for terminated employees or employees no longer working with radioactive materials required by 10 CFR 19.13, "Notifications and Reports to Individuals," that have been submitted to both the NRC and the employee.

#### 03.04 Decommissioning and Survey Requirements for Uranium Recovery Sites

The regulatory requirements for uranium recovery decommissioning are provided in Appendix A to 10 CFR Part 40, "Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for their Source Material Content." Appendix A provides the requirements for cleanup of groundwater (Criterion 5), closure of tailings and waste impoundments (Criterion 6), and reclamation of land areas (Criterion 6). Criterion 6 also provides the survey requirements for land areas. The release limits for land areas are based on concentrations of radium-226 in the soil, but regulations allow the licensee to calculate cleanup criteria for other radionuclides of concern, specifically uranium and thorium isotopes, using the radium benchmark dose calculation process.

Commonly, uranium recovery sites conduct decommissioning using the instructions provided in an NRC-approved reclamation plan which focuses on the cleanup and restoration of land areas. Structures used to support uranium recovery operations are demolished and buried rather than surveyed and released. The reclamation plan normally includes instructions for radiologically surveying the site for unrestricted use. Regulations allow licensees to conduct surveys using alternative methods such as MARSSIM with prior NRC approval; however, most uranium recovery licensees adhere to the basic survey requirements provided in Appendix A.

As noted earlier, the survey requirements for land areas are provided in Criterion 6. In accordance with Criterion 6, the land is divided into 10-meter by 10-meter grids. The licensee conducts ambient gamma radiation measurements and collects a multi-point soil sample from each grid. Depending on the size of the site, the licensee may have to survey and sample hundreds of individual grids.

Many uranium recovery licensees have performance-based licenses which allow them to make changes to the reclamation plan in certain circumstances as specified in the license. These changes should be reviewed as part of each inspection.

The NRC inspector or the NRC's contractor should conduct side-by-side verification and/or independent confirmatory surveys. These surveys will normally involve surface and subsurface land areas but may also include remaining building surfaces such as concrete slabs. In consultation with the licensing project manager, develop a survey plan that will verify the results of the licensee's FSS.

If the inspector plans to conduct side-by-side surveys, select, and use detection equipment that is comparable to the licensee's equipment. A commonly used meter for land area surveys includes a ratemeter coupled to a 2-inch by 2-inch sodium-iodide detector calibrated to radium-226. Collect soil samples, or split soil samples with the licensee, since the release criteria for land areas are based primarily on radioactive material concentrations in the soil.

The inspector has several choices when conducting the confirmatory survey. The inspector could choose to:

- a. Randomly select grids that were surveyed by the licensee. An advantage of this method is that the inspector should be able to directly compare the confirmatory survey results to the licensee's FSS results or
- b. In a biased manner, select the grids with the highest sample results to ensure that these grids do not exceed the release criteria or
- c. Select both grids in a random manner and grids with the highest sample results or
- d. Implement a MARSSIM-style survey consisting of randomly selected locations across the entire area to statistically demonstrate that the property can be released for unrestricted use.

Regardless of the type of survey chosen, the goal of the survey is to ensure that the licensee has effectively reclaimed the area and implemented the FSS. The results of the NRC's confirmatory survey can be used to help demonstrate that the property can be released for unrestricted use.

#### 83890-04 RESOURCE ESTIMATE

Inspections of the decommissioning of material sites depending on the complexity of the licensee's program, would typically involve one to two inspectors and require about one to four days (8-36 hours) to complete. This estimate is only for the direct inspection effort and does not include preparation for and documentation of the inspection.

#### 83890-05 PROCEDURE COMPLETION

This IP is complete when the inspection staff observe the activities, interview site staff, and review records as needed to satisfy the objectives of this IP. This IP should be completed at least once during a decommissioning project, or at other frequencies as established in the inspection schedule.



## 83890-06 REFERENCES

IMC 0312, "Technical Assistance for Radiation Safety Inspections at Nuclear Fuel Cycle Facilities and Materials Licensees' Sites"

IMC 2602, "Decommissioning Inspection Program for Fuel Cycle and Materials Licensees"

NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination"

NUREG-1575, Revision 1, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)"

NUREG-1757, Volume 1, "Decommissioning Process for Materials Licensees (Revision 2)"

NUREG-1757, Volume 3, "Financial Assurance, Recordkeeping, and Timeliness (Revision 1)"

END

## APPENDICES

Appendix A: Inspection of Final Status Survey Programs

## ATTACHMENTS

Attachment 1: Revision History for IP 83890

## Appendix A: Final Status Survey Program Inspection Field Notes

These field notes are provided to focus the inspector on the key program areas that should be reviewed during inspections of Final Status Survey (FSS) program.

The inspector's review of the FSS program can be divided into several parts including: (1) review of FSS design; (2) observation of the licensee's implementation of the FSS; (3) performance of an independent confirmatory survey; and (4) review of the licensee's and NRC's survey results.

### 01.01 DESIGN REVIEW AND OBSERVATION OF FSS

Prior to the onsite inspection, the inspector should review the contents of the FSS plan and any implementing procedures<sup>1</sup>. The following should be reviewed as part of the plan review or during onsite observation of performance of the FSS.

#### Risk Module (RM) 1: Observation of Decommissioning Activities

- Survey design is consistent with NRC accepted guidance documents..... ( )Y ( )N
- Maps of areas to be surveyed are available and accurate. .... ( )Y ( )N

#### RM 2: Occupational Radiation Protection

- Workers are provided appropriate personal protective equipment for the environment..... ( )Y ( )N
- Hard to detect nuclides have been addressed and employees briefed on process for detection. .... ( )Y ( )N
- Background locations clearly defined..... ( )Y ( )N
- Proposed instrumentation for use during survey; ensure the instrumentation can detect the radionuclide concentrations at or below the proposed release limits..... ( )Y ( )N
- Procedures to manage daily functional checks, minimum detectable calculation and instrument critical levels as appropriate. .... ( )Y ( )N

#### RM 3: Security and Control of Radioactive Materials

Not applicable

#### RM 4: Waste Generation, Storage and Transportation

Not applicable

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<sup>1</sup> If the plan has been approved by the NRC, then the inspector should verify implementation of the plan during inspection. If the FSS plan has not been reviewed and approved by the NRC, the inspector should review the plan for consistency with NRC guidance documents including MARSSIM as appropriate. Additional details about FSS design can be found in NUREG-1757, Volume 2, Section 4.4.

RM 5: Public Dose, Effluents and Environmental Monitoring

Not applicable

RM 6: Management Organization and Control

- Release criteria approved or acceptable to the NRC. .... ( )Y ( )N
- Statistical tests that are either approved or acceptable to the NRC for evaluation of the survey results. .... ( )Y ( )N
- Defined organizational structure, responsibilities, and training/qualification requirements. .... ( )Y ( )N
- A quality assurance/quality control (QA/QC) program to manage data, survey documentation, equipment calibrations, audits, and corrective actions. .... ( )Y ( )N
- Capability and qualifications for offsite laboratories to conduct the required analyses; in particular, ensure the QA/QC procedures are acceptable for the radionuclides to be analyzed. .... ( )Y ( )N

RM 7: FSS

01.02 REVIEW OF FSS RESULTS

Most complex FSS reports will be reviewed and approved by the licensing project manager and headquarters health physicist. The inspector may assist in this review.

Materials licensees with less complex projects may submit the FSS report to the Regional Office for review and approval. In these situations, the license reviewer may request that the inspector conduct the technical review of the FSS report. The NRC reviewer/inspector should verify that:

- a. The FSS was implemented in accordance with the approved FSS plan.
- b. The results of previously conducted in-process inspections and confirmatory surveys to confirm that the licensee has properly implemented the FSS plan and associated procedures. In other words, the results of confirmatory surveys, including split samples or independent measurements, are consistent with results of licensee surveys.
- c. The licensee's QA/QC program was effectively implemented.
- d. Changes made to the FSS plan, if not previously reviewed, are not significant and are technically correct.
- e. Descriptions of the survey units are consistent with FSS plan requirements.
- f. Results of elevated measurement comparisons, if any, confirm that small areas of residual radioactivity do not exceed the appropriate limits.
- g. The results of the appropriate statistical tests (e.g., Wilcoxon Rank Sum and sign tests), confirm that the survey results indicate compliance.

- h. Judgmental survey results are not used in the statistical tests and are evaluated separately against the release criteria, and survey results obtained via random start and systematic sampling are statistically treated separately for the purpose of demonstrating compliance.
- i. Appropriate instrumentation, with sufficient sensitivities, proper calibrations, and adequately trained users, was used for surveys, scans, and measurements, as described in the FSS plan.

END

Attachment 1: Revision History for IP 83890

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public Information)
N/A	ML20125D995 11/08/83			
N/A	ML031490061 05/01/03 CN 03-013	Revised to incorporate the Final Status Survey approach recommended by IMC 1246, App MARSSIM and to incorporate in-process confirmatory inspections		
N/A	ML22010A145 12/15/22 CN 22-026	Revised to incorporate risk-informed, performance-based inspections; also includes updated guidance documents		ML22327A271