

# NRC INSPECTION MANUAL

DWMEP/DCD

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## INSPECTION PROCEDURE 83801

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### INSPECTION OF REMEDIAL AND FINAL SURVEYS AT PERMANENTLY SHUTDOWN REACTORS

PROGRAM APPLICABILITY: 2561

#### 83801-01 INSPECTION OBJECTIVES

01.01 To verify that permanently shutdown power reactor sites have been decontaminated to acceptable residual radioactivity levels in accordance with the License Termination Plan (LTP) requirements for unrestricted or restricted use.

01.02 To verify that the radiological measurements, surveys and documentation of remedial action support surveys (RASS) and final status surveys (FSSs) are conducted in accordance with the licensee's LTP and implementation procedures.

01.03 To verify that the licensee's implementation or completion of remediation surveys have been adequately performed and the survey units have been prepared and are acceptable for the performance of FSSs.

01.04 To verify that the licensee's implementation of the FSS program and to confirm the acceptability of the FSS results. See Appendix A, "Final Status Survey Program Inspection Checklist."

#### 83801-02 DEFINITIONS

##### 02.01 Remedial Action Support Surveys

Remedial action support surveys are defined as those surveys that are performed by the licensee after soil remediation activities or structure dismantling and decontamination activities have been completed. RASS's are performed to support remediation activities, as a pre-requisite to verify the area has been properly decontaminated and prepared for the FSS to be implemented and to provide data for planning the FSS. RASS's typically include verification that there is no significant contamination at depth either in soil or in structures, cracks, crevices and floor-wall interfaces, and that there is no significant loose surface contamination on structures.

##### 02.02 Final Status Surveys

Final Status Surveys are measurements and sampling performed by the licensee following the completion of decontamination activities in preparation for release. The FSS is conducted to demonstrate that the residual radioactivity levels are less than the derived concentration guideline levels (DCGLs) in the approved LTP.

### 02.03 In-Process Surveys

NRC's in-process surveys and sampling may be conducted simultaneously with the licensee's activities. The in-process surveys may be conducted either during or prior to completing remediation activities to assess the licensee's progress in preparing for FSSs, or may be conducted during the licensee's performance of FSSs to verify that the licensee is performing radiological measurements and obtaining results consistent with the FSS design and procedures and the LTP. The inspectors should collect side-by-side, split samples or arrange for "round robin" sampling, with the licensee for comparative purposes, and should compare in-field instrument readings and sensitivity. In the "round robin" sampling approach, the samples are collected in the presence of the inspector, counted by the licensee, and the inspector sends the samples to the NRC contracted laboratory for analysis. To validate laboratory capability, the inspector may count samples previously collected and analyzed by the licensee.

NOTE: NRC lessons learned and experience have shown that the in-process approach has resulted in significant savings in cost, assured a more accurate FSS, and had less of an impact on the licensee in maintaining the survey unit accessibility for NRC inspectors.

### 02.04 Confirmatory Surveys

Confirmatory Surveys are performed after the licensee has completed their FSS measurements. Confirmatory surveys are performed to validate the licensee's survey program and to provide assurance that the survey unit meets residual radioactivity levels for release.

## 83801-03 INSPECTION PLANNING AND CONDUCT

### 03.01 Inspection Survey Preparation

- a. The inspectors should review licensee records for the types of radioactive materials used, occurrence of any significant safety issues, and any special concerns about the site expressed by the Project Manager(PM), NRC staff or other stakeholders.
- b. The inspectors should review the licensee's LTP to determine the scope of facility contamination and the licensee's decontamination, remediation survey, and FSS programs. If the licensee does not have an approved LTP, the inspectors should review the licensee's procedures for performing these tasks.

NOTE: Without an approved LTP that establishes the permissible residual radioactivity levels, the licensee is at risk for performing remediation and FSSs activities.

- c. The inspectors, in conjunction with the PM and headquarters health physicist, should consider the following when planning inspection surveys. In areas where in-process surveys were not conducted, or samples were not collected, confirmatory surveys and sampling may be performed after the licensee has completed decontamination activities and performed the FSS. Sites where in-process surveys and sampling have not identified significant weaknesses in the

FSS program may not require confirmatory surveys and sampling. However, confirmatory surveys may be deemed necessary for sites where unresolved radiological program weaknesses were previously identified or where violations were identified. Confirmatory surveys should be considered where there is historical information of spills or unusual occurrences involving the spread of contamination at the site. The goal is to conduct sufficient confirmatory surveys and to collect an adequate number of samples so that the inspector and staff can conclude that the licensee's decommissioning activities and survey program has been implemented in a manner that provides confidence in the results.

### 03.02 Inspection Effort

Based on the characterization data and other information provided by the licensee during the course of the decommissioning, the PM, the headquarters health physicist and the Regional Inspectors should determine in advance the level of effort to be employed to collect sufficient data and information that will allow the staff to ascertain that the licensee has met residual radioactivity requirements. Table A below provides recommendations for focusing the inspection effort for various phases of the decommissioning.

Table A - Recommended Inspection Focus

Licensee Activity	NUREG 1757 Guidance	Inspection Purpose	Inspection Process
Dismantling and Decontamination Remediation Activities	Section 4.2 - Validate data consistency with licensee's characterization surveys	Ensure health and safety of remediation workers and public	NRC Inspection Manual Chapter 2561, "Decommissioning Power Reactor Inspection Program" and NRC Inspection Procedure 83750, "Plant Support"
Remedial Action Support Surveys	Section 4.3 - Verify area is prepared for FSS and validate the FSS design	Ensure areas are prepared for FSS	Observation of Licensee surveys and survey records for compliance with LTP survey requirements
FSS in-progress	Section 4.4 - Validate FSS design and performance	Ensure LTP-FSS compliance	Observation and inspection of licensee surveys and performance of NRC In-process Surveys
FSS completed	Section 4.4 - Verify FSS residual radioactivity levels	Verify compliance with LTP - FSS requirements	Performance of NRC Confirmatory Surveys and review of licensee survey records

FSS Reports	Section 4.5 - Verify FSS report requirements	Verify compliance with LTP-FSS Reporting	Review of licensee survey records, and NRC In-process or Confirmatory Surveys for agreement with licensee conclusions
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- a. Inspections of facilities where the NRC in-process surveys have not identified significant weakness in the facility's radiation protection program implementation or deficiencies in the FSS program and FSS report, may not require additional in-process or confirmatory surveys.
- b. Facilities that have experienced the following may require extensive in-process or confirmatory surveys to be performed:
  1. Significant unresolved weaknesses that are identified during the inspection of the licensee's survey program.
  2. Repetitive radiation protection violations.
  3. Partial site releases that include impacted areas.
  4. Records of spills or unusual occurrences involving the spread of contamination during decommissioning activities at the site.

### 03.03 Inspection Plan

The inspector should develop an inspection plan outlining the types of measurements, the samples to be taken, the survey units to be surveyed, and the documents to be reviewed. The inspection plan should include a survey plan that is consistent with the licensee's approved DCGLs, survey unit classification and media sampling and survey methods. Inspections should be biased toward the conduct of surveys and the review of documents from Class 1 rather than Class 2 or 3 survey areas. The inspectors should also ensure that survey units have been properly classified or re-classified as a result of decommissioning activities.

### 03.04 Inspection of Remediation Activities and Transition to FSSs

Inspection of remediation activities should include reviews of procedures for sample chain-of-custody, access control to future FSS areas, survey data collection and data management, quality control surveys, and records retention and management. Instrumentation calibration and survey methods should be evaluated to ensure measurements are meeting the required percentage of the area to be surveyed, instrument scan sensitivity, and direct survey or sampling requirements for the survey unit classification. Inspection activities should evaluate the licensee's RASS completion and that the prerequisite activities required for FSSs have been performed. In performing this evaluation, the inspector should review the procedures and performance of RASSs as follows:

- a. Review the radiation technician/surveyors training and qualification records to ensure compliance with technical specifications and the LTP.
- b. Review the method for determining the background radioactivity level for the survey

is consistent with the LTP.

- c. For remnant structures, review the procedures for performing surveys that determine contamination-at-depth in cracks, crevices and floor wall interfaces. Review the licensee's surveys or samples taken to verify that remnant structures were remediated to the appropriate depth.
- d. For remnant structures, review the surveys that determine the loose surface contamination is less than 10% of the total residual radioactivity.
- e. For soil areas, review the surveys that demonstrate that the areas were remediated to the appropriate depth.
- f. If automated measurement systems are employed, a review of the licensee's technical bases documents, including calculations, validation tests, and software verification must be performed. These systems may include portable In-situ gamma spectroscopy systems, conveyor based monitors, and bulk monitors.
- g. Ensure access control measures were followed for areas where FSSs have been completed and re-survey protocols are addressed.

#### 03.05 Conduct of In-Process Surveys

The "In-Process" final survey inspection is to provide confidence that the licensee's survey results are accurate and representative of the conditions at the facility. Inspectors should review any license conditions related to the prerequisite activities for performing the RASS and FSS in the LTP. Review the licensee's final status survey design packages, and/or survey reports, as applicable. See Appendix A, "Final Status Survey Program Inspection Checklist."

#### 03.06 Conduct of Confirmatory Surveys

Inspection activities for completed FSSs may include the collection of confirmatory samples or measurements to provide confidence that the licensee's FSS program is adequate. These surveys may be in addition to the findings of the in-process inspection. The confirmatory surveys are performed to ensure that the survey results reported by the licensee are accurate and representative of the conditions at the facility.

#### 03.07 Review of FSS Records

The review of FSS Records shall include the following: review of FSS records packages for completeness, licensee review and approvals, training and qualification records for survey technicians and instrument calibration records. For a detailed discussion of FSS inspection areas, see Appendix A.

#### 03.08 Inspection Report

- a. The inspectors will prepare an inspection report that summarizes the actions taken under this inspection procedure and the findings and evaluations of the inspection staff. Issue the inspection report to the licensee and distribute a copy of the Inspection Report to the appropriate licensing staff. The report should include or

reference NRC contractor reports documenting in-process or confirmatory surveys performed during the inspection period.

- b. The Inspection Reports are part of the basis for the staff's finding that the licensee has met the release criteria. The licensee's FSS reports are the licensee's demonstration of the residual radioactivity levels remaining in each survey unit meet the DCGLs in the LTP. Inspection reports include the NRC in-process and confirmatory survey results, document the licensee's FSS results and are used as part of the basis for license termination.

#### 03.09 Inspection Resources

The direct onsite inspection hours required to complete this inspection depend on the complexity of the facility and the duration of the licensee's remediation and final survey program. For facilities needing a significant final survey effort, approximately 10 to 40 inspection hours will be needed to complete the inspection of each soil or building survey unit.

END

**APPENDIX A**  
**FINAL STATUS SURVEY PROGRAM INSPECTION CHECKLIST**

**I. CONSIDERATION FOR DESIGNING FINAL STATUS SURVEY INSPECTIONS**

- A. Inspections should be made against commitments in the LTP and the licensee's FSS plan. If items for further or future review were identified in the Safety Evaluation Report that supported the LTP approval, the inspectors should also verify that these items are addressed.
- B. Inspection of a licensee's FSS program may include independent in-process or confirmatory measurements by the inspector or NRC contractor. The extent of the confirmatory measurements, and whether the use of an NRC contractor is warranted, depends on a number of factors discussed in Section III below.
- C. For each inspection, the inspector should identify which inspection areas and activities listed below are covered.

**II. INSPECTION ITEMS DURING FSS**

- A. Review the Organization and Responsibilities for adequacy/completeness:
  - 1. Survey program documentation
  - 2. Responsibilities and qualifications of the survey staff.
  - 3. Relevant License Termination Plan, design and procedure changes in accordance with 10 CFR 50.59 or 72.48.
- B. Review the Quality Assurance/Quality Control (QA/QC) Programs for adequacy/completeness:
  - 1. Organizational structure
  - 2. QC Surveillance Program
  - 3. Document Control/Records Management Program
  - 4. Equipment Maintenance and Control Program
  - 5. Audits and Corrective Action Program
- C. Determine if the laboratory analytical procedures, sample chain-of-custody procedures, data management, (including QA/QC) are acceptable, and if the results are adequately documented.
- D. Determine if the licensee's survey implementation procedures are consistent with the LTP and FSS Plan.
- E. Determine if the field and laboratory instrumentation are adequate and appropriate for scanning, direct measurements, and analysis for the radionuclides of concern (ROCs), the DCGL and DCGL- Elevated Measurement Comparison (DCGL<sub>EMC</sub>).
- F. Determine if the calibration accounts for the ROCs.



- G. Review ROCs, area classification, survey unit size, estimated mean and standard deviation for samples.
- H. Review the methods used to address the impact of multiple ROCs in FSS planning.
- I. Review instrument use procedures:
  - 1. Minimum Detectable Concentration (MDC) and scan MDC calculations
  - 2. Actual vs. required scan sensitivity; and
  - 3. Calibration, including accounting for multiple radionuclides and any environmental factors that may influence instrument performance, such as temperature limitations or moisture concerns.
- J. Review project documentation for completeness, accuracy, and represents current radiological conditions relative to the DCGLs.

### III. NRC IN-PROCESS AND CONFIRMATORY SURVEYS

- A. The PM and inspector should determine if an in-process or confirmatory survey is to be performed. Extensive in-process or confirmatory surveys should be considered if any of the following exist:
  - 1. Significant, unresolved, weaknesses identified during the inspection of the licensee's final status survey program.
  - 2. Repetitive radiation protection violations.
  - 3. Partial site release of impacted areas.
  - 4. Records of spills or unusual occurrences involving the spread of contamination during decommissioning activities at the site.
- B. If an in-process or confirmatory survey is to be performed, determine if an NRC Contractor should be used. Meeting any of the criteria listed below will, in general, justify the use of a contractor.
  - 1. Licensee's FSS involves unique or complex technical issues.
  - 2. Confirmatory survey is expected to require more than a person-week effort to complete field surveys and sampling.
  - 3. Confirmatory survey is very high priority project that cannot be completed by NRC staff in a timely manner.
- C. Evaluate each anomaly identified during in-process, or confirmatory surveys, for compliance with LTP Survey Plan requirements, the DCGL and DCGL<sub>EMC</sub>.
  - 1. Is it acceptable relative to size and concentration?
  - 2. Has the licensee adequately addressed it?
  - 3. Is it within the bounds of survey unit classification?
- D. Select survey units/areas for Confirmation:
  - 1. Determine scan coverage based on classification.
  - 2. Review analytical procedures for appropriateness for measuring the ROCs, the DCGL and DCGL<sub>EMC</sub>.
  - 3. Cross-check FSS data packages against plan requirements.



- E. For soil sampling, determine sampling depth requirements and sampling intervals. At a minimum, samples should be collected from anomalous or other judgmental areas, together with selected licensee-archived samples, for confirmatory analysis. The necessity for, and the specific numbers of, other random/systematic samples should be separately evaluated, using the Data Quality Objectives (DQO) process.
- F. For structure surfaces, perform direct measurement surveys or sampling to determine contamination-at-depth in cracks, crevices and floor/wall interfaces.

END

# ATTACHMENT 1

## Revision History: IP 83801 “INSPECTION OF REMEDIAL AND FINAL SURVEYS AT PERMANENTLY SHUTDOWN REACTORS”

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
N/A	08/11/97	<u>IP 83801</u> (Inspection of Final Surveys at Permanently Shutdown Reactors) has been revised to be consistent with the dose base criteria used on the licensee termination rule and MARSSIM guidance. The pervious guidance was NUREG-5849 which was based on concentration limits. Therefore, in order to comply with 10 CFR 20 subpart E, the licensee needs to do a dose analysis and follow MARSSIM guidance and the procedure has made the appropriate changes.	No	N/A	No
N/A	01/28/02	Incorporated MARSSIM guidance	No	N/A	No
N/A	09/05/06 CN 06-020	Major revision incorporating lessons learned from Maine Yankee and Trojan	No.	N/A	ML061090058