

# **NRC INSPECTION MANUAL**

URMDB

---

## **INSPECTION MANUAL CHAPTER 2801**

---

URANIUM RECOVERY AND 11e.(2) BYPRODUCT MATERIAL  
FACILITY INSPECTION PROGRAM

2801-01	PURPOSE .....	1
2801-02	OBJECTIVES .....	1
2801-03	APPLICABILITY .....	1
2801-04	DEFINITIONS .....	1
04.01	11e.(2) byproduct material .....	1
04.02	Construction .....	1
04.03	Groundwater .....	2
04.04	In situ recovery .....	2
04.05	Operation .....	2
04.06	Master Inspection Schedule .....	2
04.07	Performance-based approach .....	2
04.08	Performance-based license .....	2
04.09	Risk-informed approach .....	2
04.10	Site-specific inspection plan .....	2
04.11	Source material .....	2
04.12	Standby mode .....	2
04.13	Unrefined and unprocessed ore .....	3
04.14	Uranium milling .....	3
2801-05	RESPONSIBILITIES AND AUTHORITIES .....	3
05.01	Director, Office Nuclear Material Safety and Safeguards (NMSS) .....	3
05.02	Regional Administrator(s) .....	3
05.03	Director, Division of Decommissioning, Uranium Recovery, and Waste Programs ....	3
05.04	Director, Division of Nuclear Materials Safety .....	3
05.05	Branch Chief, Division of Nuclear Materials Safety .....	4
05.06	Branch Chief, Division of Decommissioning, Uranium Recovery and Waste Programs .....	4
05.07	Inspectors, Division of Nuclear Materials Safety .....	4
2801-06	REQUIREMENTS .....	5
06.01	Performance-based, Risk-informed Inspections .....	5
06.02	Types of Inspections and Timing of Routine Inspections .....	5
06.03	Core and Discretionary Procedures .....	6
2801-07	GUIDANCE .....	6
07.01	Regulatory Requirements .....	6
07.02	Performance-Based, Risk-Informed Inspection Approach .....	7
07.03	General Description of Inspection Program .....	7
07.04	Inspection During Construction and Preoperational Phases .....	9
07.05	Inspections During Operational Phase .....	10

07.06	Inspection Frequencies and Adjustments to Frequencies .....	11
07.07	Independent Inspection Effort .....	12
07.08	Inspector Qualifications and Use of Technical Experts .....	12
07.09	Master Inspection Schedules and Site-Specific Inspection Plans .....	12
07.10	Inspection Process.....	13
07.11	Documentation of Inspections.....	14
07.12	Management Reviews .....	14
2801-08	REFERENCES .....	14
Appendix A: Core and Discretionary Inspection Procedures for Construction and Preoperational Inspections.....		AppA-1
Appendix B: Core and Discretionary Inspection Procedures for Operational Inspections..		AppB-1
Attachment 1: Revision History for IMC 2801.....		Att1-1

## 2801-01 PURPOSE

To establish the inspection program for conventional uranium mills, in situ recovery uranium mills and other 11e.(2) byproduct material facilities licensed and regulated under Title 10 to the *Code of Federal Regulations* (10 CFR) Part 40.

## 2801-02 OBJECTIVES

02.01 To provide the inspection requirements for licensed sites in construction, pre-operation, operations, and standby modes. The inspection program will be implemented in a risk-informed and performance-based manner with an emphasis on activities that impact safety and the environment.

02.02 To determine if uranium recovery and byproduct material sites are managed in a manner that is protective of workers, members of the public, and the environment.

02.03 To achieve consistency in the performance of inspections by inspectors based in regional offices and the program office.

## 2801-03 APPLICABILITY

The information provided in this Inspection Manual Chapter (IMC) applies to conventional and in situ recovery (ISR) uranium mills. This IMC also applies to other sites authorized to possess 11e.(2) byproduct material. The information provided in this IMC would apply to thorium mills, if constructed in the future.

This IMC does not apply to: (1) former uranium mill and tailings sites managed by the U.S. Department of Energy under the general license provisions of 10 CFR 40.27 and 40.28; (2) unrefined and unprocessed ore; and (3) the import or export of uranium. The NRC's Memorandum dated September 7, 2012 (Agencywide Document Access and Management System [ADAMS] Accession No. ML12213A418) provides the current guidance for inspection of uranium recovery sites transferred to the Department of Energy for long-term surveillance.

The decommissioning inspection program requirements for uranium recovery and 11e.(2) byproduct material facilities are provided in IMC 2602, "Decommissioning Oversight and Inspection Program for Fuel Cycle Facilities and Materials Licensees." Some uranium recovery and byproduct material sites may conduct decommissioning activities in conjunction with operations. In these situations, inspectors should plan and conduct inspections using the guidance provide in IMC 2801 for operational activities and IMC 2602 for decommissioning-related activities.

## 2801-04 DEFINITIONS

04.01 11e.(2) byproduct material: Tailings or waste produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

04.02 Construction: As defined in 10 CFR 40.4, construction means the installation of wells associated with radiological operations (e.g., production, injection, or monitoring well

networks associated with ISR or other facilities), installation of foundations, or in-place assembly, erection, fabrication, or testing for any structure, system, or component of a facility or activity subject to the regulations in this part that are related to radiological safety or security.

- 04.03 Groundwater: The water below land surface in a zone of saturation, or water contained within an aquifer.
- 04.04 In situ recovery: In situ recovery (ISR) involves the use of a leaching solution (lixiviant) to extract the mineral of interest from the geological formation in which it occurs.
- 04.05 Operation: Operation for a mill is the process of extracting uranium from ore. For an 11e.(2) disposal facility, operation means that a uranium or thorium mill tailings pile or impoundment is being used for the continued placement of byproduct material or is in standby status for such placement.
- 04.06 Master Inspection Schedule: An inspection schedule that is used to plan and implement all uranium recovery and 11e.(2) site inspections. The schedule helps the inspection staff to manage the inspection frequencies, avoid conflicts between inspections, and control inspection program resources.
- 04.07 Performance-based approach: As applied to inspection, a performance-based approach tends to emphasize results (e.g., can the pump perform its intended function?) over process and method (e.g., was the maintenance technician trained?). In other words, a performance-based inspection focuses on what was achieved by the licensee rather than how it was achieved.
- 04.08 Performance-based license: A performance-based license allows the licensee to make changes to the facility without prior NRC approval if certain conditions specified in the license are met.
- 04.09 Risk-informed approach: An approach in which risk insights are considered together with other factors to determine a course of action to focus inspection activities commensurate with the licensee's authorized program. A risk-informed inspection focuses on those areas that are most important to ensuring safety. The qualitative risk of an activity can be determined by evaluating the combined answer to three questions (i.e., the risk triplet): (1) what can go wrong; (2) how likely it is; and (3) what its consequences might be?
- 04.10 Site-specific inspection plan: An inspection plan that is developed for individual sites. These plans are used to facilitate the inspection by specifying the required inspection procedures, work assignments, inspection dates, contacts, and other logistical information.
- 04.11 Source material: (1) Uranium or thorium, or any combination thereof, in any physical or chemical form or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of: (i) uranium; (ii) thorium; or (iii) any combination thereof. Source material does not include special nuclear material.
- 04.12 Standby mode: Situation where a uranium recovery licensee has chosen to stop production or processing of uranium but does not want to proceed with the

decommissioning of the site. This typically occurs when the driver to cease production is expected to be resolved and the facility plans to resume production. In certain situations, the licensee may have to submit an alternate schedule for completion of decommissioning in accordance with 10 CFR 40.42, if no principle activities are conducted for a period of 24 months.

- 04.13 Unrefined and unprocessed ore: Ore in its natural form prior to any processing, such as grinding, roasting or beneficiating, or refining. Processing does not include sieving or encapsulation of ore or preparation of samples for laboratory analysis.
- 04.14 Uranium milling: Any activity that results in the production of byproduct material as defined in 10 CFR 40.4.

## 2801-05 RESPONSIBILITIES AND AUTHORITIES

### 05.01 Director, Office of Nuclear Material Safety and Safeguards (NMSS).

- a. Provides overall program direction for the NRC materials and waste inspection programs.
- b. Provides resources as needed for the NRC materials and waste inspection programs.

### 05.02 Regional Administrator(s).

- a. Oversees implementation of the uranium recovery and 11e.(2) byproduct material inspection program.
- b. Provides staffing and financial resources for implementation of the inspection program.

### 05.03 Director, Division of Decommissioning, Uranium Recovery, and Waste Programs.

- a. Develops and directs implementation of policies, programs, and procedures for inspecting applicants, licensees, and other entities subject to NRC jurisdiction.
- b. Assesses the effectiveness, uniformity, and completeness of the uranium recovery and 11e.(2) byproduct material inspection program.
- c. Approves changes to the uranium recovery and 11e.(2) byproduct material inspection program.
- d. Coordinates with regional offices to obtain technical assistance, as necessary.

### 05.04 Director, Division of Nuclear Materials Safety.

- a. Assigns staff to the branch responsible for implementing the inspection program and ensures sufficient travel funds are available to conduct inspections.
- b. Ensures that funds are available to purchase and maintain radiological survey instrumentation for use during inspections.

- c. Periodically reviews status of inspection program and requests routine updates of problematic sites.
- d. Provides advice and instructions for proposed changes to the inspection program.
- e. Ensures that the enforcement, allegation, and training programs are properly implemented in the division in accordance with NRC policies.

05.05 Branch Chief, Division of Nuclear Materials Safety.

- a. Assigns individual inspectors to implement inspection program.
- b. Provides training oversight of new inspectors.
- c. Ensures that a Master Inspection Schedule, or equivalent, has been developed to schedule inspections and reviews changes to the inspection schedule based on available resources, significant site activities, changes in site status, or other site-specific situations as discussed in 07.06.
- d. Ensures that site-specific inspection plans are developed for inspections as needed, especially if the inspection involves multiple staff or complicated site activities.
- e. Reviews and approves most inspection reports.
- f. Coordinates inspection activities with staff from Office of Nuclear Materials Safety and Safeguards (NMSS) and other regions, including requests for experts for inspections of complex program areas such as security, groundwater corrective action programs, and construction activities.

05.06 Branch Chief, Division of Decommissioning, Uranium Recovery and Waste Programs.

- a. Provides support, as requested, for implementation of the inspection program by the regions. Support would include providing technical experts for complex program areas such as groundwater and cell construction.
- b. Stays informed of the results of the inspection program and provides advice to the responsible Regional Branch Chief regarding changes in site status, staffing budgets, and evolving priorities.

05.07 Inspectors, Division of Nuclear Materials Safety.

- a. Implement the inspection program in accordance with the instructions provided in this IMC and associated Inspection Procedures (IPs) referenced in the appendices.
- b. Develop a Master Inspection Schedule, or equivalent, to schedule inspections during the fiscal year and to update the schedule as conditions change.
- c. Develop inspection reports to document inspection findings in accordance with instructions provided in IMC 0610, "Nuclear Materials Safety and Safeguards Inspection Reports."

- d. Implement the allegation and enforcement programs, as necessary, as part of the inspection process. This includes follow up and documentation of assigned allegations and implementation of the Enforcement Policy in response to inspection findings.

## 2801-06 REQUIREMENTS

This section provides the specific instructions to satisfy the inspection requirements of the IMC.

**06.01 Performance-based, Risk-informed Inspections.** In accordance with Commission policy (SECY-98-144), inspectors must conduct performance-based inspections with an emphasis on risk-significant activities that have an impact on safety and the environment. Inspectors shall focus their attention on activities and programs important to safety by using a performance-based, risk-informed approach. A performance-based inspection emphasizes the observation of activities and results of the licensees' programs over the review of procedures or records for conformance to programs. The risk-informed inspection approach considers risk insights together with other factors to focus inspection activities commensurate with the risks associated with the implementation of the licensee's NRC-approved programs.

The inspector will verify compliance primarily through observations of site conditions, observations of work activities, interviews with workers, demonstrations by workers, and reviews of critical records. The inspector shall focus attention on the most important, risk-significant activities and the results of the licensee's efforts.

The risk-significant activities at uranium recovery and 11e.(2) byproduct material sites are described in NUREG-CR/6733, "A Baseline Risk-Informed, Performance-Based Approach for In Situ Leach Uranium Extraction Licensees," and NUREG-2150, "A Proposed Risk Management Regulatory Framework."

**06.02 Types of Inspections and Timing of Routine Inspections.** The inspection program includes routine, non-routine, and reactive inspections. Routine inspections are the most common type of inspection. As described in Section 07.06 below, routine inspections should be conducted at 12-month intervals. The intervals for routine inspections can be reduced or increased based on site-specific conditions such as operational activities, enforcement history, major facility or program changes, and other significant factors.

Non-routine inspections may be conducted based on site conditions or unique site activities. Examples of non-routine inspections include inspections of new operational modes, construction work, preoperational activities, or to implement Temporary Instructions. Non-routine inspections will be scheduled and conducted as needed.

Reactive inspections will be conducted as necessary in response to spills, unplanned releases, worker uptakes, enforcement actions, NRC Orders, allegations, bankruptcies, or similar events. Reactive inspections will be conducted in accordance with NRC policies after consultation with NRC management and program office staff. These inspections will be conducted using the guidance provided in IMC 1301, "Response to Radioactive Material Incidents That Do Not Require Activation of the NRC Incident Response Plan," and IP 87103, "Inspection of Material Licensees Involved in an Incident or Bankruptcy Filing."

Inspections may be conducted remotely or partially remotely as needed depending on site accessibility or travel concerns. The decision to conduct a remote inspection would be made in

consultation with the inspector's management and program office staff. If needed, the onsite portion of an inspection could be conducted later, when travel restrictions are no longer an issue.

06.03 Core and Discretionary Procedures. Attachments 1 and 2 provide the core and discretionary IPs for use during routine and non-routine inspections. The core procedures provide the minimum inspection program requirements necessary to determine whether there is reasonable assurance that a facility is operating safely and in accordance with regulatory and license requirements. The core procedures must be implemented during each routine inspection.

Inspectors should implement the discretionary IPs as needed based on site conditions and as specified in the Master Inspection Schedule or site-specific inspection plan. These discretionary procedures include the program areas that are important to safety but are less risk significant. The discretionary inspection program includes the reactive inspection program, to be implemented as needed in response to spills, accidents, or bankruptcies. With branch chief approval, the inspector may choose to implement other IPs not specifically mentioned in this IMC based on site-specific situations. These changes to the defined inspection program should be documented in the associated Master Inspection Schedule and/or site-specific inspection plan.

Temporary Instructions may be issued by the NRC as needed in response to uncommon situations such as promulgation of new regulations or in response to industry events. Inspectors will implement and document Temporary Instructions using the guidance provided in these instructions.

Due to the wide variation between sites, the number of hours needed to complete the inspection will vary. The estimated number of hours to complete each IP is provided in the associated IPs. The estimated number of days needed to complete each inspection should be documented in the Master Inspection Schedule.

The inspection is considered complete when the objectives of the IPs selected for that inspection have been fulfilled. The inspector will use a risk-informed approach to determine when the objectives of the various IPs have been satisfied.

## 2801-07 GUIDANCE

07.01 Regulatory Requirements. The inspector should evaluate the licensee's performance against the following regulatory requirements, using a risk-informed approach, for each uranium recovery and 11e.(2) byproduct material licensee:

- 10 CFR Part 19, Notices, Instructions and Report to Workers: Inspections and Investigations
- 10 CFR Part 20, Standards for Protection Against Radiation
- 10 CFR Part 21, Reporting of Defects and Noncompliance
- 10 CFR Part 40, Domestic Licensing of Source Material, including Appendix A
- 10 CFR Part 71, Packaging and Transportation of Radioactive Material
- 10 CFR Part 75, Safeguards on Nuclear Material-Implementation of Safeguards Agreements Between the United States and the International Atomic Energy Agency

The NRC Memorandum dated June 22, 2012, "Verification of Additional Protocol Reporting at Uranium Recovery Facilities" (ML12171A355), provides guidance to inspectors explaining how to implement the Additional Protocol requirements specified in 10 CFR Part 75.

**07.02 Performance-Based, Risk-Informed Inspection Approach.** Inspectors should focus their attention on activities important to safety by using a performance-based, risk-informed approach. The performance-based, risk-informed approach emphasizes observation of activities that are the most risk significant in terms of safety. The NRC has identified the risks associated with uranium recovery and 11e.(2) byproduct material site operations. These risks are documented in NUREG-CR/6733, "A Baseline Risk-Informed, Performance-Based Approach for In Situ Leach Uranium Extraction Licensees," and NUREG-2150, "A Proposed Risk Management Regulatory Framework." As discussed in NUREG-CR/6733, the higher risk activities include:

- Hazardous chemical management and use (this program area may not be regulated by NRC unless hazardous chemicals are mixed with licensed material)
- Security and stability of conventional mill tailings impoundments
- Radiological spill response and other radiological emergencies
- Yellowcake dryer operations and accidents
- Groundwater contamination including excursions
- Environmental contamination
- Responses to transportation incidents involving radioactive material
- Procedures and training for the risks listed above

NUREG-2150 provides supplementation information regarding the risks of dryer operations and environmental contamination:

- Dryer risks include excessive occupational exposures under certain accident scenarios
- Environmental risks include potential or actual groundwater contamination, long-term tailings management, and radon emissions

In summary, the inspection program should be implemented to concentrate on areas that have higher risk significance and emphasizes direct observation of site conditions and activities. In other words, the inspector should focus attention on the most important, risk-significant activities and the results of the licensee's efforts. Additional guidance for risk-informed decision making is provided in NUREG/KM-0016, *Be riskSMART: Guidance for Integrating Risk Insights into NRC Decisions*.

**07.03 General Description of Inspection Program.** Inspections are used to verify that licensees are implementing the NRC's regulatory and license requirements. When licensees implement these requirements, it is assumed that they are most likely conducting operations in a manner that is protective of the public and environment from undue risk. The inspection program for uranium recovery and 11e.(2) byproduct material sites is divided into two overlapping areas: construction/pre-operation and operations.<sup>1</sup>

---

<sup>1</sup> Inspection requirements for decommissioning facilities are described in IMC 2602, "Decommissioning Oversight and Inspection Program for Fuel Cycle Facilities and Materials Licensees." For sites conducting decommissioning activities in conjunction with site construction and/or operations, inspection planning and implementation will include the relevant components of both IMCs 2801 and 2602 appropriate for the activities being inspected.

The goals of the construction and preoperational inspections are to ensure that the licensee has established programs, constructed the facility, and trained the staff in accordance with license and regulatory requirements prior to commencing operations with licensed material. The goal of the operational inspection program is to verify compliance with license and regulatory requirements using a risk-informed, performance-based inspection approach.

In general, inspections of uranium recovery and 11e.(2) byproduct material sites will be announced inspections. The inspections should be announced to ensure that pertinent licensee staff are available to support the inspection since most sites are remotely located. The NRC inspection staff may choose to conduct unannounced inspections in certain situations. The most common reasons for unannounced inspections are to observe plant operations, transportation activities, and security controls without prior licensee notification.

Regulations state that each licensee shall afford to the Commission at all reasonable times the opportunity to inspect source or byproduct material and the premises and facilities wherein source or byproduct material is used or stored. If the licensee does not maintain a 24-hour presence at a site, NRC inspectors are not expected to conduct inspections after normal working hours without prior notification to the licensee. However, if the licensee maintains a 24-hour presence at a site, unannounced inspections during evenings or weekends may be appropriate to review site status, security, and operations without prior notification.

The licensee is required by regulation and license conditions to maintain a significant number of records. The inspector is expected to review select risk-significant records as part of the inspection process. Risk-significant records include environmental monitoring, spill cleanup, groundwater restoration, and training records. The inspector should also look for potential trends in occupational doses or effluent releases that may be indicative of declining performance. The inspector should retain copies of records as needed to support future enforcement actions.

The inspector should use a risk-informed, performance-based approach when reviewing records. For example, the inspector may choose to select random records of significance for review, such as occupational exposure records. The inspector should also consider reviewing records of activities or problems that were observed during site tours.

When reviewing the licensee's performance, the inspector should cover the period from the last to the current inspection. Corrective actions related to older issues that precede the last inspection, such as incidents, non-compliances, or elevated radiological exposures, should also be reviewed.

All inspections should include a review of licensee reportable events and other incidents that involve contamination, releases, spills, and equipment malfunctions that may impact safety. The review should include the licensee's assessment of worker and environmental consequences and corrective actions taken to correct and prevent recurrence of the event.

The number of inspectors for each inspection will be determined by the complexity of the inspection. Many inspections tend to be multi-discipline team inspections that include expertise in radiation safety, operations, groundwater corrective actions, construction, transportation, and so forth. The actual number of inspectors will be referenced in the Master Inspection Schedule and approved by NRC management. Less complex inspections will require fewer inspectors.

Inspectors should conduct independent confirmatory radiological surveys as part of each inspection. The purpose of the independent survey is to ensure that the licensee has adequately implemented its radiation protection program. For example, inspectors may want to verify that radiation areas are properly posted or that shipping containers are properly packaged. The inspector should ask licensee representatives to verify any unusual or out-of-compliance measurements. The inspector's survey meter must be appropriate for the radionuclides of concern, and the inspector should have detailed knowledge of the operation and limitations of the meter.

During site tours, inspectors may identify findings that are not within the NRC's regulatory authority. Examples include industrial or safety hazards such as open holes, unmarked confined spaces, or inadequate lockout/tagout controls. These hazards should be reported to the licensee's management during the inspection. At the discretion of NRC management and depending on severity level, these findings may be reported to the proper regulatory authorities for follow up review, in accordance with the agreements provided in the NRC's Memorandums of Understanding with these agencies.

**07.04 Inspection During Construction and Preoperational Phases.** Construction activities vary depending on the type of facility being inspected. For a conventional uranium mill, construction would include erection of the mill, construction of the tailings disposal cell foundation, installation of groundwater monitoring wells, and collection of environmental monitoring data to establish background conditions. For ISR sites, construction would include erection of the central processing plant and satellite facilities; development of wellfields; drilling of production, monitoring, and excursion wells; construction of evaporation ponds; and collection of environmental data. Construction of heap leach piles include construction of the base of the pile, drip and collection lines, and ion exchange equipment. Finally, construction of an 11e.(2) byproduct material disposal cell includes construction of the base of the cell, installation of monitoring wells, and collection of background environmental monitoring data.

Regulations allow certain site preparation activities to occur prior to commencement of NRC-licensed construction activities. The NRC may conduct inspections or site visits during pre-construction activities to observe the site, observe onsite activities, or ensure that the licensee has not started NRC-regulated construction activities prior to issuance of the license. The list of authorized pre-construction activities is provided in 10 CFR 40.4. NRC-regulated construction activities, as defined in 10 CFR 40.4, cannot begin until the NRC has issued the associated license.

Construction inspections are conducted to verify that construction activities are implemented in accordance with regulatory and license requirements. Typically, details of planned construction activities are provided in the license application. The license may also include special conditions, such as requirements for environmental monitoring, that must be implemented prior to operations. Construction inspections may require the use of inspectors with special expertise for activities such as drilling of wells or installation of the disposal cell base. Regional staff should request program office support as needed based on site activities.

The timing of construction inspections will depend on site activities. The NRC may also choose to conduct a construction inspection during or immediately following major plant modifications at a facility in operation. Critical activities, such as construction of the disposal cell base, may warrant multiple inspections to ensure that the licensee's staff and contractors are conducting the work in accordance with license or application requirements. During construction inspections, independent radiological confirmatory surveys may not be necessary, unless there

is a need to verify background information. The inspectors should review records that are important to safety such as disposal cell quality controls tests and well installation records.

Some ISR facilities are constructed in phases. Wellfields, satellite buildings, and header houses are commonly constructed, operated, and decommissioned in phases. Construction and preoperational inspections should be conducted at all new wellfields until the NRC staff has confidence in the licensee's demonstrated ability to implement construction and operational requirements as specified in regulations and the license.

Preoperational inspections typically occur between construction and operations. Some licenses include a requirement that operations cannot commence until the NRC has conducted the preoperational inspection. The purposes of the preoperational inspection are to ensure that the licensee has the staff, programs, procedures, and facilities to commence with licensed operations. Depending on the status of the site, the licensee may not be in possession of licensed material at that time. The goal of the preoperational inspection is to ensure that the licensee is prepared for operations involving radioactive material.

Historically, more than one preoperational inspection has been necessary at newly constructed facilities before the NRC authorizes operations. The first inspection may identify the program areas or other weaknesses that need licensee management attention. Subsequent inspections would then concentrate on these previously identified areas or weaknesses to ensure that these areas have been completed or corrected by the licensee. Once the NRC authorizes operations, the preoperational inspection program has been completed for that portion of the facility. Future plant expansions may warrant additional preoperational inspection efforts.

Preoperational inspections should be conducted at conventional mills and ISR sites that have been in standby for extended periods of time. The goals of these inspections include verification of equipment operability, re-staffing efforts, and program implementation.

The core and discretionary IPs for construction and preoperational inspections are provided in Appendix A. The core inspection procedures were selected to ensure that risk-significant activities are addressed. Based on site-specific conditions, inspectors have the discretion to implement other IPs as needed.

**07.05 Inspections During Operational Phase.** Depending on the type of facility, the operational inspection program begins after completion of construction or preoperational activities, when the license is issued, or restart of operations following an extended standby. The operational phase ends when the facility, or a portion of the facility, permanently ceases operations.

As noted earlier, the operational inspection program should be implemented with a risk-informed, performance-based approach. As such, the inspector should concentrate on activities with a higher level of risk, such as dryer operations, with less emphasis on low-risk activities such as routine documentation requirements. The inspection should also be performance-based, with more emphasis on observation of the licensee's implementation and execution of its licensed program.

The inspectors should conduct independent confirmatory radiological surveys as part of the inspection. Ideally, the equipment or areas surveyed should be rotated over time, to avoid surveying the same areas or equipment during successive inspections.

Some facilities, or portions of facilities, may suspend operations for extended periods of time. These facilities are considered to be operational since they have not permanently ceased operations. Facilities in standby do not pose the same level of risk as operating facilities. For these facilities, implementation of all core procedures may be unnecessary. However, certain activities such as groundwater monitoring and the groundwater corrective action program should continue to be inspected while the facility remains in standby. The inspection program should be adjusted for facilities in standby and changes documented in the Master Inspection Schedule and/or memoranda to the docket file. Depending on the circumstances, the licensee may have to submit, for NRC approval, an alternate schedule for completion of decommissioning, in accordance with 10 CFR 40.42, if no principle activities are conducted for a period of 24 months.

The core and discretionary procedures for the operational phase are provided in Appendix B. The inspection program can be adjusted as needed based on site-specific conditions. These changes should be documented in the associated Master Inspection Schedule.

**07.06 Inspection Frequencies and Adjustments to Frequencies.** The base frequency for inspections at uranium recovery and 11e.(2) byproduct material sites is 12 months with a variance of plus or minus 3 months. The inspection program can be reduced or extended based on site-specific conditions, as described below. The implementation of individual IPs can also be extended or reduced based on site-specific conditions. The decision to extend or reduce an inspection interval should be made using a risk-informed approach. Proposed changes to the inspection interval should be discussed with regional management and the responsible project manager in the NRC's program office and should be documented in the Master Inspection Schedule and/or by memoranda to the associated docket file.

The inspection interval can be reduced (increased frequency of inspections) based on significant program changes, changes in management staffing, poor performance, poor enforcement history, bankruptcies, strikes, unanticipated events or incidents, or other situations where safety may have been compromised.

The inspection interval can be increased (reduced frequency of inspections) due to superior performance over time, good enforcement history, strong management commitment to safety, and low number of incidents or events. Extensions may also be granted for sites in long-term standby, sites with radioactive material in long-term storage, and sites conducting operations with limited quantities of licensed radioactive material that pose little risk to workers, the public, and the environment. Extensions should not be considered for licensees who have recently undergone significant program or management staffing changes to ensure that the licensee can maintain adequate performance over the next several inspection periods.

If escalated enforcement action has been taken for a licensee, a follow up inspection should be conducted approximately six months after completion of the escalated enforcement action to assess the licensee's corrective actions in response to the enforcement action. This follow up inspection can be conducted as part of the next routine inspection.

Inspections conducted during the construction and preoperational phase should be planned and implemented on a case-by-case basis. Ideally, the inspection should be conducted when risk-significant activities are in progress such as installation of wells, testing of critical systems and controls, or installation of pond liners. Preoperational inspections should be conducted at least once prior to startup of facility operations; although, more than one preoperational

inspection may be necessary to ensure that the site is ready for operations with licensed material.

Some licensees may have a license for construction and operation of a uranium mill but have not started actual construction or operation of the mill. Other licensees may be in long-term standby. At these sites, the NRC inspection staff shall verify, at least once per year, that these licensees have not taken action to start construction or restart of the mill. This information will be recorded in annual memoranda to the docket file for the respective sites.

**07.07 Independent Inspection Effort.** The NRC's inspection program has traditionally allocated time to independent inspection effort. The amount of time spent should be commensurate with the level of risk, the complexity of the facility, and the degree to which inspection resources have already been committed to significant safety and environmental issues that have been identified at the facility. This effort may include more in-depth inspection effort in selected technical areas. The objectives of this effort should be to gain increased understandings of potential safety and environmental hazards of activities of interest. Activities of interest may include a detailed review of the licensee's collection and analysis of radiological samples, control of spreadsheets that are used to manage data, and reasons for a series of non-reportable events. Independent inspection findings may uncover unresolved safety and environmental concerns, improper radiological practices, and other problems that may not be discovered through other means.

**07.08 Inspector Qualifications and Use of Technical Experts.** The inspector qualification requirements are provided in IMC 1248, "Qualification Programs For Federal and State Materials and Environmental Management Programs." Depending on the type of inspection, the preferred qualifications usually include health physics, decommissioning, or uranium recovery inspector qualifications. Other qualifications may be accepted by NRC management based on the experience of the inspector and the inspection requirements.

The lead inspector should be qualified in at least one of the program areas referenced in IMC 1248. Other inspectors may support the inspection, but the lead inspector is responsible for oversight of unqualified inspectors or inspectors-in-training. The lead inspector is also responsible for oversight of the development and issuance of the inspection report.

In some situations, the NRC's regional staff may not have the expertise for certain program areas. Common examples include the availability of hydrogeologists and geotechnical experts. In these situations, the regional staff should request support from the NRC's program office. With proper planning and advanced notice, the program office should be able to provide qualified technical staff to support the inspections. In rare situations, regional staff will need the support of staff from other regions or contractors. These requests for support should be coordinated with NRC management and the other regions.

**07.09 Master Inspection Schedules and Site-Specific Inspection Plans.** The inspection staff should develop a Master Inspection Schedule to manage the inspections for the upcoming fiscal year. The Master Inspection Schedule can be used to evenly allocate the workload over the fiscal year. The schedule should be continuously updated based on changes to the inspection program. The schedule should be reviewed by management on a routine basis, including at the beginning of the fiscal year, to confirm that all inspections have been scheduled at the recommended frequencies. Management should also verify that appropriate resources are assigned to support the inspection program.

For more complex inspections or inspections with multiple inspectors, a site-specific inspection plan should be developed to ensure that all planned inspection attributes will be addressed and to ensure that each inspector understands their areas of responsibility. At a minimum, the inspection plan should include the facility to be inspected; docket number and report number; the dates of the inspection; names of inspectors conducting the inspection; what IPs will be used; and the events, open violations, orders, or any special issues that will be reviewed as part of the inspection. Since the Master Inspection Schedule and site-specific inspection plans are used to coordinate and facilitate the inspection, they do not have to be added to the docket file.

**07.10 Inspection Process.** This section describes the general, step-by-step process for implementing the inspection program.

Prior to the inspection, the inspector should become familiar with the regulatory and license requirements for each site to be inspected. The inspector should review the application since it contains the details of the licensee's programs. The inspector should also be familiar with NRC and industry guidance documents that are specifically referenced in the license. The licensee is not required to implement updated guidance if an older revision is specifically referenced in the license. Thus, the inspector should be aware of the correct revisions of guidance that will be used as references during inspections.

If the inspection is an announced inspection, the inspector should contact the licensee to obtain a list of personnel protective equipment required to enter the licensee's owner-controlled area. The protective equipment may include safety shoes, hard hats, safety glasses, and limitations on types of clothing worn. If the inspection is unannounced, the inspector should consider bringing these items to avoid unnecessary delays upon arrival at the site.

The inspector will conduct an entrance meeting with licensee management at the beginning of the inspection or, if requested by the licensee, as soon as practicable upon starting the inspection. The purpose of the entrance meeting, in part, is to request licensee support for staff, records, or tours necessary to ensure the inspection is conducted in an efficient manner. Depending on the length of the inspection, debriefs may be useful at the end of each workday.

An exit briefing will be held at the end of the onsite inspection. At the exit briefing, the inspector should summarize the areas inspected and preliminary inspection findings. The preliminary findings may include potential violations, safety-related concerns, and any unresolved issues. Before leaving the site, the inspector should ensure that the licensee has taken corrective actions, or will take appropriate corrective actions, for safety-significant issues or violations that were identified during the inspection.

The inspector may collect copies of certain licensee records and take notes of licensee activities as part of the inspection. These working files will be used to help the inspector develop the written inspection report. Inspection-related working files must be managed in accordance with the instructions provided in IMC 0620, "Inspection Documents and Records." Some of these records may contain proprietary information, and the inspector must manage these records accordingly.

The inspector may choose to take photographs during the inspection. The inspector should always inform the licensee when photographs will be taken and explain the future uses of the photographs. The inspector should provide the licensee with the opportunity to review the photographs at the end of the inspection. The inspector should avoid photographs of anything security-related including guards and monitoring equipment. The inspector should also avoid

taking photographs of proprietary equipment or systems. The NRC's guidance on inspection-related photographs is provided in IMC 0620.

After completion of the onsite inspection, the inspector will debrief with the responsible branch chief. The inspector should debrief with the licensing project manager if any inspection findings have a potential impact on licensing activities. The inspector should debrief with NRC's enforcement staff if any non-compliances were identified to ensure that the non-compliances are properly managed in accordance with the NRC's Enforcement Policy.

In some situations, the inspectors may continue the inspection process after the conclusion of the onsite inspection. Common examples include review of proposed enforcement actions and review of confirmatory sample results for samples collected during the onsite inspection. These post-inspection activities may result in changes to the conclusions of the inspection or significance of the inspection findings. In these situations, the inspector should notify the licensee of the changes in the inspection findings and conclusions before the inspection report is issued. Details of this re-exit briefing should be documented in the cover letter transmitting the inspection report to the licensee.

Based on the results of the inspection, the inspector should consider whether changes to the inspection program are recommended. These changes should be discussed with NRC management and program office staff and documented in the Master Inspection Schedule and/or memorandum to the docket file as appropriate.

**07.11 Documentation of Inspections.** With rare exceptions, the results of the inspection are documented in narrative inspection reports using the guidance provided in IMC 0610, "Nuclear Material Safety and Safeguards Inspection Reports." Depending on the situation, some inspections and site visits may be documented in memoranda to the docket file or by using NRC Form 591, "Safety Inspection Report and Compliance Inspection." The documentation of violations will be managed in accordance with the NRC Enforcement Policy, Enforcement Manual guidance, and regional procedures.

**07.12 Management Reviews.** At least once per year, or at intervals established by regional NRC management, the inspection program should be reviewed to ensure that the various licensees are being inspected at the appropriate frequencies and with the proper level of inspection oversight. The assessment should include input from both the inspection and program office staff.

Regional management will establish a format for these reviews. The format may include site summary, site information, site activities, inspection results, enforcement history, items of interest, planned inspections for the next fiscal year, and observations/comments. The assessment may include both quantitative and qualitative information. The information to be considered may include enforcement history, performance history, event assessments, number of allegations, significant changes in programs or management staffing, and licensee management commitments to safety. The goals of the management review are to ensure that the inspection program has been implemented in a manner that is commensurate with program requirements and to provide recommendations for adjustments for future inspections.

## 2801-08 REFERENCES

IMC 0610, "Nuclear Material Safety and Safeguards Inspection Reports," May 18, 2004

IMC 0620, "Inspection Documents and Records," July 23, 2020

IMC 1248, "Qualification Programs for Federal and State Materials and Environmental Management Programs," April 19, 2013

IMC 1301, "Response to Radioactive Material Incidents That Do Not Require Activation of the NRC Incident Response Plan," October 20, 2000

IMC 2602, "Decommissioning Oversight and Inspection Program for Fuel Cycle Facilities and Materials Licensees," July 29, 2008

IP 87103, "Inspection of Material Licensees Involved in an Incident or Bankruptcy Filing," November 3, 2000

NRC Memorandum dated June 22, 2012, "Verification of Additional Protocol Reporting at Uranium Recovery Facilities," ML12171A355

NRC Memorandum dated September 7, 2012, "Division of Waste Management and Environmental Protection Actions to Address Recommendation 2 of the Office of the Inspector General Audit of the Uranium Recovery Decommissioning Program," ML12213A418

NUREG-2150, A Proposed Risk Management Regulatory Framework, April 2012

NUREG-CR/6733, A Baseline Risk-Informed, Performance-Based Approach for In Situ Leach Uranium Extraction Licensees, September 2001

NUREG/KM-0016, *Be riskSMART*: Guidance for Integrating Risk Insights into NRC Decisions, March 2021

Staff Requirements SECY-98-144, "White Paper on Risk-informed and Performance-based Regulation," March 1, 1999

END

Appendices:

Appendix A: Core and Discretionary Inspection Procedures for Construction and Preoperational Inspections

Appendix B: Core and Discretionary Inspection Procedures for Operational Inspections

Attachment 1: Revision History for IMC 2801

# NRC INSPECTION MANUAL

URMDB

---

## INSPECTION MANUAL CHAPTER 2801 APPENDIX A

---

### CORE AND DISCRETIONARY INSPECTION PROCEDURES FOR CONSTRUCTION AND PREOPERATIONAL INSPECTIONS

Table A-1:

<b>Core Procedures for Construction/Preoperational Inspections</b>	
IP Number	Name
89010	Disposal Cell Construction at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89015	Construction and Preoperational Inspection Program at Uranium Recovery and 11e.(2) Byproduct Material Facilities

Table A-2:

<b>Discretionary Procedures for Construction/Preoperational Inspections</b>	
IP Number	Name
89005	Management Organization and Controls at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89020	Groundwater and Water Management at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89030	Radiation Protection at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89035	Radioactive Waste Management and Transportation at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89045	Effluent Control and Environmental Protection at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89050	Emergency Preparedness and Fire Protection at Uranium Recovery and 11e.(2) Byproduct Material Facilities
92701	Followup
92703	Followup of Confirmatory Action Letters or Orders

END

# NRC INSPECTION MANUAL

URMDB

---

## INSPECTION MANUAL CHAPTER 2801 APPENDIX B

---

### CORE AND DISCRETIONARY INSPECTION PROCEDURES FOR OPERATIONAL INSPECTIONS

Table B-1:

<b>Core Procedures for Operational Inspections</b>	
IP Number	Name
89020	Groundwater and Water Management at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89030	Radiation Protection at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89035	Radioactive Waste Management and Transportation at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89045	Effluent Control and Environmental Protection at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89050	Emergency Preparedness and Fire Protection at Uranium Recovery and 11e.(2) Byproduct Material Facilities

Table B-2:

<b>Discretionary Procedures for Operational Inspections</b>	
IP Number	Name
87102	Maintaining Effluents from Materials Facilities As Low As Is Reasonably Achievable (ALARA)
87103	Inspection of Material Licensees Involved in an Incident or Bankruptcy Filing
89005	Management Organization and Controls at Uranium Recovery and 11e.(2) Byproduct Material Facilities
89010	Disposal Cell Construction at Uranium Recovery and 11e.(2) Byproduct Material Facilities
92701	Followup
92703	Followup of Confirmatory Action Letters or Orders

END

Attachment 1: Revision History for IMC 2801

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
n/a	04/15/94	Initial issuance		
n/a	ML20212A074 CN 97-013 09/02/97	Periodic update		
n/a	ML003753600 CN 00-014 08/25/00	Periodic update		
n/a	ML21202A302 10/08/21 CN 21-034	<p>IMC 2801 is being updated to implement a risk-informed, performance-based inspection program; IMC 2801 is being combined with IMC 2641.</p> <p>This is a major programmatic revision that combines the operating uranium recovery inspection program as currently described in IMC 2801 and IMC 2641. The uranium recovery decommissioning inspection program will eventually be moved to IMC 2602. IMC 2641 and the previous revision of IMC 2801 will remain available as guidance for uranium recovery decommissioning inspections until IMC 2602 has been updated and reissued. Once IMC 2602 has been reissued, the uranium recovery decommissioning program currently provided in the previous revision of IMC 2801 and IMC 2641 will be deleted.</p>	n/a	ML21202A300