

NRC INSPECTION MANUAL

DANU/UARP

INSPECTION MANUAL CHAPTER 2574

INSPECTION OF THE “OPERATIONAL READINESS” STRATEGIC PERFORMANCE AREA OF THE ADVANCED REACTOR CONSTRUCTION OVERSIGHT PROGRAM (ARCOP)

Effective Date: 02/05/2026

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2574-01 PURPOSE

To define the inspection and audit program for the operational readiness strategic performance area during construction of advanced power reactors.

2574-02 OBJECTIVES

- 02.01 To provide site-specific inspection and auditing scoping guidance for operational programs identified in a combined operating license (COL), manufacturing license (ML), construction permit (CP), or operating license (OL) application for an advanced power reactor.
- 02.02 To coordinate implementation of the inspection program for the security and safeguards strategic performance area with Inspection Manual Chapter, IMC 2203 (Official Use Only – Security Related Information), “Security Inspection Program for Advanced Reactor Construction,” which describes the inspection scope for security inspections.

2574-03 APPLICABILITY

- 03.01 This IMC is applicable to the fabrication, manufacture, and construction of all advanced commercial nuclear reactors, including SMRs and microreactors incorporating both light water reactor (LWR) and non-LWR technologies, and large LWR or non-LWRs with enhanced safety features. Activities under this IMC may begin when an application for the manufacture or construction of an advanced power reactor facility has been submitted to the NRC and accepted/docketed by the NRC for review. This includes applications for a CP, LWA, COL, or ML.
- 03.02 This IMC remains in effect until the NRC makes a finding that the acceptance criteria in the COL are met, per 10 CFR 52.103(g), or until an OL is issued for the facility.
- 03.03 The requirements identified in this IMC are applicable to all advanced power reactor designs. However, plant-specific inspection and auditing plans and inspection procedures (IPs) may differ depending upon the plant’s design basis and licensing requirements. Some licensees may be exempt from certain regulations and therefore exempt from some operational program requirements. Licensees may also have additional design-specific program requirements not identified in this IMC. When determining the operational readiness inspection and audit scope for a specific project, NRC staff shall consider all operational programs applicable to the licensee.

2574-04 DEFINITIONS

Applicable ARCOP definitions are in Inspection Manual Chapter 2570, “Advanced Reactor Construction Oversight Program General Guidance and Basis Document.” For readers’ convenience, some relevant definitions are also listed below.

- a. Audit. A review of an operational program prior to its implementation. A review of an operational program after its implementation is an inspection.
- b. Fundamental Safety Functions (FSFs). A set of high-level functions that serve to limit the release of radioactive materials to within established limits over the entire range of

licensing basis events. FSFs are discussed in various references, such as in Nuclear Energy Institute (NEI) 18.04, revision 1, "Risk-Informed Performance-Based Technology Inclusive Guidance for Non-Light Water Reactor Licensing Basis Development," (endorsed by Regulatory Guide 1.233). The FSFs are:

1. Control of Heat Generation (Reactivity and Power Control),
 2. Control of Heat Removal (including reactor and spent fuel decay heat and heat generated from waste stores), and
 3. Radionuclide Retention.
- c. Noncompliance. The failure to adhere to a legally binding requirement or a non-legally binding commitments and standards. Legally binding requirements include regulations, technical specifications, license conditions, and NRC Orders. Non-legally binding commitments and standards include commitments made to the NRC, self-imposed requirements to establish and maintain quality, and requirements specified in procurement contracts.
 - d. Project Vendor. A non-licensed entity that fabricates nearly complete reactor plants or significant portions of safety-significant system modules under contract to an NRC licensee, NRC permit holder, or an applicant for an NRC license or permit.
 - e. Reactor Manufacturer. An ML holder that produces complete reactor plants (e.g., microreactors), or nearly complete reactor plants (e.g., SMR power modules). A reactor manufacturer may produce reactors for multiple reactor construction projects.

2574-05 RESPONSIBILITIES AND AUTHORITIES

05.01 Director, Office of Nuclear Reactor Regulation NRR

Concurs with the decision of the Director, ARCOP Project Office (APO), the Regional Administrator of Region 2 (construction inspection organization), and the Regional Administrator (RA) of the host region, that the status of operational and security programs supports the approval of reactor operations for OL applicants or the 10 CFR 52.103(g) finding for COL holders. This decision is made at the final assessment meeting described in IMC 2572, Assessment Program for Advanced Reactor Construction Projects.

05.02 Director, Division of Advanced Reactors and Non-Power Production and Utilization Facilities (DANU) (NRR)

- a. Acts as the ARCOP program office director (APO Director)
- b. Coordinates with the host region RA to inform the NRR Office Director that the status of operational and security programs supports the approval of advanced reactor operations for OL applicants or the 10 CFR 52.103(g) finding for COL holders as part of the reactor project final assessment described in IMC 2572.
- c. Provides overall program direction for the ARCOP.

- d. Concurs with the decision to conduct a reactive inspection at advanced power reactor facilities under construction.

05.03 Chief, Advanced Reactor Policy Branch (UARP)

- a. Acts as the APO Branch Chief.
- b. Responsible for periodic updates to IMC 2574 in accordance with IMC 0040, "Preparation, Revision, Issuance, and Ongoing Oversight of NRC Inspection Manual Documents."

05.04 NRR/DANU Staff - ARCOP Program Organization (APO)

- a. Provide interpretations and support for information contained in this IMC.
- b. Provide resolution for identified gaps in IMC directions and guidance.
- c. Coordinates with the host region to provide technical assistance and inspection and audit support where needed to complete inspection and audit of operational programs in the site-specific operational readiness inspection and audit plans.
- d. Provides resolution for identified gaps in ARCOP IMC directions and guidance.
- e. Coordinates with the host region in development of the site-specific operational readiness inspection and audit plan.

05.05 Regional Administrator, Host Region

- a. Coordinates with the APO Director to inform the NRR Office Director that the status of operational and security programs supports the approval of reactor operations for reactor facilities built in their regions as part of the reactor project final assessment described in IMC 2572.
- b. Ensures sufficient host region resources are available to implement the operational and security program inspection and audit plans for advanced power reactor facilities built in their regions.
- c. Approves the decision to conduct a reactive inspection (Special Inspection Team (SIT) or Augmented Inspection Team (AIT)) at advanced reactor facilities under construction in the host region.

05.06 Director, Division of Operating Reactor Safety (DORS), Host Region

- a. Implements this IMC for advanced reactor facilities built in their region.
- b. Coordinates with APO to develop the site-specific operational program inspection and audit plan.
- c. Ensures that inspections and audits are documented in accordance with IMC 0618, "Advanced Power Reactor Inspection Reports."
- d. Dispositions inspection noncompliances per IMC 2571, "Dispositioning Advanced Power Reactor Construction Noncompliances," and perform program assessments per IMC 2572.

- e. Notifies the host region RA and the Director of APO when the operational readiness inspection and audit plan is complete for an advanced reactor facility being built in their region.
- f. Using the guidance in Attachment 2 of this IMC, recommends to the RA of the host region the decision whether to conduct a reactive inspection for significant events that occur at advanced reactor facilities located in the host region.

05.07 Director, RII Division of Operating Reactor Safety (DORS)

- a. Ensures coordination between RII DORS and the host region to participate in inspections of the preoperational testing portion of the initial test program (ITP) or post-construction inspection, testing, and analysis program (PITAP).
- b. Provide inspection and audit resources and technical assistance to the host region (if required) for the preoperational testing portion of the ITP or PITAP.
- c. Using the guidance in Attachment 2 of this IMC, recommends to the host region's RA, whether to conduct a reactive inspection for significant events that occur at advanced reactor facilities.

05.08 Director, Office of Nuclear Security and Incident Response (NSIR)

- a. Provides technical assistance and inspection and audit support to the host region to complete security and safeguards inspections at advanced power reactor facilities under construction.
- b. Maintains inspection procedures and inspection and audit guidance for security and safeguards inspections at advanced power reactor facilities under construction.
- c. Using the guidance in Attachment 2 of this IMC, recommends to the host region's RA, whether to conduct a reactive inspection for significant security-related events that occur at advanced reactor facilities.

2574-06 REQUIREMENTS

- 06.01 Inspections and audits of operational programs shall occur in accordance with the site-specific operational readiness and audit plan.
- 06.02 A site-specific operational readiness and audit plan shall be developed for each advanced power reactor construction project.

2574-07 GUIDANCE

07.01 Inspection and Audit Scoping Guidance

This IMC establishes uniform operational program inspection and audit scoping methodology for advanced power reactors under construction. Attachment 1 lists operational programs and inspection procedures that are generally applicable to an advanced power reactor facility. The specific operational program requirements for each advanced reactor are expected to vary and are provided in the licensing basis. Therefore, not all operational programs listed in Attachment 1 may be applicable at each advanced power reactor project. NRC staff should consult the licensing basis to compile a list of applicable operational programs for each project and specify appropriate IPs for inspection and auditing of each inspected or audited program in the operational program inspection and audit scoping plan.

Operational program inspection and audit scope should be adjusted for units under construction at sites where there is an operating unit of similar design and operational requirements. This adjustment gives the licensee credit for existing operational programs where appropriate. In addition, most operational program inspections and audits should not be repeated for nth-of-a-kind (NOAK) unit(s). For those operational programs that include additional inspection and audit scope for NOAK units, inspection or audit should only focus on the differences between the program as applied to the initial unit and the NOAK unit(s).

IMC 2203 describes inspection and audit scoping for advanced reactor security and safeguards programs.

Some operational programs are inspected under IMC 2573, "Inspection of the Advanced Power Reactor Quality of Reactor Plant Construction Strategic Performance Area." For example, equipment qualification programs, such as the environmental qualification (EQ) program, are inspected during IMC 2573 inspections. These programs should not be scoped for inspection under this IMC.

07.02 Creating an Operational Readiness Inspection and Audit Plan

The APO staff will create, the host region DORS director will concur with, and the APO Director will approve, an operational program inspection and audit scope for each advanced power reactor being deployed (e.g., manufactured microreactors) or constructed. The process of creating a site-specific operational readiness inspection and audit plan includes identifying the applicable site-specific operational programs; determining through a risk-informed and performance-based screening approach the operational program inspection and audit requirements; and determining the most efficient method and time to conduct operational program inspections and audits.

a. Identifying the Required Site-Specific Operational Programs.

The required operational programs are listed in the FSAR, COL (Part 52), or in the OL application (Part 50). Operational program requirements may also be included in an ML or a CP. Attachment 1 lists the operational programs from Chapter 13.4 of the Standard Review Plan (SRP). Some advanced reactors may not require all of these programs or may require additional operational programs not listed in Attachment 1.

b. Operational program inspection and audit scoping considerations.

The NRC staff determines which operational programs will be inspected and audited, and the timing for inspections and audits, using the risk-informed and performance-based methods described in this section. The word “audit” is used instead of “inspection” when the operational program is being reviewed prior to its implementation. NRC staff use IPs to conduct audits, but since the programs are not required by a license prior to their implementation, enforcement is not applicable to issues of concern identified during audits. Instead, NRC staff will provide an audit report to the licensee or permit holder that includes a list of observations that would represent program noncompliances if the program was implemented.

1. Risk-informed.

The NRC staff should risk-inform operational program inspection and audit scoping. This may be done by applying the “risk triplet” questions for the individual operational programs:

- (a) What can go wrong if the operational program is implemented incorrectly?
- (b) How likely is this?
- (c) What are the consequences?

2. Performance-based.

Performance-based operational program inspection and audit opportunities are situations where execution of the operational program can be directly observed, as opposed to only reviewing implementation documents. For example, observation of emergency planning drills, inspection of installed program hardware, and observing preoperational tests of SSCs are examples of performance-based inspections and audits. Inspectors may combine performance-based inspections and audits with document reviews but should use performance-based inspection and audit observations to inform documents chosen for review, where possible.

3. Other operational program scoping considerations.

- (a) The program is in use at a co-located operating reactor.
- (b) The licensee has implemented “fleetwide” operational programs.
- (c) The licensee has prior experience implementing operational programs at other reactor plant facilities.
- (d) The program is accredited by an independent 3rd-party organization.

- (e) The degree of overlapping program attributes with other programs.
 - (f) The likelihood of inspection or audit identifying significant noncompliances.
 - (g) The operational program is inspected under IMC 2573 or another IMC.
- c. Guidance for determining if an operational program should be included in the ARCOP inspection and audit scope.

NRC staff should use the process described in this section to determine if an operational program should be included in the ARCOP inspection and audit scope. Other risk-informed, performance-based scoping methodologies may be used if appropriate. Figure 1 demonstrates how risk-informed, performance-based inspection and audit scoping may be performed for operational programs for advanced power reactors under construction.

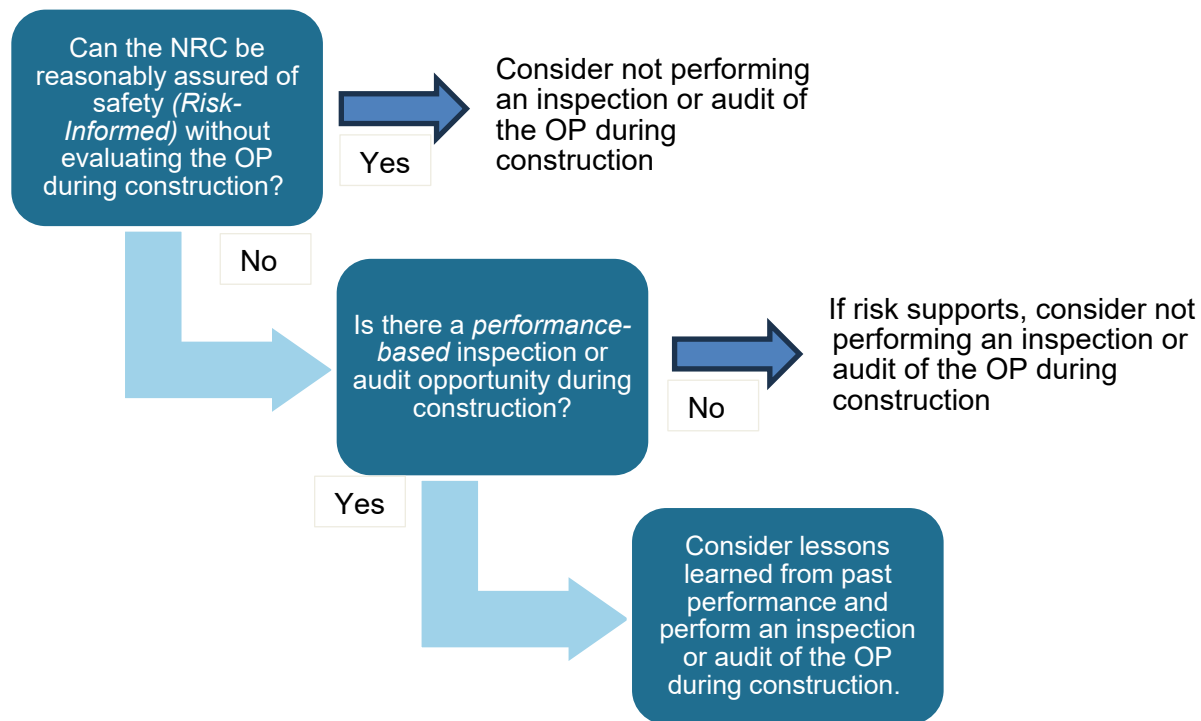


Figure 1: Operational Program Inspection and Audit Scoping Process

1. Can the NRC be reasonably assured of safety without inspecting the operational program during construction?

Inadequate implementation of some operational programs, for various reasons, may not pose a significant risk to the public, plant workers, or the environment during construction or during early operations of the reactor plant. After performing a risk-

informed evaluation of the program as discussed above, the NRC staff may choose not to include these operational programs in the ARCOP inspection and audit scope.

2. Is there a performance-based inspection or audit opportunity during construction?

Some operational programs, or aspects of operational programs, may not have informative performance-based inspection or audit opportunities during construction. For example, the contamination controls portion of the Radiation Protection operational program has little performance-based opportunity for inspection or audit until reactor operation produces potentially radioactive contamination. Staff should identify the performance-based inspection and audit opportunities for each operational program and should consider omitting those operational programs, or subprograms, that do not have performance-based inspection or audit opportunities during construction from the ARCOP inspection and audit scope. This decision should also be risk-informed such that unacceptable risk associated with program noncompliance is avoided.

3. Consider lessons learned from past performance and perform an inspection or audit of the operation program during construction.

When the risk evaluation for an operational program indicates that the NRC should perform an inspection or audit, and there are adequate performance-based inspection and audit opportunities, then the operational programs should be included in the ARCOP inspection and audit scope. Each operational program inspection and audit should be informed by inspection and audit experience and modified as appropriate to the specific reactor project. This may include adding to, or subtracting from, existing IP guidance.

d. When to perform operational program inspections and audits

The NRC inspection and audit strategy for operational programs should be performance-based so that inspections and audits verify the implementation of the program to the extent possible. This generally requires that inspections occur after the programs' implementation milestones. However, a risk-informed decision to audit an operational program prior to its implementation may be appropriate for some programs.

Program inspections and audits should be scheduled to optimize the value of the inspections and audits regardless of when the inspection or audit is scheduled in relation to licensing actions. However, since implementation of programs are not required until their implementation milestones, licensees may not be ready for pre-implementation program audits until just before the program's implementation.

e. Modifying the operational program inspection and audit scope.

The NRC staff may modify operational program inspection and audit scope as inspections and audits are completed and the results are assessed (see IMC 2572 for assessment guidance). Planned inspections and audits may be reduced or the scope of planned inspections and audits may be reduced if the licensee demonstrates that they are compliant with the program requirements already inspected and audited and the scope of the completed inspections and audits is sufficient to provide reasonable assurance that other program attributes are also compliant.

- f. Importance of the preoperational testing portion of the ITP (LWRs) or the PITAP (Non-LWRs).

The ITP and the PITAP are particularly important in providing assurance that construction and installation of equipment in reactor facilities have been accomplished in accordance with design and licensing requirements. Regulatory Guide 1.68, “Initial Test Programs for Water-Cooled Nuclear Power Plants,” describes the general scope and depth that the NRC staff considers acceptable for ITPs for LWRs. Similarly, interim staff guidance (ISG) DANU-ISG-2022-06, “Post-construction Inspection, Testing, and Analysis Program,” describes the general scope and depth that the NRC considers acceptable for testing of non-LWRs.

The ITP and the PITAP are operational programs that include preoperational and initial startup tests. Preoperational testing consists of those tests conducted following completion of construction of SSCs, but prior to startup. Initial startup testing consists of those test activities that are performed during and following fuel loading. Initial startup tests include activities such as fuel loading, precritical tests, initial criticality, low-power tests, and power-ascension tests. Preoperational testing will be inspected under ARCOP during construction and initial startup testing will be inspected under a separate IMC¹.

Due to the importance of ITP or PITAP testing, the NRC oversees it in three ways:

1. The first review of the ITP or PITAP is the safety evaluation review for the COL or OL application. This review is a programmatic review of the licensee’s implementation plan, and the staff uses either RG 1.68 (LWR) or DANU-ISG-2022-06 to verify adequate SSC testing scope and methodologies.
2. The second review of the ITP or PITAP is inspection of pre-operational testing through observation of construction testing or review of construction testing records during vertical slice inspections conducted under IMC 2573. The vertical slice inspections are part of the inspection scope of the “Quality of Reactor Plant Construction” strategic performance area developed in accordance with IMC 2573.
3. The third layer of the ITP/PITAP oversight is direct observation of system testing after construction of systems, or significant portions of systems, is complete. These inspections may be performed as part of a dedicated inspection area in the project-specific inspection scoping matrix developed per IMC 2573 or scoped separately using the inspection scoping strategy described in this IMC and is performed near the end of construction. Inspections should cover a sampling of risk-significant system tests that were not inspected in the vertical slice inspections, or that test multiple risk-significant systems.

- g. Security programs.

IMC 2203 provides guidance for roles and responsibilities associated with inspection of the security and safeguards strategic performance area. IMC 2203 also provides a list of

¹ The NRC staff anticipates that some microreactor deployment models will include startup testing in a factory. The staff anticipates that ARCOP will cover low power operational testing in a factory, and that the transition to the operating oversight program will not occur until relocation to its intended operating site. The staff will provide specific guidance for NRC oversight of this scenario prior to implementation of this deployment model by microreactor developers.

security programs that may be applicable to advanced reactor construction. Some COL licensees and OL applicants may be exempt from certain regulations and therefore exempt from some security and safeguards requirements. Licensees and applicants may also have design-specific requirements for security and safeguards. NSIR, in coordination with the host region and APO, should select those security and safeguards programs to be excluded from the security and safeguards inspection plan dependent upon the plant's design and licensing basis.

h. Use of IPs

The IPs listed in Attachment 1 may not be completely appropriate for some reactor plant designs. NRC staff may need to supplement, or omit, portions of the IPs. Additional inspection and audit guidance may be taken from other IPs, temporary instructions, or from approved site-specific inspection and auditing planning documents. It is not the intent of this IMC that all sections of the IPs be completed if they are not compatible with specific reactor plant designs. In addition, all sections of the IPs need not be completed to fulfill the objectives of the IPs. If in doubt of the need to complete specific sections of IPs, inspectors should discuss the inspection and audit activities with their supervisors.

07.03 Status of Operational Programs

The staff should inform the Director, NRR of the status of the operational programs as part of the final assessment results performed in accordance with IMC 2572. This status report is not meant to be a detailed report on the status of NRC inspections and audits of the programs. Instead, it is meant to inform the Director, NRR of the status of implementation of the programs as required by the license.

07.04 Noncompliances, Enforcement, and Assessment

NRC staff uses IMC 2571 to screen and characterize operational program noncompliances and IMC 0618 to document operational program findings prior to the transition to operations. Program noncompliances identified after the transition to operations will be dispositioned, documented, and assessed using the appropriate reactor operations oversight process.

07.05 Response to Significant Issues or Events

Guidance for responding to significant events at advanced reactor project vendors, manufacturers or construction facilities is contained in Attachment 2 of this IMC.

2574-08 REFERENCES

10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants"

10 CFR 50.34, "Contents of applications; technical information."

RG 1.206, "Combined License Applications for Nuclear Power Plants"

RG 16.8, "Initial Test Programs for Water-Cooled Nuclear Power Plants"

SECY-05-0197, "Review of Operational Programs in a Combined License and General Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria"

SECY-06-0114, "Description of the Construction Inspection Program for Plants Licensed under 10 CFR Part 52"

IMC 0618, "Advanced Power Reactor Inspection Reports"

IMC 2200, "Security Inspection Program for Construction"

IMC 2200, App. A, "Security Construction Inspection Program"

IMC 2570, "Advanced Reactor Construction Oversight Process (ARCOP) General Guidance and Basis Document."

IMC 2571, Dispositioning Advanced Power Reactor Construction Noncompliances,"

IMC 2572, "Assessment of Advanced Reactor Construction Projects."

IMC 2573, "Inspection of the Advanced Power Reactor "Quality of Construction" Strategic Performance Area"

END

List of Attachments:

Attachment 1:	Inspection Procedures for Operational and Security Programs
Attachment 2:	Response to Significant Issues or Events
Attachment 3:	Revision History for IMC 2574

Attachment 1: Inspection Procedures for Operational Programs

Table 1

<u>Program</u>	<u>Requirement</u>	<u>Inspection Procedures</u>
Preservice Inspection / Inservice Inspection	50.55a(g)	See IMC 2573 IPs
Inservice Testing	50.55a(f)	See IMC 2573 IPs
Environmental Qualification	50.49	See IMC 2573 IPs
Reactor Vessel Material Surveillance	50.60, App. H	See IMC 2573 IPs
Preservice Testing	50.55a(f)	See IMC 2573 IPs
Containment Leak Rate Testing	50.54(o)	See IMC 2573 IPs
Fire Protection	50.48	TBD ²
Process and Effluent Monitoring	50.34(b)(3), Part 50, App. I	TBD ¹
Radiation Protection	Part 20, Subpart B	TBD ¹
Non-licensed Plant Staff Training Program	50.120 52.79(a)(33)	TBD ¹
Reactor Operator Training	52.79(a)(33), 55.13, 55.31, 55.41, 55.43, 55.45	TBD ¹
Reactor Operator Requalification	52.79(a)(34) 50.34(b) 50.54(i) 55.59	TBD ¹

² IPs listed as TBD are under development and IP numbers will be assigned at a later date.

<u>Program</u>	<u>Requirement</u>	<u>Inspection Procedures</u>
Emergency Preparedness	50.34(b)(6)(v), 50.47, 50.54(q), 50.54(t)	TBD ¹
Security (including training, vehicle and personnel access control, FFD, safeguards contingencies, cyber security, SNM Material Control and Accounting, and Part 37)	50.34(c) 50.34(d) 50.34(e) 50.54(p)(1) 50.54(v) Part 26, Subpart K 73.54(b) Part 74, Subpart B Part 37	See IMC 2203 IPs
Quality Assurance (Operation)	Part 21 50.54(a) Part 50, Appendix B	See IMC 2573 IPs
Maintenance Rule	50.65	See IMC 2573 IPs
Motor-Operated Valves	50.55a(b)(3)(ii)	See IMC 2573 IPs
Initial Test Program	50.34 52.79(a)(28)	See IMC 2573 IPs

Attachment 2: Revision History for IMC 2574

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	ML25210A582	Draft IMC for public comment.	N/A	N/A
N/A	ML25342A172 02/05/26 CN 26-004	Initial Issuance.	Construction Inspector, supervisor and PM ARCOP training	ML25336A292