

Army Regulation 50–7

**Nuclear and Chemical Weapons
and Materiel**

Army Reactor Program

**Headquarters
Department of the Army
Washington, DC
17 November 2016**

UNCLASSIFIED

SUMMARY of CHANGE

AR 50-7

Army Reactor Program

This major revision, dated 17 November 2016—

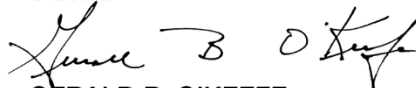
- o Changes the name of the U.S. Army Nuclear and Combating Weapons of Mass Destruction Agency to the U.S. Army Nuclear and Countering Weapons of Mass Destruction Agency (para 1-1).
- o Updates responsibilities (paras 1-4 through 1-22).
- o Clarifies Assistant Chief of Staff for Installation Management responsibilities to include policy guidance on environmental compliance for both operating and deactivated reactors and operations review support for operating reactors (para 1-12).
- o Updates references that impact personnel reliability program requirements for reactor operations (para 1-19a).
- o Lists applicable regulations and directives for the health physics plan requirements (para 4-2).
- o Revises personnel reliability program direction and references (para 4-3).

**Nuclear and Chemical Weapons and Materiel
Army Reactor Program**

By Order of the Secretary of the Army:

MARK A. MILLEY
General, United States Army
Chief of Staff

Official:



GERALD B. O'KEEFE
Administrative Assistant to the
Secretary of the Army

History. This publication is a major revision.

Summary. This regulation establishes policies, assigns responsibilities, and prescribes procedures for implementing the Army Reactor Program to ensure that Army reactors are operated in a safe, secure, and reliable manner from activation through decommissioning. This regulation designates the Deputy Chief of Staff, G–3/5/7 as the proponent of the Army Reactor Program and establishes the Army Reactor Office under the U.S. Army Nuclear and Countering Weapons of Mass Destruction Agency to coordinate the Army Reactor Program.

Applicability. This regulation applies to the Active Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve, unless otherwise stated. It also applies to Department of the Army civilian employees. During mobilization, the proponent may modify the procedures in this publication to support policy changes as necessary.

Proponent and exception authority. The proponent of this regulation is the Deputy Chief of Staff, G–3/5/7. The proponent has the authority to approve exceptions or waivers to this regulation that are consistent with controlling law and regulations. The proponent may delegate this approval authority, in writing, to a division chief within the proponent agency or its direct reporting unit or field operating agency, in the grade of colonel or the civilian equivalent. Activities may request a waiver to this regulation by providing justification that includes a full analysis of the expected benefits and must include formal review by the activity's senior legal officer. All waiver requests will be endorsed by the commander or senior leader of the requesting activity and forwarded through their higher headquarters to the policy proponent. Refer to AR 25–30 for specific guidance.

Army internal control process. This regulation contains internal control provisions in accordance with AR 11–2 and identifies key internal controls that must be evaluated (see appendix C).

Supplementation. Supplementation of this regulation and establishment of command and local forms are prohibited without prior approval of the Deputy Chief of Staff, G–3/5/7, 400 Army Pentagon, Washington, DC 20310–0430.

Suggested improvements. Users are invited to send comments or suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to the Office of the U.S. Army Nuclear and Countering Weapons of Mass Destruction Agency (MONA–CWA), 5915 16th Street (Bldg. 238), Fort Belvoir, VA 22060–5514 with a copy furnished to the Headquarters, Department of the Army, Deputy Chief of Staff, G–3/5/7, 400 Army Pentagon, Washington, DC 20310–0430.

Distribution. This publication is available in electronic media only and is intended for command levels C, D, and E for the Active Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve.

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Chapter 1 Introduction

Section I

General

1–1. Purpose

This regulation establishes Department of the Army (DA) policies, assigns responsibilities, and prescribes procedures for the Army Reactor Program (ARP). The purpose of the ARP is to ensure that Army nuclear reactors as defined in this regulation's glossary are operated in a safe, secure, and reliable manner from design through decommissioning. This regulation designates the Deputy Chief of Staff (DCS), G–3/5/7 as the proponent for the ARP, and the U.S. Army Nuclear and Countering Weapons of Mass Destruction Agency (USANCA) as the focal point for the management of the ARP and the Army Reactor Office (ARO).

1–2. References

See appendix A.

1–3. Explanation of abbreviations and terms

See the glossary.

1–4. Responsibilities

Responsibilities are listed in section II, chapter 1.

Section II

Responsibilities

1–5. Assistant Secretary of the Army (Installations, Energy and Environment)

The ASA (IE&E) will oversee any planning efforts, studies, or entering into negotiations or establishing any agreement to site, finance, construct, or operate a nuclear power reactor for Army activities. Approval from ASA (IE&E) is required prior to initiation of permitting or licensing process actions for nuclear power reactors in accordance with policy memorandum "Nuclear Power Project Guidance and Approval Policy," dated 7 May 2013.

1–6. Inspector General

The Inspector General will perform assessments and inspections of Army reactor facilities in accordance with AR 50–5 and AR 20–1.

1–7. Chief of Public Affairs

The Chief of Public Affairs will manage public affairs activities in support of the ARP.

1–8. Deputy Chief of Staff, G–2

The DCS, G–2 will supervise counterintelligence support to reactor sites and activities.

1–9. Deputy Chief of Staff, G–3/5/7

The DCS, G–3/5/7 will—

- a.* Coordinate policy for the ARP.
- b.* Establish policies for the safe, secure, and reliable operation of Army reactors in accordance with Department of Defense (DOD) policies. Oversees implementation of Army reactor policy.
- c.* Establish Army policy for the nuclear personnel reliability program (PRP) (AR 50–5).
- d.* Function as the Army Staff (ARSTAF) single point of contact for reactor matters, except for radiation safety issues which are under the purview of the DASAF.
- e.* Integrate other ARSTAF program responsibilities into the ARP.
- f.* Approve reactor facility reliability operating standards and certification process.
- g.* Approve, in coordination with appropriate proponents, policy, and procedures for the authorization, acquisition, accounting, control, and disposition of nuclear reactors and reactor fuel.

h. With concurrence of the Assistant Chief of Staff for Installation Management (ACSIM) and the DASAF, approve environmental protection and monitoring management policy and procedures and ensure that all environmental documentation required by AR 200–1 is properly prepared.

i. With concurrence of ACSIM and DASAF representatives to the ARC—

- (1) Approve decommissioning strategy, policy, and procedures.
- (2) Approve environmental, safety, and security standards for operating and deactivated reactors.
- (3) Approve deactivated reactor management policy.

j. In coordination with DASAF—

(1) Approve each reactor study report identified in table 2–1 of this regulation before the ARO issues the appropriate permit.

- (2) Approve permit amendments.
- (3) Approve the removal of permit suspensions.

k. Limit the approval authority for operations of a reactor facility, either active or deactivated, and possession of reactor fuel to the first general officer (current or promotable general officer serving as commander or senior executive service member serving as senior manager of the organization that holds the Army reactor permit).

l. Provide a member to the ARC. This member is normally from the Office of the Director of Strategy, Plans, and Policy.

1–10. Chief of Engineers

The COE will—

a. Act as the single point of contact at Headquarters, Department of the Army (HQDA) for nuclear reactor engineering and design, reactor construction, and decommissioning design and implementation.

b. Develop deactivated reactor management policy.

c. Ensure Commander, U.S. Army Corps of Engineers (USACE)—

(1) Develops procedures for compliance and ensures compliance with all safety and environmental requirements for deactivated reactors.

(2) Conducts decommissioning studies and report status of reactor facilities undergoing decommissioning, with a copy furnished to the DASAF.

(3) Ensures compliance with environmental requirements for designing, constructing, and decommissioning Army nuclear reactors. Informs the ARO of the status of the National Environmental Policy Act (NEPA) process for reactors.

(4) Coordinates on all pre-construction, preoperational, initial, or decommissioning reactor studies.

(5) Coordinates on all operational and special reactor studies that have the potential for major modifications that would affect reactor systems safety or security or could cause significant revision to the facility decommissioning plan as determined by the ARO.

(6) Participates in reactor audits and studies, as requested.

(7) Executes environmental restoration activities as directed by the ACSIM.

(8) Provides a member to the ARC.

(9) Formulates decommissioning strategy and execution procedures.

1–11. The Surgeon General

The TSG will—

a. Establish medical policies and procedures in support of the ARP.

b. Provide policy and guidance on the medical aspects of programs to screen and certify reactor operator (RO) personnel.

c. Participate in reactor studies as required.

d. Provide a member to the ARC. The radiological hygiene consultant will normally fulfill this responsibility.

1–12. Assistant Chief of Staff for Installation Management

The ACSIM will—

a. Provide policy guidance on environmental protection, environmental compliance, and environmental restoration issues pertaining to both operating and deactivated reactors.

b. Provide oversight of installation restoration activities associated with the closure of reactor sites.

c. Review environmental monitoring policies and procedures at operating reactors during annual operational reviews.

d. Provide assistance to the ARC in developing reactor environmental standards.

e. Provide a member to the ARC and operational reviews.

1–13. Provost Marshal General

The Provost Marshal General will—

- a.* Coordinate on reported security issues.
- b.* Establish policies for the security of Army reactors (AR 190–54).
- c.* Provide a member to the ARC.

1–14. Director of Army Safety

The DASAF (in accordance with AR 385–10) and Army Radiation Safety (in accordance with DA Pam 385–24) will—

- a.* Oversee the Armywide radiation safety program.
- b.* Coordinate on all reactor studies and on any other action identified by the ARO that involves reactor safety.
- c.* Coordinate Department of Energy (DOE) assistance in support of reactor health and safety under provisions of section 91 of the Atomic Energy Act of 1954 (42 USC 2121(b)), through the Assistant to the Secretary of Defense (Nuclear and Chemical and Biological Defense Programs).
- d.* Approve the following in coordination with DCS, G–3/5/7:
 - (1) Each reactor study report identified in table 2–1 of this regulation before the ARO issues the appropriate permit.
 - (2) Permit amendments.
 - (3) The removal of permit suspensions.
- e.* Implement U.S. Army Nuclear Weapon/Reactor Accident Investigation Board responsibilities.
- f.* Provide a health physicist and a safety professional to serve as members of the Army Reactor Council (ARC).
- g.* Provide assistance to the ARC in developing deactivated reactor safety standards.

1–15. Commanding General, U.S. Army Medical Command

The CG, MEDCOM will provide and maintain adequately trained, privileged, and resourced occupational health, industrial hygiene, and emergency medical service staff for the installation medical treatment facilities that support nuclear reactor accident/incident response activities.

1–16. Commanding General, U.S. Army Test and Evaluation Command

The CG, ATEC will—

- a.* Provide guidance for management of the Army’s operational testing, developmental, and continuous evaluation programs.
- b.* Provide a member to the ARC.

1–17. Commander, U.S. Army Installation Management Command

The Commander, IMCOM will—

- a.* Ensure subordinate commands provide base support to reactor facilities on post.
- b.* Authorize subordinate commands to enter memoranda of understanding to support the reactor permit holder/mission commander.

1–18. Director, U.S. Army Nuclear and Countering Weapons of Mass Destruction Agency

The Director, USANCA will—

- a.* Manage the ARP for the DCS, G–3/5/7.
- b.* Establish and maintain the ARO, and designate the Army Reactor Program manager (ARPM).
- c.* Serve as focal point for interaction and coordination with DOD, DOE, Nuclear Regulatory Commission (NRC), other Federal and State agencies, and Army agencies involved in the ARP.
- d.* Issue reactor permits and amendments, in coordination with the DASAF.
- e.* Issue certification letters to applicants who successfully complete the RO certification process.
- f.* Conduct reactor studies and supporting activities as required.
- g.* Forward reactor studies and proposals contained in table 2–1 of this regulation to the DCS, G–3/5/7 and DASAF for approval.
- h.* Oversee reactor system audits.
- i.* Perform quality assurance program reviews.
- j.* Develop and issue design and evaluation criteria for reactors based on the ARP objectives described in this regulation.
- k.* Review reactor personnel training requirements, certification procedures, and qualification criteria to assure compatibility with applicable national nuclear standards.
- l.* Authorize tests and experiments which are not addressed in existing reactor documents.
- m.* Perform other reactor-related tasks as directed by the DCS, G–3/5/7.

- n.* Establish, serve as chairperson, and provide a member to the ARC.
- o.* Provide chairperson, executive secretary, and staff support required for each study conducted by, or directed by, the ARC.
- p.* Determine agencies that will be required to provide members to augment the ARC personnel.
- q.* Request participation in reactor studies from appropriate agencies.
- r.* Provide the DCS, G-3/5/7 an annual report that contains the status of open ARC recommendations with copies provided to the Radiological Hygiene Consultant (Office of The Surgeon General) and the DASAF.
- s.* Establish reactor facility reliability operating standards and certification process based on Federal statutes and DOD directives.
- t.* Oversee the USACE decommissioning execution.
- u.* Oversee USACE execution of the deactivated reactor management program.
- v.* Establish security classification guidance for the ARP.

1-19. Commanders of Army commands, Army service component commands, and direct reporting units acquiring or possessing nuclear reactors

The Commanders of ACOMs, ASCCs, and DRUs acquiring or possessing nuclear reactors will—

- a.* Ensure that nuclear PRP, security, and safety programs are consistent with AR 50-5, AR 190-54, DA Pam 385-24, and this regulation.
- b.* Notify the ARO of plans to build or acquire a reactor as early as possible in the development process and before applying for a reactor system construction permit.
- c.* Apply for appropriate reactor permits by submitting the documents listed in table 2-1 of this regulation to the ARO.
- d.* Send reports and plans required by this regulation to the ARO.
- e.* Provide technical support and data to the organizations participating in nuclear reactor studies.
- f.* With USACE, implement a quality assurance program for designing, constructing, and decommissioning reactor facilities and for major modifications that affect reactor system safety or security.
- g.* Establish a reactor safety program.
- h.* Forward changes to the reactor facility which involve unreviewed safety questions (USQs) or a change to the technical specifications through command channels to the ARC for review.
- i.* Send requests for conducting tests or experiments that are not addressed in existing nuclear reactor documents to the ARO.
- j.* Submit security/augmentation force requirements to HQDA in the appropriate force submission system to allow HQDA to allocate taskings to the appropriate force providers and provide Army Force Generation/Global Force Management (ARFORGEN/GFM) system visibility.
- k.* Provide a member to the ARC.

1-20. Commanders responsible for reactor facilities

The commander, or subordinate commander, will—

- a.* Ensure the safety, security, and reliability of reactor operations.
- b.* Forward changes to the reactor facilities which involve USQs or a change to the technical specifications through command channels to the ARC for review.
- c.* Conduct reviews of reactor safety, security, operations, and the nuclear PRP. Manage the workload of the test facilities.
- d.* Submit security/augmentation force requirements to HQDA in the appropriate force submission system to allow HQDA to allocate taskings to the appropriate force providers and provide ARFORGEN/GFM system visibility.
- e.* Provide a representative to the ARC.
- f.* Review reports and activities of the Reactor Facility Safety Committee (RFSC), and provide a copy of the minutes through command channels to the ARO for subsequent ARC review.
- g.* Implement a safety program in accordance with AR 385-10, and designate, in writing, a person to be the reactor radiation safety officer (RRSO) for the reactor facility.
- h.* Ensure adherence to all applicable environmental requirements in AR 200-1.
- i.* Develop and implement special nuclear material (SNM) inventory procedures and perform an annual inventory.
- j.* Establish a RFSC.
- k.* Identify, investigate, report, and correct problems that affect the ARP.
- l.* Develop a crisis communication plan to inform workforce and general public in the event of an incident.

1–21. Reactor facility directors

The reactor facility directors will—

- a.* Manage a safe, secure, and reliable reactor facility.
- b.* Establish a reactor staff training program for ROs.
- c.* Report to the ARO and ARC any safety defects or positive USQs involving reactor operations.
- d.* Forward changes to the reactor facilities which involve USQs or a change to the technical specifications through command channels to the ARC for review. Implement a quality assurance program.
- e.* Administer the Reactor Staff Certification Program.
- f.* Establish duty hour limitations to ensure safe operations.

1–22. Reactor safety manager

The RSM is the point of contact, independent of the reactor operations staff, for safety matters. As independent advisor to the responsible reactor facility commander, the RSM will identify safety problems to the reactor facility director and responsible reactor facility commander for resolution. The RSM will perform duties in accordance with this regulation.

Section III

The Army Reactor Program

1–23. Policy

It is Army policy to follow NRC guidelines, as well as the recommendations of the National Council on Radiation Protection and Measurements, and American National Standards Institute (ANSI).

1–24. The Army Reactor Program concept

The ARP establishes policies, assigns responsibilities, and prescribes procedures to ensure that Army reactors are designed, constructed, operated, maintained, and decommissioned in a safe, secure, and reliable manner, in compliance with laws, regulations and agreements, and consistent with sound practices. It also provides controls to prevent the loss of SNM, nuclear accidents, incidents, or unauthorized reactor operations.

1–25. The Army Reactor Program objectives

- a.* Minimize the probability of a reactor accident or incident.
- b.* Minimize the severity of a reactor accident or incident.
- c.* Maintain radiation exposures to the public, the environment, and operating personnel to levels within regulatory limits and as low as is reasonably achievable (ALARA).
- d.* Ensure adequate physical security of reactor facilities and SNM.
- e.* Ensure regulatory compliance with environmental and transportation requirements.
- f.* Ensure reactor facilities undergoing decommissioning meet unrestricted release conditions. Decommissioning to a lesser standard requires ARC approval to protect current and future Army interests.

1–26. Army Reactor Council

a. The ARC is chartered by DCS, G–3/5/7 to provide overall executive oversight which assures that the ARP complies with DOD directives concerning—

- (1) Reactor safety.
- (2) Radiation exposures of personnel and the general public.
- (3) Environmental protection.
- (4) Physical security of SNM.

b. The members of the ARC include representatives from the DCS, G–3/5/7; DASAF; USANCA; USACE; Office of the Provost Marshal General; Office of The Surgeon General (OTSG); ACSIM; and ATEC. Representatives to the ARC are from offices responsible for reactor facilities.

c. The ARC—

- (1) Monitors the utilization of operating Army reactors and coordinates within the Army and with other Services and Defense agencies to ensure that the ARP is fully responsive to national nuclear testing, research, and other requirements.
- (2) Approves proposals for new reactors and sponsors associated technical studies, as required.
- (3) In coordination with the ACSIM, approves decommissioning decisions and plans and certifies when decommissioning actions are completed. Approves changes to the reactor facilities which involve USQs or a change to the technical specifications.

(4) Conducts operational reviews, to include health, environmental protection, safety, and security, to provide assurance that Army nuclear reactor systems are designed, built, and operated in accordance with Army policy and all legal requirements.

(5) Meets at a minimum semiannually, but more often if required.

1–27. Army Reactor Program manager

The ARPM—

- a.* Manages the ARO as an organizational element of USANCA.
- b.* Serves as Executive Secretary to the ARC.
- c.* Monitors Federal statutes and DOD instructions to ensure their inclusion, as required, in Army regulations and policy applicable to the ARP.
- d.* Convenes meetings of the ARC semiannually, but more often if required .
- e.* Tracks disposition of issues raised by the operating commands or others for action.
- f.* Follows up on ARC decisions through studies, changes to Army regulations, resource allocation, or other means.
- g.* Engages consultants to perform expert studies when required.
- h.* Obtains resolutions of Army regulations and directives.
- i.* Collects, coordinates, and provides guidance on the mission and operation of operating and proposed reactors and resources required to support operation and regulatory requirements.
- j.* Tracks unresolved issues to resolution.
- k.* Coordinates with non-Army agencies concerning reactor projects and utilization to avoid duplication and maximize use of DOD resources.
- l.* Reviews reactor system documents and changes contained in table 2–1 of this regulation.
- m.* Keeps Office of the Chief of Public Affairs informed of reactor operations, including, but not limited to, serious incident reports, commissioning and decommissioning plans, routine reports, and studies.

1–28. Supplemental guidance

- a.* This regulation does not restrict the authority of a commander to deviate from normal policies and procedures in an emergency, if compliance would aggravate the situation or prevent return to a normal operating environment. The commander will make required reports (in accordance with AR 190–45 and AR 385–10).
- b.* DA reactor security matters will be managed as directed by AR 190–54. AR 190–54 prescribes the physical security policy, criteria, and standards for securing reactor facilities and the SNM used as reactor fuel. Only the portions of AR 190–54 that are pertaining to nuclear reactor facilities with SNM on site or have not been deactivated are applicable.
- c.* DA reactor security matters will be managed as directed by AR 190–13. AR 190–13 prescribes the physical security policy for deactivated reactor facilities.

Chapter 2 Reactor Permits

2–1. General

All Army reactor construction, commissioning, operation, testing, and decommissioning requires a permit. The ARO issues six types of permits—

- a.* Construction permit to build or acquire the reactor.
- b.* Load and test permit to receive fuel, initialize core loading, and characterize and test the reactor.
- c.* Operational permit for routine use of the reactor.
- d.* Deactivated reactor facility possession permit.
- e.* Decommissioning permit to decommission the reactor.
- f.* Special permits to cover other operations.

2–2. Application and approval procedures

- a.* Commanders submit permit applications, including supporting documentation listed in table 2–1 and other content specified by the ARO, to the ARO for review and approval.
- b.* The ARO will commission a reactor study dependent on the permit type, as specified in table 2–1, and publish findings in a study report.
- c.* The ARO issues permits after DCS, G–3/5/7 and DASAF approve the appropriate reactor study report.

d. The permit holder will comply with all requirements identified in the permit. The compliance will be documented in facility plans, specifications, and procedures.

Table 2-1

Supporting documentation and reactor studies for permit applications

Permit type	Supporting documentation	Reactor study
Construction	<ol style="list-style-type: none"> 1. Preliminary safety analysis report. 2. Preliminary decommissioning plan. 3. Preliminary physical security plan. 4. Preliminary emergency plan. 5. Preliminary health physics plan. 6. Approved environmental impact statement or environmental assessment. 7. Environmental radiation monitoring plan. 	Initial
Load and test	<ol style="list-style-type: none"> 1. Updated safety analysis report. 2. Updated decommissioning plan. 3. Updated physical security plan. 4. Updated emergency plan. 5. Updated health physics plan. 6. Preliminary technical specifications. 7. Preliminary training plan. 8. Preliminary requalification plan. 9. Preliminary maintenance plan. 	Pre-operational
Operational	<ol style="list-style-type: none"> 1. Facility safety analysis report. 2. Facility decommissioning plan. 3. Facility physical security plan. 4. Facility emergency plan. 5. Facility health physics plan. 6. Facility technical specifications. 7. Facility training plan. 8. Facility requalification plan. 9. Facility maintenance plan. 	Operational
Special	<ol style="list-style-type: none"> 1. Special safety analysis report. 2. Appropriate supporting documents. 	Special
Deactivated reactor facility possession	<ol style="list-style-type: none"> 1. Compliance agreements/consent decrees, and so forth, that involve other regulators and stakeholders in the decommissioning. 2. Any applicable agreements between responsible commander and garrison organizations to be in place during deactivation phase. 3. Safety and health framework, identifying how personnel and radiation safety will be managed. 	Post-operational
Decommissioning	<ol style="list-style-type: none"> 1. Approved environmental impact statement or environmental assessment. 2. Historical site assessment. 3. Coordination documents with State Historical Preservation Office (if required). 4. Compliance agreements/consent decrees, and so forth, that involve other regulators and stakeholders in the decommissioning. 5. Proposed classification of areas for cleanup. 6. Any applicable agreements between responsible commander and garrison organizations to be in place during decommissioning. 7. Safety and health framework, identifying how personnel and radiation safety will be managed. 8. Waste management and disposal plan. 9. Final decommissioning plan. 	Decommissioning

2–3. Permit changes

a. When there are changes to the parameters of an existing permit, a new permit or a permit amendment is required. A new permit is typically issued every ten years following an annual operations review; the new permit application will be submitted per paragraph 2–2. The following cases are other situations that may require a new permit or permit amendment:

- (1) Change in the permit holder organization.
- (2) Approval of an updated safety analysis report by the ARC requires a new permit.

Note. Acceptance of a special safety analysis report or safety evaluation covering a special condition can generally be handled at the level of a permit amendment.

(3) An existing permit is rescinded due to internal or external activities that significantly impact the conditions as called out in the U.S. Army Reserve or existing permit.

(4) The proponent requires one based on recommendations from the ARC.

b. Only DCS, G–3/5/7 and DASAF may approve permit amendments. An amendment application includes a description of the proposed change, with the justification and updates to any of the affected documents from table 2–1. Based upon these documents, the ARO conducts a study which concludes with a recommended disposition.

2–4. Permit suspension

The ARO or the facility’s operational chain of command will suspend permits if the reactor staff fails to maintain the requirements of the permit, or if worker or public safety is at risk. The DRU or ACOM commander will immediately notify the ARO of the suspension, which will remain in effect pending review and decision by the ARO and HQDA (DCS, G–3/5/7 and DASAF).

Chapter 3 Reactor Studies

3–1. General

Reactor studies evaluate Army reactors for compliance with the ARP objectives (para 1–25) and the system design and evaluation criteria to support permit applications, or address emergent conditions or USQs. Study participants will ensure facility operations and programs meet the commitments in required facility documentation. The ARO appoints the study chairman and designates organizations to participate in the studies.

3–2. Philosophy

Reactor studies identify and assess the risk associated with any activity at an Army Reactor Facility. DCS, G–3/5/7 and DASAF approve reactor permits based upon a balance among risks, mitigation requirements and costs, and the expected benefits of reactor operations.

3–3. Study reports

- a.* The DCS, G–3/5/7 will provide guidance to the ARO on the scope of the study.
- b.* The ARO documents study conclusions and recommendations. Study participants will sign the report for their organizations.
- c.* The ARO publishes and distributes the study reports.

3–4. Initial reactor study

This study evaluates the proposed new reactor system early in the development cycle to determine whether the design provides adequate reactor safety and security. This study is conducted between the design development and design approval phases.

3–5. Pre-operational reactor study

This study evaluates the organization’s staff and functional readiness to conduct initial reactor operations and determines whether construction and staffing provide adequate reactor safety and security.

3–6. Operational reactor study

This study examines safety features in the reactor system’s design, facility technical specifications, and procedures and evaluates readiness to conduct continuing operations.

3-7. Special reactor study

As recommended by the ARO and approved by DCS, G-3/5/7 and DASAF, studies are used to evaluate—

- a. Potentially unsafe conditions or operational procedures revealed inadequate during reactor operations.
- b. Modifications, alterations, or retrofits that affect reactor safety or security.
- c. Tests that affect reactor safety or security.
- d. Significant changes or modifications in the operational concept that affect reactor safety or security.
- e. Any other condition that could affect reactor safety or security.

3-8. Decommissioning reactor study

This study evaluates the ability of the DRU, ACOM and/or USACE to decommission the reactor.

3-9. Study findings

The ARO will recommend the action agency and suspense for each finding requiring corrective action. The action agency will send the ARO a monthly status report of corrective actions taken until corrective action is complete, as determined by the ARO.

Chapter 4

Management Programs and Documentation

4-1. Reactor Safety Program

a. *Reactor Safety Program.* The Reactor Safety Program must comply with Army safety program requirements and address all types of risks present in the facility and its operation. Specific to nuclear safety, the program must include the following elements:

b. *Safety analysis reports.* The format of NUREG 1537 provides formatting guidelines for the following reports:

- (1) Preliminary safety analysis report will contain information about the proposed system and relationship to the program under which it is being developed.
- (2) Updated safety analysis report will contain the proposed operational concept and information about the reactor.
- (3) Facility safety analysis report (FSAR) will contain a description of the reactor and how it will be operated.
- (4) The special safety analysis report (SSAR) will contain a description of the reactor and any proposed modifications, procedural changes, or tests.

c. *Technical Specifications.* The technical specifications are derived from the safety analysis report. Technical specifications include the following components, as appropriate:

- (1) Safety limitations, limiting safety system settings, limiting conditions for operation.
- (2) Surveillance requirements.
- (3) Design features.
- (4) Administrative controls. These are the measures that the reactor facility director takes to ensure that the specific requirements contained in technical specifications are implemented. These also include the procedures to report failures to comply with the requirements.

d. *Unreviewed safety question process.* The reactor facility director shall implement a process to identify and analyze the effects of proposed changes, tests, or experiments to the nuclear safety margin, and to identify any potential deficiency which could—

- (1) Increase the probability or severity of an accident or malfunction of equipment important to the safety analysis.
- (2) Introduce the possibility of an accident or malfunction which was not previously considered.
- (3) Reduce the margin of safety as defined in the basis of technical specifications.
- (4) A screening for potential USQ following 10 CFR 50.59 is required for proposed facility changes, tests, or experiments of a different nature than previously performed, or discovered analytical inadequacy. Any identified USQ must be forwarded to and addressed by the ARC.

e. *Reactor Facility Safety Committee.* The RFSC will ensure coordination among organizations involved in reactor construction, operations, and decommissioning. The following guidelines apply:

- (1) Each responsible commander, or designated representative, will chair the committee. The RFSC may be combined with other radiation safety councils or committees if they fully address all reactor matters at each meeting.
- (2) The committee must have a written charter, including opening procedures and voting rules.
- (3) Required membership includes the reactor facility director, RRSO, RSM, and at least two representatives from installation safety.

- (4) The committee may include representatives from the military medical services, civil engineering, safety, disaster preparedness, environmental offices, and the office of the staff judge advocate as appropriate.
- (5) The committee will meet at least semiannually.
- (6) Participants advise the chair on matters affecting reactor safety security, reliability, and environmental issues.
- (7) The committee chair will maintain minutes, assign action items, and provide a copy of the minutes through command channels to the ARO for subsequent ARC review.
- (8) Committee minutes will be maintained per AR 25–400–2.
 - f. Unescorted access.* Unescorted access to radionuclides of concern must be authorized in accordance with DA Pam 385–24.

4–2. Health physics plan

The reactor facilities will be designed to ensure that exposure of personnel to radiation is maintained ALARA and to minimize the potential for future health problems are not encountered. Each facility must, therefore, maintain a formal radiological safety program documented by an approved health physics plan. The health physics plan is maintained as a single entity and contains the following management and procedural details:

- a.* Health physics personnel responsibilities and staff organization.
- b.* Training of personnel (AR 385–10 and DA Pam 385–24).
- c.* Personnel monitoring and exposure limits, procedures for recording exposures, and procedures for evaluating over-exposures (DA Pam 385–25 and DA Pam 385–24).
- d.* Procedures for issuance of work permits in radiation areas.
- e.* Maximum acceptable contamination levels (DA Pam 385–24).
- f.* Operational monitoring and surveys (DA Pam 385–24 and DA Pam 385–25).
- g.* Use, maintenance, and calibration of radiation monitoring equipment (DA Pam 385–24 and TB 43–180).
- h.* Decontamination procedures.
- i.* Radioactive waste disposal and effluent release procedures (DA Pam 385–24).
- j.* Radiation storage area (location and procedure for use).
- k.* Radiation placarding and labeling (DA Pam 385–24).
- l.* Procedures for qualifying health physics personnel.
- m.* Health physics records and documentation (AR 25–400–2 and DA Pam 25–403).
- n.* Procedures to validate a commitment to keep all radiation exposures ALARA.

4–3. Personnel reliability program

- a.* Each responsible commander and/or subordinate commander will implement a nuclear PRP in accordance with AR 50–5.
- b.* Each responsible commander and/or subordinate commander will establish an occupational health program in support of reactor operations in accordance with the latest MEDCOM guidance.

4–4. Environmental radiation monitoring plan

This plan outlines the environmental monitoring program put in place to ensure the reactor is operated in an environmentally safe manner that minimizes, to the extent practicable, the impact of the reactor on the environment. The environmental radiation monitoring plan specifies environmental sampling and effluent monitoring activities for the reactor and must include a baseline hazards analysis, conceptual site model, and data quality objectives upon which the sampling and monitoring requirements are based. The plan must comply with NRC guidelines and National Council on Radiation Protection and Measurements recommendations, and be approved by the ARC.

4–5. Training plan

The reactor facility director will ensure that the training necessary to maintain the technical and professional competence of reactor personnel is conducted and documented. The training plan includes a RO certification plan, which includes maintenance of operator qualification. This plan is reviewed by the ARO and DASAF.

4–6. Physical security plans

The physical security plan provides measures for resource protection and for countering threats that may be directed against the reactor system and must comply with the requirements in AR 190–54 for operating facilities and must comply with the requirements of AR 190–13 for deactivated and decommissioning facilities.

4–7. Emergency plan

This plan contains emergency procedures for dealing with reactor accidents and incidents. This plan will be exercised at least annually by each reactor facility director in coordination with the responsible commander. The principal national and Army guidance document for the emergency plan is ANSI/ANS–15.16.

4–8. Facility maintenance plan

The reactor facility director will ensure that the maintenance necessary to sustain safe, predictive, and reliable reactor operations is conducted on a continual basis and documented. Facility documentation will specify those maintenance tasks that are reactor-related and which of the tasks require direct supervision. All reactor-related maintenance requires pre-approval by the on-duty reactor leader (RL), or supervisor, and will be performed or supervised by a RL or supervisor.

4–9. Quality assurance program

Quality assurance is a continuous process to prevent or reduce impact on public health and safety as a result of a facility's operation. The quality assurance program will include such key elements as—

- a.* Review and trending of performance and conditions observed during reactor operations, surveillance, and inspections.
- b.* Management of facility modifications to avoid the emergence of USQs.
- c.* Causal analysis of events, conditions, near misses and USQs to identify underlying conditions or opportunities to improve operational consistency.

4–10. Decommissioning plan

This plan documents status and operating history, radioactive material inventory, planned decommissioning program, radiological and non-radiological safety analyses, and organization and control.

Chapter 5

Audits, Reviews, and Inspections

5–1. Annual reactor audit (internal)

Each RSM will audit reactor programs annually, in accordance with appendix C. Areas may be audited in one effort, or the review may be scheduled throughout a 12-month period. A report documents the annual audit. The annual audit may be combined with other safety inspections, audits, or reviews. Audit reports will be maintained by each RSM and will be available for inspection by the ARC and the DA Inspector General.

5–2. Quality assurance program review

The quality assurance program review is a series of reviews to assess the DRU or ACOM quality assurance programs. It is conducted on an as required basis by the ARO. The review covers quality assurance records and procedures affecting design, fabrication, construction, equipment installation, and test and checkout. The requirements are separate from routine inspections.

5–3. Operational review

The ARC will conduct an operational review annually to determine if a facility is operating in compliance with its operational permit. The ARC continuously monitors operational reactor systems, and assesses each subject area in appendix B. A report documents the findings, observations, and commendable items found during the review. It also provides an assessment of the areas under review. The reviewed organization will correct each finding as quickly as possible and provide monthly status reports through command channels to the ARC until all findings requiring corrective action are completed. The report includes an estimated completion date for all corrective actions. The ARC determines whether corrective action is complete.

Chapter 6

Reporting

6–1. Reactor operating reports

For facilities holding an operating permit, the reactor facility director will send through command channels to the ARO an initial reactor startup report, quarterly reactor operating reports, and an annual summary reactor operating report (due 30

June). Annual reports summarize reactor system use, corrective maintenance, unscheduled shutdowns, reportable occurrences, and changes and tests.

6–2. Environmental radiation monitoring reports

a. For operating facilities, the reactor facility director will send quarterly environmental radiation monitoring reports to the local environmental manager, installation radiation safety office, and installation environmental protection office which include the results of area monitoring, sample analyses, and other significant data (such as, releases into the environment exceeding allowable levels). A copy of the quarterly reports will be forwarded to the ARO through command channels.

b. For operating reactors and deactivated reactor facilities, the reactor facility director/permit holder will send annual reports of summarized environmental radiation monitoring data to the ARO (due 30 June).

6–3. Abnormal events and unreviewed safety questions

For operating, deactivated, and decommissioning facilities, the reactor facility director or decommissioning program manager shall notify the ARO in a timely manner of events or conditions which could have a significant impact on reactor safety or security.

Chapter 7

Operator Qualification and Training

7–1. Technical qualifications

a. General. Technical qualifications of certified operators are specified in facility documentation reviewed by the ARO.

b. Reactor operator. The ROs must be able to operate the controls and monitor the instrumentation of the reactor and perform other required tasks during normal, abnormal, and emergency operations. In general, ROs—

- (1) Communicate to create shared understanding.
- (2) Anticipate error-likely situations.

c. Reactor leader. The RLs must be able to supervise reactor operations and maintenance of the reactor facility on a daily basis. RLs direct the activities of ROs. RLs must be proficient in reactor-related administrative requirements. The RLs are responsible for compliance with technical specifications and the operating permit. In general, RLs—

- (1) Facilitate open communications.
- (2) Promote teamwork to eliminate error-likely situations and strengthen defenses.
- (3) Search for and eliminate organizational weaknesses that create conditions for error.
- (4) Reinforce desired jobsite behaviors.

d. Senior reactor leader. The senior reactor leaders (SRLs) must have the abilities of the ROs and RLs. Additionally, SRLs must have the added experience and training for facility-specific responsibilities such as the safety evaluation of reactor tests and experiments.

7–2. Candidate training

The reactor facility director will—

a. Establish a training program to provide candidates with the knowledge and skills needed to safely operate and maintain the reactor and ensure its security.

b. Include any other topics applicable for each operator position and review the training biennially.

7–3. Requalification program

Individuals must re-qualify every two years, effective from the date of certification. The reactor facility director may request an extension of up to 90 days. The reactor facility director will establish an ongoing requalification program for certified operators to ensure competence, address topics not reinforced by direct or constant use, and improve weak performance areas. The requalification program implements the approved requalification plan. The reactor facility director may integrate the requalification plan and the training plan into a single coordinated program. The reactor facility director will submit their requalification plan for review, through command channels, to the ARO every 2 years. The plan will contain—

- a.* Course content covering the categories in table 7–1 as applicable to each specific reactor facility.
- b.* Descriptions of tests and passing criteria.
- c.* A schedule of training which completes each major topic in 2 years.

7-4. Recurring training requirements

Certified reactor operating staff members will meet the following recurring training requirements:

- a. Review procedures for normal, abnormal, and emergency operations annually.
- b. Receive training on changes to facility documentation, including procedures, before performing certified duties affected by the changes.

7-5. Training documentation

The reactor facility director will maintain the following training and certification documents:

- a. Current training and requalification programs.
- b. Documents used in certification and requalification, including operating procedures and training and reference materials.
- c. Training and certification records, including copies of completed training, current medical certification, the certification letter issued by the ARO, and decertification records.

7-6. Operator certification process

a. *Certification tests.* The ARO will implement initial certification tests. The reactor facility director will implement follow-on certification tests. The certification of reactor operations staff members will be through written and performance tests. The written test will cover the categories in table 7-1 as applicable to each specific reactor facility. A passing score in all applicable categories is required for certification. The performance test will evaluate an individual's operational and/or maintenance skills, performance, knowledge, and ability to communicate. Performance testing will be conducted under the supervision of a certified SRL. Candidates who fail either test may retake it after completing remedial training. Candidates who fail in one or two categories of the written test may be retested in the failed categories; otherwise they must retake the entire test.

b. *Applications and document reviews.* After ensuring the applicant is qualified, the reactor facility director will forward the following through command channels to the ARO—

- (1) Results of certification test.
- (2) Copies of current operational procedures (normal and emergency), current operational data and formulas, and test questions, including acceptable answers for each question and credit to be given for each question or parts of questions.

c. *Official certification.* Upon review of certification test results, the ARO will issue a certification letter to applicants who successfully complete the certification process. Certification is valid for six years from the date of issue or until decertification. Existing certifications will expire on the date noted on the certification. Future certifications will be issued for six years.

7-7. Operator proficiency requirements

a. *Minimum reactivity manipulations.* Each quarter, certified operators must perform at least two significant reactivity manipulations, as defined by the reactor facility director. Certified operators not meeting this requirement must be supervised by a RL while performing operations until they satisfactorily perform these manipulations.

b. *Absence from certified functions.* A certified operator who has not actively performed certified functions for 4 months must demonstrate satisfactory knowledge and proficiency to the reactor facility director or SRL before returning to certified duties.

c. *Suspension from certified duties.* Suspension temporarily prohibits an individual from performing any certified duties until all corrective conditions are met, as determined by the reactor facility director. A suspension may not exceed 120 calendar days and the reactor facility director must notify his or her major subordinate command if all corrective conditions cannot be fulfilled within that time.

7-8. Operator decertification

The reactor facility director, responsible commander, and ACOM, ASCC or DRU commander have authority to decertify an operator based on disqualification, lack of proficiency, or to ensure the safety or security of a nuclear reactor. Decertification is an administrative measure and is not considered disciplinary action. The underlying conduct which led to decertification, however, may be used for further administrative and/or disciplinary action. The decertification authority must notify the reactor facility director, responsible ACOM or DRU commander, and ARO as applicable. The reactor facility director must personally notify the decertified individual verbally and in writing.

7-9. Duty hour limitations

The reactor facility director will establish duty hour limitations to ensure safe operations.

Table 7-1
Major training categories

Training category	Required topics
Theory and Principles of Reactor Operation	Nuclear, radiation, reactor theories; thermodynamics; heat transfer; fluid flow.
Facility Design and Operating Characteristics	Safety and emergency systems; facility design, operating characteristics and safety analyses; nuclear safety-related utilities; and experiment and test facilities.
Facility Instrumentation and Control Systems	Nuclear and process instrumentation, control systems, and experimental instrumentation and controls.
Normal, Abnormal, and Emergency Procedures	Normal, abnormal, and emergency procedures and administrative controls.
Radiological Control and Safety	SNM and radioactive materials handling, safe practices, and radiation protection and instruments.
Administration	Administrative controls, rules, applicable regulations, and permits.
Technical Specifications	Technical specifications.
Security	Security procedures and requirements to include two person rule.
Fuel Handling (excluding operators)	Procedures and criticality controls, rules, and limitations.
Maintenance Tasks	Tasks required to maintain the facility.

Appendix A

References

Section I

Required Publications

AR 20–1

Inspector General Activities and Procedures (Cited in para 1–6.)

AR 50–5

Nuclear Surety (Cited in para 1–6.)

AR 190–13

The Army Physical Security Program (Cited in para 1–28*c*.)

AR 190–54

Security of Nuclear Reactors and Special Nuclear Materials (Cited in para 1–13*b*.)

AR 200–1

Environmental Protection and Enhancement (Cited in para 1–9*h*.)

AR 385–10

The Army Safety Program (Cited in para 1–14.)

DA Pam 385–24

The Army Radiation Safety Program (Cited in para 1–14.)

Section II

Related Publications

ANSI/ANS–1–2000; R2007; R2012

Conduct of Critical Experiments (<http://www.ans.org>)

ANSI/ANS–8.1–2014

Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors (<http://www.ans.org>)

ANSI/ANS–8.23–2007; R2012

Nuclear Criticality Accident Emergency Planning and Response <http://www.ans.org>

ANSI/ANS–8.24–2007; R2012

Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations (<http://www.ans.org>)

ANSI/ANS–8.3–1997; R2003; R2012

Criticality Accident Alarm System (<http://www.ans.org>)

ANSI/ANS–8.7–1998; R2007

Nuclear Criticality Safety in the Storage of Fissile Materials (<http://www.ans.org>)

ANSI/ANS–14.1–2004; R2009; R2014

Operation of Fast Pulse Reactors (<http://www.ans.org>)

ANSI/ANS–15.4–2007

Selection and Training of Personnel for Research Reactors (<http://www.ans.org>)

ANSI/ANS–15.8–1995; R2005; R2013

Quality Assurance Program Requirements for Research Reactors (<http://www.ans.org>)

ANSI/ANS–15.11–2009

Radiation Protection at Research Reactor Facilities (<http://www.ans.org>)

ANSI/ANS–15.16–2015

Emergency Planning for Research Reactors (<http://www.ans.org>)

ANSI/ANS–15.21–2012

Format and Content for Safety Analysis Reports for Research Reactors (<http://www.ans.org>)

ANSI/ANS-58.3-1992; R1998; R2008

Physical Protection for Nuclear Safety Related Systems and Components (<http://www.ans.org>)

AR 11-2

Managers' Internal Control Program

AR 15-1

Department of the Army Federal Advisory Committee Management Program

AR 25-30

Army Publishing Program

AR 25-55

The Department of the Army Freedom of Information Act Program

AR 25-400-2

The Army Records Information Management System (ARIMS)

AR 40-13

Radiological Advisory Medical Teams

AR 40-66

Medical Record Administration and Health Care Documentation

AR 40-68

Clinical Quality Management

AR 190-14

Carrying of Firearms and Use of Force for Law Enforcement and Security Duties

AR 190-45

Law Enforcement Reporting

AR 340-21

The Army Privacy Program

AR 380-13

Acquisition and Storage of Information Concerning Non-affiliated Persons and Organizations

AR 381-10

U.S. Army Intelligence Activities

AR 381-12

Threat Awareness and Reporting Program

AR 525-13

Antiterrorism

AR 530-1

Operations Security

AR 600-8-10

Leaves and Passes

AR 600-8-104

Army Military Human Resource Records Management

AR 600-37

Unfavorable Information

AR 600-85

The Army Substance Abuse Program

Assistant Secretary of the Army (Installations, Energy and Environment) Memorandum

Nuclear Power Project Guidance and Approval Policy, dated 7 May 2013

10 CFR 50.59

Changes, tests and experiments (Available at <http://www.nrc.gov>.)

DA Pam 25–403

Guide to Recordkeeping in the Army

DA Pam 40–11

Preventive Medicine

DA Pam 385–25

Occupational Dosimetry and Dose Recording for Exposure to Ionizing Radiation

DA Pam 385–40

Army Accident Investigations and Reporting

DA Pam 750–8

The Army Maintenance Management System (TAMMS) Users Manual

DODI 5210.42

Nuclear Weapons Personnel Reliability Program (PRP)

DODI 5210.63

DOD Procedures for Security of Nuclear Reactors and Special Nuclear Materials (SNM)

DODI 5210.67

Special Nuclear Material Information, Security Classification Guidance

NUREG 1537

Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors (Available at <http://www.nrc.gov>.)

TB 43–180

Calibration and Repair Requirements for the Maintenance of Army Materiel

42 USC 2121b

Atomic Energy Act of 1954 (Available at <https://www.gpo.gov>.)

42 USC 4321

National Environmental Policy Act (Available at <https://www.gpo.gov>.)

Section III

Prescribed Forms

This section contains no entries.

Section IV

Referenced Forms

Unless otherwise indicated, DA forms are available on the APD Web site (<http://www.apd.army.mil>).

DA Form 11–2

Internal Control Evaluation Certification

DA Form 2028

Recommended Changes to Publications and Blank Forms

Appendix B

Material Control and Accounting of Special Nuclear Material

Commanders responsible for reactor facilities will develop and implement SNM inventory procedures and perform an annual inventory according to paragraph 1–20i of this regulation. The policy provided in this appendix is consistent with the regulatory requirements of Title 10 of the Code of Federal Regulations (10 CFR), Part 74, Material Control and Accounting of Special Nuclear Material, and DODI 5210.63, DOD Procedures for Security of Nuclear Reactors and Special Nuclear Materials (SNM). ARO reactor permit holders who possess SNM in a quantity greater than 350 grams of contained uranium-235, uranium-233, or plutonium, or any combination thereof must apply the reporting and recordkeeping requirements set forth below. Quantities of SNM less than 350 grams are regulated under DA Pam 385–24. Commanders may delegate responsibilities in writing to assigned SNM custodians.

B–1. Reports of loss, theft, or attempted theft of special nuclear material

All incidents and threats related to sabotage, theft, loss, diversion, or seizure of SNM, or to damage to nuclear reactors will be reported per requirements in DODI 5210.63.

B–2. Material status reports

Submit annual inventory data to the National Nuclear Security Administration according to instructions in the Annual Nuclear Materials Inventory Assessments Guidance.

B–3. Special nuclear material physical inventory summary reports

Report annual SNM inventory results through command channels to the ARO. The ARO will forward annual inventory results to the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs.

B–4. Recordkeeping

- a.* Keep records showing the receipt, inventory (including location and unique identity), acquisition, transfer, and disposal of all SNM. Each record of receipt, acquisition, or inventory of SNM must be retained for the duration of possession of the material and for 3 years following transfer of the material.
- b.* Establish, maintain, and follow written material control and accounting procedures that are sufficient to enable accountability for SNM and retain these procedures until the ARO terminates the permit.

B–5. Nuclear material control and accounting for special nuclear material

Inventory control and physical inventory procedures will include:

- a.* Conduct the annual physical inventory by the SNM custodian or alternate and a disinterested party (designated in writing by the Commander) either by visual inspection of each item on inventory or by witnessing a core physics verification of an assembled reactor core, and by visual inspection of all items on inventory at least every three years when the reactor core is disassembled for maintenance;
- b.* Provide unique identification for each item on inventory and maintain inventory records showing the identity, location, and quantity of SNM for these items;
- c.* Document all transfers of SNM between designated internal control areas within the facility;
- d.* Maintain and follow procedures for tamper-safing of containers or vaults containing SNM, if tamper-safe seals are to be used;
- e.* Maintain accurate, current, and reliable information on, and confirm, the quantities and locations of SNM;
- f.* Conduct investigations and resolve any anomalies indicating a possible loss of SNM;
- g.* Immediately report an actual loss of SNM.

Appendix C

Internal Control Evaluation

The following are examples of questions that would be appropriate for the Operational Review. The questions are grouped into four subject areas: Reactor Operations, Safety, Security, and Environmental Protection.

C-1. Function

The functions covered by this evaluation concern the Army Reactor Program.

C-2. Purpose

The purpose of this evaluation is to assist commanders and their staff at all levels in evaluating the key internal controls outlined below.

C-3. Instructions

Answers must be based on the actual testing of key internal controls (for example, document analysis, direct observation, sampling, simulation, other). Answers that indicate deficiencies must be explained and the corrective action identified in supporting documentation. These internal controls must be evaluated at least once every 5 years. Certification that the evaluation has been conducted must be accomplished on DA Form 11-2 (Internal Control Evaluation Certification).

C-4. Test questions for reactor operations

- a. Certified operations personnel—
 - (1) Is the number of certified operators suitable?
 - (2) Do unnecessary certified operators exist?
 - (3) Do operators receive good daily supervision?
 - (4) If operator changes occur in the middle of an operation, is there an appropriate system in place to accommodate the changes?
 - (5) Are supervisor/leader absences from the facility allowed? If allowed, are they handled appropriately?
 - (6) Does a system exist for ensuring that the necessary operations people are in the facility during operations?
 - (7) Is the operator initial training and certification process adequate?
 - (8) Is the recertification process adequate?
 - (9) Is there a routine review and checkout of operators by management?
 - (10) Are all operators performing sufficient operations to maintain proficiency?
 - (11) Do operators have the knowledge they need to operate safely?
- b. Procedures—
 - (1) Do adequate written procedures exist for the areas given below?
 - (a) Calibration of safety systems and trip setpoints.
 - (b) Emergencies.
 - (c) Facility radiation safety.
 - (d) Facility record keeping.
 - (e) Fuel inventory and control.
 - (f) Handling of fuel.
 - (g) Internal quality assurance and quality control.
 - (h) Local organization audits.
 - (i) Monitoring burst parameters.
 - (j) Power calibrations.
 - (k) Reactor shutdown.
 - (l) Reactor startup.
 - (m) Routine operations, both steady state and burst.
 - (n) Safety evaluations of experiments.
 - (o) Safety evaluations of facility modifications.
 - (p) Surveillance and maintenance of reactor support components.
 - (q) Surveillance and maintenance of safety systems.
 - (r) Use of irradiation facilities.
 - (s) Use of special test fixtures.

Are the procedures clearly written with an appropriate level of detail?
Are the procedures quickly accessible and being followed?

Are the procedures being maintained and updated as necessary?

c. Equipment surveillance—

(1) Is there a mechanism to ensure that surveillance and maintenance items are properly scheduled, performed, and audited?

(2) Are all of the Technical Specification and permit requirements addressed in the surveillance program?

(3) Is there an audit mechanism to ensure that all of the surveillance parameters are within their prescribed limits?

d. Operations records—

(1) Are records for the following subjects properly maintained?

(a) Current, as-built drawings of the facility.

(b) Environmental monitoring.

(c) Fuel inventories.

(d) Key control files.

(e) Operating logs.

(f) Operator certificates.

(g) Operator medical and PRP files.

(h) Operator proficiency files.

(i) Operator training and requalification files.

(j) Post-operation checks.

(k) Pre-operation checks.

(l) Reportable occurrences.

(m) Safety evaluations of modifications, experiments, and tests.

(n) Safety-related maintenance operations.

(o) Technical Specification and permit required surveillance results.

(2) Are the records dated, signed when required, easily understood and legible?

(3) Do the records contain sufficient data to enable events to be reproduced?

(4) Are required records archived?

(5) Are required records kept secure from theft, flood, and fire?

(6) Are record retention requirements being met?

(7) Are specific documents easily retrievable?

(8) Are adequate reviews being performed to identify USQ in operations, tests, experiments, and facility modifications?

e. Procedures and practices—

(1) Do clearly defined limits exist on experiments and tests?

(2) Is there an appropriate mechanism for the review and approval of tests and experiments?

(3) Is there a mechanism for approval/authorization of each reactor operation?

(4) Is there an adequate mechanism for keeping the facility Health Physicist informed of operations, tests, and experiments?

(5) Is there an adequate mechanism for ensuring that radioactive materials are appropriately transferred to a licensed receiver?

(6) Are experimenters aware of limits imposed on the operations for their experiments?

f. Review of records—

(1) Does a clear audit trail exist for tests and experiments that have been performed at the facility?

(2) Have prior tests and experiments had proper approval before they were performed?

(3) Does a clear accountability trail exist for any radioactive materials that may have been produced during the tests or experiments?

C-5. Test questions concerning safety (in accordance with AR 385-10)

a. Industrial Safety—

(1) Are facility spaces adequately clean, orderly, and free of trip and slip hazards?

(2) Are compressed gas cylinders properly maintained as follows:

(a) Free of corrosion or defects that would render them unfit?

(b) Plainly marked with the type of gas?

(c) Kept away from sources of heat?

(d) Capped whenever regulator is not installed?

(e) At least 40 feet from highly flammable or combustible materials?

(f) Empty cylinders marked "empty?"

(g) Valves shut on empty cylinders?

- (h) Securely held in an upright position?
- (i) Pressure tested every five years?
- (j) Moved with hand truck equipped with safety chain or strap?
 - Are flammable liquids stored in adequate safety containers?
 - Are flammable liquid storage areas properly labeled?
 - Are the number, types, and locations of fire extinguishers adequate?
 - Are fire extinguishers properly maintained?
 - Are equipment power cords properly grounded and in good condition?
 - Are polychlorinated biphenyls (PCB)-contaminated transformers and capacitors properly identified?
- (9) Are Material Safety Data Sheets present, properly completed, and readily accessible for each hazardous chemical in the facility?
- (10) Is adequate personal protection and/or emergency equipment available for the hazardous materials at the facility?
- (11) Is the facility lockout/tagout procedure sufficient to isolate potential hazardous energy before maintenance is performed?
- (12) Are confined space policy and procedures established and implemented?
- (13) Is adequate fall protection provided where required?
- (14) Are ergonomic hazards sufficiently identified and mitigated?
- (15) Are hazards associated with manual material handling sufficiently identified and managed?
- (16) Are machines appropriately guarded where they present a mechanical hazard to personnel?
- b. Radiation safety—
 - (1) Are the following areas being adequately addressed?
 - (a) Effluent monitoring.
 - (b) Waste disposal.
 - (c) Personnel monitoring.
 - (d) RADIAC and dosimeter calibrations.
 - (e) Experiment contamination/activation monitoring.
 - (f) Proper use of radiation instrumentation.
 - (g) Radioactive material shipments.
 - (h) Area monitoring.
 - (i) Radiation safety training of workers.
 - (j) Environmental monitoring.
 - (k) Receipt and storage of radioactive materials.
 - (l) Leak testing of sealed sources.
 - (2) Is an approved radiation protection program in place and effectively implemented?
 - (3) Is health physics support adequate to meet the facility's needs?
 - (4) Is the working relationship between the health physics personnel and reactor operations personnel good?
 - (5) Do health physics personnel have the authority to terminate operations that they consider unsafe?
 - (6) Are written health physics procedures available for routine functions?
 - (7) Is an effective procedure in place to ensure radiation detection equipment is properly functioning and in calibration before used?
 - (8) Is a record being maintained of the radioactive material being produced?
- c. Recordkeeping—Are the following records being properly maintained?
 - (1) Personnel radiation exposures.
 - (2) Radiation safety program requirements.
 - (3) Radioactive effluents.
 - (4) Radioactive material inventories.
 - (5) Radioactive material transferred.
 - (6) Radiological training for visitors.

C-6. Test questions concerning security

- a. Emergency response planning—
 - (1) Is an appropriate emergency response organization in place?
 - (2) Are the staff aware of their responsibilities in the plan?
 - (3) Is the system for activating the emergency response organization realistic?
 - (4) Is the staff capable of activating the response organization from offsite?
 - (5) Are the response actions of the support organizations clearly understood and agreed upon by the involved parties?

- (6) Are the drills/exercises adequate?
- (7) Are evaluators or observers used?
- (8) Are sufficient emergency supplies available and in suitable locations?
- (9) Is training being conducted for facility personnel and support personnel?
- (10) Are the following records being maintained?
 - (a) Emergency equipment maintenance and inventory.
 - (b) Emergency exercise and drill scenarios and critiques.
 - (c) Emergency response training files.
 - (d) Emergency plan reviews and revisions.
- (11) Is there a crisis communication plan to inform workforce and general public in the event of an incident?
- b. Physical Security—
 - (1) Does an approved physical security plan exist?
 - (2) Is the physical security plan being implemented properly?
 - (3) Are the facility personnel aware of their security responsibilities?
 - (4) Are security drills and exercises adequate?
 - (5) Have security personnel received proper radiation safety training?
 - (6) Is the security organization appropriate?
 - (7) Are security plan files and security training files being properly maintained?

C-7. Test questions for environmental protection (in accordance with AR 200-1)

The environmental protection portion of the Operational Review resembles an abridged Environmental Performance Assessment System review under AR 200-1, targeted to those areas most relevant to reactor operations. This list of questions is not exclusive, but provides areas for assessment, follow-up as needed, and documentation in support future actions (for example, decommissioning).

a. *Radiological.* Is the environmental radiation monitoring plan up to date?

- (1) Are sampling/monitoring locations identified, mapped, and recorded using global positioning system techniques?
- (2) Are the environmental sampling protocols and quality assurance/quality control procedures based on a comprehensive baseline hazards analysis and are they appropriate given current site conditions and the full scope of current reactor operations?
- (3) Are the records related to environmental sampling being adequately maintained?

b. *Hazardous materials and hazardous waste.*

(1) Have there been any identified releases of hazardous materials, hazardous substances, hazardous wastes, or other hazardous constituents, either above or below a reportable quantity?

(2) Are there any active or previously closed in place underground storage tanks in the operational area? Check—

- (a) Tank contents.
 - (b) Leak monitoring, tightness testing, and other monitoring requirements.
 - (c) Closure documentation for tanks that are no longer in service.
- (3) Are any transformers or capacitors present that contain PCBs? Check—
- (a) Proper identification and labeling.
 - (b) Plans for remediation, disposal, and/or control of identified transformers or capacitors.

(4) Does the facility generate hazardous waste?

(5) Does the facility operate under a National Pollutant Discharge Elimination System or State Pollutant Discharge Elimination System permit?

c. *NEPA actions.* Are there any impending, ongoing, or recently completed NEPA documents associated with the facility or adjacent areas?

d. *Environmental restoration activities.*

(1) Are there any impending, ongoing, or recently completed actions being completed under the Comprehensive Environmental Response, Compensation, and Liability Act on the facility or in adjacent areas?

(2) Are there any Resource Conservation and Recovery Act corrective actions impending, ongoing, or recently completed on the facility or in adjacent areas?

C-8. Supersession

No previous internal control evaluation exists for this program.

C-9. Comments

Help make this a better tool for evaluating internal controls. Submit comments to Deputy Chief of Staff, G-3/5/7, 400 Army Pentagon, Washington, DC 20310-0430.

Glossary

Section I

Abbreviations

ACOM

Army command

ACSIM

Assistant Chief of Staff for Installation Management

ALARA

As low as is reasonably achievable

ANSI

American National Standards Institute

ARC

Army Reactor Council

ARFORGEN/GFM

Army Force Generation/Global Force Management

ARO

Army Reactor Office

ARP

Army Reactor Program

ARPM

Army Reactor Program manager

ARSTAF

Army Staff

ASA (IE&E)

Assistant Secretary of the Army (Installations, Energy and Environment)

ASCC

Army service component command

ATEC

U.S. Army Test and Evaluation Command

CFR

Code of Federal Regulations

CG

Commanding General

CMA

competent medical authority

COE

Chief of Engineers

DA

Department of the Army

DASAF

Director of Army Safety

DCS

Deputy Chief of Staff

DOD

Department of Defense

DOE

Department of Energy

DRU

direct reporting unit

FSAR

facility safety analysis report

HQDA

Headquarters, Department of the Army

IMCOM

U.S. Army Installation Management Command

MEDCOM

U.S. Army Medical Command

NEPA

National Environmental Policy Act

NRC

Nuclear Regulatory Commission

NUREG

U.S. Nuclear Regulatory Commission Regulation

OTSG

Office of The Surgeon General

PCB

polychlorinated biphenyls

PRP

personnel reliability program

RFSC

Reactor Facility Safety Committee

RL

reactor leader

RO

reactor operator

RRSO

reactor radiation safety officer

RSM

reactor safety manager

SNM

special nuclear material

SRL

senior reactor leader

SSAR

special safety analysis report

SSC

structure, system, or component

TSG

The Surgeon General

USACE

U.S. Army Corps of Engineers

USANCA

U.S. Army Nuclear and Countering Weapons of Mass Destruction Agency

USQ

unreviewed safety question

Section II

Terms

Change

Any proposed activity (including modifications to facility equipment or procedures, or new tests or experiments) that may affect a design, function, or method of performing or controlling the function of a structure, system, or component (SSC) as described in the FSAR, or an evaluation that demonstrates that intended functions will be accomplished. An activity involving an SSC not explicitly described in the FSAR that has the potential to impact the function of an SSC which is explicitly described in the FSAR is also considered a change.

Competent medical authority (CMA)

A U.S. physician, physician assistant, or nurse practitioner (military, civilian, or contractor) employed by, or under contract or subcontract to, the U.S. Government, trained in the concepts of supporting the nuclear personnel reliability program (that is, has completed the MEDCOM sponsored Nuclear Surety Medical Support Course), privileged to provide occupational medicine services, and appointed by the medical treatment facility commander as CMA. Physician assistants or nurse practitioners must be supervised by an appropriately trained physician who is licensed to practice medicine and has been granted current occupational medicine privileges. (Reference AR 40–68).

Deactivated reactor facility

A nuclear reactor system, associated buildings, auxiliary equipment, and surrounding areas impacted by reactor operations that have been made unable to create criticality and all special nuclear material has been safely removed from the site. The deactivated reactor facility will be maintained under a possession permit.

Deactivation

The removal of all fuel and special nuclear material or any components that would create criticality within a reactor and the termination of the operating permit for the nuclear reactor facility.

Decommissioning

The removal of a facility safely from service and reduction of residual radioactivity to a level that permits release of the property for unrestricted use and termination of permit. Decommissioning may include deactivation and a period of safe storage during which the deactivated reactor facility will be maintained under a possession permit until final decommissioning.

Emergency medical support coordinator

The individual (medical commander, director of health services, contract medical director, or equivalent) who is responsible for coordinating medical support for nuclear accidents and incidents.

Facility safety analysis report (FSAR)

Documentation which describes a nuclear reactor facility; design and operation; hazards and materials; management programs, and controls; and the considerations and reasoning used to support the conclusion that the facility can be operated safely and securely. The analysis considers a range of potential accidents, including the maximum hypothetical accident. It represents the design bases for the 10 CFR 50.59 change process, for training reactor operators, for preparing reactor operator certification examinations, and for preparing inspections and operational reviews. It is important that the FSAR remain an accurate, current description of the facility and be periodically updated.

Inventory

Physical verification of the quantity of SNM on hand at a given time. The methods of physical inventory may vary. The primary purpose of a physical inventory is to detect a loss, theft, or diversion of SNM.

Item

Any discrete quantity or container of SNM as defined in this regulation having a unique identity and also having an assigned element and isotope quantity.

Material

SNM as defined in this regulation and contained in nuclear reactor fuel elements.

Non-power reactor

A nuclear reactor that is used for research, training, or development purposes (which may include producing radioisotopes for medical and industrial uses) but has no role in producing electrical power.

Nuclear power reactor

A nuclear reactor designed for purpose of producing electrical power.

Nuclear reactor

A mechanical device in which fissile material is used to produce a controlled, chain reaction (nuclear fission) to produce heat and radiation for practical application and research, development, and testing.

Nuclear reactor facility

A nuclear reactor system, associated buildings, auxiliary equipment, and the reactor staff required for its operation, maintenance, and support. The facility includes (a) the structures, systems, and components (SSCs) as described in the FSAR; (b) the design and performance requirements for such SSCs as described in the FSAR; and (c) the evaluations or methods of evaluation as described in the FSAR for such SSCs which demonstrate that their intended functions(s) will be accomplished.

Nuclear reactor system

Any equipment or device, except a nuclear weapon or weapon component, capable of neutron multiplication through nuclear fission of SNM. This definition includes both critical and subcritical nuclear reactors, subcritical assemblies of SNM, and the supporting associated equipment or devices (if any).

Off-site

That area beyond the boundaries of a DOD installation including the area beyond the boundary of a national defense area or national security area that has been, or may become affected by a nuclear accident or incident.

Operational review

A review conducted by the ARC that includes examination of the capability of a nuclear reactor facility to perform specific tasks involving the nuclear reactor and associated equipment, to provide a safe and secure environment, to provide physical security for the special nuclear material and reactor, to ensure the reactor is operated in an environmentally safe manner that minimizes, to the extent practicable, the impact of the reactor on the environment, and to determine if essential administration and support is provided the unit.

Reactor facility director

The chief of the organizational unit directly responsible for the operation of a nuclear reactor staff. The term "reactor facility director" as used in this regulation applies to both research and power nuclear reactor systems.

Reactor operations staff

Includes all organizational elements subordinate to the reactor facility director and responsible for the operation, maintenance, and support of the specific nuclear reactor involved.

Responsible commander

The immediate commander of the organization directly accountable for the nuclear reactor facility.

Risk

The product of the probability of occurrence and the severity of an accident or of a malfunction of a structure, system, or component (SSC) important to safety as evaluated in the updated final safety analysis report.

Source material

Uranium or thorium, or any combination, in any physical or chemical form or ores which contain by weight 0.05% or more of uranium, thorium, or any combination thereof. Source material does not include special nuclear material.

Special nuclear material (SNM)

Plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the Nuclear Regulatory Commission, pursuant to the provisions of section 51 of the Atomic Energy Act of 1954, section 2071, title 42, United States Code, determines to be SNM, but does not include source material. Any material artificially enriched by any of the foregoing but does not include source material.

Special safety analysis report (SSAR)

A modification to a reactor system which involves an unreviewed safety question or a change to the technical specifications will be documented in a SSAR and submitted to the ARO for review. This report will describe any proposed changes

involved in the technical specification limits of the nuclear reactor system operation and provide an analysis and evaluation demonstrating the safety of this change.

Technical specifications

The technical specifications state the limits, operating conditions, and other requirements imposed on nuclear reactor facility operations to protect the environment and the health and safety of the facility staff and the general public. The technical specifications are derived from the facility descriptions and safety considerations contained in the safety analysis and represent a comprehensive envelop of safe operation.

Unreviewed safety question

A proposed or actual change, test, or experiment, or identified analytic inadequacy which could: increase the probability or consequences of an accident or malfunction of equipment important to the safety analysis; introduce the possibility of an accident or malfunction which was not previously considered, or reduce the margin of safety as defined in the basis of any technical specifications.

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