U.S. Department of Energy
Washington, DC

ORDER

NE O 414.1

Approved: August-2025

SUBJECT: QUALITY ASSURANCE

1. PURPOSE. To establish an integrated Quality Assurance Program (QAP) that assures:

   Controls for the conduct of work.

   Requirements are met.

   Achievement of organizational mission needs.

2. CANCELS/SUPERSEDES.

   This Order applies in lieu of DOE O 414.1E (current version) with respect to the facilities and activities covered by Section 3 below. Cancellation of a directive does not, by itself, modify or otherwise affect any contractual or regulatory obligation to comply with the directive. Contractor Requirements Documents (CRDs) that have been incorporated into a contract remain in effect throughout the term of the contract unless and until the contract or regulatory commitment is modified to either eliminate requirements that are no longer applicable or substitute a new set of requirements.

3. APPLICABILITY.

   a. Departmental Elements. This Order applies to all Departmental elements including NNSA, and their associated field elements,[1] to the extent they are involved with facilities and activities described in paragraph 3.b.

   b. NE Facilities and Activities. Except as stated in paragraph 3.d., this Order applies to all facilities and activities under the responsibility of the Office of Nuclear Energy (NE), including nuclear facilities and nuclear activities authorized by NE. Such nuclear activities include the design, construction, management, operation, decontamination, decommissioning, or demolition of nuclear facilities.

   c. Contractors. Except as stated in paragraph 3.d., this Order sets forth conditions to be applied to contractors performing work that involves facilities and activities described in paragraph 3.b. The CRD must be included in contracts under which the contractor is involved with such facilities and activities.

   d. Equivalency and Exemptions.

      1. Exemption. In accordance with the responsibilities and authorities assigned by Executive Order 12344, codified at 50 United States Code (USC) sections 2406 and 2511, and to ensure consistency through the joint Navy/DOE Naval

[1] Operations offices, service centers, site offices, area offices, field offices, government-owned government-operated facilities, and regional offices of federally-staffed laboratories that report directly to a DOE Headquarters office.

Nuclear Propulsion Program, the Deputy Administrator for Naval Reactors (Director) implements and oversees requirements and practices pertaining to this directive for activities under the Director's cognizance, as deemed appropriate.

2. Exemption. This Order does not apply to activities regulated by either the Nuclear Regulatory Commission (NRC) or the authorities of a State under an agreement with the NRC per the Atomic Energy Act of 1954, as amended (AEA).

3. Other Equivalencies/Exemptions. Any other equivalency or exemption to this Order requires the approval of the Office of Nuclear Energy, Safety Basis Approval Authority (SBAA). Requests for equivalencies/exemptions will be adjudicated by NE's SBAA within 14 calendar days of receipt of a substantially complete request.

4. REQUIREMENTS.

Quality Assurance Program Development and Implementation. The Office of Nuclear Energy (DOE-NE) and the associated field element(s) must identify and assign an individual within their organization to have responsibility, authority, and accountability for QAP development, implementation, assessment, maintenance, and improvement. The organization must develop a QAP and its Quality Assurance Program Description (QAPD) and then implement the approved QAP. The QAP must implement the Quality Assurance (QA) requirements found in Attachment 2. The QAP, as documented in the QAPD, must:

1. Apply the Graded Approach: Where appropriate, a graded approach must be used to implement the requirements of the QAP.

   (a) The implementation of a graded approach is fundamental to a quality assurance program because it ensures that resources are allocated, and efforts are focused in proportion to the risks associated with a product, process, or project.

   (b) A graded approach means the process of ensuring that the level of analysis, documentation, and actions used to comply with a requirement are commensurate with:

      1 The relative importance to safety, safeguards, and security.

      2 The magnitude of any hazard involved.

      3 The life-cycle stage of a facility.

      4 The programmatic mission of a facility.

      5 The particular characteristics of a facility.

      6 The relative importance to radiological and nonradiological hazards.

      7 Any other relevant factors. (10 C.F.R. § 830.3)

(c) The basis of the graded approach must be documented for each applicable quality assurance requirement of this Order, and be submitted to DOE as part of the QAPD. The graded approach must not be used to negate any applicable requirements.

2. The QAPD must describe how the requirements in Attachment 2 are met.

3. The applicable QA requirements and responsibilities must be flowed down throughout all levels of the Departmental element and associated field office.

4. Document the selection of an appropriate industry standard.

   (a) The necessary level of detail from the standard(s) must be described during development of the QAP to achieve quality consistent with contractual and regulatory requirements, and Assistant Secretary of Nuclear Energy direction.

   (b) Gaps between the selected industry standard(s) and Attachment 2 must be addressed within the QAPD.

   (c) For Hazard Category 1, 2, and 3 nuclear facilities, ASME NQA-1 is the preferred standard for use as the basis of the QAP with appropriate gaps (e.g., software and work control) addressed. Other industry standards may be used upon approval by the DOE QA Approval Authority.

Quality Assurance Program Approval and Changes. Each Departmental element and associated field element(s) must:

5. Obtain QAPD approval by the designated DOE QA Approval Authority.

   (a) The QAPD must adequately prescribe the flow down of quality requirements to working level processes (e.g., procedures, instructions, or any other similar term used in the implementing documents.)

   (b) The selection of the industry standard(s) used to develop the working level processes of the QAP must be described.

6. Review the QAP and update as needed. Submit the modified QAPD to the DOE QA Approval Authority for significant non-editorial changes.

Modifications which do not reduce or change provisions of the QAP or QAPD do not require approval.

7. Implement the QAP as approved.

8. Regard the QAP as approved 90 calendar days after receipt by the DOE QA Approval Authority, unless approved or rejected at an earlier date.

Federal Technical Capability and Qualifications. Qualification for the functional areas identified in paragraphs 4.c.(1) and (2) must be achieved as provided in DOE O 426.1, *Department of Energy Federal Technical Capabilities*, current version.

Review and Approval of a Management and Operating Contractor Quality Assurance Program. The designated DOE QA Approval Authority must identify the personnel responsible for conducting the review of the contractor's QAP. The personnel responsible for conducting this review must:

9. When submitted by the contractor per the requirements of Attachment 1, Section 2:

    (a) Ensure that the QAPD adequately prescribes the flow down of the Attachment 2 requirements to working level processes.

    (b) Ensure an appropriate industry standard or portions of standards are selected as the basis for the program:

        1 Gaps between the selected industry standard(s) and Attachment 2 must be addressed within the QAPD.

        2 For Hazard Category 1, 2, and 3 nuclear facilities, ASME NQA-1 is the preferred standard for use as the basis of the QAP with appropriate gaps (e.g., software and work control) addressed. Other industry standards may be used upon approval by the DOE QA Approval Authority.

10. Document the results of the review including any programmatic gaps.

11. If the review results in identified programmatic gaps precluding QAP approval, direct the contractor to address the issues preventing approval. Upon correction, complete the review process for the corrected items.

12. Following a satisfactory review, submit the review documentation to the DOE QA Approval Authority for final approval. Formally document the approval and issue to the contractor.

Review and Approval of Prime Contractor Quality Assurance Program. The designated DOE QA Approval Authority must identify the personnel responsible for conducting the review of a Prime Contractor's QAP.

13. Prime Contractor's QAP approval process:

    (a) The Nuclear Safety Design Agreement (NSDA) will identify an appropriate industry QA Standard.

(b) A Quality Assurance Program Plan (QAPP) will be submitted that describes the implementation of the requirements when the NSDA is submitted. Gaps between the selected industry standard(s) and Attachment 2 must be addressed within the QAPD.

(c) The QA Approval Authority or designee will perform periodic surveillances to verify adequate program implementation at intervals commensurate with program progress/phases.

(d) The Prime Contractor will submit a QAPD to the Department QA Approval Authority prior to Preliminary Documented Safety Analysis (PDSA) approval. Approval process will include verification of adequate implementation via audit of the contractor.

1 When submitted by the contractor per the requirements of Attachment 1, Section 3, the DOE QA Approval Authority or designated personnel must:

a Ensure that the QAPD adequately prescribes the flow down of the Attachment 2 requirements to working level processes.

b Ensure an appropriate industry standard or portions of standards are selected as the basis for the program.

14. If the review and audit results in identified programmatic gaps precluding QAP approval, direct the contractor to address the issues preventing approval. Upon correction, complete the review process for the corrected items.

15. Formally document the approval and issue to the contractor.

5. RESPONSIBILITIES.

a. Assistant Secretary of Nuclear Energy.

1. Ensure implementation of DOE QA requirements throughout the Department.

2. Provide leadership for QA program development and implementation with the support of the Office of Environment, Health, Safety, and Security (EHSS).

3. For other than field-issued contracts, notify cognizant contracting officers of those contractors that should include the CRD or its requirements, as appropriate, in their organization's contracts. The Secretarial Officer has the authority to direct the contracting officer, as necessary, to ensure appropriate quality requirements are implemented by the contractor.

4. Secretarial Officers act as the QA Approval Authority or delegate such authority, as appropriate, for QAPs within the Secretarial Officer's organization, and the DOE field elements and contractors within the purview of that Secretarial Office.

5. Provide direction and resources for implementing QA requirements for work within their purview and ensure that the appropriate staff is qualified as specified in paragraph 4.c.

6. Ensure development and approval of the QAP governing the work of their respective organization that meets the requirements of paragraph 4 of this Order.

7. Ensure reviews of their Secretarial Officer's QAP are performed per paragraph 4.b.(2) of this Order.

8. Secretarial Officers ensure review and approval of new or revised QAPs for:

   (a) Field elements under their purview.

   (b) Contractors within the purview of the Secretarial Officer if approval authority is not delegated.

9. Ensure the QAPs are reviewed, and either rejected or approved within 30 calendar days of receipt. Requests for review/approval that are not approved or rejected within 30 calendar days from receipt will be deemed approved.

b. Field Element Managers (FEMs).

1. For field-issued contracts, notify the contracting officers which contractors are affected by this Order. The Secretarial Officer has the authority to direct the contracting officer, as necessary, to ensure appropriate quality requirements are implemented by the contractor.

2. For FEMs of sites where approval authority is delegated to the FEM, designate a reviewer and approve any new or revised QAPs for work under the FEM's purview. Where authority is not delegated to the FEM, review and comment on, and submit the QAPs to the Secretarial Officer for approval.

3. Provide resources and staff to meet the provisions of this Order and ensure that appropriate staff is qualified, as specified in paragraph 4.c of this Order.

4. Ensure reviews are performed of the field element QAP per paragraph 4.b.(2) of this Order and update, as necessary. Obtain approval of the modified QAPD by the DOE QA Approval Authority.

c. Contracting Officers. Incorporate the CRD into appropriate contracts in a timely manner upon notification of their applicability.

d. Director, Office of Enterprise Assessments. Plans and conducts independent oversight reviews of implementation of the requirements of this Order and the CRD (see NE O 226.1B, Implementation of Department of Energy Oversight Policy, and DOE O 227.1A, Independent Oversight Program, for details).

6. DEFINITIONS.

a. Item. An all-inclusive term used in place of any of the following: assembly, component, equipment, material, module, part, product, structure, sub-assembly, sub-system, system, unit, software, or support.

b. Nonreactor Nuclear Facility. Facilities, activities or operations that involve, or will involve, radioactive and/or fissionable materials in such form and quantity that a nuclear or a nuclear explosive hazard potentially exists to workers, the public, or the environment, but does not include accelerators and their operations and does not include activities involving only incidental use and generation of radioactive materials or radiation such as check and calibration sources, use of radioactive sources in research and experimental and analytical laboratory activities, electron microscopes, and x-ray machines.

c. Nuclear Facility. A reactor or a nonreactor nuclear facility where an activity is conducted for or on behalf of DOE, or under DOE authorization and includes any related area, structure, facility, or activity to the extent necessary to ensure proper implementation of the requirements.

d. Quality Assurance Program (QAP). The overall program or management system established to assign responsibilities and authorities, define policies and requirements, and provide for the performance and assessment of work.

e. Quality Assurance Program Description (QAPD). A document describing how the quality assurance requirements of Attachment 2 to this Order and any additional contractual and federal quality-related requirements are met.

f. Quality Assurance Program Plan (QAPP). A document that minimally identifies the quality assurance program basis and plan for implementation through conceptual design.

g. Safety Class (SC) Structures, Systems, and Components (SSCs). Means SSCs, including portions of process systems, whose prevention or mitigative function is necessary to limit radioactive hazardous material exposure to the public, as determined from safety analyses.

h. Safety Significant (SS) Structures, Systems, and Components (SSCs). Means SSCs, which are not designed as SC SSCs, but, whose preventative or mitigative function is a major contributor to defense in depth and or worker safety as determined from safety analyses.

i. Suspect/Counterfeit Items (S/CIs). A general term that includes:

   1. Suspect Items. Items that have indications that they may not be genuine but there is not yet definitive proof of counterfeiting or fraud.

   2. Counterfeit Items. Items that are manufactured, refurbished, or altered to imitate original products without authorization in order to be passed off as genuine.

   3. Fraudulent Items. Items that are misrepresented with the intent to deceive, including items provided with incorrect identification or falsified and/or inaccurate certification. They may also include items sold by entities that have acquired the legal right to manufacture a specified quantity of an item but

which has produced a larger quantity than authorized and has sold the excess as legitimate inventory.

7. REFERENCES.

The following documents provide guidance and/or related requirements for implementing this Order. DOE directives are available at http://www.directives.doe.gov:

P.L. 106-65, Department of Defense Authorization Act of 2000.

10 Code of Federal Regulations (C.F.R.) 830, *Nuclear Safety Management*.

Executive Order 12344, *Naval Nuclear Propulsion Program*, dated 02-01-82.

Executive Order 13401, Reforming Nuclear Reactor Testing at the Department of Energy, dated 05-23-25.

DOE O 200.1, Information Technology Management, current version

DOE O 205.1, Department of Energy Cybersecurity Program, current version

DOE O 210.2, DOE Corporate Operating Experience Program, current version.

DOE O 221.1, Reporting Fraud, Waste and Abuse to the Office of Inspector General, current version.

NE O 226.1, Implementation of Department of Energy Oversight Policy, current version.

NE O 232.2, Occurrence Reporting and Processing of Operations Information, current version.

DOE O 410.1, Central Technical Authority Responsibilities Regarding Nuclear Safety Requirements, current version.

DOE O 413.3, Program and Project Management for the Acquisition of Capital Assets, current version.

DOE O 426.1, Department of Energy Federal Technical Capabilities, current version.

DOE G 414.1-1, Management and Independent Assessments Guide, current version.

DOE G 414.1-2, *Quality Assurance Program Guide*, current version.

DOE G 414.1-4, Safety Software Guide for Use with 10 C.F.R. 830, Subpart A, Quality Assurance Requirements, current version.

DOE-STD-1150-2013, Quality Assurance Functional Area Qualification Standard, dated December 2013

DOE-HDBK 1221-2024, Suspect/Counterfeit Items Resource Handbook, dated July 2024

8. CONTACT. Questions concerning this Order should be addressed to the Office of Nuclear Energy.

BY ORDER OF THE SECRETARY OF ENERGY:

JAMES P. DANLY
Deputy Secretary

ATTACHMENT 1
CONTRACTOR REQUIREMENTS DOCUMENT
NE O 414.1, *QUALITY ASSURANCE*

This Contractor Requirements Document (CRD) includes the requirements outlined in Attachment 2 of Department of Energy (DOE) Nuclear Energy (NE) Order (O) 414.1, *Quality Assurance*, referenced in and made a part of this CRD, and which provides program requirements and/or information applicable to contracts in which this CRD is inserted.

Software (including systems, subsystems, and codes) is considered an item, and as such, the criteria defined in Attachment 2 apply.

1. QUALITY ASSURANCE PROGRAM DEVELOPMENT.

   The contractor is responsible for developing and documenting a quality assurance program (QAP) in compliance with the contract scope of work, while meeting the requirements of this CRD, including Attachment 2 to NE O 414.1.

   QAP development must account for the integration of additional contractual and federal quality-related requirements.

   The contractor must identify and assign an individual within their organization to have responsibility, authority, and accountability for QAP development, implementation, assessment, maintenance, and improvement.

2. QUALITY ASSURANCE PROGRAM APPROVAL AND CHANGES FOR M&O CONTRACTORS. The contractor must:

   Submit a QAPD to DOE for approval within 45 days of being awarded a DOE contract containing this CRD.

   1. The QAPD must be a summary of the QAP.

   2. The QAPD must adequately prescribe the flow down of requirements to working level processes (e.g., procedures, instructions, or any other similar term used in the implementing documents).

   3. The selection of the appropriate industry standard(s) used to develop the working level processes of the QAP must be described.

      (a) Gaps between the selected industry standard(s) and Attachment 2 of this Order must be addressed within the QAPD.

      (b) For Hazard Category 1, 2, and 3 nuclear facilities, ASME NQA-1 is the preferred standard for use as the basis of the QAP with appropriate gaps (e.g., software and work control) addressed. Other industry standards may be used upon approval by the DOE QA Approval Authority.

4. The QAPD must also provide a summary explaining the graded approach.

   (a) The implementation of a graded approach is fundamental to a quality assurance program because it ensures that resources are allocated, and efforts are focused in proportion to the risks associated with a product, process, or project. Where appropriate, a graded approach must be used to implement the requirements of this CRD.

   (b) A graded approach means the process of ensuring that the level of analysis, documentation, and actions used to comply with a requirement are commensurate with:

      1 The relative importance to safety, safeguards, and security.

      2 The magnitude of any hazard involved.

      3 The life-cycle stage of a facility or item.

      4 The programmatic mission of a facility.

      5 The particular characteristics of a facility or item.

      6 The relative importance to radiological and nonradiological hazards.

      7 Any other relevant factors. (10 C.F.R. § 830.3)

      The basis of the graded approach must be documented for applicable quality assurance requirement in this CRD, and that documentation must be submitted to DOE as part of the QAPD. The graded approach must not be used to negate any applicable requirements.

5. The QAPD must describe how the requirements of this CRD are met.

6. The QAP will be regarded as approved by DOE 30 calendar days after receipt by DOE, unless the QAPD is approved or rejected at an earlier date. The QAP

will be considered received upon acknowledgement by the receiving organization.

Implement the QAP as approved.

Modify the QAP as directed by the designated DOE contracting authority.

Review the QAP and update as needed. Submit the modified QAPD to the DOE QA Approval Authority for significant non-editorial changes. Modifications that do not reduce or change provisions of the QAP or QAPD do not require approval by the DOE QA Approval Authority.

3. QUALITY ASSURANCE PROGRAM APPROVAL AND CHANGES FOR PRIME CONTRACTORS.

For initial submittal of the contractor's QAP, the following apply:

7. Ensure submittal of the Nuclear Safety Design Agreement includes the industry recognized standard for the QA program basis.

8. Develop and submit for review a Quality Assurance Program Plan that describes the implementation of the requirements when the NSDA is submitted.

Following QAPP submittal, but prior to the PDSA, develop program elements required for design, procurement, manufacture, and assembly of the final product:

9. Those elements must be documented and applied to ongoing procurement and work efforts. These must be documented in the QAP and compliant to this order and the selected industry standard.

10. While development and implementation may be iterative, full QA program development is required prior to PDSA submittal.

The QAPD must be a summary of the QAP.

11. The QAPD must adequately prescribe the flow down of requirements to working level processes (e.g., procedures, instructions, or any other similar term used in the implementing documents).

12. Document the basis for the QAP to meet the contractual and regulatory requirements.

13. The QAPD must also provide a summary explaining the graded approach.

14. The implementation of a graded approach is fundamental to a quality assurance program because it ensures that resources are allocated, and efforts are focused in proportion to the risks associated with a product, process, or project. Where appropriate, a graded approach must be used to implement the requirements of this CRD.

    (a) A graded approach means the process of ensuring that the level of analysis, documentation, and actions used to comply with a requirement are commensurate with:

        1 The relative importance to safety, safeguards, and security.

        2 The magnitude of any hazard involved.

        3 The life-cycle stage of a facility or item.

        4 The programmatic mission of a facility.

        5 The particular characteristics of a facility or item.

        6 The relative importance to radiological and nonradiological hazards.

        7 Any other relevant factors. (10 C.F.R. § 830.3)

        The basis of the graded approach must be documented for applicable quality assurance requirement in this CRD, and that documentation must be submitted to DOE as part of the QAPD. The graded approach must not be used to negate any applicable requirements.

The QAPD must describe how the requirements of this CRD are met.

The contractor must submit a QAPD to the Department QA approval authority prior to PDSA approval. The approval process will include verification of adequate implementation via audit of the contractor.

Implement the QAP as approved.

Modify the QAP as directed by the designated DOE contracting authority.

Review the QAP and update as needed. Submit the modified QAPD to the DOE QA Approval Authority for significant non-editorial changes. Modifications that do not reduce or change provisions of the QAP or QAPD do not require approval by the DOE QA Approval Authority.

ATTACHMENT 2
QUALITY ASSURANCE REQUIREMENTS

This Attachment provides the requirements associated with NE O 414.1, as well as the requirements applicable to contracts in which the associated CRD (e.g., Attachment 1 to NE O 414.1) is inserted. The requirements are in Part A for general QA criteria, Part B for Suspect/Counterfeit Item Prevention, and Part C for Software QA.

Part A – Quality Assurance Criteria

For all work performed by and for the Department, or under DOE authorization, the quality assurance program must establish, identify, and implement processes for:

1. Criterion 1 — Management/Program.

    a. Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing the work.

    b. Establish management processes, including planning, scheduling, and providing resources for the work.

2. Criterion 2 — Management/Personnel Training and Qualification.

    a. Train and qualify personnel to be capable of performing their assigned work.

    b. Provide continuing training to personnel to maintain their job proficiency.

3. Criterion 3 — Management/Quality Improvement.

    a. Establish and implement processes to detect and prevent quality problems.

    b. Identify, control, and correct items, services, and processes that do not meet established requirements.

    c. Identify the causes of problems and include prevention of recurrence as a part of corrective action planning.

    d. Review item characteristics, process implementation, and other quality-related information to identify items, services, and processes needing improvement.

4. Criterion 4 — Management/Documents and Records.

    a. Prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.

    b. Specify, prepare, review, approve, and maintain records.

5. Criterion 5 — Performance/Work Processes.

   a. Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements using approved instructions, procedures, or other appropriate means.

   b. Identify and control items to ensure proper use.

   c. Maintain items to prevent damage, loss, or deterioration.

   d. Calibrate and maintain equipment used for process monitoring or data collection.

6. Criterion 6 — Performance/Design.

   a. Design items and processes using sound engineering/scientific principles and appropriate standards.

   b. Incorporate applicable requirements and design bases in design work and design changes.

   c. Identify and control design interfaces.

   d. Verify or validate the adequacy of design products using individuals or groups other than those who performed the work.

   e. Verify or validate work before approval and implementation of the design.

7. Criterion 7 — Performance/Procurement.

   a. Procure items and services that meet established requirements and perform as specified.

   b. Evaluate and select prospective suppliers on the basis of specified criteria.

   c. Establish and implement processes to ensure that approved suppliers continue to provide acceptable items and services.

8. Criterion 8 — Performance/Inspection and Acceptance Testing.

   a. Inspect and test specified items, services, and processes using established acceptance and performance criteria.

   b. Calibrate and maintain equipment used for inspections and tests.

9. Criterion 9 — Assessment/Management Assessment. Ensure that managers assess their management processes and identify and correct problems that hinder the organization from achieving its objectives.

10. Criterion 10— Assessment/Independent Assessment.
    a. Plan and conduct independent assessments to measure item and service quality, to measure the adequacy of work performance, and to promote improvement.

    b. Establish sufficient authority and freedom from line management for independent assessment teams.

    c. Ensure persons who perform independent assessments are technically qualified and knowledgeable in the areas to be assessed.

Part B – Suspect/Counterfeit Item (S/CI) Prevention

Processes for Suspect/Counterfeit Item Prevention must be identified, established, and implemented within the QAP.

1. Applicability:

    a. Suspect/Counterfeit Items Prevention: Ensure items meet specified requirements, prevent entry of S/CIs into the DOE supply chain, and ensure detection, control, reporting, and appropriate disposition of S/CIs.

        15. Conduct S/CI oversight and prevention of S/CI entering Safety Significant (SS) and Safety Class (SC) Structures, Systems, and Components (SSCs).

        16. Develop processes for inspection, identification, evaluation, and disposition of installed S/Cis in SS and SC SSCs that may present potential hazards. During routine evaluations (e.g., maintenance and/or inspections) determine whether S/CIs are installed. Evaluations must consider potential risks to the environment, the public and workers along with a cost/benefit impact, and a schedule for replacement (if appropriate). Clearly mark S/CIs that remain in use.

        17. Provide training for managers, supervisors, and workers on S/CI processes and controls for SS and SC SSCs (including prevention, detection, and disposition) as appropriate.

        18. S/CI processes must include provisions for the collection, dissemination and use of the most accurate, up to date S/CI information.

        19. Include applicable provisions for S/CI reporting:

            (a) DOE O 210.2A, *DOE Corporate Operating Experience Program*.

            (b) DOE O 221.1B, *Reporting Fraud, Waste and Abuse to the Office of Inspector General*.

            (c) nE O 232.2, *Occurrence Reporting and Processing of Operations Information*.

20. Coordinate with the DOE Office of Inspector General before destroying or disposing of S/CIs and corresponding documentation.

Part C – Software Quality Assurance for Government-Owned Contractor-Operated Facility Contractors

Processes for software quality assurance must be identified, established, and implemented within the QAP.

1. The graded approach must be applied to the selection, management, control, documentation, and implementation of all software, including software systems and subsystems, through the QAP.

   Applicable requirements in this Attachment apply to all software using the graded approach.

   The basis for the graded approach used for software must be documented and submitted to/approved by DOE.

2. Software must be documented, managed, and controlled throughout the software's life cycle. Appropriate national or international software engineering industry standard(s) may be used as approved by the DOE QA Approval Authority. The industry standards could include combinations of standards (e.g., Institute of Electrical and Electronics Engineers (IEEE), National Institute of Standards and Technology (NIST), (American Nuclear Society) ANS, etc.) or other software engineering standard(s).

Part D – Software Quality Assurance for Privately Owned Privately Operated Facility Contractors

Processes for software quality assurance must be identified, established, and implemented within the QAP.

1. Software used for performing a nuclear safety function or design verification for any SSC must be documented, managed, and controlled throughout its life cycle to ensure that the safety functions will be performed under design basis conditions. Appropriate industry standard(s) or portions of standards must be used as approved by the DOE QA Approval Authority.

2. Software must be documented, managed, and controlled throughout the software's life cycle. Appropriate national or international software engineering industry standard(s) may be used as approved by the DOE QA Approval Authority. The industry standards could include combinations of standards (e.g., IEEE, NIST, ANS, etc.) or other software engineering standard(s).