

CONFIGURATION MANAGEMENT

1.0 SCOPE

This Performance Assessment Guide for Configuration Management will be used to carry out the oversight responsibility of the U.S. Department of Energy (DOE) Brookhaven Group. This guide was prepared to assist in conducting performance-based assessments of both DOE prime contractors and subcontractors to ensure that their configuration management programs identify, disposition, and take corrective action on issues that affect satisfactory facility performance. The goals are to ensure that laboratory employees and the public do not experience injuries and illness as a result of configuration management safety activities and that there is little or no economic loss to the Government.

Configuration management assessments will be directed at all prime contractors and subcontractors working at DOE sites. DOE line management must ensure that these contractors comply with DOE Orders and Federal and State regulations. Information developed from this assessment will determine the degree to which this is being done as well as the effectiveness of the laboratory's program.

2.0 ATTRIBUTES AND LINES OF INQUIRY

This section provides lines of inquiry to help assess whether the laboratory has implemented a program that ensures that configuration management requirements are incorporated into line activities. This section will be used to evaluate the laboratory's line organization. For additional guidance, see Section 4.0, "Guidance to Assessor."

2.1 Both the DOE and laboratory organizations define an appropriate method of configuration management for the specific work or project being performed.

- Does a configuration management plan exist?
- Does the plan establish the technical interface requirements and procedures for a specific project?
- Is the configuration management plan used as a project management tool to determine and control baselines and to ensure and document that all components of a project interface both physically and functionally?

- Does the chosen method of configuration management ensure that the product acquired satisfies the technical and operational requirements?
- Is the configuration management plan the means through which the integrity and traceability of the hardware/software systems are recorded, communicated, and controlled during development, operation, and maintenance?
- Does the chosen method of configuration management ensure that the technical requirements are clearly defined and controlled throughout the development and acquisition process?
- Does the configuration management plan promote the maximum degree of design and development latitude yet provide an appropriate degree and depth of configuration control?
- Does the configuration management plan control configuration changes with respect to their necessity, benefit, cost, timing, and implementation?
- Are changes to the applicable configuration systematically reviewed to ensure that all effects of a proposed change are identified and that proper authorization is given in making a decision to incorporate a change?
- Is the configuration management plan consistent with the quantity, size, scope, and complexity of the project involved?
- Is the selection of facilities, equipment, or other items used for formal configuration management determined by the need to control inherent characteristics or to control the interface with other items?
- Is the chosen configuration management plan tailored to the specific project and to particular products?

2.2 The laboratory has established requirements for configuration identification.

- Does technical documentation (baselines) exist that establishes the configuration identification?
- Are technical baselines initially identified in the project plan controlled, detailed, and updated through conceptual design, preliminary design, definitive design, and the as-built process?

- Does the basis for configuration identification change as an item progresses from initial conceptual design to final detailed design? Is the final identification the basis for technical, administrative, and management documents that concern or depend on configuration?
- Are permanent copies of the controlled identification documents maintained throughout the life cycle of the project? Do these records include proposed and approved changes from the initial baselines?

2.3 The laboratory has established requirements for configuration change control.

- Is technical documentation changed as agreed to by DOE and as described in the laboratory's configuration management plan?
- Are changes proposed by the laboratory screened by the laboratory to determine whether DOE approval is required prior to implementation?
- Are changes affecting the configuration of an item limited to those that are necessary or that offer significant benefit to DOE?
- Are changes required under the following conditions: correcting deficiencies; incorporating approved changes in operational or logistic support characteristics; effecting substantial life-cycle cost savings; and correcting safety deficiencies?
- Does the DOE project office ensure that all data required for effective evaluation of changes are made available to those individuals responsible for change decisions?
- If prior approval is required, are the changes formally proposed to the DOE project office prior to implementation?
- Does the DOE project office approve or disapprove changes or endorse and forward the proposed change to the next higher board if the change exceeds the project office approval authority?
- If DOE approval is not required and the laboratory implements the change, does the laboratory's control system include the following: identifying the status of a proposed change; identifying the status of change implementation; and providing a method for auditing the change history?
- Does the DOE project office establish priorities and time requirements for change proposal processing based on the nature of the change and its relative priority?

- When a configuration change is approved by DOE, are the necessary instructions issued to ensure timely and economical implementation?
- Are all affected project activities, such as engineering, logistics support, quality assurance, maintenance, and procurement involved in evaluating proposed changes?
- Is change control accomplished through an established DOE configuration control board when required?

2.4 The laboratory has established requirements for configuration recording and reporting.

- Are the status of proposed changes and the progress on approved changes identified and reported?
- Is the DOE project office selecting specific data, choosing record and report formats, and maintaining the actual records?
- Does the DOE project manager tailor the recording and reporting requirements contained in the request for proposal and contract to ensure that only the minimum information necessary to manage the configuration effectively and economically is provided?
- Are the laboratory's records and report formats accepted when they provide the necessary information?
- Is the following information included in the configuration records and reports: technical documentation comprising the approved configuration identification; essential data (e.g., engineering test data); and contractual information required for each item subject to configuration management?
- In addition, is the following information on changes included in the configuration records and reports: proposed changes to the configuration and the status, including the individual responsible for the change decisions; and approved changes to configuration, including the specific items to which the changes apply, and the activity responsible for implementation?
- Does the configuration management plan have requirements for collecting, storing, handling, verifying, and reporting configuration status information?

2.5 The laboratory has established requirements for waivers and deviations.

- Does the change process include a procedure for converting change proposals to an approved waiver or deviation?

- Does a waiver constitute contractual relief after producing the end product?
- Does a deviation constitute contractual relief prior to producing the end product?

2.6 Use of a configuration management plan is controlled and well defined.

- Does planning for configuration management start with preparation of the project plan and continue as part of the project planning process?
- Does configuration management continue throughout the product's life cycle until the product is removed from inventory?
- Does the laboratory submit a configuration management plan, detailing how it will manage and conduct configuration management in response to the requirements of a solicitation?
- For major system acquisitions and major projects, does the project office include a configuration management plan as a component of the project management plan?
- For projects that may not require a project management plan, is a configuration management plan still used?
- Does each non-DOE organization participating in the engineering effort prepare and maintain a configuration management plan that integrates with the project-level plan?
- If there are multiple participating organizations, is the project-level configuration management plan a cohesive assembly of the individual plans?
- Does the laboratory identify in the plan the items proposed for inclusion in the contract? Are only those items that are basic to the satisfaction of the project objectives placed on contract?
- Is the configuration management plan updated as required pursuant to contract award?
- Are laboratory procedures and planning baselines prepared in sufficient detail to support DOE requirements for visibility, validation, and verification of the contractual items?

2.7 The basis for configuration technical baselines is well defined.

- Has the laboratory defined the functional requirements baseline as the initial technical baseline founded on the functional requirements of the end product that are derived from the mission needs?

- Has the laboratory defined the technical requirements baseline as the basis for preliminary design that is established at the completion of conceptual design?
- Does the technical requirements baseline consist of the documentation that describes the selected design approach and specifies its design and performance requirements?
- Has the organization defined the design requirements baseline as the collection of documentation that defines the preliminary design?
- Is the design requirements baseline established at the completion of preliminary design and is it the basis for the definitive design?
- Is the final product configuration baseline established when the definitive design is complete?
- Does the final product configuration baseline describe all the details of the design necessary for fabrication, assembly, construction, installation, and checkout of the facilities and equipment?
- Is the final product configuration baseline composed of the specifications, "as-built" drawings, quality assurance provisions, test procedures, and operation and maintenance manuals?

2.8 The configuration management plans submitted by the laboratory contain specific information and conform to a specified outline.

- Does the configuration management plan include a cover sheet that provides the nomenclature of the system or product, laboratory, contract number, and date of issue?
- Does the plan include an introductory section with a table of contents that describes the laboratory's facilities, material features, organizational features, and other capabilities that have a determining effect on the configuration management plan?
- Does the plan include an organization section describing the individual responsibilities, activities, policy directives, and organizational relationships/structures involved in the configuration management plan?
- Does the plan include a technical baseline identification section that establishes the requirements for preparation, submission for DOE approval, and release of the DOE-approved documentation that defines each required baseline? Does the laboratory describe the method under which this will be done and the time period for accomplishment of each step?

- Does the plan include a configuration change control section outlining the procedures for processing engineering change proposals and requests for deviations or waivers? Does the configuration change control section include specific requirements for interface control between respective groups?
- Does the plan include a status recording and reporting section outlining the plans for data bank establishment, collecting, storing, handling, verifying, auditing, and reporting configuration status information?
- Does the plan include a special considerations section addressing issues such as multiple organizations, use of commercial items, use of existing drawings or specifications, and innovations to improve the configuration management process?

2.9 The configuration management process flow will vary from project to project; however, a general flow in the configuration management process within DOE will occur.

- Does the DOE Headquarters Program Office approve baseline identification documents?
- Does the DOE Headquarters Program Office approve an engineering change proposal (ECP) if cost, schedule, or technical impact exceeds thresholds prescribed by the project charter or project management plan?
- Does the DOE Field Organization/Project Office establish project procedures, define engineering change classes, and establish the Configuration Control Board (CCB)?
- Does the DOE Field Organization/Project Office develop the functional requirements baseline in support of the objectives delineated in the justification for new start?
- Does the DOE Field Organization/Project Office supply the laboratory with copies of the technical requirements baseline documents?
- Does the DOE Field Organization/Project Office review the laboratory's ECPs, ensuring that all required elements are included? (Reference DOE 4700.1, Attachment III-6 step 3.d, for specific requirements.)
- Does the DOE Field Organization/Project Office notify the laboratory of approval of the baseline and authorize the laboratory to issue the baseline identification documents?
- Does the DOE Field Organization/Project Office receive, evaluate, and approve or disapprove Class 1 engineering change proposals and engineering changes that require contract modifications?

- Does the DOE Field Organization/Project Office authorize change implementation through the appropriate authority?
- Does the DOE Field Organization/Project Office initiate any required revisions to an earlier or higher level baseline document and provide the results to all affected parties?
- Does the DOE Field Organization/Project Office review Class 2 changes? If the project office does not concur with the Class 2 designation, do they notify the laboratory to resubmit the change as Class 1?

2.10 The configuration management process flow will vary from project to project; however, a general flow in the configuration management process within the laboratory's organization will occur.

- On contract award, does the laboratory implement the contractually required configuration management plan?
- Does the laboratory develop the configuration identification in support of the current baseline requirements?
- Using the ECP format, does the laboratory submit the proposal to issue baseline identification documents?
- Does the laboratory issue the baseline identification documents and maintain the document masters?
- Does the laboratory develop changes to configuration identification documents that may result from the normal engineering process, from other laboratory-initiated ECPs, or from changes in project requirements directed by the DOE Project Office?
- Does the laboratory prepare and process ECPs in accordance with the configuration management plan?
- Does the laboratory segregate Class 1 and Class 2 ECPs and forward them to the DOE Project Office?
- Does the laboratory issue the revised configuration identification?
- Does the laboratory incorporate the authorized changes into the hardware/software in accordance with the revised documentation and track the incorporation of these changes?

- Does the laboratory oversee the inspection, acceptance, and checkout to verify that the "as-built" configuration of hardware/software is consistent with its current configuration identification?
- If a change is required due to an identified deficiency, does the laboratory develop new configuration identification, an ECP, and supporting documentation?
- Does the laboratory establish and maintain the administrative records and files necessary for support of the configuration management process?
- Does the laboratory prepare and distribute periodic configuration status reports in accordance with contract reporting instructions?

2.11 The laboratory has a method for controlling contractors and vendors.

- Does the laboratory have a plan for incorporating the externally developed items into the configuration identification?
- Does the laboratory have a method for coordinating changes to externally developed items?
- Does the configuration management plan detail how contractors or vendors will be monitored for compliance?
- Does the configuration management plan detail how external documentation, data, and equipment will be tested, verified, accepted, and ultimately merged with the final project configuration?

2.12 The laboratory has administrative methods for maintaining configuration management throughout the life cycle of the project.

- Has the laboratory established administrative control programs to handle configuration changes resulting from maintenance, modifications, and testing activities?
- For a project that is in operation, are the "as-built" drawings current and do they match the actual field configuration?
- Are systems and equipment returned to their original design configuration following maintenance?

- Is control over equipment and system status during the conduct of operations adequate to maintain the design configuration? Specific requirements for conduct of operations can be found in the Administrative Procedure for that topic.
- Are operating personnel receiving and using the latest revisions of engineering drawings and specifications?
- Are administrative controls established for the installation of temporary modifications that change the design configuration?
- Do the temporary modification administrative controls make provisions for safety reviews, pre-installation design approval, independent verification of correct installation and removal, documentation of the temporary modification, update of the operating documents, training, marking of the temporary modification, and periodic audits of outstanding temporary modifications?
- Are audits performed by the laboratory to determine the effectiveness of the configuration management plan? Are the results of the audits definitive, identifying deficiencies and initiating corrective action where required?

3.0 STANDARDS AND REQUIREMENTS

3.1 Specific DOE Orders and Standards.

- DOE O 232.1A, "Occurrence Reporting and Processing of Operations Information."
- DOE O 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees"
- DOE 2300.1B, "Audit Resolution and Followup."
- DOE 2321.1B, "Auditing of Programs and Operations."
- DOE 3790.1A, "Federal Employee Occupational Safety and Health Program, Chapter VIII."
- DOE 4700.1, "Project Management System," Chapter III - Part C - "Configuration Management."
- DOE 5480.19, "Conduct of Operations Requirements for DOE Facilities."
- DOE 5700.6C, "Quality Assurance."

3.2 Additional Standards.

- ANSI/IEEE Std 828-1990, Standard for Software Configuration Management Plans.

4.0 GUIDANCE TO ASSESSOR

This assessment guide is intended to assist in conducting a performance assessment of configuration management. It is not to be considered as all-inclusive, inflexible, or limiting reasonable assessment concentration when lines of inquiry responses dictate that an area must be more thoroughly probed.

The assessment of configuration management at DOE facilities requires the assessment team to focus on two areas: configuration management responsibilities of DOE, and the laboratory's responsibilities concerning configuration management. DOE 4700.1 has specific requirements for both organizations for setting up and maintaining a program for compliance to each requirement of the DOE 4700.1 criteria. The two issues must be clearly separated in the assessment.

For assessing the DOE configuration management function, it is suggested, for example, that the assessor review the laboratory's Engineering Change Proposal (ECP) area not only for compliance with the configuration management requirements but also look at the DOE responsibilities in the area; that is, what does DOE do to ensure the program is in compliance? Look at samples by picking a few criteria to check if there is a good program and there is good reason to believe that the program is working correctly.