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Engineering Manual: 10A – Engineering	Management Control Procedures	For Additional Info: <a href="http://EDMS">http://EDMS</a> <b>USE TYPE 3</b>	Effective Date: 04/21/09 Change Number: <u>326024</u>
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## 1. INTRODUCTION

### 1.1 Purpose

*Testing* (see def.) performed to collect data, to verify conformance of *systems, structures, and components* (SSCs; see def.) to specified requirements, or to demonstrate satisfactory performance for service shall be planned and executed per this procedure.

### 1.2 Scope and Applicability

This engineering process covers determining testing rigor, planning and preparing the test procedures or work instructions, performing the test, and documenting and accepting test results. Five categories of tests — *Qualification Test (QT)* (see def.), *Integrated Test* (see def.), *System Operability (SO) Test* (see def.), *In-Use Test* (see def.), and *other test* (see def.) — are addressed.

This process applies to testing of new or modified SSCs for which ICP has design responsibility.

This process does **not** apply to:

- A. *Post-maintenance testing* (PMT; see def.), which may be performed per STD-101, “ICP Integrated Work Control Process,” unless due to complexity or facility impacts a specific test procedure is required to verify conformance with requirements.
- B. *Software* (see def.) testing covered in MCP-550, “Software Management”
- C. Testing planned, performed, and documented in accordance with a project-specific test program that implements the requirements of PRD-5082.
- D. Instrument and control (I&C) systems per MCP-3630, “I & C Computer System Management,” except for the start-up of these systems as integrated into a larger system or facility.

## 2. RESPONSIBILITIES

**NOTE:** *The performer designations called out in this procedure, except Quality Assurance positions, are based on function rather than organization. As such, performer responsibilities may be assigned to individuals with titles other than those specified below. This is acceptable if the competency of assigned personnel is commensurate with responsibility.*

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Performer	Responsibilities
<i>Engineering Manager</i> (see def.)	Determine testing rigor. Assign the test engineer or tester. Accept the results of <i>formal tests</i> (see def.).
<i>Design Authority</i>	Determine or approve test requirements and acceptance criteria. Evaluate test results for acceptability. Determine resolution for identified test deficiencies.
<i>Test Engineer</i> (see def.) or tester	Assume overall responsibility for planning and performing the test and documenting test results.
Quality Engineer	Review test plan (if required) and test procedures for QL-1 and -2 tests. Approve the results of formal tests for QL-1 and -2 items.

**3. PREREQUISITES**

None

**4. INSTRUCTIONS**

**4.1 Testing Rigor**

- 4.1.1 Engineering Manager: Determine the type of *testing* (see def.) that will be performed and the testing rigor using the following criteria:

Type of SSCs to be Tested	Testing Rigor
Quality level (QL)-1 and -2 SSCs in Hazard Category 1, 2, or 3 facilities	Formal testing per Section 4.2 or <i>Limited formal testing</i> (see def.) per Section 4.3
QL-3 SSCs in Hazard Category 1, 2, or 3 facilities that require a high degree of confidence that they will perform their intended function, as determined by the design authority	
SSCs which are <i>waste-acceptance-impacting</i> (WAI; see def.) regardless of SSC QL	

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Type of SSCs to be Tested	Testing Rigor
QL-3 and -4 SSCs in less than Hazard Category 3 or lower facilities	<i>Commercial testing</i> (see def.) per Section 4.4 (The engineering manager may request a formal test in place of a commercial test for reasons other than those stated herein.)
QL-4 SSCs in Hazard Category 1, 2, or 3 facilities	
QL-3 SSCs in Hazard Category 1, 2, or 3 facilities that do not require “Formal Testing.”	

4.1.2 Engineering Manger: Assign a qualified individual to perform the test.

4.1.2.1 For formal tests, assign a qualified system engineer as the test engineer or a person qualified as a test engineer per project-specific requirements.

**NOTE:** *The assigned test engineer is not required to be the system engineer for the SSC under test as long as the designated design authority for the SSC is providing specified design authority input and reviews.*

4.1.2.2 For commercial tests, assign a tester who is knowledgeable about the SSC to be tested.

4.1.3 Engineering Manager: Proceed with formal testing per Section 4.2, limited formal testing per Section 4.3, or commercial testing per Section 4.4.

## 4.2 Formal Testing

4.2.1 Design Authority: Provide test requirements and acceptance criteria that are referenced to the source of this information to the test engineer.

**NOTE:** *A test plan is optional, but should be considered in highly complex systems, as determined by the design authority. If not used, the requirements and acceptance criteria are typically incorporated as needed into the test procedure or work instructions. To accomplish all of the objectives in a test plan, multiple test procedures and/or work orders may be used as long as all test objectives are met prior to final acceptance of the new or modified SSC.*

4.2.2 Test Engineer: Coordinate with the design authority and impacted disciplines (see Step 4.2.3.5 for examples of impacted disciplines) to establish requirements and plan the test.

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4.2.3 Test Engineer: Develop a test procedure as a technical procedure (TPR) per MCP-135 (see STD-9, “Technical Procedure Writing”).

4.2.3.1 Determine test requirements based on:

- A. Design requirements from the TFRs or from design disclosure documents
- B. Functional requirements and performance criteria as described in safety basis documents
- C. Scaling laws, if the test will be performed on a model or mockup
- D. Prerequisites and suitable environmental conditions, including conditions that simulate a range of expected operating parameters
- E. Other applicable documents.

**NOTE:** *Testing documents, such as American Society for Testing and Materials (ASTM) specifications, supplier manuals, or other related documents containing acceptance criteria, should be considered in the preparation of the test procedure.*

4.2.3.2 Include the numbered sections identified in Appendix A, “Test Procedure Format and Content.” If a section does not apply to the test, state so (list as “Not Applicable”).

4.2.3.3 Cover the topics identified as required in Appendix A. If a required topic does not apply to the test, state so (such as “There are no hold points required for this test”).

**NOTE:** *In the following step, test results may be recorded in the test procedure (typically referred to as a consumable or executable procedure), a Form 431.02, “Engineering Design File,” a report (RPT), or other retrievable format that is acceptable for entry into the Electronic Document Management System (EDMS) as a record.*

4.2.3.4 Determine where test results will be recorded, to include, as a minimum:

- A. SSC(s) tested
- B. Date(s) of test
- C. Measuring and test equipment used during the test, including identification number, most recent calibration date, and next calibration due date
- D. Name of the test engineer and other performers

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- E. Test criteria or reference documents used to determine acceptance (reference test plan, if provided)
  - F. Test observations, results, and conclusions, including acceptability of the tested SSC
  - G. Actions taken to correct any deviations, exceptions, and discrepancies
  - H. Names of personnel evaluating and approving the test results.
- 4.2.3.5 Obtain review from impacted disciplines such as:
- A. Operations
  - B. Maintenance
  - C. Quality assurance
  - D. Environmental
  - E. Industrial safety
  - F. Fire protection
  - G. Industrial hygiene
  - H. Radiological control
  - I. Emergency preparedness
  - J. Safeguards and security
  - K. Engineering (design agent and/or design authority)
  - L. Safety analysis
  - M. Facility or project management
  - N. Other impacted management.
- 4.2.4 Design Authority Manager: Approve the test procedure as document owner and submit the procedure to the DRSC for issue.
- 4.2.5 Design Authority: Initiate a temporary modification per MCP-2042, “Temporary Modification Control,” if it is necessary to change the system configuration or support systems to perform the test scope.
- 4.2.6 Test Engineer: Before starting the test, coordinate with involved parties regarding testing logistics, including temporary modifications to facility configuration (see MCP-2042, “Temporary Modification Control”).
- 4.2.7 Test Engineer: Perform the test per the test procedure.
- 4.2.7.1 Test Engineer: If the test includes mandatory hold points, ensure the assigned organization witnesses the hold point.

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4.2.7.2 Test Engineer: If procedural or SSC failure occurs (such as an exception or discrepancy), stop testing and take appropriate corrective action or actions, which may include:

- A. Evaluate the testing failure.
- B. Correct discrepancies or, if the acceptance criteria cannot be met, complete a nonconformance report (NCR) per MCP-538, "Control of Non-Conforming Items," and document the resolution.
- C. Determine if there is a need for retest and the extent of retest required.
- D. Determine if modifications to the design, implementation, test plan, or test procedure are required.
- E. Revise and reissue affected documents, as needed, per Step 4.2.3.

4.2.8 Test Engineer: Complete testing including any retests required. Collect and record all necessary data and determine acceptability.

4.2.9 Design Authority: Review and accept the test results.

4.2.10 Test Engineer: If a temporary modification was made for test purposes, initiate restoring the SSC to its normal configuration.

**NOTE:** *In the following step, test results may be recorded in the test procedure (typically referred to as a consumable or executable procedure), a Form 431.02, "Engineering Design File," a report (RPT), or other retrievable format that is acceptable for entry into the Electronic Document Management System (EDMS) as a record.*

4.2.11 Test Engineer: Provide written test results that document the ability of the SSC to meet requirements or perform its intended function (see Step 4.2.3.4 for a list of testing topics that must be covered).

4.2.12 Test Engineer: Obtain required test result concurrences, which include, at a minimum, the quality engineer, design authority, and engineering manager.

**NOTE:** *Testing for a construction project may require additional acceptance of testing results (such as a completed Form 432.04, "Inspection and Project Transfer") prior to full completion of a test.*

4.2.13 Quality Engineer, Design Authority, Engineering Manager, and Other Approvers: Provide written concurrence that test data and results were collected and accurately recorded per the test procedure.

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- 4.2.14 Test Engineer: Submit the completed test results to the DRSC for retention as QA records (see MCP-557, “Records Management”).

### 4.3 Limited Formal Testing

- 4.3.1 Design Authority: If testing is to be conducted on specific individual items that are not integrated into larger systems, conduct limited formal testing per this section using documented work instructions (a TPR may be developed and released, but is not required).

- 4.3.2 Design Authority: Provide test requirements and acceptance criteria referenced to the source of this information to the test engineer.

**NOTE:** *A test plan is optional, but should be considered in highly complex systems, as determined by the design authority. If not used, the requirements and acceptance criteria are typically incorporated as needed into the work instructions. To accomplish all of the objectives in a test plan, multiple test procedures and/or work orders may be used as long as all test objectives are met prior to final acceptance of the new or modified SSC.*

- 4.3.3 Test Engineer: Coordinate with the design authority and impacted disciplines (see Step 4.3.3.5 for examples of impacted disciplines) to establish requirements and plan the test.

- 4.3.4 Test Engineer: Initiate a work order to direct test performance as a planned or expedited work order per STD-101, “ICP Integrated Work Control Process.”

- 4.3.4.1 Determine test requirements based on:

- A. Design requirements from the TFRs or from design disclosure documents
- B. Functional requirements and performance criteria as described in safety basis documents
- C. Scaling laws, if the test will be performed on a model or mockup
- D. Prerequisites and suitable environmental conditions, including conditions that simulate a range of expected operating parameters
- E. Other applicable documents.

**NOTE:** *Testing documents, such as American Society for Testing and Materials (ASTM) specifications, supplier manuals, or other related documents containing acceptance criteria, should be considered in the preparation of the test instructions.*

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4.3.4.2 Cover the topics identified as required in Appendix A. If a required topic does not apply to the test, state so (such as “There are no hold points required for this test”).

**NOTE:** *In the following step, test results may be recorded in a Form 431.02, “Engineering Design File,” a report (RPT), or other retrievable format that is acceptable for entry into the Electronic Document Management System (EDMS) as a record.*

4.3.4.3 Determine where test results will be recorded, to include as a minimum:

- A. SSC(s) tested
- B. Date(s) of test
- C. Measuring and test equipment used during the test, including identification number, most recent calibration date, and next calibration due date
- D. Name of the test engineer and other performers
- E. Test criteria or reference documents used to determine acceptance (reference formal test plan, if provided)
- F. Test observations, results, and conclusions, including acceptability of the tested SSC
- G. Actions taken to correct any deviations, exceptions, and discrepancies
- H. Names of personnel evaluating and approving the test results.

4.3.4.4 Obtain review from impacted disciplines such as:

- A. Operations
- B. Maintenance
- C. Quality assurance
- D. Environmental
- E. Industrial safety
- F. Fire protection
- G. Industrial hygiene
- H. Radiological control
- I. Emergency preparedness
- J. Safeguards and security
- K. Engineering (design agent and/or design authority)

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- L. Safety analysis
  - M. Facility or project management
  - N. Other impacted management.
- 4.3.5 Design Authority: Approve the test instructions provided in the work order.
- 4.3.6 Test Engineer: Before starting the test, coordinate with involved parties regarding testing logistics.
- 4.3.7 Test Engineer: Perform the test per the work order.
- 4.3.7.1 Test Engineer: If the test includes mandatory hold points, ensure the organization that placed the hold point witnesses the hold point.
  - 4.3.7.2 Test Engineer: If SSC failure occurs (such as an exception or discrepancy), stop testing and take appropriate corrective action or actions, which may include:
    - A. Evaluate the testing failure.
    - B. Correct discrepancies or, if the acceptance criteria cannot be met, complete a nonconformance report (NCR) per MCP-538, "Control of Non-Conforming Items," and document the resolution.
    - C. Determine the extent of retest required.
    - D. Determine if modifications to the design, implementation, test plan, or work order are required.
    - E. Revise and reissue affected documents, as needed, per Step 4.3.3.
- 4.3.8 Test Engineer: Complete testing including any retests required. Ensure all necessary data is collected and recorded and determine acceptability of results.
- 4.3.9 Design Authority: Review and accept the test results.
- 4.3.10 Test Engineer: Provide written test results that document the ability of the SSC to meet requirements or perform its intended function (see Step 4.3.4.4 for a list of testing topics that must be covered).

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**NOTE:** *In the following step, test results may be recorded on a Form 431.02, “Engineering Design File,” a report (RPT), or other retrievable format that is acceptable for entry into the Electronic Document Management System (EDMS) as a record.*

4.3.11 Test Engineer: Obtain required test result concurrences, which include, at a minimum, the quality engineer, design authority, and engineering manager.

**NOTE:** *Testing for a construction project may require additional acceptance of testing results (such as a completed Form 432.04, “Inspection and Project Transfer”) prior to full completion of a test.*

4.3.12 Quality Engineer, Engineering Manager, Design Authority, and Other Approvers: Provide written concurrence that test data and results were collected and accurately recorded per the work order test instructions.

4.3.13 Test Engineer: Submit the completed test results (EDF, report, or other acceptable record) to the DRSC for retention as a QA record (see MCP-557, “Records Management”).

#### 4.4 Commercial Testing

4.4.1 Test Engineer: Coordinate with impacted disciplines (see Step 4.3.3.5 for examples of impacted disciplines) to establish requirements and plan the test.

4.4.2 Tester: Incorporate the test procedure into a planned or expedited work order per STD-101, “ICP Integrated Work Control Process.”

**NOTE:** *Although it is not required, a test procedure can also be developed as a TPR per Section 4.2, if directed to do so by the engineering manager.*

4.4.2.1 Consider applicable test procedure topics in Appendix A.

4.4.2.2 Include methods for recording test results and conclusions.

4.4.2.3 Complete review and approval of the work order (see Step 4.3.4.3 for a list of possible items) per STD-101 (see Step 4.3.4.4 for a list of potential reviewers).

4.4.3 Tester: Perform the test.

4.4.3.1 Document the ability of the SSC to meet requirements or perform its intended function

**NOTE:** *Test results may be documented in the work order, a Form 431.02, “Engineering Design File,” or other retrievable format that is acceptable for entry into EDMS as a record.*

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4.4.3.2 If procedural or SSC failure occurs, stop testing, take corrective action, and retest as needed.

4.4.4 Test Engineer: Submit test results to the DRSC for retention as records.

## 5. RECORDS

Test procedure and test results

**NOTE:** The [Records Schedule Matrix](#) and applicable facility, organization, program, or project records management plan and records type list provide current information on uniform file codes, disposition authorities, and retention periods for these records.

## 6. DEFINITIONS

*Commercial testing.* Testing of SSCs is conducted using documented work instructions per STD-101, but without using a formal, released TPR procedure. Test results are documented in the work order.

*Discrepancy.* A measured or observed condition of performance of an item or SSC being tested that does not meet a specific acceptance criterion.

*Engineering manager.* Engineering staff assigned supervisory or managerial responsibility for the conduct of engineering work. Engineering management positions include, but are not limited to, design leads, engineering supervisors, engineering managers, project chief engineers, and the ICP chief engineer.

*Exception.* An omission, addition, or deviation from procedure steps during the performance of a test.

*Formal test.* Testing of SSCs using a form test procedure developed as a TPR document type approved and released through the Document Management and Records Center. The test results are documented in an EDF, RPT, or other document retrievable in EDMS

*Instrumentation and control (I&C) computer system.* For the purposes of this procedure, any type of electronic hardware that utilizes a microprocessor for the purposes of monitoring or controlling operations in nuclear and non-nuclear facilities. This can include, but is not limited to data acquisition computers, distributed control systems, and programmable logic controllers.

*In-use test.* Term applied to testing of a computer program in the final operating system, similar in purpose to an Integrated or SO Test.

*Integrated test.* Documented trial use of a facility or system to ensure overall, integral performance of equipment that was SO tested in separate units. This test includes demonstrating the compatibility and operability of new items with existing or auxiliary items.

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*Limited formal test.* Testing of specific items, not integrated in larger systems, using documented work instructions per STD-101, but without using a formal, released TPR procedure. The results are documented in the work order.

*Other test.* A test that does not fit within the definition of Qualification, Integrated, or SO test.

*Post-maintenance test (PMT).* Test conducted after completion of maintenance to verify that equipment operates correctly and performs its desired function. This type of test is managed through STD-101, “Integrated Work Control Process.”

*Qualification test.* A test that is intended to provide a desired level of confidence that an item meets specified criteria.

**NOTE:** *This is a method used to verify a design (see MCP-9217, “Design Verification”), but normally not used as the sole method of verification. The test is normally used when the performance capabilities of an engineered product cannot be reasonably shown to meet requirements through review or analysis. This test is used to verify that an SSC does or does not satisfy acceptance criteria under simulated operational environmental conditions with a margin of safety.*

*Post-maintenance test (PMT).* Test conducted after completion of maintenance to verify that equipment operates correctly and performs its desired function. This type of test is managed through STD-101, “ICP Integrated Work Control Process.”

*Software.* Computer programs and code, including databases, spreadsheets, macros, routines, and Web pages (both static and dynamic) developed to fulfill specific user needs, such as data maintenance, data manipulation, calculations, and reporting. Software is supported by documentation that describes its functions, uses, and maintenance (such as plans, requirements documentation, user instructions, and data dictionary).

*Structures, systems, and components (SSC).* *Structures* are elements that provide support or enclosure, such as buildings, freestanding tanks, basins, dikes, and stacks. *Systems* are collections of components assembled to perform a function, such as heating, ventilating, and air conditioning, control systems, utility systems, reactor cooling systems, or fuel storage systems. *Components* are items of equipment such as pumps, valves, and relays; or elements of a larger array such as computer software, lengths of pipe, elbows, or reducers.

*System operability (SO) Test.* Documented trial use of an SSC to ensure it functions as designed and in accordance with designated acceptance criteria.

*Test engineer.* Individual with overall responsibility for test planning, performance, and completion. Within this procedure, the test engineer normally represents the design authority.

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*Testing.* An element of verification for determining the capability of an item to meet specified requirements by subjecting the item to a set of chemical, physical, environmental, or operating conditions.

*Waste-acceptance-impacting (WAI).* Any system, structure, and component (SSC), analysis, or document that may affect a high-level waste (HLW) form from development through qualification, production, and acceptance or spent nuclear fuel (SNF) characterization, conditioning, treatment, canisterization through acceptance, as defined in PLN-533, “Quality Assurance Program Plan for High-Level Waste and Spent Nuclear Fuel.”

## 7. REFERENCES

10 CFR 830, “Nuclear Safety Management”  
PRD-5074, “Design Control”  
PRD-5079, “Identification and Control of Items”  
PRD-5082, “Test Control”  
PRD-5088, “Quality Assurance Records”  
Form 431.02, “Engineering Design File”  
Form 432.04, “Inspection and Project Transfer”  
PLN-533, “Quality Assurance Program Plan for High-Level Waste and Spent Nuclear Fuel”  
STD-9, “Technical Procedure Writing”  
STD-101, “ICP Integrated Work Control Process”  
MCP-135, “Document Management”  
MCP-538, “Control of Non-Conforming Items”  
MCP-550, “Software Management”  
MCP-557, “Records Management”  
MCP-2042, “Temporary Modification Control”  
MCP-3562, “Hazard Identification, Analysis, and Control of Operational Activities”  
MCP-3630, “I&C Computer System Management”

## 8. APPENDIXES

Appendix A, Test Procedure Format and Content  
Appendix B, MCP-3056 Procedure Basis

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## Appendix A

### Test Procedure Format and Content

This appendix provides guidance for the format and content of formal test procedures. Numbered sections below must be included, or a statement provided (such as “Not Applicable”) if a section does not apply to a particular test (see Step 4.2.3.3). Required topics (indicated by an “R”) must be addressed in the test procedure, or a statement provided (such as “There are no hold points required for this test”) to explain that the topic is not applicable to the particular test (see Step 4.2.3.4).

Although this appendix is optional for limited scope testing and commercial test procedures, the topics covered herein should be considered during test procedure development.

Test procedure numbered sections and select content topics are based on STD-9, “Technical Procedure Writing.” STD-9 is the company standard for TPRs and should be consulted during formal test procedure development to ensure the procedure is accurate, complete, clear, consistent, and usable.

### Table of Contents

A table of contents is optional, but recommended if the test procedure is lengthy or contains appendixes.

## 1. INTRODUCTION

### 1.1 Purpose

(R)Describe the purpose and objective(s) of the test.

### 1.2 Scope and Applicability

(R)Describe the scope of the test from initial preparation through completion. Identify the affected SSCs. Identify an initiating document such as a technical and functional requirements (TFR) document, study, or safety evaluation that serves as a source of design input data and establishes functional requirements.

## 2. PRECAUTIONS AND LIMITATIONS

(R)Identify precautions and limitations associated with the test that:

- A. Alert procedure users to actions and conditions that represent potential danger to personnel or possible damage to the environment or equipment
- B. Define boundaries that are not to be exceeded
- C. Present conditions of note that apply generally to the entire procedure, or that occur at more than one point in the procedure.

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### 3. PREREQUISITES

(STD-9)Identify planning and coordination actions and conditions that could cause unacceptable delays or disrupt flow in test performance if they were placed elsewhere in the procedure.

(R)Identify environmental conditions, tools, and equipment necessary to conduct the test in a manner to fulfill test requirements and acceptance criteria. Include the following information in the prerequisites section, as applicable:

- A. (R)Characteristics of the SSC that are to be tested
- B. (R)Test methods to be used
- C. (R)Calibrated instrumentation
- D. (R)Equipment, tools, and supplies
- E. (R)Training, functional qualification level (category or class), or certification required for inspectors or other test performers
- F. (R)Condition of test equipment, test facility, test process, and SSC(s) to be tested
- G. (R)Suitable environmental conditions
- H. (R)Provisions for data acquisition
- I. (R)Performance requirements and acceptance limits (criteria), including required levels of precision and accuracy
- J. (R)Other performance documents that must be performed before starting this procedure or that are used in conjunction with this procedure (such as drawings, approved vendor manuals, ASTM methods, and other procedures)
- K. (R)Approvals and notifications, particularly for temporary changes to the approved facility configuration.

### 4. INSTRUCTIONS

(R)Provide detailed instructions to direct users through testing performance. It is important for the instructions to be clear, concise, and complete.

(R)Write the instructions as numbered steps organized in sequence, with descending levels of subordination. The steps must be performed in sequence, unless otherwise specified. The instructions section may also include section headings, warnings, cautions, notes, tables, and figures as needed to accomplish the testing goals. As applicable to the test, clearly identify:

- A. (R)Test performers by functional title
- B. (R)Required actions written in clear, concise command language (start the pump, turn the switch, etc.)
- C. (R)Conditions that must exist or be met before a step is performed
- D. (R)Mandatory hold points at which users must wait for another person to perform an action or for some other event to occur (such as radiological or QA hold points)
- E. (R)Steps to restore equipment or system operability
- F. (R)Equally acceptable alternative steps
- G. Time-dependent steps

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- H. Concurrent, continuous, or repeated steps
- I. Steps that reference or branch the users to another step, section, appendix in the test procedure, or to another document
- J. (R)Warnings that alert users to potential hazards that could result in injury or death
- K. (R)Cautions that alert users to potential hazards that could result in damage to equipment or in an undesirable process outcome.

**5. RECORDS**

(R)List records that are generated or received as a result of performing the test.

(R)Handle records generated as a result of the test as quality assurance records per MCP-557, “Records Management.”

**6. REFERENCES**

(R)List any documents that may be of use in performing the test or that were used as source material in developing the test procedure.

**7. APPENDIXES**

(R)List any appendixes to the test procedure such as discrepancy logs and any other guidance, information, or data recording tools appended to the test procedure.

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**Appendix B**

**MCP-3056 Procedure Basis**

Step	Basis	Source	Citation
All	Criterion 8—Performance/Inspection and Acceptance Testing. Inspect and test specified items, services, and processes using established acceptance and performance criteria.	10 CFR 830, "Nuclear Safety Management"	122.(h)(1)
All	The Engineering organizations are responsible for: P. Establishing inspection and test acceptance criteria Q. Ensuring test and inspection plans are prepared R. Approving test and inspection plans.	PRD-5074	3.1.P, Q, and R
All	Design verification will be performed to determine the adequacy of the design. Acceptable verification methods include...qualification testing.	PRD-5074	4.1.6.1, 4.2.4.1
All	Design verification will be performed prior to releasing the design for procurement, manufacture, construction, or use by another organization... In all cases the design verification will be completed prior to relying upon SSCs or computer programs to perform its function.	PRD-5074	4.1.6.3
All	The responsible design organization will identify and document the particular design verification method(s) used.	PRD-5074	4.1.6.7
All	Controls will be established to ensure that only correct and accepted items are used or installed.	PRD-5079, "Identification and Control of Items"	4.1.1.1
All	Organizations performing tests are responsible for...	PRD-5082, "Test Control"	3.1
All	Tests required to collect data (e.g., for siting or design input) to verify conformance of an item or computer program to specified requirements, or to demonstrate satisfactory performance for service, will be planned and executed.	PRD-5082	4.1.1.1

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Step	Basis	Source	Citation
All, 6 (testing definition)	Required tests, including, as appropriate, prototype qualification tests, production tests, proof tests before installation, construction tests, preoperational tests, operational tests, computer program tests (e.g., software design verifications), factory acceptance tests, site acceptance tests, and in-use tests will be controlled.	PRD-5082	4.1.1.2
4.1.1	The quality assurance program will develop and implement...QA criteria...using a graded approach and describing how the criteria and graded approach are applied.	PRD-5071, "Quality Assurance Program"	4.1.1.2
4.1.2	Design verification will be performed by any competent individual(s) or group(s) other than those who performed the original design, but who may be from the same organization.	PRD-5074	4.1.6.6 4.2.4.3
4.1.2	Personnel who direct tests shall be qualified and certified in accordance with PRD-5072.	PRD-5082	4.2.2.2
4.1.2	Personnel performing inspection or tests shall be trained, qualified, and certified in accordance with the following requirements...	PRD-5072, "Personnel Training and Qualification"	4.2.1.2
4.1.2	Specific qualification requirements for personnel performing...tests to verify quality and auditing are as follows:  A. The initial capabilities of an inspection and test candidate will be determined by an evaluation of the candidate's education, experience, training, and either test results or capability demonstration.  C. The job performance of inspection and test personnel will be reevaluated at periodic intervals not to exceed 3 years.  D. Reevaluation of inspection and test personnel job performance will be by evidence of continued satisfactory performance...  E. Any person who has not performed inspection or testing activities in the qualified area for a period of 1 year will be reevaluated.	PRD-5072	4.1.3.3

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Step	Basis	Source	Citation
4.2.6	The Engineering organizations are responsible for: Implementing appropriate corrective actions, up to and including stop work, when work is not in compliance with the applicable design control requirements.	PRD-5074	3.1.C
4.2.1, 4.2.2.6, 4.2.8, 4.2.9	The cognizant quality engineer associated with the organization requesting or providing the design activities/documents is responsible for...Approving test and inspection plans.	PRD-5074	3.3.D
4.2.2.3, Appendix A	The final design...output documents will: Specify required inspections and tests and include or reference appropriate acceptance criteria.	PRD-5074	4.1.4.5.B
4.2.2.2, 4.2.2.5, Appendix A	The results of design verification will be documented with the identification of the verifier clearly indicated.	PRD-5074	4.1.6.8
4.2.2.1.D, 4.2.2.3, Appendix A	Qualification tests will demonstrate the adequacy of performance under conditions that simulate the most adverse design conditions...	PRD-5074	4.1.9.1
4.2.2.3, Appendix A	Required tests will be controlled under appropriate operating modes and environmental conditions using the tools and equipment necessary to conduct the test in a manner to fulfill test requirements and test criteria.	PRD-5074	4.1.9.2
4.2.2.3, Appendix A	Test procedures will include or reference the test configuration and test objectives. Test procedures will also include provisions for ensuring that prerequisites and suitable environmental conditions are met, adequate instrumentation is available and used, appropriate tests and equipment are used, and necessary monitoring is performed.	PRD-5074	4.1.9.3
4.2.2.3, 4.2.2.5, 4.2.7, 4.2.8, 4.2.9, Appendix A	Test results will be documented and evaluated by a responsible authority to assure that they satisfy test requirements and conform with acceptance criteria.	PRD-5074	4.1.9.4
4.2.2.1.C, 4.2.2.3, Appendix A	When tests are being performed on models or mockups, scaling laws will be established, reviewed, and approved.	PRD-5074	4.1.9.5
4.2.6	The results of model test work will be subject to error analysis, where applicable, before using the results in final design work.	PRD-5074	4.1.9.6

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Step	Basis	Source	Citation
4.2.2.3, 4.2.6, Appendix A	Errors and deficiencies in approved design documents, including design methods (i.e., computer software supporting a safety or waste isolation function), that could adversely affect SSCs important to safety or waste isolation shall be documented and action taken to ensure all errors and deficiencies are corrected.	PRD-5074	4.2.6.1.C
4.2.2.6, 4.2.8, 4.2.9	Personnel performing independent verification are responsible for: Verifying that test data and results are collected in accordance with test procedures; Verifying that test data and results are accurately recorded in accordance with the test.	PRD-5082	3.2
4.2.2, 4.2.8, 4.2.9	Test requirements and acceptance criteria will be provided or approved by the responsible design organization.	PRD-5082	4.1.2.1
4.2.2.1, 4.2.2.2, 4.2.2.3, Appendix A	Test requirements and acceptance criteria will be based on specified requirements contained in applicable design documents or other pertinent technical documents that provide approved requirements.	PRD-5082	4.1.2.2
4.2.1, 4.2.2.3, 4.2.3, Appendix A	If temporary changes to the approved configuration of a facility are required for testing purposes, approval by the design authority is required before performing the test.	PRD-5082	4.1.2.3
4.2.2.3, 4.2.4, 4.2.2.5, 4.2.7, Appendix A	Tests performed will provide the necessary data with sufficient accuracy for evaluation and acceptance.	PRD-5082	4.1.2.4
4.1, 4.2.1, 4.2.2, Appendix A	Test planning includes: Specification of characteristics to be tested, test methods to be employed, and instructions for performing the test.	PRD-5082	4.1.3.1
4.2.2.3, Appendix A	Test prerequisites that address calibrated instrumentation, appropriate and adequate test equipment and instrumentation, trained personnel, condition of test equipment and the item to be tested, suitably controlled environmental conditions, and provisions for data acquisition.	PRD-5082	4.1.3.2
4.2, 4.2.2.2, 4.2.2.3, Appendix A	Tests will be performed in accordance with implementing documents that address the following requirements:  Test procedures that include or reference the test configuration and test objectives.	PRD-5082	4.1.4  4.1.4.1

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Step	Basis	Source	Citation
	<p>Test procedures that include provisions for ensuring that prerequisites and suitable environmental conditions are met, adequate instrumentation is available and used, appropriate tests and equipment are used, and necessary monitoring is performed.</p> <p>Prerequisites that include the following, as applicable: calibrated instruments, appropriate equipment, trained personnel, condition of test equipment and the item to be tested, suitable environmental conditions, and provisions for data acquisition.</p>		<p>4.1.4.2</p> <p>4.1.4.3</p>
4.2.2.1 and note	As an alternative to Subsection 4.1.4, appropriate sections of related documents (e.g., ASTM methods, supplier manuals, equipment maintenance instructions, or approved drawings or travelers with acceptance criteria) can be used instead of preparing special test-implementing documents.	PRD-5082	4.1.5.1
4.2.3, 4.3.4	Implementing documents will include adequate supplemental instructions as required to ensure the required quality of the testing work.	PRD-5082	4.1.5.2
4.2.2, 4.2.7, 4.2.8, 4.2.9	Test results will be documented, and their conformance with test requirements and acceptance criteria will be evaluated by a responsible authority.	PRD-5082	4.1.6.1
4.2.7, 4.2.8, 4.2.9	Test results for design-qualification tests and software-design verification will be evaluated by the responsible design organization.		4.1.6.2

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Step	Basis	Source	Citation
4.2.3.5, 4.3.7, 4.3	Test records shall be established and maintained to indicate the ability of the item or computer program to satisfactorily perform its intended function or to meet its documented requirements. Test records vary depending on the test type, purpose, and application, but shall contain the following information, as a minimum, for the specified application identified: (a) item tested (b) date of test (c) tester or data recorder (d) type of observation (e) results and acceptability (f) action taken in connection with any deviations (g) person evaluating test results	PRD-5082	601, “Test Records”
4.2.1, 4.2.3	Qualification of Test Personnel...	PRD-5082	4.1.7
4.2.1, 4.2.2, Appendix A	Test planning shall require that test implementing documents provide for the following... Identification of the implementing documents to be developed to control and perform tests and provide criteria for (i) determining the accuracy requirements of the test and (ii) determining when tests are required and defining how and when testing activities are performed.	PRD-5082	4.2.1.1 4.2.1.1.1
All	Provisions for the performing prototype, component, or feature qualification testing, including design verification testing, as early as possible before installation would be irreversible.		4.2.1.1.2
4.2.2.1, 4.2.2.3, 4.2.2.5, Appendix A	Identification of the item to be tested and the test requirements and acceptance limits, including required levels of precision and accuracy		4.2.1.1.3
4.1, 4.2, 4.3	Identification of test methods to be employed and instructions for performing the test.		4.2.1.1.4
4.2.2.2, 4.2.2.5, Appendix A	Test prerequisites that address the following: calibrated instrumentation, appropriate and adequate test equipment and instrumentation, including accuracy requirements, trained personnel, condition of test equipment, and the completeness of the item to be tested; controlled environmental conditions; and provisions for data acquisition and storage.		4.2.1.1.5

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Step	Basis	Source	Citation
4.2.2.2, 4.2.5, Appendix A	Mandatory hold points for witnessing by the organization placing the hold point.		4.2.1.1.6
4.2.2.2, 4.2.2.5, Appendix A	Methods to record data and results.		4.2.1.1.7
	Provisions for ensuring that test prerequisites have been met.		4.2.1.1.8
	Selection and identification of the measuring and test equipment to be used to perform the test to ensure that the measuring and test equipment is of proper type, range, accuracy, and tolerance to accomplish the intended function.		4.2.1.1.9
4.2.2.2, 4.2.2.5, 4.2.7	Test documentation will identify the following: A. Item or work product tested B. Date of the test C. Name of the tester and data recorders D. Type of observation E. Identification of test criteria or reference documents used to determine acceptance F. Results and acceptability of the test G. Actions taken in connection with any non-conformances noted H. Name of the person evaluating the test results I. Identification of measuring and test equipment used during the test including the identification number and the most recent calibrated date. I. Qualification and Certification of Test Personnel	PRD-5082	4.2.2.1
4.2.10	All records generated by this document that are designated in implementing documents as quality assurance records will be controlled in accordance with PRD-5088, "Quality Assurance Records."	PRD-5082	4.3.1
4.2.7, 4.2.10, 5.	Test records will be established and maintained to indicate the ability of the item to satisfactorily perform its intended function or to meet its documented requirements.	PRD-5082	4.3.2