

<b>CH2M HILL Hanford Group, Inc.</b>	<b>Manual</b>	<b>Projects</b>
<b>TEST PLAN PREPARATION</b>	<b>Document</b>	<b>TFC-PRJ-SUT-C-01, REV B-1</b>
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## 1.0 PURPOSE AND SCOPE

(7.1.1)

This procedure describes and establishes the responsibilities and format for the development, review, approval, revision and control of Tank Farm Contractor test plans. Implementing the use of test plans ensures that new and modified structures, systems, and components (SSCs) are: fabricated, constructed and tested in accordance with the approved design ~~and,~~ by meeting specified acceptance criteria. This will allow test plans that are capable of ~~fully~~ performing to their design functions to meet project or modification performance requirements. Test plans are developed concurrently with the design so that the scope and responsibility for testing activities are identified and documented early in the project life cycle. A graded approach for testing activities is systematically applied during the development of the test plan ~~and, once,~~ When test plans are approved by the Joint Test Group, they will ensure the appropriate level of testing review and that the documentation is applied. Test plans provide a mechanism ~~for ensuring to ensure~~ the testing is appropriately identified, performed in a logical sequence, and documented, ~~thereby establishing which will establish~~ confidence to support “achieving readiness” associated with the new or modified SSC. The process for developing a test plan is shown in [Figure 1](#).

This procedure applies to modifications to SSCs (Engineering Change Notices (ECNs)) and projects. This procedure does not encompass the testing associated with repairs performed by Maintenance or the functional tests performed routinely by Operations.

## 2.0 IMPLEMENTATION

This procedure is effective on the date shown in the header. New test plans and sub-test plans requiring approval after the effective date shall comply with the provisions of this procedure. Test and Evaluation Plans (TEPs) and Sub-Test and Evaluation Plans (STEPS) previously approved may continue to be used once they have been reviewed and determined to be adequate by the cognizant senior test director. ~~Once When TEPs and STEPs are~~ determined to be adequate, the senior test director will obtain review and approval of this determination from the Startup and Testing manager. Additionally, any subsequent revisions that will bring them into compliance with this procedure will be reviewed and determined on a case-by-case basis through the application of the graded approach worksheet, ~~the need for further revision to bring them into compliance with this procedure.~~

Graded approach worksheets that were previously recommended for approval after the review by the Joint Test Working Group or approved by the Joint Test Group are not affected by this change. Worksheets that have not been recommended for approval after review by the Joint Test Working Group and those prepared after the effective date shown in the header shall comply with the applicable provisions of this procedure revision.

## 3.0 RESPONSIBILITIES

Test plans are normally prepared by a senior test director or test director within the Startup and Testing organization. During the development of initial project documents, Startup and Testing personnel other than senior test directors or test directors may be assigned to provide assistance at the discretion of the Startup and Testing manager.

### 3.1 Startup and Testing Manager

Ensures that the test plans developed are using a graded approach to provide assurance that SSCs will function as intended when placed into operation.

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### 3.2 Field Startup and Testing Manager

Ensures the satisfactory completion of test plans to support the CH2M HILL schedule. Also provides direction to the senior test directors, test directors, and support personnel.

### 3.3 Joint Test Group

Approves all test plans and the classification of tests to the appropriate graded approach level in accordance with [TFC-CHARTER-15](#).

### 3.4 Joint Test Working Group

Reviews all test plans prior to the Joint Test Group review in accordance with [TFC-CHARTER-16](#).

### 3.5 Operations

The Operations organizations, i.e., Waste Feed Operations and Closure Project, support the test planning by ~~review of~~ **reviewing the** test plans to ensure compliance with technical safety requirements and other operational requirements.

Other responsibilities are provided within Section 4.0.

## 4.0 PROCEDURE

The Startup and Testing organization supports a new project by providing testing input during the development of project documents. For new construction projects and plant modifications (ECNs), a senior test director or test director will be assigned to begin the development of a test plan, concurrent with the development of the ~~conceptual~~ **detailed** design. If there is no conceptual design phase, the test plan will be developed concurrent with the detailed design. The test plan shall be completed closely, following the completion of detailed design. The test plan will provide testing requirements and acceptance criteria that can be included with procurement and construction contracts that are issued to support implementation of a design change. The test plan identifies and documents what tests will be performed but does not provide the detail for how the tests will be conducted. ~~(i.e., it~~ **The test plan** does not provide the detailed step-by-step instructions for the performance of the tests. See [TFC-PRJ-SUT-C-02](#).

For larger and more complex projects, the testing may be covered by an overall test plan and supported by sub-test plans. These sub-test plans can be treated as individual test plans for the purposes of review and approval under this procedure.

The development of a graded approach screening for testing activities for a project or modification is detailed in Section 4.1. This screening is typically performed prior to the beginning of the test plan development to minimize expenditure of resources on modifications that can be accepted by post-modification testing. The development of a test plan for projects or modifications (ECNs), when required, is detailed in Section 4.2.

The following procedure steps are presented in the order in which they generally occur; however, it is not intended that this procedure be used in a step-by-step manner. Steps may be worked out of the sequence presented or in parallel with other steps.

#### 4.1 Screening for Graded Approach (New Construction Projects and Plant Modifications (Engineering Change Notices))

Field Startup and  
Testing Manager

1. Upon notification of a new project or modification (ECN), assign a senior test director or test director to develop the graded approach screening.

Senior Test Director  
or Test Director

2. Obtain copies of project or modification documents, as available, to provide details sufficient to support the development of the required graded approach screening. Certain ~~of these~~ documents may not be available at project or modification inception since they are developed as the ~~design project~~ progresses. The following documents are examples of information that should be considered:

- Project Execution Plan (see [TFC-PRJ-PM-C-02](#))
- Functions and Requirements Document (see [TFC-ENG-DESIGN-C-01](#))
- Design Input Form (see [TFC-ENG-DESIGN-C-06](#))
- Project Requirements and Interface (see [TFC-BSM-CP\\_CPR-C-17](#) and [TFC-ENG-DESIGN-C-01](#))
- System and Subsystem Specifications (see [TFC-ENG-DESIGN-C-01](#))
- System Design Descriptions (see [TFC-ENG-DESIGN-P-07](#))
- Vendor Drawings and Manuals (see [TFC-ENG-DESIGN-C-21](#))
- Process Hazards Analysis (see [TFC-ENG-SB-C-06](#))
- Unreviewed Safety Question Determination (see [TFC-ENG-SB-C-03](#)).

3. For each potential test plan and sub-test plan, complete a graded approach worksheet (see Figure 2) following the format in [Attachment A](#). This worksheet will establish the graded approach level to be applied to each test plan and sub-test plan and ultimately to the tests and test results reports associated with that test plan and sub-test plan.

NOTE: A graded approach worksheet is not required for an overall test plan in cases where the project contains sub-test plans and all the details are in the sub-test plans.

4. For a graded approach Level 3 modification, prepare a memo to the Joint Test Group/Joint Test Working Group and attach a graded approach worksheet indicating no test plan is required.

- For redeployment of existing tested equipment (e.g., portable exhausters and vacuum retrieval system), regardless of the graded approach level, only a review and approval by the Joint Test Working Group is required.
- For testing of new equipment which is the same as equipment that has been tested under this program with the Joint Test Group approved tests, only a review and approval by the Joint Test Working Group is required.

Field Startup and  
Testing Manager

5. Ensure the proper level of graded approach has been assigned. If the test is graded approach Level 3, forward memo to the Joint Test Working Group/Joint Test Group for concurrence and exit this procedure. ~~(Post modification testing will be done in accordance with TFC-ENG-DESIGN-C-06.)~~ If preliminary indication is graded approach Level 1 or 2, submit the graded approach worksheet to the Joint Test Working Group/Joint Test Group, as appropriate, and continue to Section 4.2. Post-modification testing will be done in accordance with TFC-ENG-DESIGN-C-06.

NOTE: While the criteria and the associated grading scale provide a guideline and a basis for determination of the graded approach for the start-up and testing activities, the Startup and Testing manager may request, and the Joint Test Group may approve, adjusting the graded approach level for a given modification. ~~from that determined~~ This will determine using these criteria when circumstances warrant (e.g., screening of sub-test plans to more prohibitive project level criteria).

Senior Test Director  
or Test Director

6. For graded approach Level 3 testing, upon concurrence by the Joint Test Working Group/Joint Test Group, provide a memo to the system engineer advising of this determination and that the responsibility for post-modification testing now resides in his organization. Provide a copy of this notification to Startup and Testing Document Control.

NOTE: If a modification requires post-modification testing on an expedited basis, interim concurrence with this determination of graded approach level may be obtained from the Startup and Testing manager.

7. If concurrence on the level is not obtained from the Joint Test Working Group/Joint Test Group, go to step 4.1.3 and revise or prepare new worksheet addressing the identified issue(s).

## 4.2 Test Plan Development

Project Manager

1. For a new project, ~~the project manager will~~ request ~~the~~ Startup and Testing organization support during preparation of project functions and requirements in accordance with [TFC-ENG-DESIGN-C-01](#).

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- |                                       |    |  |
|---------------------------------------|----|--|
| Startup and Testing Manager           | 2. | Provide startup and testing input during preparation of project definition criteria.   |
| Project Manager                       | 3. | <del>The Project Manager will</del> Request the Startup and Testing organization review, <u>and in</u> concurrence with testing scope, during preparation of the Project Execution Plan in accordance with <a href="#">TFC-PRJ-PM-C-02</a> or <a href="#">TFC-PRJ-PM-C-11</a> .  |
| Startup and Testing Manager           | 4. | Review and concur with testing scope during preparation of the Project Execution Plan.   |
| Field Startup and Testing Manager     | 5. | Upon notification of a new project or modification, assign a senior test director or test director to support project or modification activities and develop the test plan for the project or modification, as required.   |
| Senior Test Director or Test Director | 6. | <p>Obtain copies of project/design documents, as available, to support the development of the test plan and acceptance criteria. Design criteria and the basis for the acceptance criteria for testing are expected to be defined in these documents. (Certain documents may not be available at project inception since they are developed as the project progresses. Certain documents may also not be available as they are not required for modifications.) The following documents are examples of information that should be considered:</p> <ul style="list-style-type: none"> <li>• Project Execution Plan (see <a href="#">TFC-PRJ-PM-C-02</a>)</li> <li>• Functions and Requirements Document (see <a href="#">TFC-ENG-DESIGN-C-01</a>)</li> <li>• Design Input Form (see <a href="#">TFC-ENG-DESIGN-C-06</a>)</li> <li>• Project Requirements and Interface (see <a href="#">TFC-BSM-CP_CPR-C-17</a> and <a href="#">TFC-ENG-DESIGN-C-01</a>)</li> <li>• System and Subsystem Specifications (see <a href="#">TFC-ENG-DESIGN-C-01</a>)</li> <li>• System Design Descriptions (see <a href="#">TFC-ENG-DESIGN-P-07</a>)</li> <li>• Vendor Drawings and Manuals (see <a href="#">TFC-ENG-DESIGN-C-21</a>)</li> <li>• Process Hazards Analysis (see <a href="#">TFC-ENG-SB-C-06</a>)</li> <li>• Unreviewed Safety Question Determination (see <a href="#">TFC-ENG-SB-C-03</a>).</li> </ul> |
|                                       | 7. | Ensure start-up and testing activities are appropriately scheduled in the Integrated Mission Execution Schedule, including preliminary resource loading.   |

8. Support conceptual design, when applicable, including design review, by providing testing input as required ([TFC-ENG-DESIGN-P-17](#)).
9. Provide start-up and testing input to the Statement of Work for detailed design specification, when applicable.
10. Upon initiation of detailed design, commence development of test plan in accordance with the format specified in [Attachment B A. Refer to Attachment B for items to consider for test plans and tests.](#)
11. Develop Section 1.0 of the test plan to provide a brief explanation of the project and why the test plan is needed. If the project will require sub-test plans, describe the basis for this breakdown.

Senior Test  
Director/Test  
Director

NOTE: In the case of a project containing sub-test plans, the test plan should follow the general format described in this procedure. However, details of the required testing will only be required in the sub-test plans.

12. If sub-test plans are required, prepare a sub-test plan overview table similar to ~~Example 1 attached to this procedure~~ [what is shown in Figure 3](#)). This same overview table will be included for information in all sub-test plans associated with a particular test plan.
13. Complete the sub-test plan overview table by entering the title of the modification or project. Modifications and projects whose work scope will be divided into independent packages for design, construction, and turnover shall be recorded in the overview table with sub-test plans and titles.
14. As detailed design development permits, develop Section 2.0 to describe the extent of the testing and the SSCs involved. This will include defining the boundaries of the test. Boundaries shall be shown on marked up drawings.
15. As detailed design permits, develop Section 3.0, including the following details as applicable and available:
  - SSCs to be tested. List the types of components being added or modified. Provide specific SSC identifier numbers, if known.
  - Testing to be done on each of the SSCs. Group by subsystem or skid, as applicable.
  - Basis for the test. Provide the requirement document that drives the need for the test.
  - Type of test (e.g., factory acceptance test, construction acceptance test, or operational acceptance test).

- Conditions and Sequence. Identify any sequencing needs for the tests.
- Acceptance criteria for each of the tests.
- The basis for the acceptance criteria. Identify the design document or industry standard that documents the acceptance criteria.
- The type of data to be collected during the testing. Identify the specific data that is to be collected by each of the tests.

This information shall be presented in a tabular format similar to what is shown in [Figure 4](#).

16. Support detailed design by providing detailed start-up and testing input for equipment procurement specifications and construction specifications.
17. As detailed design development permits, develop Section 4.0 of the test plan providing additional details on the interdependence of the identified tests, plant conditions required, and special needs or limitations for the tests.
  - Develop Section 4.1 by identifying any special precautions to be taken during the testing based on the SSCs being tested or their interface with existing installed SSCs based on the following:
    - Applicable Authorization Basis impacts (TSR/LCO Limits)
    - Vendor precautions for equipment and personnel safety
    - Design basis limitations (e.g., heat-up rates)
    - Environmental constraints.
  - Develop Section 4.2 by identifying any special requirements for the sequence of testing. This section should include a logic flow diagram outlining the testing sequence similar to Example 3 attached to this procedure as shown in Figure 5.
  - Develop Section 4.3 by identifying interfacing plant SSCs and conditions that are required for any of the tests identified in the Test Requirements section. Address the system restoration that is required to follow any tests that will require lineups that are outside of normal operation.

- Develop Section 4.4 **by** identifying any special equipment needed to conduct the test or collect the data required. Equipment readily available to CH2M HILL does not need to be listed.
18. At completion of detailed design, support the detailed design review ([TFC-ENG-DESIGN-P-17](#)).
19. Develop Section 5.0 to describe the methods to be used to collect the data for the tests, e.g.:
- Hand-recorded from permanently installed plant instrumentation
  - Hand-recorded from measuring and test equipment
  - Collected and recorded from data acquisition systems.
20. Include in Section 5.0 the responsibilities for preparation and submittal of test results reports to Startup and Testing (e.g., factory acceptance test results and construction acceptance test results).
21. Develop Section 6.0 **by** listing documents, including the revision, used in the preparation of the test plan.
22. Develop Section 7.0 **by** listing attachments to the test plan. Attachments may include charts, figures, and curves needed, in addition to the examples cited in the steps above.
23. Upon completion of detailed design, complete the assembly of the draft test plan(s) using the format shown in [Attachment B A](#). Obtain a number for the test plan(s) from Startup and Testing Document Control. The format of the number for a project will be as shown below:
- Project No.-TP-1.0 (e.g., W-XXX-TP-1.0)
  - Sub-test plans will be sequentially numbered as 1.1, 1.2, etc., and will be preceded with an “S” (e.g., Project No.-STP-1.1, ~~(e.g., W-XXX-STP-1.1, W-XXX-STP-1.2, etc.)~~).

For a modification, use the following format:

- ECN No.-TP-1.0
- Sub-test plans will be sequentially numbered as 1.1, 1.2, etc., and will be preceded with an “S” (e.g., ECN No.-STP-1.1, ECN No.-STP-1.2, etc.

NOTE: The initial issue of test plans and sub-test plans will be Revision 0 upon Joint Test Group approval. Changes made to the test plans and sub-test plans after final approval will be indicated with the next revision number.

#### 4.3 Test Plan Review

Senior Test Director  
or Test Director

1. Submit the draft test plan for review to affected organizations (e.g., system engineer, design authority, Operations personnel, including craft workers, Quality Assurance/Quality Control, ~~radiation controls~~ Radiological Control, Safety) that will be directly involved in or will be supporting the testing.

2. Resolve any comments or concerns with the applicable department personnel based on their comments and revise the test plan accordingly.

Field Startup and  
Testing Manager

3. Review the test plan for accuracy of technical content and completeness with respect to level of detail.

Senior Test Director  
or Test Director

4. Incorporate any discrepancies identified by the Field Startup and Testing manager.

5. Present the test plan and graded approach worksheet to the Joint Test Working Group.

NOTE: The graded approach worksheet may be, and is typically, submitted to the Joint Test Working Group/Joint Test Group separately from the test plan.

Joint Test Working  
Group

6. Review the test plan and graded approach level identifying any deficiencies ~~as necessary~~ in accordance with TFC-CHARTER-16. Upon satisfactory review of the test plan and graded approach level, recommend approval to the Joint Test Group.

Senior Test Director  
or Test Director

7. Incorporate Joint Test Working Group review comments, as necessary.

NOTE: For revisions to the test plan or sub-test plan, ~~resubmittal of the~~ a resubmitted graded approach worksheet is not required unless specifically requested by the Joint Test Working Group chairperson.

8. If concurrence on graded approach level is not obtained from the Joint Test Working Group go to ~~step 4.1.3-Section 4.1, step 3~~, and revise or prepare a new worksheet addressing the identified issue(s).

9. Present the test plan and graded approach worksheet to the Joint Test Group.

Joint Test Group

10. Review the test plan and identify any deficiencies ~~as necessary~~ in accordance with TFC-CHARTER-15. Upon satisfactory review, approve the test plan and associated graded approach level.

Senior Test Director  
or Test Director

11. Incorporate Joint Test Group review comments ~~as necessary~~ and obtain Joint Test Group approval of the test plan and graded approach worksheet.

NOTE: For revisions to the test plan or sub-test plan ~~resubmittal of the a resubmitted~~ graded approach worksheet is not required unless specifically requested by the Joint Test Working Group chairperson.

12. If concurrence on graded approach level is not obtained from the Joint Test Group, go to ~~step 4.1.3~~ Section 4.1, step 3, and revise or prepare a new worksheet addressing the identified issue(s).

13. Forward the approved test plan and graded approach worksheet to the Field Startup and Testing manager.

Field Startup and  
Testing Manager

14. Submit a copy of the approved test plan and graded approach worksheet to the project manager or responsible engineer for the modification, and Submit a copy of the approved test plan and worksheet to Startup and Testing Document Control.

Startup and Testing  
Document Control

15. Maintain the approved test plan on file until all testing is completed, then disposition in accordance with Startup and Testing records management guidelines (under development).

16. Maintain a list of active/open test plans.

Field Startup and  
Testing Manager

17. Schedule the development of the test document(s) in accordance with the test preparation procedure.

#### 4.4 Test Plan Revisions

Senior Test Director  
or Test Director

1. If changes to the ECN or project are of sufficient magnitude to require a change in the test plan or sub-test plans, revise as required.
2. Verify the graded approach worksheet remains valid or prepare a revised evaluation using the worksheet in [Attachment A](#).
3. Submit revised test plan or sub-test plan for review in accordance with Section 4.3.

#### 4.5 Test Plan Cancellation

Senior Test Director  
or Test Director

1. If an ECN or project is canceled after a test plan ~~(s)~~ has been approved, prepare a memo to file from the Field Startup and Testing manager explaining why the test plan is no longer active.

Field Startup and  
Testing Manager

2. Approve the cancellation memo and submit to Startup and Testing Document Control.

Startup and Testing  
Document Control

3. Remove the subject testing plan(s) from the active file, attach the cancelation memo, and submit the package ~~to Records Management in accordance with TFC-BSM-IRM\_DC-C-02.~~

## **5.0 DEFINITIONS**

No terms or phrases unique to this procedure are used.

## **6.0 RECORDS**

The following records may be generated, as required, during the performance of this procedure:

- Test plan
- Sub-test plan
- Graded approach worksheet.

The Startup and Testing group is responsible for record retention and retirement in accordance with TFC-BSM-IRM\_DC-C-02.

## **7.0 SOURCES**

### **7.1 Requirements**

1. TFC-PLN-02, "Quality Assurance Program Description."

### **7.2 References**

1. [TFC-BSM-CP\\_CPR-C-17](#), "Interface Management."
2. [TFC-BSM-IRM\\_DC-C-02](#), "Records Management."
3. [TFC-CHARTER-15](#), "Joint Test Group Charter."
4. [TFC-CHARTER-16](#), "Joint Test Working Group Charter."
5. [TFC-ENG-DESIGN-C-01](#), "Development of System and Sub-System Specifications."
6. [TFC-ENG-DESIGN-C-06](#), "Engineering Change Control."
7. [TFC-ENG-DESIGN-C-21](#), "Vendor Information."
8. [TFC-ENG-DESIGN-P-07](#), "System Design Descriptions."
9. [TFC-ENG-DESIGN-P-17](#), "Design Verification."
10. [TFC-ENG-SB-C-03](#), "Unreviewed Safety Question Process."
11. [TFC-ENG-SB-C-06](#), "Safety Basis Development."
12. [TFC-PRJ-PM-C-02](#), "Project Management for DOE O 413.3 Projects."

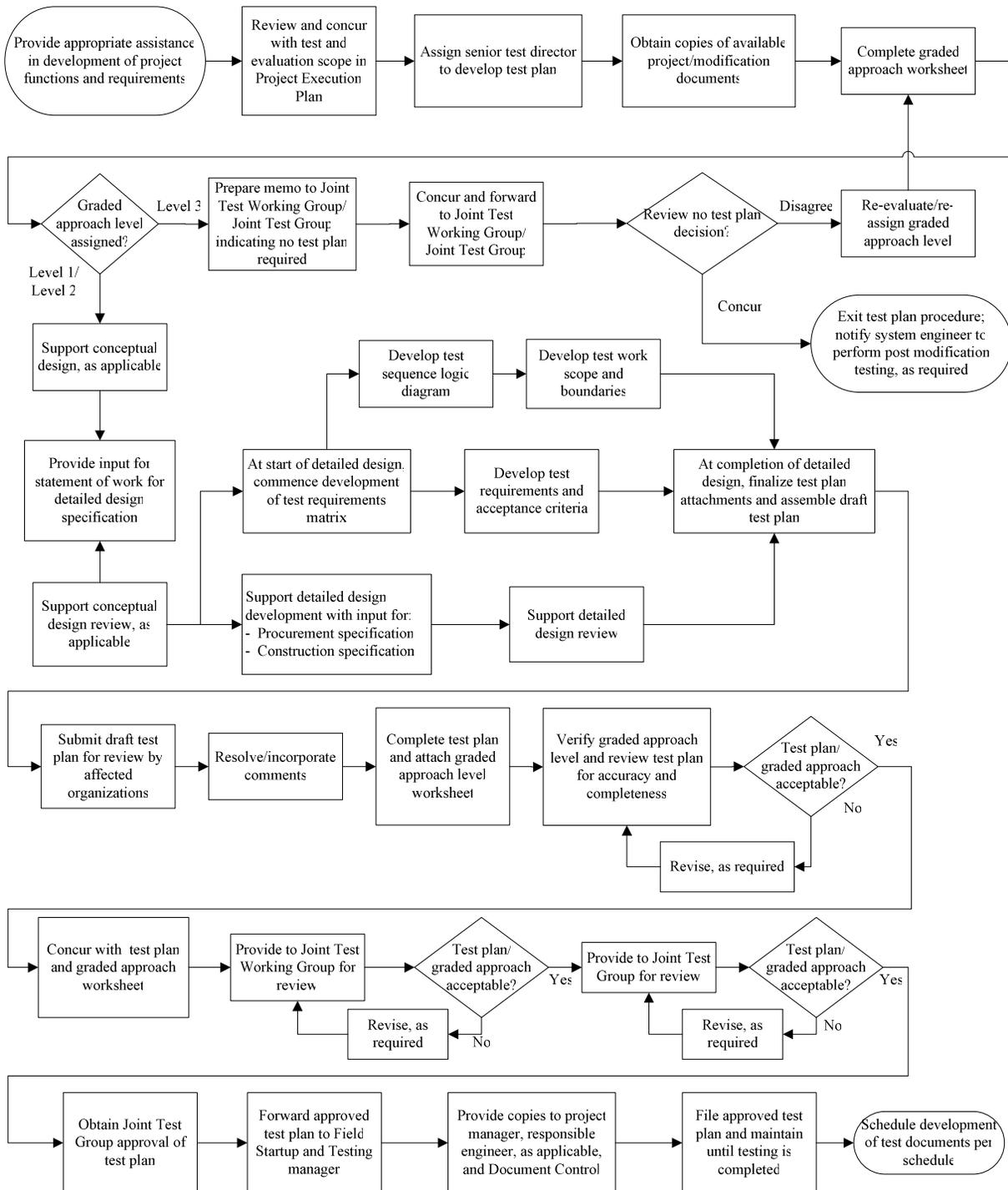
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13. [TFC-PRJ-PM-C-11](#), "Project Management for Hanford Tank Waste Cleanup Expense-Funded Projects."
14. [TFC-PRJ-SUT-C-01](#), "Test Preparation."

Figure 1. Summary of Process of Preparation of a Test Plan.



**Figure 2. Startup and Testing Graded Approach Worksheet.**

The criteria listed below are used to determine the level of start-up and testing review activities that will be associated with a given project or facility modification.

<b>Startup and Testing Graded Approach Review</b>
Test Plan#/ECN#: _____
Test Plan/ECN Title: _____
Graded Approach Level: (based on worksheet) _____
Answer the following questions to determine the level of start-up and testing review activities to be applied to the project or facility modification.

Brief Description of Modification Scope

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<b>Question/Criteria</b>	<b>Result</b>
1. Does the project or modification potentially affect a <del>safety limit</del> <u>TSR, LCO or other safety basis requirements</u> as defined in the <del>Documented Safety Analysis and the TSRs</del> <u>Tank Farm Authorization Basis</u> ?	Yes=GA-1 No=Continue
2. Does the project or modification involve adding or changing multiple operational parameters or interlocks in a safety significant system? <del>(Note: Removal of equipment, operational parameters, or interlocks is not intended to be considered a GA-1. Also, setpoint only changes are not intended to be considered a GA-1.)</del>  <u>(NOTE The following changes are not intended to be considered a GA-1:</u> <ul style="list-style-type: none"> <li><u>- Removal of equipment, operational parameters, or interlocks</u></li> <li><u>- Setpoint only changes</u></li> <li><u>- Redeployment of previously tested equipment with no changes or with minor changes</u></li> <li><u>- New equipment that is the same as equipment that has been tested under this program with approved tests.)</u></li> </ul>	Yes=GA-1 No=Continue
3. Does the project or modification involve adding or changing multiple operational parameters or interlocks in a general service system?  <del>(NOTE 1: Removal of equipment, setpoint only changes, operational parameters, or interlocks is not intended to be considered a GA-2.) Also, setpoint only changes are not intended to be considered a GA-2.)</del>  <u>(NOTE 2: Redeployment of existing tested equipment is intended to be considered as GA-2. New equipment that is the same as equipment that has been tested under this program by approved tests is intended to be considered a GA-2.)</u>	Yes=GA-2 No=Continue

**Figure 2. Startup and Testing Graded Approach Worksheet. (cont.)**

Question/Criteria	
4. Does the project or modification install SSCs that are design features, as described in the <del>DSA, TSRs or SSCs that</del> <del>or</del> are significantly different from those currently in use in the tank farm facilities? (If the SSCs are significantly different, <u>it</u> may involve the difference in the equipment, the interface with the operator, and the method of accomplishing an objective.)	Yes=GA-2 No=Continue
5. Does the project or modification involve an increase in the reportable quantities or concentrations of any of the following: <ul style="list-style-type: none"> <li>• Hazardous chemicals produced, purchased, stored, or disposed?</li> <li>• Radioactive materials released to the atmosphere?</li> <li>• Increased radiation exposure to plant personnel?</li> </ul>	Yes=GA-2 No=Complete

**NOTE:** If all answers are “No,” then the modification is classified as a Level GA-3 and is therefore not subject to the Startup and Test Program. Examples of typical modifications that would be classified as GA-3 ~~are~~ include:

Equipment replacements, piping only changes, isolation or removal of equipment, temporary modifications, simple operational changes in SS or GS systems, material changes, and setpoint only changes.

**Startup and Testing Program Level**

Level	Description of Level
GA-1	Joint Test Working Group Review; Joint Test Group Approval of Plan; Tests and Test Results Reports.
GA-2	Joint Test Working Group Review of Pan; Joint Test Working Group approval of Tests and Test Results Reports.
GA-3	After concurrence, no further Joint Test Group <u>or</u> Joint Test Working Group involvement.

**Justification**

Question #	Justification
1.	
2.	
3.	
4.	
5.	

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Senior Test Director/Test Director

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Chairperson - Joint Test Working Group

**Approved by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Chairperson - Joint Test Group

**Example 1. Figure 3. Sub-Test Plan Overview.**

The following list identifies the sub-test plans that are prepared to cover the entire scope of modification or project included under this test plan. The test type (e.g., Construction Acceptance Test (CAT), Factory Acceptance Test (FAT), Operational Acceptance Test (OAT)) should be included, when known.

Sub-Test Plan #	Description of Design Phase/Package Contents	Interdependencies	Test Types Included
W211- STP-1.1	Tanks		CAT
W211- STP-1.2	Pumps and piping system	Complete sub-test Plan STP-W211-1.1 prior to the OAT for STP-W211-1.2	FAT, CAT, OAT
W211- STP-1.3	Electrical		FAT, CAT
W211- STP-1.4	Instrumentation		FAT, CAT, OAT
W211- STP-1.5	Lighting		OAT

NOTE: Complete the sub-test plan overview table by entering the title for the modification or project. Modifications and projects whose work scope will be divided into independent packages for design, construction, and turnover, shall be recorded in this sub-test plan overview table with sub-test plans and titles.

~~ATTACHMENT B – ITEMS TO CONSIDER FOR TEST PLANS AND TESTS (cont.)~~

~~Example 2~~Figure 4. Test Requirements Matrix.

~~ATTACHMENT B—ITEMS TO CONSIDER FOR TEST PLANS AND TESTS (cont.)~~

~~Example 3~~Figure 5. Test Sequence Logic Diagram.

## ATTACHMENT A – TEST PLAN FORMAT

### COVER SHEET

All test plans and sub-test plans will contain a cover sheet that provides the following information:

- Test Plan Number, Revision, and Title
- Signature block for the: Senior Test Director or Test Director, Field Startup and Testing Manager, Joint Test Working Group Chairperson, and Joint Test Group Chairperson.

### TABLE OF CONTENTS

#### 1.0 PURPOSE

Provide an explanation of why the test plan is needed. If the design change is being done in phases, the initial test plan should identify the phases and explain how a sub-test plan will be developed for each of the phases. The relationship between the initial test plan and any sub-test plans can be shown in an attachment similar to that shown ~~as Example 1 in Figure 3.~~

#### 2.0 SCOPE

Describes the extent of the testing, the SSCs to be involved in the test, and. ~~This section will also describe~~ the boundaries of the SSCs to be tested. Marked up drawings of the system shall be used to depict the boundaries of the testing. Drawing mark-ups are to be done on facility or project drawings that show the design change. The boundaries can be shown on the drawing by using the most appropriate method to clearly show the SSCs included in the testing scope (e.g., clouding, shading, break points, etc.)

#### 3.0 TEST REQUIREMENTS

This section identifies:

- SSCs to be tested. List the types of components being added or modified. Provide specific SSC identifier numbers, if known.
- Testing to be done on each of the SSCs. Group by sub-system or skid, as applicable.
- Basis for test. Provide the requirement document that drives the need for the test.
- Type of test, e.g., factory acceptance test, construction acceptance test, or operational acceptance test.
- Conditions and Sequence. Identify any sequencing needs for the tests.
- Acceptance criteria for each of the tests.

**ATTACHMENT A – TEST PLAN FORMAT (cont.)**

- The basis for the acceptance criteria. Identify the design document or industry standard that documents the acceptance criteria.
- The type of data to be collected during the testing. Identify the specific data that is to be collected by each of the tests.

This information should be presented in a tabular format ~~as shown in Example 2~~ shown in Figure 4.

**4.0 TEST COORDINATION**

These sections provide additional details regarding the interdependence of the identified tests, the plant conditions required, and any special needs or limitations for the tests.

**4.1 Precautions and Limitations**

This section identifies any special precautions that must be taken during the testing activities based on the SSCs being tested and their interface with existing installed SSCs. This section should list all precautions and limitations based on the following:

- Applicable Authorization Basis impacts (TSR/LCO Limits)
- Vendor precautions for SSCs and personnel safety
- Design basis limitations (e.g., heat-up rates)
- Environmental constraints.

**4.2 Sequence of Testing**

This section identifies any special requirements for the sequence of testing that is not obvious from a review of the test requirements. For example, it is obvious that all factory acceptance testing is complete before operational acceptance testing; however, it may not be obvious that a test of the diluent system should be conducted prior to a test of a transfer pump. This section should be prepared as a logic flow diagram of the connections between the identified tests. (See Example 3 Figure 5.)

**4.3 Plant Conditions**

This section describes the interfacing plant SSCs and conditions that are required for any of the tests identified in the test requirements section. This section should also address the system restoration required following any of the tests if the tests will require system lineups that are outside of normal operation.

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<b>TEST PLAN PREPARATION</b>	<b>Effective Date</b>	<b>March 30, 2004</b>

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## ATTACHMENT A – TEST PLAN FORMAT (cont.)

### 4.4 Special Equipment Needed

This section identifies any special equipment that may be needed to conduct the test or collect the data needed for the tests. If the equipment is ~~currently~~ readily available to CH2M HILL, ~~then~~ it ~~need not be~~ does not need to be listed in this section.

### 5.0 DATA COLLECTION AND TEST RESULTS REPORTING

This section describes how the test data should be collected and assigns the responsibility for preparing the test results reports. Factory acceptance test results will be documented in a factory acceptance test report that will be submitted to the Startup and Testing group for review. Construction acceptance tests will be documented in a construction acceptance test report that will be submitted to the Startup and Testing group for review. Operational acceptance tests will be documented in a test results report and presented to the Joint Test Group/Joint Test Working Group for review and approval in accordance with the Joint Test Group and Joint Test Working Group charters.

### 6.0 REFERENCES

List documents used to prepare the test plan.

### 7.0 ATTACHMENTS

List attachments (charts, figures, curves, etc.) to the test plan. If an attachment contains more than one page, the number of pages shall be noted. Examples of potential attachments are:

- Test Plan and Sub-Test Plan Overview Chart (see ~~Example 1~~ Figure 3)
- Test Requirements Matrix (see ~~Example 2~~ Figure 4)
- Test Sequence Logic Diagram of project work activities/test sequencing to show the integration of testing (see ~~Example 3~~ Figure 5).

**ATTACHMENT B – ITEMS TO CONSIDER FOR TEST PLANS AND TESTS**

NOTE: This checklist is intended as a guide and is not an exhaustive list of everything that should be considered.

- Desired results
- Parameters to be measured and precision required
- Expected range of results and acceptance criteria (i.e., ensure that minimum expected values are included to allow zero values due to instrument, equipment, and test problems to be highlighted and investigated prior to proceeding with the test)
- Method of data collection (e.g., manual, electronic, strip chart, logbook, and photographic, ~~or?~~)
- Software validation and verification
- Hold points requiring evaluation or verification
- Test abort criteria and test restart criteria
- Independent witness, verification of readings, or results
- Potential test failure modes and affects
- Potential hazards:
  - Industrial
  - Radiological
  - Chemical
  - Criticality
  - Fire
  - Environmental
- Effect of environmental conditions on test
- Environmental permits
- Authorization Basis (Unreviewed Safety Question)
- Instrument uncertainty and accuracy
- Operating Specification Limits and any required deviations or revisions
- Special equipment required, including spare parts
- Test equipment required and calibration
- Availability of vendor manuals for operation, maintenance, and troubleshooting equipment
- Allowable maintenance and troubleshooting during test
- Disposal of special test equipment, or material
- How to confirm proper function of all existing equipment affected by modification, repair, or replacement
- Sequence of test steps
- Prerequisite lineups of mechanical, electrical, and instrumentation systems (e.g., valves, breakers, transmitters, and sensing lines)
- Control of interfaces of system being tested with other plant systems, such as:
  - Electrical
  - Water
  - Sewer
  - Compressed air
  - Instrumentation
  - Alarm

**ATTACHMENT B – ITEMS TO CONSIDER FOR TEST PLANS AND TESTS (cont.)**

- Post-test lineups of mechanical, electrical, and instrumentation systems (e.g., valves, breakers, transmitters, and sensing lines)
- Personnel required to conduct test
- Support personnel required for test
- Training of personnel
- Incorporate lessons learned, as appropriate, from previous designs and test plans.