**DOE STANDARD
(FOR TRIAL USE)**

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**WRITER'S GUIDE FOR
TECHNICAL PROCEDURES**

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MASTER

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DOE
WRITER'S GUIDE FOR
TECHNICAL PROCEDURES
(FOR TRIAL USE)

NOTE: This Writer's Guide for Technical Procedures was compiled with the assistance of personnel responsible for writing procedures at many DOE facilities. Publication of this Draft Standard for interim use and comment has been approved by the Director, Office of Nuclear Safety Policy and Standards. Distribution of this Draft Standard for comment shall not continue beyond(18) months from the date of publication. It is expected that following this (18) month period, this draft standard, revised as necessary, will be submitted to the Department of Energy for approval as a DOE Standard. Suggestions for revision should be directed to Dr. Robert M. Waters, Operation and Analysis Division (NE-73), Office of Nuclear Safety Policy and Standards, Department of Energy, Washington, D. C. 20585 (301-353-5755 or FTS 233-5755).

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REVISION LOG

Revision Number	Date Approved	Pages Affected	Description of Revision
0		All	Initial Issue

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1.0 INTRODUCTION

A primary objective throughout the Department of Energy (DOE) complex is that operations be conducted in a deliberate and controlled manner with emphasis upon recognition and maintenance of the facility-specific safety envelope. One critical element of maintaining the safety envelope is procedures.

DOE is providing guidance through this and other writer's guides to assist procedure writers across the DOE complex in producing accurate, complete, and usable procedures that promote safe and efficient operations in keeping with such DOE Orders as 5480.19, "Conduct of Operations for DOE Facilities", 5480.5, "Safety of Nuclear Facilities", and 5480.6, "Safety of Department of Energy-Owned Nuclear Reactors". This Writer's Guide addresses the content, format, and style of technical procedures (procedures that prescribe production, operation of equipment and facilities, and maintenance activities) and is intended to be applied in a manner appropriate to the individual facility.

For procedures to assist the user in successfully accomplishing the objective, the correct actions to be performed must be presented clearly, concisely and in the proper sequence. Implementing the techniques presented in this Writer's Guide will result in development of technical procedures that present a process for accomplishing the objective. Within a procedure, the process is divided into specific activities. Each activity is composed of one or more tasks. Each task is divided into individual actions. These actions describe what steps to take and how to complete the process, thereby accomplishing the objective.

The two major, and equally important, activities associated with the development of technical procedures are the (a) preliminary activities to gather the pertinent administrative and technical basis information, scope the procedure and plan the development and (b) writing and formatting of the procedure.

There are a number of key questions that must be addressed during procedure development to ensure the procedure is correct, complete, and usable. Among the questions that must be asked, and that this Guide affords a method for answering, are the following:

- A. What technical and administrative requirements are to be met?
- B. Who is the user, and what is the user's level of experience and training?

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1.0 INTRODUCTION, Cont.

- C.** How does this document relate to other procedures for this equipment and facility?
- D.** What materials, equipment and facilities are to be used?
- E.** What tasks are to be accomplished?
- F.** Why and when are the tasks to be accomplished?
- G.** Where and how are the tasks to be accomplished?

1.1 Organization of this Guide

Following the front matter contained in Section 1.0, the body of the material in this Guide is presented in three parts:

- A.** The first part, Section 2.0, provides information regarding preliminary steps in procedure development, specifically establishing the technical basis for the content of the procedure.
- B.** The second part, Section 3.0, addresses procedure content and format. This section discusses what will be included in technical procedures and how that content is to be presented to the user.
- C.** The third part, Section 4.0, deals with writing and structuring of action steps. Also included are appendixes, worksheets, a glossary, a list of acronyms and abbreviations, and a verb list.

1.2 Purpose

This Writer's Guide establishes the recommended process for developing technical procedures that are accurate, complete, clear and consistent. It provides guidance for the following:

- A.** Developing a technical basis for the procedure.
- B.** Planning, organizing, and structuring of the procedure.

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1.2 Purpose, Cont.

- C.** Content and formatting of the procedure.
- D.** Writing action steps.

The examples in this Guide cannot cover every situation. The techniques presented should be implemented with consideration of the specific situation.

1.3 Scope

This Guide is to be used by all involved in the development and writing of technical procedures: writers, reviewers, administrators, subject matter experts, support personnel, and users.

This Guide is specifically for use in the development of technical procedures that direct production, operation of equipment and facilities, and maintenance activities. Technical procedures include:

- A.** Normal Operating Procedures (NOPs).
- B.** Planned Non-Routine Operations Procedures (Off-Normal Operating).
- C.** Surveillance and Test Procedures.
- D.** Maintenance Procedures.

Pending issuance of the Writer's Guide for administrative, emergency operating, or other non-technical procedure types, the techniques presented in this Guide should be selectively applied as guidance for these procedure types.

1.4 Involvement of Operational Organizations in Procedure Development

Procedures are documents for the operators of the facility, and conversely, said operators are a significant source of information for development of procedures. The process of developing procedures needs involvement by the operational organization and its personnel from the initial decision to write a procedure through the review process, verification, and validation of the procedure.

One of the major sources of data developed before the actual procedure writing starts is from operating experience. Operational organizations are the source of this information, whether conveyed in written or verbal form. For all procedures, the appropriate operational organization should be a source of data on how a job is actually performed as contrasted to how a procedure describes the job. Facility operators are invaluable source of information during development of the technical basis; this includes their involvement during walkthroughs and walkdowns, identification of behavioral obstacles and cautions, and in identification of non-standard, but valuable, source documentation beyond the normal Safety Analysis Report (SAR), Probabilistic Risk Assessment (PRA), Technical Safety Requirements (TSR), vendors manuals or old procedures. During procedure writing and review of the procedure, operators contribute their years of experience in providing insight into the job to be performed.

2.0 ESTABLISHING THE TECHNICAL BASIS FOR PROCEDURES

This section discusses planning and preliminary activities needed in the procedure development process. In particular, an approach to establishing a technical basis for procedures is described.

It is important that procedures maintain the safety envelope of the facility. The safety envelope can be thought of as a package of interrelated elements that are the minimum bases required to ensure safe operation of a facility. The elements of the safety envelope are the facility design bases, design verification and functional test results, safety analysis, operating limits and surveillance requirements, and operating and maintenance procedures. The procedures must be based upon the same technical information, operational data, and analyses that were used in establishing the safety envelope. The procedure writer must therefore identify, assemble and document the technical basis for the procedure.

The process of establishing the technical basis involves activities to research and plan the content of a technical procedure. The technical and administrative basis of a procedure must be defined before the actual writing can begin. The extent of the research and planning depends on the complexity of the process and whether the procedure is new or is being revised.

The technical basis documentation is the compilation of the results of the activities preliminary to writing the procedure. If a procedure is being replaced, the old procedure will also be included in the technical basis documentation. Appendix A contains suggested worksheets to facilitate documentation of research and planning activities; they may be used to develop facility worksheets.

The technical basis will be used for the following activities, as applicable:

- A. Writing the procedure.
- B. Simplifying the review process.
- C. Developing later revisions.
- D. Resolving audit findings.
- E. Providing useful fault analysis information.

2.0 ESTABLISHING THE TECHNICAL BASIS FOR PROCEDURES, Cont.

Four basic steps are involved in assembling the technical basis information. First, determine the procedure requirements, such as safety limits. Second, determine the facility configuration and pertinent design considerations. Third, determine the conditions under which the procedure will be performed. And fourth, conduct an analysis of the process logic.

2.1 Research and Planning Process

Procedures are written for, and used for, all work that could result in abnormal facility conditions, degraded equipment reliability, or personnel or equipment hazards. For nonsafety-related work, the complexity of the work or activity is also a good indicator of the need for a procedure.

- [1] Identify the type of procedure to be written.
- [2] Plan the research process.
- [3] Record the research and planning process to document the technical basis of the procedure. (Be sure to record the methods, calculations, and user feedback obtained during the development process that might not exist elsewhere.)
- [4] Identify the appropriate operations organizations and plan for their personnel to assist with procedure development.

It is critical that operations personnel be involved in the development process. Technical basis documentation areas, such as technical processes, conditions of performance, process analysis and user feedback, are greatly enhanced by the participation of operations personnel.

2.2 Procedure Requirements

Before the actual writing process can begin, the writer has to understand the technical and administrative basis for the procedure. Completion of the following steps will provide that understanding. The worksheets in Appendix A may be used to record information.

- [1] Research the regulatory and administrative requirements affecting the procedure. This research includes assembling and reviewing documents containing direct requirements and commitments that apply to the procedure.

2.2 Procedure Requirements, Cont.

[2] Determine the technical requirements that apply to the procedure. This research may require examining any or all of the following:

- A. DOE Rules, Orders, and Standards.
- B. Safety Analysis Report (SAR) and Technical Safety Requirements (TSR; formerly Technical Specifications or Operational Safety Requirements).
- C. Approved vendor information.
- D. Other procedures that describe similar functions, including procedures from outside organizations, if necessary.
- E. Technical literature such as textbooks.
- F. Engineering documents, such as engineering drawings or analysis reports.
- G. Records of the basis for and development of methods and calculations.
- H. Analyses of the process.
- I. User feedback reports.
- J. Event reports, root cause analyses, and lessons-learned documents relevant to the procedure.
- K. Results of design verification, qualification test and functional tests.
- L. Other information relevant to procedure requirements, such as letters of commitment, contracts and other documents that should also be reviewed and incorporated into the technical basis.

[3] Document the information obtained in determining the procedure requirements. This may include listing procedures used or referred to in the research process (the worksheets in Appendix A provide a sample of how the information might be documented.)

2.3 Facility Configuration and Conditions of Performance**2.3.1 Facility Configuration**

In order to ensure the technical adequacy and accuracy of the process and equipment information to be contained in the procedure, it is necessary to perform a detailed check (walkthrough).

- [1] Study Technical Safety Requirements, the SAR, or other documents to understand the process. Refer to appropriate drawings before and during the walkthrough(s).
- [2] Perform an appropriate assessment of each section (using walkdowns, simulations, modeling, or desk-top reviews) to note:
 - A. Configuration of equipment.
 - B. Nameplate information.
 - C. Environmental or location factors that may influence performance of the procedure or increase the safety risk to the user, such as radiation or chemical hazards, equipment locations requiring ladders, special lighting, scaffolding, or rigging.
- [3] Observe the performance (or a simulation of the performance) of the activity and similar activities, if practical. Observing such a performance provides information regarding the sequence of activities and the techniques for successful and expeditious performance that might not be apparent by merely reading the existing procedure.
- [4] Research potential hazards and problems in performing the activities.
 - A. Interview procedure users familiar with similar activities.
 - B. Learn about past problems with the existing procedure(s) used in performing the activities.
 - C. Obtain suggestions on methods for improvement from those involved in performing the process and from training personnel.

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2.3.1 Facility Configuration, Cont.

D. Review procedure usage histories or other documentation that indicates previous performance (for example, maintenance histories for maintenance procedures).

- [5] Determine the frequency of usage.
- [6] Consider the consequences of improper performance of the procedure.
- [7] Identify the administrative processes that affect the procedure process. Administrative processes include required verifications, inspections, and notifications. Avoid generic administrative information. Be specific. For example, "Observe all safety rules" or "refer to the facility's safety manual section xxxx" does not add any specific work instructions, and may result in the procedure user not researching to determine the specific instructions.

2.3.2 Conditions of Performance

Once you have completed the research and planning process and determined the procedure requirements, and the facility configuration, it is time to understand the conditions of performance and to perform a process analysis of the activities that make up the process. A process analysis looks at the requirements of the activity and identifies what functions must be accomplished to meet the process objectives. In performing this analysis, consider the rationale behind the activities, their frequency and complexity, the consequences of an error, and the relationship of training to the performance of the activities. The actions that make up the activities become the performance sections of the procedure. The process analysis and the development of the process and activities (Section 2.4) are performed simultaneously and interactively.

- [1] Determine the following, as applicable:
 - A. The principal users of the procedure and other participants in the process, including support functions such as health physics and laboratory services.
 - B. The existing user experience and training, and any additional training needed by the principal users of the procedure will determine the level of detail to be included in the procedure.

2.3.2 Conditions of Performance, Cont.

- C. The level of detail to be used in writing the procedure based on user training and qualifications. Section 3.1.1 of this Guide discusses level of detail.
- [2] Obtain and review any available process information, such as task analyses.
- [3] Obtain and review a similar procedure to help establish the appropriate level of detail.

2.3.3 Process Vulnerability Analysis

A process vulnerability analysis (PVA) identifies and helps mitigate the potential for abnormal events by making procedures sensitive to any aspects of the process that could cause errors. The PVA is necessary for determining the warnings and precautions to be included in technical procedures, and should be documented as part of the technical basis.

A PVA is a straightforward analysis technique that segregates and reviews each process activity or component for possible abnormal conditions or failures. The results of a PVA will identify design defects and assist the procedure developer in providing warnings and cautions at appropriate places within the procedure. Providing the appropriate cautions and warnings will help the procedure user to recognize and prevent mishaps, or to mitigate the effects if any occur.

2.4 Develop the Process and Activities

A procedure provides a process (method) to accomplish a specific objective. In this subsection the process is defined. The definition is based upon the information gathered in the process analysis described in the previous section. Define the activities that make up the process. Then organize them into related sections. These pieces will later become the subsections and steps within the procedure.

2.4 Develop the Process and Activities, Cont.**[1] Identify each activity within each process.****[a] Assess the technical requirements to accomplish the activity, such as:**

1. System/Component configuration.
2. Interfaces with other procedures and with other organizations.
3. Limitations.
4. Potential hazards and problems.
5. Expected system responses.

[b] Assess applicable administrative requirements such as verifications, inspections, and notifications (a form such as the Program Support Requirements Worksheet shown in Appendix A may be used for recording the requirements that pertain to each activity, as applicable).**[2] Sequence the identified activities in their order of performance. Outlines, tables, and flowcharts are useful for viewing the sequence and hierarchy of the activities required to complete the process.****[3] Review the identified activities and combine common activities. Activities can be combined as long as they do not increase the complexity of the procedure and the correct sequence of actions is not interrupted.****[4] Develop a clear, concise statement of purpose for performing the procedure.****[5] List other documents, forms, and definitions of important terms that will be used to support the procedure being developed.****[6] Develop procedure headings, as applicable (see Section 3.2, "Procedure Organization).****[7] Identify the portions of the process to be addressed in each of the procedure sections listed below.**

- A. Prerequisite Actions.
- B. Performance Sections.
- C. Post Performance Activity.

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2.4 Develop the Process and Activities, Cont.

- [8] Include activities that respond to limitations and potentially hazardous conditions.

2.5 Assemble the Results of the Research into the Technical Basis

This section provides guidelines in compiling the results of the prior activities into formal technical basis documentation for the procedure. Include all research results in the documentation.

- [1] Assemble the research documents in a logical fashion which will be easy to access by reviewers and procedure writers. Documentation may include appropriate listings of documents, copies of resource material, datasheets, check lists or worksheets, as appropriate. (Example worksheets are provided in Appendix A.)
- [2] Attach records of the research that were not included on the worksheets that support the technical basis, such as observations, literature searches, methods development, and calculations.
- [3] Complete the technical basis documentation by placing Purpose and Scope statements in front of the worksheets.

EXAMPLE - Overview statement for a Technical Basis**1.1 Purpose**

This collection of information provides the technical basis for SP-EG-1-K, *GM Diesel Generator No Load Test*.

1.2 Scope

This technical basis includes documentation of the research used to evaluate the conditions and constraints relevant to performing SP-EG-1-K, *GM Diesel Generator No Load Test*.

2.6 Prepare a Revision History

NOTE *The revision history may be initiated at this point, but cannot be completed until the procedure is approved.*

The revision history provides a history of the procedure and specifies its effective date.

- [1] Include in the revision history of the technical procedure the following information:
- A. Revision level.
 - B. Effective date.
 - C. Affected pages.
 - D. Revision description.

EXAMPLE - Revision Description

Revision 2 was done to reflect the equipment changes made to the chilled water supply system.

- [2] Provide a specific statement of the reason for the revision. Generalizations such as "general revision" provide no meaningful information.

2.6 Prepare a Revision History, Cont.

- [3] List, for example, the procedure(s) that the new procedure replaces or requirements implemented.
- [4] If the number of the procedure changes, cite the old number in the revision history to afford appropriate history and cross referencing.
- [5] Add the approval date to the description of the revision for use in tracking biennial or other periodic reviews.
- [6] Include any temporary changes implemented since the last revision, as applicable.
- [7] Maintain and update the technical basis documentation to ensure that a complete history of the procedure is available each time the procedure is revised.

3.0 CONTENT AND FORMAT

3.1 General Content and Format Guidelines

Content is the technical subject matter that is included in a procedure. Format is the organization and arrangement of material in a procedure. This section discusses the content and organization of a procedure and defines the format of procedure pages, headers, and other procedure elements.

Different types of procedures may require different content. Table 3.1 specifies recommended content for various procedure types and identifies the associated section within this Writer's Guide that addresses that content. Additional guidance is provided through codes which indicate:

- S. Standard content. When content should be included in the procedure as a specific and standardized section.
- I. Information. When information should be included in the procedure but not necessarily as a specific section.
- N. Not included. When content should not typically be included in the procedure.
- C. Conditional. When an analysis of the specific situation and conditions will determine whether the content is included as a discrete section or not.

Certain procedure types not covered within the scope of this Writer's Guide are addressed by the matrix in Table 3.1. In these cases, these procedures are included for reference only. While sections within this Writer's Guide may apply to contents typical of these procedures, discretion should be exercised when applying the techniques.

3.1.1 Appropriate Level of Detail

Writing at the appropriate level of detail is the key to successful communication with the user of the procedure. Information not immediately applicable to completing the task at hand may distract from the designed purpose of the procedure. Therefore, do not include material that does not directly relate to completion of the task.

Table 3.1 Matrix of recommended content for various procedure types

Content	ONOP	NOP	Maint	Test/ Surv	ARP	ERP	Admin	Non- Routine Technical	EOP	This DOE Writers Guide Section
1. Title/Identifier	S	S	S	S	S	S	S	S	S	3.1.2, 3.1.3, 3.3.1
2. Revision status/effective date	S	S	S	S	S	S	S	S	S	3.3.2
3. Table of Contents	C	C	C	C	N	C	C	C	N	3.3.3
4. Purpose	S	S	S	S	I	S	S	S	I	3.4.A
5. Scope	S	S	S	S	I	S	S	S	I	3.4.B
6. Applicability	I	I	I	I	I	I	I	I	I	3.4.C
7. Source Requirements	S	S	S	S	N	S	S	S	N	3.4.D
8. Entry Conditions	N	N	N	N	S	N	N	N	S	N/A
9. Definitions/Acronyms	C	C	C	C	N	C	C	C	N	3.6.7, 4.1
10. Responsibilities	I	I	I	I	I	I	I	I	I	3.6.8
11. Precautions/Limitations	S	S	S	S	I	I	N	S	I	3.5
12. Prerequisite Actions	S	S	S	S	N	C	C	S	N	3.6
A. Planning & Coordination										3.6.2
B. Performance Documents										3.6.3
C. Special Tools, Equipment Parts and Supplies										3.6.4
D. Field Preparations										3.6.5
E. Approvals and Notifications										3.6.6
13. Acceptance Criteria	I	I	C	N	I	I	N	S	I	3.8.3
14. Performance Sections	S	S	S	S	S	S	S	S	S	3.7
15. Post Performance Activity	C	C	C	S	C	I	I	C	C	3.8
16. Records	N	N	N	N	N	S	S	S	N	3.9
17. Appendix	C	C	C	C	C	C	C	C	C	3.10.1
18. Attachment	C	C	C	C	C	C	C	C	C	3.10.2

S In procedure as standardized section/location.

I Information included in procedure.

N Not included in procedure.

C Conditional and can be included as S or I.

ONOP--Off-Normal Operating Procedure

NOP--Normal Operating Procedure

Maint--Maintenance Procedure

Test/Surv--Test on Surveillance Procedure

ARP--Alarm Response Procedure

ERP--Emergency Response Procedure

Admin--Administrative Procedure

Non-Routine--Non-Routine Technical Procedure

EOP--Emergency Operating Procedure

3.1.1 Appropriate Level of Detail, Cont.

- [1] Write procedures to a level of detail consistent with the qualifications and training of the expected users. Job task analyses and training records provide information concerning the qualifications of the users and are useful in assessing level of detail requirements.
- [2] Provide a level of detail that takes into account the following variables:
 - A. Qualification level of the user. As qualification level increases, level of detail can decrease on tasks that are simple or are frequently performed.
 - B. Complexity of the task. As task complexity increases, level of detail can increase.
 - C. Frequency of task performance. As task frequency increases, the level of detail can decrease.
 - D. Degree of standardization desired. Level of detail varies directly with the degree of standardization desired. The more standardized the performance, the more detailed the procedure.
- [3] Determine whether the amount and kind of information provided are adequate for intended users. The following questions may help determine the adequacy of the amount and kind of information:
 - A. Can the procedure be performed in the sequence it is written?
 - B. Can the user locate and identify all equipment referred to in the procedure?
 - C. Can the user explain in detail how to perform general instructions?
 - D. Can the user perform the procedure without obtaining additional information from persons or procedures not specified by the procedure?
 - E. Can the user perform the procedure without obtaining direct assistance from persons not specified by the procedure?

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3.1.1 Appropriate Level of Detail, Cont.

- [4] Ensure that the decision making required in the procedure is consistent with the user's qualifications and level of authority. This approach permits tasks to be performed with minimum supervision.
- [5] Exclude information that is useful only to reviewers or other persons not involved in the actual performance of the procedure actions.

3.1.2 Page Headers and Page Numbering

Each page of the procedure should include a main page header formatted to fit at the top of the page and designed to clearly distinguish a specific identity for each procedure. The identity of a procedure should include a unique number and the applicability (building or system).

- [1] Place the page header at the top of every procedure page. The header used in this guide is an example of an acceptable header.
- [2] Ensure margins are adequate on all sides, so that information is not lost during duplication. Surrounding the text area with a box, as illustrated in this Guide, is a recommended method to ensure information is not lost.
- [3] Include in the front page header the information listed below.
 - A. Procedure title.
 - B. Procedure number.
 - C. Revision number.
 - D. Revision date.
- [4] Include on successive pages sufficient information to identify the procedure to which the page belongs (for example, procedure number and revision).
- [5] Number pages consecutively. Begin with the coversheet (which counts as page 1) and continue to the end.

3.1.2 Page Headers and Page Numbering, Cont.

- [6] Establish the location of the page number and consistently maintain the location for all procedures. Designate the page number as "Page __ of __", (for example, "Page 5 of 23"). Label appendix and attachment pages in the main page header with the parent procedure revision number and revision date.
- [7] Maintain the page numbering sequence and use an internal appendix page number as shown in the following example.

EXAMPLE - Internal page numbering for an appendix

Bldg 640	CHILLED WATER SYSTEM	SP-CHW-1-640 Rev. 0 June 3, 1990 Page 14 of 19
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- [8] Ensure the header information clearly communicates the specific use and applicability of the procedure; the number, in conjunction with the title, must state the unit (building or facility) to which the procedure relates.

3.1.3 Procedure Title

- [1] Make the title of the procedure should be concise, clear, and descriptive of the system, equipment, process or activity.
- [2] Make the procedure title short and descriptive enough to permit the user to easily identify the procedure and activity to which the procedure applies.
- [3] Each procedure title should be unique in order to assist the user in identifying the correct procedure.

EXAMPLE - Procedure title

DISASSEMBLING AND BUNDLING MARK 16B FUEL ASSEMBLIES

3.1.4 Headings

Headings break the text of the procedure into sections by grouping related steps. Section headings help users locate information in the procedure, break up long series of actions into manageable chunks, and track their progress through the procedure, especially when branching to other sections.

- [1] Give each major activity in the main body of the procedure a unique and descriptive heading.
- [2] Identify first-, second-, and third-level headings by a decimal numbering system. These headings are typically used to organize the material in the procedure.
- [3] Limit the number of heading levels to three, for example, 1.0, 1.1, and 1.1.1. Excessive levels result in complex section numbers.
- [4] Begin first-, second-, and third-level headings at the left margin of the text block.
- [5] Identify first-level headings with all capitals and bold.
- [6] Identify second- and third-level headings with initial letters of important words capitalized and bold.
- [7] If second-level headings organize activities, start the headings with the "ing" form of action verbs and complete the headings with the objects of the action verbs, for example, **Starting Cooling Water Pumps**.
- [8] If the third-level headings under a second-level heading are being used to organize action steps, start the headings with action verbs and complete the headings with the objects of the action verbs, for example, **Start the Cooling Water Pump**.
- [9] Otherwise, use topics for second and third level headings. For example, **Cooling Water Pumps**.
- [10] Use a list to organize material other than action steps under headings and steps.
- [11] Designate listed items with indented upper-case letters.

3.1.4 Headings, Cont.

EXAMPLE - Headings

1.0 FIRST-LEVEL HEADING

1.1 Second-Level Heading

1.1.1 Third-Level Heading

A. Listed item

[11] If it is necessary to continue a section on subsequent pages, repeat the heading on subsequent pages, with an indication that the page is a continuation.

EXAMPLE - Section heading and indication of section continuation

3.3 Special Tools and Equipment, Parts and Supplies, Cont.

3.1.5 Step Numbering

Action steps are the mechanism for reducing a task or activity to a discrete set of instructions.

- [1] Make action steps readily distinguishable by the user.
- [2] Limit the number of step levels to two.
- [3] Identify first-level action steps with bold typeface bracketed numbers.
- [4] Identify second-level action steps with bold typeface bracketed lower-case letters.

3.1.5 Step Numbering, Cont.

EXAMPLE - First-level action step with two second-level steps

[3] Prepare compressed gas cylinders.

[a] Select compressed gas cylinders with current inservice dated gas certification.

[b] Verify that each cylinder regulator will maintain 35 psig (30 to 40).

3.2 Procedure Organization

A technical procedure is presented in a useful and structured way and organized to provide the procedure user with all the needed information to accomplish a given activity.

A technical procedure includes the following elements:

- A. Coversheet
- B. Revision Status
- C. Table of Contents
- D. Introduction
- E. Source Requirements
- F. Precautions and Limitations
- G. Prerequisite Actions
- H. Acceptance Criteria
- I. Performance Sections
- J. Post Performance Activity Section
- K. Appendixes and Attachments.

3.2 Procedure Organization, Cont.

It should be noted that not all procedures will require information from each of these elements, as denoted in Table 3.1. For example, not every procedure will need an appendix or an attachment. However, technical procedures must always address information for the above elements. If the procedure does not need an element, then do not include the element. The contents and format for each of these procedure elements are discussed in the following sections of this guide.

3.3 Content Guidelines For Specific Sections

3.3.1 Coversheet

The purpose of the cover sheet is to provide a means for the user to verify that the procedure is appropriate for the task at hand.

- [1] Provide a simple descriptive title that identifies the system, equipment, process, or activity described in the procedure.
- [2] Include other information, as needed, to differentiate the procedure from other procedures. Examples are specific conditions or activities that the procedure controls. (An example format for a coversheet appears on the following page.)

3.3.2 Revision Status

It is essential that users follow the most current version of the procedure. Document control systems typically ensure the most recent versions are available; ensure the latest revision is used by including the revision number on each page of the procedure.

Draw the user's attention to changes (additions, corrections, or deletions) made in the procedure. A clear, simple means of marking these changes is required. A suggested method is to mark the changes with vertical lines in the margin. Only the marks for the most recent revision should appear in the revision; marks from previous revisions should be removed.

3.3.3 Table of Contents

A table of contents helps in locating the portions of the procedure that a user needs for a specific operation, and is especially useful for referencing appendixes and attachments. A table of contents is recommended.

EXAMPLE - Sample coversheet

Sampling Chilled Water System

During Operations

Procedure # 10

Revision # 9

Effective 6/26/91

Page 1 of 35

Building XYZ

Performance Section

- 4.1 ISOLATING SAMPLE PIPING
- 4.2 VERIFYING SYSTEM HAS BEEN DEPRESSURIZED
- 4.3 INSTALLING TEST FITTING
- 4.4 DRAWING SAMPLE
- 4.5 RESTORING SYSTEM TO NORMAL CONFIGURATION

Nuclear Facility XYZ

Approved: _____ Manager

Draft

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3.3.3 Table of Contents, Cont.

- [1] List the procedure section and subsection headings, and the titles of appendixes and attachments exactly as they appear in the procedure.

The listing of third-level subsection headings in the table of contents is optional and is determined by the length and complexity of the procedure.

- [2] Identify at the right margin (that is, right justify) the number of the first page on which the heading or title appears.
- [3] Format the table of contents consistently (an example format for a Table of Contents follows).

3.3.3 Table of Contents, Cont.

EXAMPLE - Table of contents, showing layout and format

CONTENTS

Table of Contents	3
1.0 INTRODUCTION	5
1.1 Purpose	5
1.2 Scope	5
1.3 Applicability	6
1.4 Source Requirements	7
2.0 PRECAUTIONS AND LIMITATIONS	8
3.0 PREREQUISITE ACTIONS	9
3.1 Planning and Coordination	10
3.2 Performance Documents	10
3.3 Special Tools and Equipment, Parts and Supplies	10
3.4 Field Preparations	10
3.5 Approvals and Notifications	12
4.0 ACCEPTANCE CRITERIA	13
5.0 TURNING GEAR OPERATION	14
6.0 TURBINE EHC PANEL PRESTART STATUS	27
7.0 TURBINE WARMING OPERATIONS	35
8.0 TURBINE STARTUP	51
9.0 POST PERFORMANCE ACTIVITY	62
Appendix A Data Package Review Sheet	67
Attachment 1 Valve Checklist	71

3.4 Introduction

The Introduction section should address the following elements (consistent with Table 3.1):

- A. Purpose. Provide a clear description of the goal to be achieved by performing the procedure. Avoid purpose statements that repeat the procedure title and headings of the table of contents.

EXAMPLE - A typical purpose statement

1.1 Purpose

This procedure provides the detailed steps for performing normal maintenance of the cooling water bypass check valves CW-1 and CW-2.

- B. Scope. Describe the extent of the activities presented in the procedure, including those that fulfill the purpose of the procedure, those that meet applicable requirements, and the facility conditions in which the procedure may be used. The scope may also address the limitations of the procedure if necessary (for example, what the procedure does not cover).
- C. Applicability. Specify the conditions that require procedure use. In a surveillance test procedure, for example, the applicability statement might simply be that the test has been requested by a manager.
- D. Source Requirements. Source requirements are identified in the procedure to alert anyone who is making an expedited procedure change of the source requirements that are being implemented by the procedure.

D. Source Requirements, Cont.

- [1] List the DOE Rules and Orders, Technical Safety Requirements, Safety Analysis Reports, and other requirements and commitments directly implemented by the procedure, for example, industry codes and standards. These requirements were identified when the technical basis for the procedure was established.
- [2] Do not include broad, programmatic-type documents unless there is a specific purpose for the reference.
- [3] Identify the specific locations within the source requirements documents of the requirements that are implemented by the procedure.
- [4] Ensure that the authorized versions of the source requirement documents are listed. For example, the codes and standards in effect when the facility was designed, not the most recent versions, normally apply unless a modification, commitment, or technical safety requirement change invokes a more current version.
- [5] Do not include documents listed as performance documents.
- [6] If there is more than one type of source requirement document, then use subheadings to list the various types of source requirement documents, such as:
 - A. DOE Rules and Orders
 - B. Technical Safety Requirements and Safety Analysis Reports
 - C. Industry Codes and Standards

3.4 Introduction, Cont.

EXAMPLE - Scope for a technical procedure, presented in outline form

1.2 Scope

1.2.1 Operability Tests to be Performed

- A. Fuel level in the GM Diesel day tanks.
- B. Fuel level in the underground storage tanks.
- C. GM Diesel start capability.

1.2.2 Surveillance Requirements Fulfilled

Performance of this procedure completely satisfies Surveillance Requirements:

- A. 4.7.1.1
- B. 4.7.1.2

1.2.3 Facility Conditions

- A. Applicable - All.
- B. Performance - All.

3.5 Precautions and Limitations

Failure to include precautions and limitations within the procedure can result in severe injury to or the death of the procedure user and/or serious damage to equipment.

A specific section entitled "Precautions and Limitations" is provided to delineate precautions that affect the entire procedure or that occur at more than one point in the procedure. This section generally incorporates the following types of information.

3.5 Precautions and Limitations, Cont.

- [1] Write precautions and limitations to inform the user of hazardous conditions and their potential effects. Precautions alert procedure users to actions and conditions that represent potential hazards to personnel or possible damage to equipment, or that establish abnormal conditions. Limitations define boundaries that are not to be exceeded.

- [2] Do not present user actions in the Precautions and Limitations section.

- [3] Avoid generic precautions that are part of a job description or inherent in the task.

NOTE *Hazardous conditions that apply to individual steps are presented as warnings or cautions, and are placed just prior to and on the same page as the affected step. (See Section 4.10 for information on writing warnings and cautions.)*

- [4] Present hazardous conditions that exist during the entire procedure or occur at more than one point in the procedure.
- [5] If action is required by users to respond to the precaution or limitation, provide action steps at the appropriate location in the procedure, and use a conditional step to define the conditions under which the action is required. (See Section 4.0 for information on writing action steps.)
- [6] Address the following in the content of precautions and limitations, as appropriate.

A. The exposure of personnel or the environment to:

1. Radiation or contamination.
2. High temperature or high pressure fluids.
3. Hazardous substances.
4. Electrical shocks.
5. Excessive noise levels.
6. Confined space hazards.
7. Moving equipment or parts of equipment.
8. Fire hazards.

3.5 Precautions and Limitations, Cont.**B.** The protection of equipment and material from:

1. Inadvertent, incorrect, or omitted actions that may cause facility shutdown.
2. Inadvertent, incorrect, or omitted actions that may result in limiting conditions for operation as defined in the Technical Safety Requirements.
3. Limitations identified in approved vendor information.
4. Limitations identified in applicable design documents.
5. Unusual alarms affecting facility availability that may occur or are expected to occur as a result of the performance of the procedure.
6. Mechanical or electrical bypasses (lifted leads, inhibits, jumpers, and fuse removals) used in the performance of the procedure.
7. Electrical and mechanical interlocks involved in the performance of the procedure.
8. Actions that will result in emergency response or automatic incident response.
9. Undesirable consequences of violating each precaution or limitation statement.

EXAMPLE - Typical precaution and limitation statements

3.0 PRECAUTIONS AND LIMITATIONS

- 3.1 Vapor pressure thermometer capillary tubing can be damaged if rolled up less than eight inches in diameter.
- 3.2 The instrument terminals may carry hazardous electrical currents. You may receive severe or fatal electric shock if you touch these terminals without protection.

EXAMPLE - Limitation statement

3.0 PRECAUTIONS AND LIMITATIONS

- 3.1 The unavailability of the standby motor generator during power operations may exceed a limiting condition of operation (3.7.1.1).

3.6 Writing Prerequisite Actions

This section identifies the preparatory actions to be completed by the user, and the requirements to be met and signed off before the user proceeds with the remaining sections of the procedure.

3.6.1 General

- [1] Include the following subsections in the prerequisite actions section, as applicable:
 - A. Planning and Coordination.
 - B. Performance Documents.
 - C. Special Tools and Equipment, Parts, and Supplies.
 - D. Field Preparations.
 - E. Approvals and Notifications.
- [2] Vary the sequence of subsections as appropriate to the procedure. For example, some approvals and notifications may be needed before certain preliminary actions or field preparations may precede obtaining special tools, test equipment, parts, and supplies, depending on the activities to be performed and the location of required items.
- [3] Arrange steps in an order that ensures that all required permissions and notifications are obtained before any facility equipment is manipulated.
- [4] If the procedure is generic, include only those prerequisite actions that apply to all uses of the procedure in this section. Application-specific prerequisite actions, including data sheets, are contained in separate procedures. Administrative prerequisites for maintenance may be included in work-initiating procedures. For example, a generic procedure to change out a pump seal would include only those prerequisites applicable to the seal change out. The prerequisites for taking the specific pump out of service are contained within the specific pump procedure or work package.
- [5] Include provisions for recording data, sign-offs, and remarks discussed in the following subsections as needed.

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3.6.2 Planning and Coordination

This section provides information on activities that must be undertaken to plan and coordinate the execution of the procedure. These actions may include (but are not limited to) the following:

- [1] If training or qualifications specific to the procedure are required, list personnel requirements. For example, special training could be required for the job classification responsible to perform a given task.
- [2] Include instructions for a pre-job planning meeting with the participants, as appropriate. Such a meeting might cover coordination of activities at several locations, detailed measurements to be taken by several persons, or other aspects of performing a complex procedure.
- [3] Provide administrative requirements, such as the following statement to ensure the user has the latest revision: "Verify the procedure to be used is a copy of the current revision."
- [4] Provide steps to ensure needed information is obtained and recorded. These steps may involve:
 - A. Identifying the principal personnel involved (by functional responsibility) (for example, see Step 4.1 [9], or Section 4.9).
 - B. Recording the facility condition at the start and end of the procedures, and the date and time the procedure is started.
 - C. Justifying and identifying portions of the procedure that are used.
- [5] Address any special system conditions and hold orders required to perform the work.

3.6.3 Performance References

- [1] Direct the user to obtain all other documents that will be required to perform the procedure, such as drawings, approved vendor manuals, and other procedures that may be referenced in the base procedure. Listing these references in the Prerequisite Actions subsection ensures that the documents are available at the job site when needed.

3.6.4 Special Tools and Equipment, Parts, and Supplies

NOTE *Lists may be more appropriately placed in an appendix than in this subsection.*

- [1] List special tools, measuring and test equipment, parts, and supplies. Careful attention to the completeness and correctness of this section is extremely important. For example, failure to specify a necessary item could result in costly equipment downtime, or using a substitute for a specialized tool could damage equipment. In some instances, it is convenient to provide some of this information in tables.
- [2] Identify certified or qualified parts and equipment needed for the activities.
- [3] Provide guidelines for selecting and assembling special tools, measuring and test equipment, parts, and supplies.
- [4] Provide separate steps for the various categories, such as parts, supplies, or measuring and test equipment.
- [5] Specify alternative tools and equipment, if applicable.

EXAMPLE - Table identifying required parts

- [3] Obtain the following parts:

Description	Part No.	THC No.	Qty.	Class
Gasket	3	XX-XX-XX	1	EQ
Piston	5	YY-YY-YY	1	EQ
Nut	6	ZZ-ZZ-ZZ	2	NA

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3.6.4 Special Tools and Equipment, Parts, and Supplies, Cont.

- [6] If specific equipment is necessary to perform a procedure, identify the equipment.
- [7] Avoid using the statement "or equivalent" when specifying equipment.
- [8] Do not specify ordinary craft tools, such as standard pliers and wrenches.
- [9] If the procedure has a generic application, do not include instrument-specific information such as serial number or calibration date. Such information is included in application-specific procedures.
- [10] Provide clear specifications for verifying the adequacy of test equipment. Specifications include ranges, accuracies, and compliance with calibration standards.
- [11] Ensure that range and accuracy of measuring equipment are consistent with the expected values to be measured.
- [12] Determine when it is required to record data concerning test equipment (for example, serial numbers or calibration dates). Provide space in the procedure or in an appendix to record the data before steps using the test equipment for critical measurements.
- [13] Specify verification and performance checks or special controls required before the equipment is used. Include the check in the body of the procedure rather than in the Prerequisite Actions section, if the performance check is to be performed just before use.

3.6.4 Special Tools and Equipment, Parts, and Supplies, Cont.**EXAMPLE** - Measuring and test equipment identification

- [3] Obtain two stopwatches (accuracy = ± 0.1 sec./hr.), and record the following information in Table 4-2.

TABLE 4-2

M&TE No.	Expiration Date	Performer Initials

3.6.5 Field Preparations

- [1] Provide instructions for preparatory field activities that are required to be complete before proceeding with the procedure. Examples of these activities are listed below.
- A. Requirements for lock-out/tag out of equipment.

EXAMPLE - Tagging

- [4] Verify that the GM Diesel unit to be inspected has been tagged out. _____

- B. Unlocking valves or rooms.
- C. Recording the as-found condition of the structure, system, or component.
- D. Verifying if systems and components are in use before removal from service (for example, redundant safety system or indicator lights).

3.6.5 Field Preparations, Cont.

- E.** Confirming the correct system or equipment configuration.
- F.** Establishing system or equipment alignment and power supply.
- G.** Identifying actions to cope with potential hazards, such as fire, radioactive spills, or exposure to radiation.
- H.** Installing portable communications equipment and preparing special test equipment.
- I.** Identifying needed support services, such as craft personnel to remove a relay cover.
- J.** Verifying availability of performance documents prior to proceeding with the procedure.
- K.** Providing specifications and tolerances that determine whether the results of the prerequisite steps are acceptable.
- L.** Obtaining required permits such as radiation work, electrical work, or confined space work and ensure. Ensure appropriate signoffs and approvals are obtained.

3.6.5 Field Preparations, Cont.**EXAMPLE - Field preparations**

[4]	Verify that the halon fire protection system is in service for each GM Diesel room.	_____
[5]	Ensure that communications are established between the Central Control Room Operator at the control panel and the local Reactor Building Operator.	_____
[6]	Ensure that the following tests have been completed on the GM Diesel to be tested:	
	A. SP-EG-100 series.	_____
	B. SP-EG-1.	_____

3.6.6 Approvals and Notifications

The Approvals and Notifications subsection identifies approvals and notifications that must occur before the actions in the procedure begin. Approvals and notifications related to specific steps in the procedure are placed adjacent to the affected step.

- [1] Provide instructions to ensure that all necessary approvals are obtained and that all required notifications are made before initiating the procedure. Approvals and notifications may involve responsible individuals, such as:
- A. Shift manager.
 - B. Central control room operator of the affected units.
 - C. Responsible system or equipment engineer.
 - D. Support, quality control, regulatory, and audit personnel.
 - E. Health physics and chemistry technicians.

3.6.6 Approvals and Notifications, Cont.**EXAMPLE - Approvals to start a test**

- [1] Obtain approvals from the following individuals prior to beginning the test.

Position	Signature	Date	Time
Shift Manager			
Central Control Room Operator			
Shift Technical Engineer			

- [2] If instructions to obtain permits before performing the activity are not included in a work package encompassing the procedure, provide instructions for obtaining the required permits. Examples are a radiation work permit or a confined space entry permit.
- [3] If there are requirements that notifications be made in the event of a delay, provide for such notifications.

3.6.6 Approvals and Notifications, Cont.

EXAMPLE - Notifications in case of delay

- [2] IF the test is delayed until a later shift,
THEN obtain approvals to begin or continue the test from the following individuals:

Position	Signature	Date	Time
Shift Manager			
Central Control Room Operator			
Shift Technical Engineer			

3.6.7 Terms, Definitions, Acronyms, and Abbreviations

Persons should be adequately trained and therefore familiar with the terms used in the procedure before using a technical procedure. Use of a separate section devoted to terms, definitions and acronyms is discouraged in technical procedures. Facility-specific glossaries of terms, definitions, acronyms, and abbreviations should be maintained to ensure consistent use of these elements, and consistent interpretation by the user. If the writer decides a term needs amplification in a specific procedure, this amplification should appear in a note preceding the affected action step, or be incorporated in the action step.

3.6.8 Responsibilities

In technical procedures, responsibilities are implicit in the action statements (see Section 4.0 of this guide for direction on writing action statements). Only steps that involve personnel in addition to the user need specify the person responsible for a specific action. Therefore, since the procedure is limited in number of users, no separate "Responsibilities" section is warranted.

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3.7 Writing the Performance Sections

The performance sections are the part of the procedure containing the action steps that prescribe the principal tasks and subtasks.

- [1] Divide the performance section into subsections that logically group related activities as established in the technical basis outline.
- [2] Title each of the subsections that specifically reflects the activity rather than a generic title (for example, "Install Pump Valves," rather than "Pump Valves").
- [3] Write the specific action steps within the performance section in accordance with Section 4.0 of the Guide.

3.8 Post Performance Activity

The Post Performance Activity section follows the performance sections, and is used to stipulate actions needed to close out the activity, such as the following.

3.8.1 Testing

- [1] If operability of equipment has been affected during the performance and has to be verified before returning the equipment to service, include steps that specify these tests.

3.8.2 Restoration

- [1] Provide action steps to specify and record the return of all affected structures, systems, or equipment to the desired configuration.
- [2] Include instructions for:
 - A. Required restoration adjustments, storage, or maintenance of laboratory and process equipment.
 - B. The return of tools and equipment.
 - C. The proper disposal or storage of consumables, such as test samples or chemicals not used in the process.

3.8.2 Restoration, Cont.

- [3] Provide space for recording the notification of appropriate personnel that the system has been returned to service.
- [4] Include provisions for close out of any permits (such as confined entry permit) that were required for the performance.
- [5] Provide for verification of appropriate restoration steps consistent with technical specifications.

3.8.3 Results

- [1] Provide instructions to summarize the results of the procedure, including:
 - A. Listings of facility conditions.
 - B. Date and time of test start and test completion.
 - C. Participants.
 - D. Reasons for the test.
- [2] Provide instructions to state whether:
 - A. Problems or delays were encountered.
 - B. Corrective action(s) were performed.
 - C. Authorization signatures were obtained.
- [3] Provide instructions to state whether acceptance criteria were satisfied, a nonconformance report was initiated, and/or a limited condition for operation was exceeded.

3.8.3 Results, Cont.

- [4] Provide a step to review the entire procedure for completion, and for review and approval of test results.

EXAMPLE - Acceptance criteria**ACCEPTANCE CRITERIA SATISFIED:**

	YES	NO	
As Found	_____	_____	
As Left	_____	_____	Verified By _____

ACCEPTANCE CRITERIA NOT SATISFIED:

	No	Number
Nonconformance Report initiated?		
Limiting condition for operation (LCO) exceeded?		

EXAMPLE - Review and approval of test results**REVIEW/APPROVAL OF TEST RESULTS:**

Title	Signature	Date

3.9 Records

Records generated or accepted are maintained to document the completion of the task performed by the procedure. The requirement and control of records is established in the associated administrative control procedure. Any post task analysis of the procedure requires that the conditions of performance and the personnel involved are clearly recorded so that if adverse consequences occur, lessons can be learned.

- [1] Identify the records generated as a result of the performance of this procedure in the performance section. Forms, data sheets, checklists, and documentation of as found conditions are examples.
- [2] Classify the records generated as either quality related or non-quality related and indicate the appropriate filing or transmittal of the records.
- [3] If no records are generated, state this in the procedure.

3.10 Appendixes and Attachments

Appendixes and attachments are not always required. They are written when the material and function of the procedure support a need for them. Appendixes are considered part of the procedure and pages are numbered to show they are a continuation of the main body of the procedures. In addition, both appendixes and attachments are numbered independently in order to ensure all pages are available if the appendix or attachment is detached from the main body of the procedure.

3.10.1 Appendixes

Appendixes are an integral part of the procedure. Examples of items that may be placed in an appendix are forms, tables, figures, graphs, and some checklists that are too large to incorporate in the sequence of action steps.

- [1] Reference appendixes within the text of the procedure.
- [2] Include in appendixes information more conveniently located outside the main body of a procedure.

The following example illustrates a suggested format for a valve alignment checklist.

3.10.1 Appendixes, Cont.**EXAMPLE - Valve alignment checklist**

SHIELD HX CW				SP-SHS-1-K Rev. 0 Page 19 of 23
APPENDIX D SHIELD SYSTEM HX COOLING WATER SUPPLY & VALVE ALIGNMENT CHECKLIST (Page 1 of 2)				
Component Noun Name	Description (Location)	Valve Number	Required Position	Initials
Bypass Supply to HX		CWS-V-272C	OPEN	— <u>IV</u>
Bypass effluent to HX		CWS-V-272D	OPEN	— <u>IV</u>
Flow pressure tap		CWS-V-1513	OPEN	—
Flow pressure tap		CWS-V-1514	OPEN	—

3.10.2 Attachments

Attachments are required for completion of their parent procedure but are used separately.

- [1] Include in attachments information that covers a specific subject or function.
- [2] Avoid using vendor information as attachments.
 - [a] Integrate approved vendor information into procedures, when possible, rather than referencing the information.
 - [b] Refer to administrative requirements for the processing and use of vendor information.

4.0 WRITING ACTION STEPS

The basic element of an action step is an imperative sentence: a command to perform a specific action. An action step answers the question "what is to be done?" Additional elements, such as cautions and condition statements, are used to increase the precision with which instructions can be communicated.

4.1 Writing Basic Action Steps

EXAMPLE - Basic Action Step

<u>Action Verb</u>	<u>Direct Object</u>	<u>Supportive Information</u>
Replace	the flat tire	with the spare tire.

NOTE *The words will, should, and must, which are often found in requirements, are not part of the structure of an action step. The command form of the verb is equivalent to "shall".*

- [1] Start the basic action step with a singular present tense action verb, such as open. Appendix D of this Guide includes a list of suggested action verbs.
- [2] Describe the direct object of the verb.
 - [a] Identify equipment precisely as it is in the facility.
 - [b] If the equipment is not labeled within the facility, then use equipment nomenclature precisely as it appears in the technical basis documentation.
 - [c] Avoid using acronyms and abbreviations when writing action steps, particularly for short, simple words and terms. If an acronym or abbreviation is used, it must (a) be easily understood by the users and (b) have a standardized and unique meaning for the users.
 - [d] Use only acronyms and abbreviations that are included in an approved, site-specific list.
- [3] Complete the basic action step with supportive information about the action verb and the direct object. Supportive information includes further description of the object and the recipient of the object. (Acceptance criteria, referencing, and

4.1 Writing Basic Action Steps, Cont.

branching are other types of supportive information that are described later in this section.)

- [4] Identify each action step and action sub-step with a special identifier (as established by Section 3.1.5) to distinguish the steps from each other and from topical headings and explanations.

EXAMPLE - First-level action step with two second-level steps

[3] Prepare compressed gas cylinders as follows:

- [a] Select compressed gas cylinders with current inservice dated gas certification. _____
- [b] Verify that each cylinder regulator will maintain 35 psig (30 to 40 psig). _____

- [5] Write action steps using words that are easily understandable by the users. Where a word is used that requires a definition, the definition of the word will be included as (a) part of that action step, or (b) as a note that immediately precedes the action step that uses the defined word.
- [6] Restructure the actions as needed to avoid using sub-sub-action steps. Break one section into two or more sections to simplify the step structure, if necessary.
- [7] Place three or more objects of the verb in a separate table or listing with appropriate checkoff boxes or sign-off blanks.
- [8] Consider combining multiple verbs with the same object in a single action statement.

EXAMPLE - Three action verbs combined in a single action statement

- [12] Sign, date, and transmit completed form to Records Management. _____

4.1 Writing Basic Action Steps, Cont.

- [9] If someone other than the primary procedure user is responsible for performing an action step, then identify the person to perform the task directly above the affected step.

EXAMPLE - Identification of performer of action step

NOTE *Before torquing, ensure QA inspector is present to observe.*

[2] Torque head bolts with torque wrench set at 90 foot-pounds. _____

**QA
Inspector**

[3] Verify that head bolts are torqued to 90-foot pounds. _____

- [10] Use emphasis techniques (for example, **bold**, *italics*, or underlining) to highlight important information, with the following constraints: (a) do not use all capital letters for blocks of text, (b) do not capitalize the first letter of any words unless they are formal, proper nouns in accordance with Standard American English usage or they are the first word of a sentence, and (c) avoid the overuse of multiple emphasis techniques.
- [11] Present numerical information in Arabic numbers (as opposed to Roman numerals).
- [12] Do not specify numbers at a greater precision than can be read from instrument(s).
- [13] Avoid requiring users to make conversions from one unit of measure to another whenever possible. Provide an aid for the user if conversions are required. Do not require mental calculations.
- [14] Use consistent vocabulary, syntax, and punctuation
- [a] Include articles (a, an, the) when referring to a general item; omit the article when referring to specific items. For example, "Open the door," versus "Open door DW-9."
 - [b] Use punctuation in accordance with Standard American English.

4.1 Writing Basic Action Steps

- [c] Present steps, including associated substeps and lists, with a minimum of interruption (for example, page breaks).
- [d] Follow standard grammatical principles.
- [e] Use words consistently within and among procedures.
- [f] Use short, simple words.
- [g] Avoid ambiguous or vague adverbs.

4.2 Conditional Action Steps

Conditional steps are used when a decision is based upon the occurrence of a condition or a combination of conditions. Conditional steps use the conditional terms IF, WHEN, THEN, AND, OR, or NOT to present required action(s) and condition(s). Other words (for example, except or but only if) should never be used to present conditional information.

- [1] If two conditions are required and both of these conditions must be met, then place the conditional term AND between the conditions. Begin a new line when presenting the second condition and begin a new line with THEN and the action.
- [2] If two conditions are involved and one or both of these conditions must be met before the action is taken, place the conditional term OR in underlined capital letters between the conditions. Begin a new line when presenting the second condition and begin a new line when presenting the action.
- [3] If two conditions are involved and only one of those conditions must be met before the action is taken, then use the format "IF a OR b, but not both,...."

4.2 Conditional Action Steps, Cont.

- [4] If three or more conditions are described, consider using a decision table or a listing format.

EXAMPLE - Use of a listing format for three or more conditions

[6] IF all of the following conditions exist,

A. Condition 1

B. Condition 2

C. Condition 3

THEN open CWS-HMOV-290, ECW pump discharge valve. _____

- [5] Avoid using AND and OR in the same conditional statement as the resulting logic can be ambiguous and difficult to understand.
- [6] Use only AND and OR to join conditions that include both a subject and an object. If two subjects apply to the same object (for example, "IF temperature and pressure are stable, ...") or one subject takes two objects (for example, "IF level is stable or falling, ...") use the conjunctions "and" or "or" rather than conditional terms.

EXAMPLE - Two conditions with one object

[5] WHEN cooling water pump and pump discharge pressure have stabilized,
THEN close CWS-V-3351-1 bypass isolation valve. _____

- [7] For a negative condition, use the conditional term NOT. Avoid using NOT if a single word can be used and the condition can be stated in a positive manner. For example, "IF the valve is open, ..." is preferable to "IF the valve is NOT closed,"

4.3 Nonsequential Action Steps

Users are to perform the steps in the order in which they are written unless specifically directed to do otherwise. In those instances when the objectives of the steps will be met regardless of the sequence in which the steps are performed, then:

- [1] Sequence the steps according to usability criteria, such as according to equipment or control board layout, to reduce opportunities for error.
- [2] Place a note before the sequence of steps identifying that the series of steps can be performed nonsequentially, as shown in the following example.

EXAMPLE - Note announcing nonsequential steps

NOTE	<i>The actions in Steps [1] through [7] may be performed in any order.</i>
-------------	--

- [3] Provide a checkoff box or sign-off line for every action in a series of nonsequential steps to ensure that steps are not omitted.

4.4 Equally Acceptable Alternative Action Steps

Equally acceptable alternative steps are used when there is good reason to believe that it would be beneficial for users to be provided with more than one option. It is important to ensure that only one of the alternatives is performed.

- [1] Present alternative actions as items in a list within a single step.
- [2] Use the word one in lower case underlined to introduce the list of alternatives (for example, "Perform one of the following actions.").
- [3] Provide a checkoff box for every action as a series of alternative action steps to ensure that steps are not omitted and that redundant actions are not performed.
- [4] Specify that only those steps actually performed be checked off by the user.

4.4 Equally Acceptable Alternative Action Steps, Cont.

EXAMPLE - Two equally acceptable steps

[1] Perform <u>one</u> of the following actions	Check action taken
- Open Switch S-7	_____
- Open Switch S-9	_____

4.5 Time-dependent Action Steps

Some steps contain actions that impose time requirements on the user. Such requirements may consist of the need to time the duration of actions or to complete actions within a specified period of time. Consider the following:

- [1] Place a note before the step or steps to be timed in order to alert the user.
- [2] Begin the step or steps with instructions for the user to record critical time information and provide the user with a place to record this information. Typically this information will be the time that "starts the clock," and the time by which some step or action must be completed.
- [3] Include guidance to identify the actions to take in the event that the time-dependent step cannot be performed within the specified time.

4.5 Time-dependent Action Steps, Cont.**EXAMPLE - Time-dependent steps**

NOTE *The following step initiates a time-limited sequence. Steps [2] through [5] are to be performed within 20 minutes.*

- [1] Determine the time by which step [2] is to be completed. _____
- [a] Record the time that step [2] is to be started. _____
- [b] Add 20 minutes. + 20 minutes
- [c] Record the time that the test is to completed. _____
Complete by
- [2] Place Incident Action switch to TEST. _____
- [3] Verify amber ALARM TEST light on the AIA graphic panel is LIT. _____
_____ IV
- [4] Place Incident Action switch to OFF. _____
- [5] Push RESET pushbutton on AIA logic tester. _____

4.5 Time-Dependent Action Steps, Cont.

NOTE *A note advising of time-dependent actions, and a place to record the time information, are not required when the time requirement is an inherent part of the step and misunderstanding is unlikely.*

EXAMPLE - Time-dependent step

NOTE *The following step initiates timed actions.*

- [1] Push Generator Start pushbutton, and verify that the Generator started within 12 seconds.

Time to Start

Initial

IV

4.6 Concurrent Action Steps

Concurrent steps contain actions that must be performed at the same time. For instance, parameters may have to be monitored or checked while the user accomplishes another action. In another case, two performers in different locations may have to execute actions simultaneously.

- [1] If concurrent steps are to be performed by one person, place those actions in one step that describes precisely the relationship between the steps.
- [2] If concurrent steps are intended to be performed by more than one person, place a note before the first of the concurrent steps, as appropriate, identifying:
 - A. Concurrent steps.
 - B. Personnel needed to perform each concurrent step when more than one person is involved.
 - C. Locations where the steps are performed.
 - D. Means of communication between locations.

4.6 Concurrent Action Steps, Cont.

EXAMPLE - Concurrent steps for one person

[1] Monitor shield system surge tank level, and
close the CWS-V-143 surge tank bypass level control valve |
|--|

4.7 Continuous Steps

Continuous steps are conditional steps where the conditions they describe must be monitored throughout a procedure or a portion of a procedure. For example, a user may need to monitor a gauge and take a specific action if the gauge, at any point during the procedure, indicates a reading above or below a specific level.

- [1] Place continuous steps in the procedure at the point at which they first apply, and then repeat the steps periodically, as appropriate, on the facing pages of the procedure or in the body of the procedure.
- [2] Format continuous steps as conditional steps and state the portion of the procedure during which they are applicable, as shown in the following example.

EXAMPLE - Continuous step

[7] <u>IF</u> at any time while performing Steps [5.9] through [5.17] condition X exists,
<u>THEN</u> take action Y. |
|---|

- [3] Notify the user when continuous steps are to be discontinued.

4.8 Repeated Steps

Repeated steps are simple action steps that must be performed more than once during the execution of a procedure.

- [1] If an action step must be repeated an indefinite number of times to achieve an objective, specify that the step is to be repeated until the expected results are achieved. Only a single signoff line is provided for this step regardless of the number of times the step is performed.

4.8 Repeated Steps, Cont.**EXAMPLE - Repeated Step**

[8] Vary input signal until switch SW-1-7 trips. _____

- [2] If it is important to know the number of times the sequence is repeated, provide placekeeping (see Section 4.13.1, "Placekeeping").
- [3] If an action must be performed repeatedly at timed intervals, place instructions in the procedure and provide suitable space to record the times that the step is performed.
- [4] If a step is to be performed periodically throughout a procedure or a portion of a procedure (but not at specific timed intervals), place reminders as steps in the body of the procedure.
- [5] If a large group of repetitive actions is required and becomes cumbersome, address the actions in steps that reference a table, a list, or an appendix (an example of a large group of repetitive actions is a series of valve alignments).
- [6] Notify the performer when repeated steps are to be discontinued.

4.9 Action Steps Containing Verifications, Checks, Notifications, and Data Recording

- [1] Provide appropriate space or tables for entering data (either in the procedure or in data sheets).
- [2] If the condition to be verified or checked is not found, provide the appropriate actions to take.
- [3] Include labeled lines in steps as necessary for users to record required information.

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4.9 Action Steps Containing Verifications, Checks, Notifications, and Data Recording, Cont.

EXAMPLE - Format for data recording of individual action step showing sign-off by initials

[10] Record cooling water flow to Shield System HX.

Req'd gpm

Actual gpm

- [4] Specify required independent verification and inspection steps (provisions for independent verification and inspection tend to increase as the consequences of performance error increase).
- [5] Include directions for notifications to other personnel as discrete action steps. Actions requiring notifications of others often include, as applicable:
 - A. System alignments to be performed.
 - B. Systems to be removed from or returned to service.
 - C. Alarms and alarm setpoints that may annunciate as a result of performing the procedure.
 - D. Equipment actuations that are expected to occur during performance of the procedure.
 - E. Electrical and mechanical interlocks involved and those to be honored or overridden.
 - F. The effects of precautions and limitations on the operating conditions, noting which equipment will be inoperative, and which lights, alarms, or annunciators will react.
 - G. Changes or special conditions established by the procedure that could affect or appear to affect other equipment or systems. For example, the performance could involve mechanical or electrical bypass (lifted leads, inhibits, jumpers, and fuse removals) or other functional restrictions.
 - H. Methods and instructions for communication between two or more people are required to perform an action.

4.9 Action Steps Containing Verifications, Checks, Notifications, and Data Recording, Cont.

- I. Inspection for degradation of qualified equipment (for example, environmentally qualified, or seismically qualified equipment).
- [6] Identify parameters and acceptable ranges needed to perform the procedure.
 - [a] Use the same units of measure in the procedure that users will read from the facility instrumentation.
 - [b] If there is an acceptable range for a parameter, include the acceptable range rather than a point value.

4.10 Action Steps with Warning, Cautions, and Notes

Warnings alert users to potential hazards to personnel.

Cautions alert users to potential hazards to products or equipment.

Notes call attention to important supplemental information.

4.10.1 Warnings and Cautions

Warnings and cautions attract attention to information that is essential to safe performance. Such information usually consists of the conditions, design limitations, practices, and procedures to be complied with to avoid loss of life, personal injury, health hazards, or damage to equipment.

- [1] Review potential hazards with facility technical specialists to determine those warnings or cautions that need to be included.
- [2] Determine those parts of the procedure where the addition of information would be helpful.
- [3] Review each action step and list the potential hazards in warning or caution format.
- [4] Position warnings, cautions, and notes so they are complete on one page, and appear immediately before and on the same page as the step(s) to which they apply.

4.10.1 Warnings and Cautions, Cont.

NOTE *An industry study of significant events attributed one-fourth of all human performance events to a failure to provide proper warnings and cautions.*

- [5] Place warnings ahead of cautions and cautions ahead of notes whenever more than one type is used at the same point in a procedure.
- [6] Do not include action steps in warnings, cautions, and notes.
- [7] Write warnings, cautions, and notes as short, concise statements. Warnings, cautions, and notes are written as statements, rather than as commands, to distinguish them from action steps, for example, "Touching this wire will electrocute you!" Do not imbed an action step in a warning format, for example, do not rewrite the instruction "Shut the valve," as "The valve should be shut."
- [8] Ensure that cautions and warnings provide (a) a description of the hazardous condition (b) the consequences of failing to heed the warning or caution and (c) critical time considerations.
- [9] Present the text of warnings, cautions, or notes using appropriate techniques to ensure visual identification. (Do not use all capital letters to distinguish warnings, cautions, and notes since it is hard for the users to read.)
- [10] Include only one topic in each warning, caution, or note.
- [11] Number each warning or caution when more than one exists, as shown in the following example.

4.10.1 Warnings and Cautions, Cont.

EXAMPLE - Numbered cautions

CAUTION 1

Do not operate the generator system at speeds less than 700 RPM for extended periods of time with the exciter regulator in operation as this may cause damage to the exciter regulator field.

CAUTION 2

In the event of a power failure, emergency equipment will start and overload the diesel if the diesel is isolated on the emergency bus during testing.

- [12] If the danger is present during the entire procedure, place the warning or caution in the Precautions and Limitations section.
- [13] Repeat the information in precautions as separate cautions or warnings within the body of the procedure as it applies to individual steps.
- [14] Avoid overusing of warnings, cautions, and notes.

4.10.2 Notes

Notes call attention to important supplemental information. The information can be a reminder of preparatory information needed to perform the activities of a procedure or step.

- [1] Use notes to present information that assists the user in making decisions or improving task performance.
- [2] Place the note immediately before and on the same page as the step to which it applies.
- [3] Use appropriate emphasis techniques (for example, *italics*) to distinguish notes from cautions or warnings.
- [4] Number the notes if more than one note is entered at the same location in a section or subsection.

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4.10.2 Notes, Cont.

EXAMPLE - Numbered notes

NOTE 1 *The following step closes generator breaker G-1 and starts diesel DL-1.*

NOTE 2 *The following step requires a time measurement starting at the initiation signal.*

- [5] Write notes so that they contain only explanatory information. Any embedded actions should be removed from the note and written as an action step.

EXAMPLE - Note presentation

Wrong form: contains a hidden command

NOTE *A timed duration starts when fluid collection begins. Time is measured and fluid is collected from the end of the test hose (at the floor drain) into a graduated cylinder.*

Rewritten to remove embedded action step.

NOTE *A timed duration starts when fluid collection begins in Step [12.6] below.*

- [12] Collect fluid from the end of the test hose (at the floor drain) into a graduated cylinder.

4.11 Action Steps Directing Users Elsewhere--Branching and Referencing

In order to complete performance of a task, users at times must branch or reference to some other procedure, section, or appendix.

Referencing designates routing the procedure user to other steps or sections within the procedure or to other procedures and then back to the position in the base procedure.

Branching designates routing the procedure user to other steps or sections within the procedure or to other procedures, and the user does not return to the original position.

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4.11 Action Steps Directing Users Elsewhere--Branching and Referencing, Cont.

WARNING

Referencing and branching increase the potential for error with attendant safety and administrative consequences. Therefore, branching and referencing are highly discouraged.

Use referencing and branching only when it is necessary to direct the user to information that is vital to the performance of the activity and it is not appropriate to incorporate that information into the base procedure.

- [1] Evaluate the following criteria to determine if referencing or branching is appropriate.
 - A. Prerequisites that affect the section to which the user is being directed.
 - B. Precautions and limitations that affect the section to which the user is being directed.
 - C. User comprehension and ease of .
 - D. Additional procedures required to accomplish the work.
 - E. Completeness of records package.
 - F. Whether steps can be readily incorporated rather than referenced.
 - G. Whether whole procedures or appendixes, rather than small, isolated sections, can be referenced.
- [2] If referencing or branching is appropriate, then use the following methods for referencing and branching.

NOTE *Data sheets are used exclusively for recording information, not prescribing how steps are to be completed. Therefore, the referencing and branching techniques of this section are not applicable to data sheets.*

- [a] Use the term GO TO presented in all capital letters to indicate departure from the base procedure.

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4.11 Action Steps Directing Users Elsewhere--Branching and Referencing, Cont.

- [b] If referencing or branching to another procedure, then identify the procedure number, title, and portion of procedure to be performed.
- [c] If referencing or branching to another location in the base procedure, then identify the specific location in the procedure where the user is to go.
- [d] If referencing, use the term RETURN TO presented in all capital letters to indicate the re-entry point into the base procedure.
- [e] If referencing, use the terms GO TO and RETURN TO in the same action step.
- [f] Ensure that a reference or branch directs the user to all material needed as a prerequisite to the identified material. For example, ensure that in executing a reference or branch the user does not bypass an applicable caution or prerequisite step.

4.12 Action Steps with Acceptance Criteria

Acceptance criteria provide a basis for determining the success or failure of an activity. Acceptance criteria may be qualitative (specify a given event that does or does not occur) or quantitative (specify a value or value range).

- [1] Determine where specific acceptance criteria are to be presented in the procedure. Either or both of the following methods can be used.
 - [a] State the location of acceptance criteria, whether located at individual action steps (used when criteria are satisfied at the time of performance) or located in data sheets or other procedures. When acceptance criteria are located in other procedures, link procedures using referencing techniques if the information cannot be included in the procedure.
 - [b] Provide a summary of the acceptance criteria in a table or a list as an attachment.

4.12 Action Steps with Acceptance Criteria, Cont.

EXAMPLE - Statement regarding the location of acceptance criteria

Summary of Acceptance Criteria

Specific quantitative or qualitative requirements that are intended to be verified by this test are noted in the action step(s) where the verifying action is performed and recorded.

- [2] If specific notifications and actions are needed to augment administrative procedures, summarize subsequent notifications and actions, such as those to be taken by reviewers.
- [3] Include instructions for notifications to be made or actions to be taken immediately by the user in the event that specified acceptance criteria are not met.
 - [a] Place these instructions or actions in the body of the procedure.
 - [b] Ensure that these actions are consistent with administrative instructions.

EXAMPLE - Notification of failure to meet acceptance criteria

[14] IF specific acceptance criteria stated in steps [15] through [19] are not met, THEN notify the shift manager as soon as practical after observing the nonconformance.

- [4] Use acceptance criteria that consist of a nominal value and, if it exists in the technical basis, an allowable range.

4.13 Action Steps with Placekeeping and Sign-offs**4.13.1 Placekeeping**

Placekeeping helps users to keep track of their progress in a procedure. The placekeeping mechanism typically consists of checkoff boxes.

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4.13.1 Placekeeping, Cont.

- [1] If initials or signatures are not required, provide a placekeeping checkoff box near the right margin of the page or the right side of a table.

EXAMPLE - Checkoff box for placekeeping at the action step

[8] Turn the transformer test switch to the TEST position.

☐

- [2] If placekeeping must be performed on a separate checklist, arrange the placekeeping items in the order the actions are to be performed and reference on the checklist the associated steps in the procedure.

4.13.2 Sign-offs

Written responses for action steps that require independent verification; inspection, data recording, or documentation of completion can also function as placekeeping devices. A sign-off step includes one or more of the following elements:

1. A blank line for verification, notification, or inspection signatures or initials.
2. A blank line for sign-off by a person other than the user.
3. Blanks for recording data and the initials or signatures of persons recording the data.

NOTE *The use of signatures, initials, check marks, and "N/A" should be defined in site-specific administrative procedures.*

- [1] If administrative procedures require that steps be signed off, provide space for the sign-off of the step.
- [2] Position a blank signature or initial line for entry of initials that identify the persons signing off the step immediately following the affected step, or on a separate data sheet or checklist, if necessary.

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4.13.2 Sign-offs, Cont.

- [3] If the sign-off is located in one procedure and the action to be signed off is located in a referenced procedure, indicate in the base procedure step that is being documented in the referenced procedure signoff space.

EXAMPLE - Verification by the user showing sign-off by initials

[14]	Verify ECS-HMOV-293 Pump A discharge valve CLOSED.	_____
------	--	-------

- [4] Use the following methods to differentiate between sign-offs required of the user and those required of other personnel.
- [a] If the step is to be signed off by someone other than the principal user, place the title or function of the responsible person under the blank line.
 - [b] If the step is to be signed off by the user, place no identifying title or function under the blank line.
- [5] Do not combine two closely related actions each requiring a sign-off into a single step. Make two separate steps with individual sign-offs.
- [6] If an independent witness or other second sign-off is needed, provide an additional space for initials and identify that an IV (independent verification) sign-off or other specified signature is required.

EXAMPLE - Independent verification or second sign-off of same step showing sign-off by initials

[9]	Verify SSS-HAOV-1575 supplementary safety system pneumatic valve CLOSED.	_____	_____ IV
-----	---	-------	-------------

4.13.2 Sign-Offs, Cont.

- [7] Identify steps requiring a hold point (steps that require inspection of the actions performed). Inspections of the results of a step before initiating successive steps are normally designated as hold points. Hold points might involve Quality assurance, health physics, engineering, or other inspectors.

EXAMPLE - Action and hold point verification sign-off in the same step

**Hold
Point**

- [7] Torque head bolts with torque wrench set at 90 foot-pounds.

QA Inspector

- [8] Include places for entering initials or signatures to identify persons recording data when presenting steps in tables.

EXAMPLE - Sign-off of a series of data points

Parameter	Tolerance	As Found	As Left	Initials
Pressure	290 psig (285 to 295)			— IV
Temperature	350°F (345 to 355)			— IV
Level	20 ft (19.5 to 20.5)			— IV

4.13.3 Sign-off or Checkoff of Conditional Steps

In some instances, the performance of an action depends upon the occurrence of a condition or combination of conditions. Conditional steps are introduced by the words IF or WHEN and are followed by an action.

4.13.3 Sign-off or Checkoff of Conditional Steps, Cont.

- [1] Provide a space for the user to mark conditional steps that use IF or WHEN. Typical entries are "N/A" if the condition does not occur or a check mark or initial if or when the condition does occur, indicating that the appropriate action was taken.

EXAMPLE - Conditional step with a sign-off

- [4] IF outside temperature is less than or equal to 39°F
AND heated air is required,
THEN place coils in service. _____

5.0 DEVELOPMENTAL REFERENCES

1. Department of Energy Order, DOE 5480.5, *Safety of Nuclear Facilities*.
2. Department of Energy Order, DOE 5480.6, *Safety of Department of Energy-Owned Nuclear Reactors*.
3. Department of Energy Order, DOE 5480.19, *Conduct of Operations Requirements for DOE Facilities*.
4. U.S. Nuclear Regulatory Commission, NUREG-0650, *Technical Writing Style Guide*, November 1979.
5. U.S. Nuclear Regulatory Commission, NUREG-0700, *Guidelines for Control Room Design Reviews*, September 1981.
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7. U.S. Nuclear Regulatory Commission, NUREG-0737, *Supplement 1, Requirements for Emergency Response Capability*, December 1982.
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10. U.S. Nuclear Regulatory Commission, NUREG/CR-1368, *Development of a Checklist for Evaluating Maintenance, Test, and Calibration Procedures Used in Nuclear Power Plants*, May 1980.
11. U.S. Nuclear Regulatory Commission, NUREG/CR-1369, *Procedures Evaluation Checklist for Maintenance, Test, and Calibration Procedures*, May 1980.
12. U.S. Nuclear Regulatory Commission, NUREG/CR-1875, *Evaluation of Emergency Operating Procedures for Nuclear Power Plants*, April 1981.
13. U.S. Nuclear Regulatory Commission, NUREG/CR-1999, *Human Engineering Guidelines for Use in Preparing Emergency Operating Procedures for Nuclear Power Plants*, April 1981.

5.0 DEVELOPMENTAL REFERENCES, Cont.

14. U.S. Nuclear Regulatory Commission, NUREG/CR-2005, *Checklist for Evaluating Emergency Operating Procedures Used in Nuclear Power Plants*, April 1983.
15. U.S. Nuclear Regulatory Commission, NUREG/CR-3177, *Methods for Review and Evaluation of Emergency Procedure Guidelines*, March 1983.

[illegible][illegible][illegible][illegible]

[illegible]

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	Title	Revision Page of

[illegible]

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	TECHNICAL BASIS Activity Worksheet	Proc. No. Revision Page of
	Title	

Instruction**Sect./Subject No.** _____ **Activity No.** _____**Activity Description****Participant
Position Titles****Special Training/Qualification Requirements****Technical Requirements (Equipment ID, setpoints, operating values and ranges,
common mode failure, cautions, warnings, limitations)****Level of Detail Considerations (Knowledge and Skill Level, Complexity, Frequency,
Consequences, Standardization)****Interfaces (Other personnel or Instructions)**

[illegible][illegible][illegible]

[illegible][illegible][illegible]

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	TECHNICAL BASIS Records Worksheet	Proc. No. Revision Page of
	Title	

Record*	Recommended or Req'd Retention	QA	Non-QA

*Group in packages, if appropriate

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APPENDIX B

GLOSSARY

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acceptance criteria	Criteria that provide a basis for determining whether an activity has been successful or failed. Acceptance criteria may be qualitative or quantitative.
actions	Specific steps performed to accomplish a task.
action step	An action step is a procedure element that provides instruction for performing a specific action or task.
activities	Groups of related tasks performed to accomplish a goal.
appendix	Supplementary material at the end of the procedure. Appendixes include information more conveniently located after the main body of a procedure including forms, tables, figures and graphs.
approvals	Approvals are OKs from the responsible person(s) that an action or activity can take place. Approvals are usually obtained in written form, by signature or initials.
attachment	Supplementary material at the end of the procedure. Attachments include information that covers a specific subject or function and is required for procedure completion but used separately. An example is a checklist.
base procedure	The original procedure from which a user may be branched or referenced.
branching/branches	Branching sends the performer to another procedure to complete the activity begun in the base procedure. The user does not return to the base procedure.

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caution	Cautions alert users to conditions, practices, or procedures that must be observed to avoid potential hazards involving products and equipment and conditions adversely affecting site operations.	
check	A check involves steps that direct operators to see if a parameter has assumed a specified value or to see if a specific action has been carried out, and, if it has not, to take the next action specified (for example, notify supervisor).	
check off	To mark a check in a box or on a line to indicate that the step has been successfully accomplished.	
concurrent steps	Two or more steps that are performed at the same time.	
conditional steps	Instructions performed if conditions warrant. Logic terms (for example, <u>IF</u> , <u>AND</u> , and <u>THEN</u>) are used to present conditional steps.	
conditions of performance	The actual conditions under which the procedural activities are performed, including actual equipment location, lighting, ventilation, protective gear required, and temperature.	
content	The subjects, topics, and technical information that is contained in a procedure.	
continuous steps	Steps that apply for a period of time while the procedure is being executed.	
coversheet	The first page of the procedure, which includes at a minimum, the procedure title and page header.	

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data point	A discrete item of information. A data point is often quantitative but may be qualitative as well.
data recording	Writing down data points to obtain a written record of particular conditions at a given time. Data may be recorded for QA purposes or for use in further calculations or verifications.
decision tables	A format for presenting algorithms in tables.
equally acceptable steps	Steps that specify a number of equally acceptable alternative actions.
facing page	The left-hand side of the two page spread of a procedure.
format	The way the pages of a document look.
headings	Short phrases that introduce the beginning of a section.
hold point	Hold points require users to wait until certain conditions exist or specific approvals or notifications have been made before continuing on in the procedure.
independent verification	Verification by someone other than the person who performed the task being verified.
level of detail	The level of technical detail presented in a procedure. Steps that are written at a low level of detail include only general instructions and rely heavily on user training. Steps that are written at a high level of detail precisely specify all actions.
logic term	Words that show the relationship of information in logic statement: <u>IF</u> , <u>WHEN</u> , <u>THEN</u> , <u>AND</u> , <u>OR</u> , and <u>NOT</u> .

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nonsequential steps	Steps that appear where they are first required but that may need to be performed later in the sequence of actions. Nonsequential steps include continuous steps, time-dependent steps and repeated steps.
note	Notes provide important supplemental information to users. This information is presented in a note if it would otherwise be difficult to incorporate in the procedure.
notification	Notifications inform the appropriate personnel that an action or activity is about to occur or has already occurred.
page header	The page header appears at the top of every page and presents the procedure title, procedure number, revision number, revision date, and page number.
placekeeping	Placekeeping is used to assist the user in knowing what steps have been accomplished in a procedure. Check off boxes are used to indicate that an action has been accomplished.
procedure	Step-by-step instructions for accomplishing a goal.
referencing/references	Referencing instructions direct the users to temporarily abandon their place in the base procedure in order to perform steps elsewhere in that procedure or in another procedure. When executing a reference, users always returns to the base procedure step after performing the referenced step(s).
repeated steps	Steps that are performed repeatedly at various times.
revision log	The revision log identifies the revision history of the procedure and its effective date.

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safety envelope	The safety envelope defines the conditions for which a nuclear facility has been designed, reviewed, evaluated, and determined to be capable of being safely operated. The safety envelope is determined by the facility design bases, design verification and functional test results, safety analyses, operating limits and surveillance requirements, and operating and maintenance procedures.
sign-off	A sign-off is a set of initials or a signature the indicates that the responsible person has successfully accomplished the step. Sign-offs may also be required of inspectors or independent verification. A blank line is used for sign-off initials/signatures.
substeps	Detailed actions that follow upper-level steps. Performing all substeps of a step results in the step being performed.
table	Graphic representation of information where the items are placed in a matrix created by columns and rows.
table of contents	A listing of sections, subsections, appendixes and attachments that helps in locating those portions of the procedure.
task	A group of related actions to accomplish a specific goal.
task analysis	An analysis of the tasks to be performed to accomplish a goal, which includes a consideration of individual tasks with respect of task characteristics, who will perform it, required skills, knowledge and abilities and the performance criteria for the task(s).
technical basis	The technical background and information, and the documentation of the background and information, needed as a basis for all technical content of a procedure.

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technical procedure	Technical procedures prescribe production, operation of equipment and facilities, and maintenance activities. They do not include nonadministrative nor emergency operating procedures.
technical safety requirement	(TSR) is a controlled safety document approved by DOE which in a specified format defines the operating limits and surveillance requirements for safe operation, and bases thereof, safety boundaries, and management or administrative controls required to ensure the safe operation of a nuclear facility. (Formerly known as Operations Safety Requirements for nuclear nonreactor facilities and Technical Specifications for nuclear reactor facilities.)
time-dependent steps	Steps that are executed only once at a specific time in the future.
user	The person(s) actually performing the procedure.
verb	The part of speech used to indicate an action or state of being.
verification	Verification involves steps that direct users to see if a parameter has assumed a specified value or to see if a specific action has been carried out, and, if it has not, to take actions to make it so.
walkdown	A walkdown consists of physically visiting and observing the location in which the activities are to be performed and the equipment that will be used. A walkdown is performed to ensure that the equipment and environment are actually as envisioned and the people involved can perform the required tasks.

APPENDIX B
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The walkthrough is the cumulative, detailed check of the process and facility. Activities that may be used to complete walkthroughs include walkdowns, simulations or modeling.

warning

Warnings alert users to conditions, practices, or procedures that must be observed to avoid loss of life or severe injury. Warnings alert users to potential hazards to personnel.

APPENDIX C**ACRONYMS & ABBREVIATIONS**
(Page 1 of 1)

Admin	Administrative Procedure
ARP	Alarm Response Procedure
DOE	Department of Energy
EOP	Emergency Operating Procedure
ERP	Emergency Response Procedure
FSAR	Final Safety Analysis Report
ID	Identification
IV	Independent Verification
LCO	Limiting Condition of Operation
M&TE	Measuring and Test Equipment
Maint	Maintenance Procedure
N/A	Not Applicable
NOP	Normal Operating Procedure
ONOP	Off-Normal Operating Procedure
Proc. No.	Procedure Number
PVS	Process Vulnerability Analysis
QA	Quality Assurance
Rev	Revision
SAR	Safety Analysis Report
Test/Surv	Test or Surveillance Procedure
TSR	Technical Safety Requirements

APPENDIX D**ACTION VERB LIST**
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The following list of verbs is not intended to be comprehensive. Verbs are selected from this list where possible so that words have a meaning common to all performers.

Avoid using of terms that do not provide specific instructions unless they are followed by specifying information. For example, "increase" used without qualification is almost meaningless, but, "increase flow to maintain level above the inlet standpipe" provides the necessary information.

Many of these verbs have similar meanings. Once a verb has been selected for a related series of steps, use it consistently.

Developing and using a site (or facility)-specific verb list is highly recommended. The site-specific verb list may drawn upon the following list of action verbs and may also use verbs that have specific meaning at the site. All verbs on the site-specific verb list should be defined precisely and used consistently in all site procedures.

VERB**DEFINITION (as used in Action Steps)**

Actuate	Place into a specific state of functional performance.
Add	Increase the size or quantity.
Adjust	Make an incremental change or series of changes to arrive at a desired condition.
Align	Arrange equipment into a specific configuration to permit a specific operation.
Allow	Permit the completion of a specific action.
Announce	To make known publicly.

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Assemble	Put together what is required to provide an operational or functional capability.
Attach	To fasten one thing to another.
Balance	Adjust several parameters at the same time at certain points in a system to specified values.
Barricade	To shut in or keep out with an obstruction.
Begin	Start an action or activity.
Bleed	Remove fluid from a piece of equipment at a restricted flow rate.
Block	Inhibit a capability of a specific system or piece of equipment.
Bolt	To attach or fasten with bolts.
Bypass	To circumvent a safety circuit (unless a single device provides for bypassing, such as a bypass switch, identify specific actions to bypass).
Calculate	To determine by computation (computation method should also be identified).
Change	To make different in some particular.
Charge	To load or fill (specific actions to charge should be included).
Check	Perform a comparison with stated requirements. No manipulation of equipment by the checker is involved.
Circle	To draw a circle around.

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Clean	To rid of dirt, impurities, or extraneous matter.
Clear	To move people and/or objects away from.
Close	Manipulate a device to allow the flow of electricity or to prevent the flow of fluids, other materials, or light.
Collect	Cause the assembly of something in a fixed location or container.
Compare	Determine the relationship of the characteristics or values of different items, parameters, or conditions.
Complete	Fulfill or accomplish an instruction totally.
Consult	To ask for advice, to take counsel; to refer to.
Connect	Join, fasten, or fit to permit a desired capability
Continue	Maintain or resume the performance of an activity or condition.
Cool	Lower the temperature of equipment or an environment
Coordinate	Arrange for activity involving other personnel.
Correct	Alter to reestablish a desired activity or condition.
Count	To add together.
Cover	Protect or shelter equipment.
Cycle	Cause repetition of an action or activity.

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Declare	To make known formally.
Decrease	Produce a smaller value.
Deenergize	Remove the supply of electrical power to equipment.
Depress	Manipulate to effect a specific position of a device.
Depressurize	To release gas or fluid pressure from.
Determine	To find out; to ascertain.
Discharge	To give outlet or vent to a fluid or other contents.
Disconnect	Separate or detach.
Discontinue	To cease to operate, administer, use, produce, or take.
Dispose	Remove from a specific location.
Don	To put on an article of wear.
Drain	Remove liquid from an enclosure or part of an enclosure, usually to empty.
Draw	To bring, take or pull out, as from a receptacle.
Energize	Provide equipment with electrical power.
Ensure	Confirm that an activity or condition has occurred in conformance with specified requirements (by action if necessary).
Enter	To make report of, set foot in.
Equalize	To make equal or uniform.
Establish	Bring about. Take necessary actions to cause a specified set of conditions to exist.

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Estimate	Approximate the size, extent, or nature of a variable.
Evacuate	Vacate.
Evaluate	To assess; to determine the importance, size, or nature of; to appraise; to give a value to based on collected data.
Exit	To leave or withdraw.
Expedite	To accelerate the process or progress of.
Fill	Add fluid to a system or equipment to a prescribed point.
Filter	Pass fluid through a sized medium to stop the passage of unwanted material in the effluent.
Flush	Remove or clean with a washing action of a liquid.
Follow	Comply with an instruction.
Go to	Depart from a position in a procedure and resume at a different location in the procedure or in a different procedure.
Ground	Provide an electrical path to a system at zero potential.
Guide	To manage or direct movement of.
Hold	Maintain a position for equipment, a place in a procedure, or an act of retention.
Identify	Determine or make known the parameter value or condition as related to a procedure.

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Implement	To carry out; to accomplish.
Increase	Produce a larger value.
Indicate	Make known an activity, parameter value, or condition.
Inflate	To blow full with air or gas.
Inform	To communicate knowledge.
Initiate	To begin a process, usually involving several steps or actions.
Inject	To introduce a new element; to drive a fluid.
Insert	Place or position into; move control rods into the reactor core.
Inspect	To examine; to perform a critical visual observation or check for specific conditions; to test the condition of.
Install	Fix or fit into equipment or a system.
Instruct	Direct or command.
Interchange	To substitute two items, one for another.
Investigate	To search or inquire into.
Isolate	To shut off or remove from service.
Jumper	To make a connection between two circuit points not normally connected.
Label	To mark or identify.
Latch	To close or fasten.

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Lift	Elevate to a higher level or remove, as in removing electrical leads or restrictions.
Limit	Restrict or impose bounds.
Locate	Determine or establish place or position.
Lock	Securely fasten, to prevent capability to function.
Log	To enter into a record of operations or progress.
Lower	Cause to move down or decrease position or value.
Lubricate	To apply a lubricant to.
Maintain	To hold or keep in any particular state or condition, especially in a state of efficiency or validity.
Minimize	To reduce to the smallest amount or degree.
Mix	Intermingle ingredients uniformly.
Monitor	Observe an activity, parameter value, or condition (usually on a continuous basis) to meet an instruction requirement.
Notify	Contact, advise, or communicate to make someone aware of an impending or completed activity, parameter value, or condition.
Observe	To watch carefully.
Obtain	To get or attain.

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Open	Manipulate a device to prevent the flow of electricity or to allow the flow of fluids, other materials, or light.
Operate	Cause equipment or system to perform designed functions.
Pass	To go by; move by.
Perform	Carry out specified actions or steps.
Place	To put or set in a desired location or position.
Plot	To represent graphically.
Plug	To connect or become connected, as in electrical plug; to stop or insert something.
Press	To act upon through thrusting force exerted in contact; to push.
Pressurize	To apply pressure within by filling with gas or liquid.
Prevent	To keep from happening.
Proceed	To go on in an orderly, regulated way.
Pull	To exert force upon so as to cause or tend to cause motion toward the force.
Purge	To make free of unwanted substance such as an impurity or foreign material.
Push	To press against.
Pump	Move a fluid in a piping system by the use of suction, pressure, or both.
Rack in	Insert a circuit breaker into its operating position.
Rack out	Withdraw a circuit breaker into its nonoperating position.

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Raise	Cause to move up, or increase position or value.
Read	Obtain information visually.
Recirculate	Cause repetitive motion of a fluid in a system.
Reduce	Decrease a variable to meet a procedure requirement.
Refer to	Use specified information that is in another location or procedure.
Release	To set free from restraint or confinement.
Remove	To take off, move away, or eliminate.
Repair	To restore to a sound state.
Repeat	Do again.
Replace	Install an equivalent part or component.
Request	Ask.
Reset	Reestablish a piece of equipment, part, or component to a previous condition, parameter value, instrument set point, or mechanical position.
Resume	To begin again after cessation or interruption.
Return to	To go back to a previous step in the procedure in effect.
Review	Examine with deliberation for confirmation or compliance to an instruction.
Rotate	Cause to turn on an axis.
Sample	Take a representative portion for the purpose of examination.

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Secure	Fasten or make safe.
Select	To take by preference of fitness from a number or group; to pick out; to choose.
Send	Dispatch.
Separate	Move apart or detach.
Set	Adjust equipment to a specified value
Shake	To agitate.
Shut down	Remove from operational status.
Silence	To stop from making noise.
Sound	To order, signal, or indicate by a sound.
Stabilize	To become stable, firm, steady.
Start	Originate the motion or function of an electrical or mechanical device.
Station	To assign a person to stand and remain at a certain place.
Stop	To halt movement or progress; to hold back; to halt.
Store	To place in reserve, to hold for later use.
Stroke	Operate a valve over its full travel. The travel time may be measured.
Subtract	To perform a subtraction.
Tag	Identify with a prescribed label.

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Throttle	Adjust a valve to an intermediate position to obtain a desired parameter value.
Torque	To cause to twist or turn, as about an axis.
Transfer	To cause to pass from one to another.
Transport	To transfer or convey from one place to another.
Trip	To manually activate a semiautomatic feature; to cause to fail or stop.
Turn	Adjust with a force on an actuator that positions form a circular movement.
Unlock	To unfasten the lock of.
Unplug	To remove from a socket or receptacle.
Update	To revise to include latest information or data.
Use	To avail oneself of; to employ; to utilize.
Vent	Release a gas or liquid confined under pressure.
Verify	Confirm, substantiate, and assure that a specific activity has occurred or that a stated condition exists.
Walk	To move along on foot.
Weigh	To measure the heaviness of as by a scale.
Withdraw	To remove.
Work	To perform a task.

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