
INSPECTION PROCEDURE 42401

PART 52, PLANT PROCEDURES

42401-01 OBJECTIVES

01.01 To confirm that the scope of the plant procedures are adequate to control safety related operations within applicable regulatory requirements.

01.02 To determine the adequacy of management controls in implementing and maintaining a viable procedure control process.

01.03 To verify that the technical adequacy of procedures is consistent with desired actions and modes of operation.

01.04 To verify the usability of procedure content and format by determining the degree to which accepted human factors principles have been incorporated.

42401-02 INSPECTION REQUIREMENTS AND GUIDANCE

Licensee plans and procedures guiding the operation and maintenance of reactor facilities are required by 10 CFR 50.34(b) and (f), as referenced in 10 CFR 52.79. This inspection should be scheduled after enough procedures are issued and in place that randomness in the selection is maintained, but early enough that lessons learned can be utilized in development of the program. It should be completed with satisfactory results prior to the Commission making a finding per 10 CFR 52.103(g).

02.01 Sample Selection. Select a sample of at least 15 procedures from at least three of the following categories of written and approved guides, steps, or instructions used by a licensee to prescribe or guide the conduct of an operation or of equipment test, calibration, or repair for review. The procedures selected in this section will be evaluated in accordance with Section 02.04. Appendix A, "Procedure Content," provides a description of typical procedure content.

- a. Abnormal Operating, Offnormal Operating, or Alarm Response Procedures.
- b. Conduct of Operations.
- c. Control of Radioactivity per 10 CFR Part 20 and 10 CFR Part 50, Appendix I.
- d. Control of Measuring and Test Equipment.
- e. Maintenance.

- f. Chemical and Radiochemical Activities.
- g. Security.
- h. Refueling.
- i. Emergency Plan.
- j. Technical Support.

Note: Procedures for combating emergencies, as used in this instruction, include those procedures that implement the Emergency Plan, such as the assembly or evacuation procedures.

02.02 Procedure Administration. Verify that administrative controls and responsibilities have been established for the review, approval, and periodic updating of plant procedures that conform to license requirements as spelled out in the license, FSAR, and other facility licensing documents.

02.03 Procedure Controls. Verify that controls, found in a procedure writer's guide, have been established in writing for the following:

- a. Procedure preparation in the desired format and content.
- b. Issuing new and revised procedures.
- c. Control and disposition of outdated procedures.
- d. Control of temporary changes to procedures.
- e. Ensuring changes to procedures will be approved by the same organization that approved the original unless another qualified organization has been designated.
- f. Ensuring that the training organization is informed of procedure changes.

02.04 Procedure Usability. Review the procedures to:

- a. Determine whether the procedures will accomplish the intended purpose within the design characteristics and the safety review considerations.
- b. Verify that appropriate technical specification, vendor, or design operating limitations, such as heatup/cooldown rates, pressure/temperature limits, reactivity limits, safety limits, LCOs, and limiting safety system settings, have been incorporated into the procedures.

- c. Determine the degree to which accepted human factors principles have been incorporated into each type of procedure to verify that the procedures are usable.
 - 1. Determine usability by evaluating the procedures against the writing style and format standards established in the licensee's Writer's Guide.
 - 2. Walk thru the procedure steps directly or as a tabletop evaluation considering the affected components, review of referenced materials, clarity of procedural steps with input on the training / experience level of the expected procedure user.
 - 3. If a Writer's Guide is not available or is determined to be inadequate, evaluate the procedures against the characteristics listed in Appendix B.
- d. Using the guidance in Appendix B, "Procedure Usability," determine the quality of the Writer's Guide.
 - 1. If a Writer's Guide is not available, evaluate the procedures directly against the characteristics listed in Appendix B to determine the degree to which accepted human factors principles have been incorporated to make the information in the procedure clear and understandable to users.
 - 2. If the procedures were not prepared according to the guidance in the Writer's Guide, or if several characteristics from Appendix B are not evident in the initial sample, select 5 - 10 additional procedures for further review to determine the degree to which usability may be an issue.

02.05 Conduct of Operations. Select 10% of the current Conduct of Operations instructions, Standing Orders, Night Orders, and/or Special Orders and verify that such orders are not being used in place of procedures. Verify administrative controls have been established that:

- a. Provide a mechanism for the issuance and distribution of Orders.
- b. Require that the Orders be periodically reviewed and updated.
- c. Assign responsibilities for issuance, distribution, review, and update.
- d. Establish limitations on what type of instructions may be issued as Standing Orders or Special Orders.

02.06 Shift Logs. Verify that administrative controls provide for the preparation and correction of operating logs, shift turnover activities and log reviews.

02.07 Interviews. Interview facility staff to determine awareness and understanding of the system established for controlling temporary changes to procedures.

42401-03 RESOURCE ESTIMATE

For planning purposes, the direct inspection effort to complete this inspection procedure is estimated to be 256 hours of on-site inspection (four inspectors for eight days of inspection), consistent with the scope of the planned regional initiative(s) to be performed.

42401-04 REFERENCES

10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)"

ANSI 3.2, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants."

ANSI N45.2, "Quality Assurance Program Requirements for Nuclear Power Plants."

Regulatory Guide 1.114, "Guidance to Operators at the Controls and to Senior Operators in the Control Room of a Nuclear Power Unit."

NUREG-0711, "Human Factors Engineering Program Review Model."

NUREG-0737, "Clarification of TMI Action Plan Requirements."

NUREG/CR-1368, "Development of a Checklist for Evaluating Maintenance, Test and Calibration Procedures Used in Nuclear Power Plants."

NUREG/CR-1369, "Procedures Evaluation Checklist for Maintenance, Test, and Calibration Procedures."

10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."

Nuclear Regulatory Commission, Technical Writing for Supervisors and Their Staff (ADAMS Accession No. ML071500275)

42401-05 PROCEDURE COMPLETION

Inspection of the minimum sample size that yield satisfactory results will constitute completion of this procedure. Unsatisfactory results may demand additional inspections, in accordance with the Assessment & Enforcement program under IMC2505.

END

Appendix A: Procedure Content
Appendix B: Procedure Usability

Attachment 1: Revision History for IP 42401

APPENDIX A

PROCEDURE CONTENT

Administrative Procedures: Procedures that provide a clear understanding of operating philosophy and management policies to ensure safe operation of the plant within the limits set by the operating license and Technical Specifications. They ensure that plant activities are conducted in a manner that will protect the general public, plant personnel, and equipment.

Administrative procedures should also include, as a minimum, a definition of proper shift turnover and a description of what is required for the proper transfer of responsibilities when a reactor or a senior reactor operator on duty is relieved of control room responsibilities during a shift or during shift change.

General Plant Operating Procedures: Procedures used to guide operations after reactor startup. General operating procedures include reactivity control procedures.

Startup Procedures: Procedures that direct reactor operation from shutdown conditions, through startup, and up to power with the generator synchronized. Startup procedures may also have special provisions for scram recoveries.

Shutdown Procedures: Procedures that guide system operations during and following a controlled shutdown. They prescribe the subsequent actions of operators after a scram has occurred, if the reactor is not to be returned to power immediately. Conditions for these operations may be controlled by a mode switch.

NOTE: Shutdown operations, as well as startup operations, may be guided by a controlling procedure which refers to other procedures for equipment operation or these operations may be an integral part of the procedures.

System Operating Procedures: Procedures that provide detailed steps to ensure safe operation of the systems which support and control reactor operation.

Surveillance Test Procedures: Procedures written for each surveillance test listed in the licensee's technical specifications. The procedures are provided to ensure that tools, gauges, instruments, controls, and other measuring and testing devices are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy in performing surveillance for safety related equipment.

Abnormal Operating Procedures, Offnormal Operating, Alarm Response Procedures: Procedures that specify actions to restore an operating variable to its normal controlled value when it goes out of normal bounds, or to restore normal operating conditions following a perturbation. If the condition is not corrected, it could degenerate into a condition requiring action under an emergency procedure.

Emergency Operating Procedures: Procedures which specify operator actions to reduce the consequences of an accident or a hazardous condition which has already occurred or developed. If the condition is not corrected, or prepared for, a threat to the public health and safety may occur, and portions or all of the emergency plan may have to be invoked.

Standing orders: Orders used to disseminate to the plant staff instructions of a general and continuing nature. They may deal with items such as job turnover and relief, definition of the duties of operators, transmittal of operating data to management, filing of charts, etc.

Special orders or night orders: Orders used to disseminate management instructions that have short-term applicability. They deal with items such as special operations, housekeeping, data taking, plotting process parameters, personnel actions, etc.

Conduct of Operations instructions: Instructions used to disseminate to the plant staff instructions of a general and continuing nature. They may deal with items such as job turnover and relief, definition of the duties of operators, transmittal of operating data to management, filing of charts, etc. Conduct of operations instructions may also be used to disseminate management instructions that have short-term applicability. They can deal with items such as special operations, housekeeping, data taking, plotting process parameters, personnel actions, etc.

Emergency Plan: Procedures used to implement the site emergency plan. Emergency Plan implementing procedures ensure timely and accurate emergency classification, onsite and offsite notification and reporting of emergency events, and identification and recommendation of onsite and offsite protective actions.

Refueling Procedures: Procedures used during refueling operations. Refueling procedures include fuel receipt and inspection; preparations for refueling including vessel head stud detensioning, vessel head removal, removal of steam dryers and moisture separators, reactor vessel cavity seal installation, and flooding of reactor cavity; refueling bridge operation to include LPRM removal and replacement; fuel movement from a flooded reactor cavity to a spent fuel storage pool; control rod unlatching, removal, and installation; and reactor vessel reassembly, including replacement of reactor vessel O-Rings.

Technical support procedures: Procedures that relate to activities such as the conduct of preventive and corrective maintenance, measuring and test equipment, radiation protection, and chemistry control.

APPENDIX B

PROCEDURE USABILITY

Incorporating human factors principles into procedures increases the likelihood that the procedures will be easier to use and follow. Standards for format and writing style will usually be found in the licensee's writer's guide. Usability should be determined by using the procedure in the plant or in a tabletop exercise or by observing use of the procedure and evaluating the degree to which procedures follow the guidance outlined in the writer's guide.

When a writer's guide is not available or if the writer's guide is in question, procedure usability can be determined by evaluating the elements of writing style and format and organization. The list that follows each element below describes characteristics that increase the likelihood that a procedure will be performed successfully.

WRITING STYLE The information in a procedure is presented in a manner that increases the likelihood that the task will be performed successfully.

Procedures are more likely to be performed successfully if:

- a. The writing style is consistent among procedures within a department and within the same procedure type.
- b. The level of detail is appropriate for the complexity of the task and the expected ability of the users.
- c. Descriptions of actions to be taken are easy to understand and unambiguous.
 1. Action instructions are written as separate and positive commands.
 2. Short, simple sentences are used.
 3. Multiple actions are written in order of sequence and clearly identify when actions must be completed in order of occurrence.
 4. Acronyms and other abbreviations are used consistently and are defined explicitly.
- d. Quantitative words are used in instructions.
- e. References to equipment or documents contain complete identification information, including plant unit applicability, and exactly match equipment labels.

- f. Numerical units used in procedures correspond to the units on the related instrumentation.
- g. Conditional statements are presented using the appropriate format.
 - 1. IF and WHEN are used to present a condition.
 - 2. THEN is used to present an action.
 - 3. IF NOT is used in combination with THEN to present an alternative.
 - 4. NOT is used to emphasize an opposite condition (NOT running).
 - 5. AND is used to present all conditions that must be met before taking action.
 - 6. OR is used to present one or more conditions that must be met before taking action.

FORMAT AND ORGANIZATION An uncluttered appearance and clear structure of the information in a procedure increases the likelihood that the task will be performed successfully. Procedures are more likely to be performed successfully if:

- a. Organization is hierarchical, logical, consistent, and reveals the organization to users through the use of headings.
- b. Step numbering and structure is not overly complex.
- c. Appendices and attachments provide explicit guidance for their allowed use and present relevant information that would be difficult to integrate into the procedure.
- d. Figures and charts are explicitly and uniquely identified so they are easy to find within the procedure.
- e. The procedure identification information is adequate to ensure the procedure is complete and current.
- f. The procedure is legible in the worst expected conditions for use. Type is readable (1) at an expected distance within which the procedure is used, (2) after copying and (3) under degraded lighting.
- g. Job aids are used to help users to track their progress through a procedure where applicable.

- h. Warnings, cautions and notes (WCNs) are consistent within a department and within a procedure type.
 - 1. WCNs are obvious and address a single topic.
 - 2. WCNs are linked to the related procedure step.
 - 3. WCNs contain no actions.
 - 4. Warnings and cautions identify the consequence of wrong action.
 - 5. Notes supply only supplemental information.
- i. The final step is clearly indicated.
- j. Checklist information reflects the sequence of information in the steps of the procedure.

PROCEDURE EVALUATION CHECKLIST

Procedure Title/No. _____

Revision _____ Reviewed by _____ Date _____

Review the procedure for each of the following items. If the procedure possesses the attribute described in the item, check Yes; if the procedure lacks the attribute, check No. Check N/A (Not Applicable) if the attribute does not apply to the procedure.

An example given in a checklist item is only one way of meeting the evaluation criterion and should not be interpreted as the only way of meeting the criterion.

	Attribute	Yes	No	N/A
1	Is the procedure format consistent for all procedures within a group?			
2	Are page margins adequate?			
3	Is the title short and descriptive of the purpose of the procedure?			
4	If the purpose of the procedure is not clear from the title, is there a statement of scope or purpose which clearly specifies the function the procedure performs? The description should appear in an introductory section preceding the instructions.			
5	If the procedure is scheduled maintenance or tests, does the title state the frequency, e.g., weekly, monthly?			
6	Does the procedure cover or first page provide the following identification information? a. Title b. Procedure number c. Revision number and date d. Unit number (if applicable) e. Approval signature and date f. Number of pages			
7	If this is a multiple unit site, does the procedure refer to one unit only and is it readily identifiable to that unit?			

	Attribute	Yes	No	N/A
8	Does each page provide the following identification information? a. Title or number b. Revision number and date c. Unit number (if applicable) d. Page ___ of ___			
9	Is the location of page identification information consistent?			
10	Is the last page of the procedure clearly identified by marking, e.g., Page ___ of ___ or Final Page?			
11	If this is a temporary procedure, is it clearly marked with the expiration date?			
12	Does the procedure provide the following job planning information? a. Other actions or procedures which must be completed prior to use. b. Plant, system, or equipment conditions which must exist prior to use. c. Precautions which must be observed in the performance of the procedure. For example, are applicable radiological requirements and precautions specified? d. The specific equipment (by part number and/or unique nomenclature) to which the procedure is applicable. e. Special tools and test equipment required to perform the procedure (by part number and/or unique nomenclature). f. Other documents, e.g., procedures, drawings, schematics, required to perform the procedure.			
13	If more than one person is required to perform the procedure, is the procedure written to one 'primary' user? That is, is it clear from the way that instructions are written that one person is responsible for coordinating the activity? For example, is critical communication between persons located remotely from each other specified?			

	Attribute	Yes	No	N/A
14	Does the procedure provide adequate quality control hold points?			
15	Does the procedure provide for verification and signoff of actions?			
16	If the answer to #15 is Yes, are the verifications predominately performed by persons other than those performing the action?			
<p>NOTE: If the procedure refers to a skill of the craft task, i.e., the procedure is general rather than specific; go directly to item #47 to evaluate the procedure.</p>				
17	Are instructions written in short, concise, numbered steps as opposed to multi-step paragraphs?			
18	If explanations/cautions are applicable to the performance of specific steps or series of steps, are they placed immediately ahead of the step(s) to which they apply?			
19	Are explanations/cautions separate and easily distinguishable in appearance from instructional steps? For example, are they enclosed in boxes, typed in bold face letters, headed with the word CAUTION, NOTE, etc.?			
20	Can the text of a explanation/caution be read without interruption by intervening steps or page turning?			
21	Do explanations/cautions avoid the use of action statements? (Statements directing personnel to perform actions must not be imbedded in explanations/cautions. Explanations/cautions should be expressed in the passive voice.)			
22	<p>Do graphs, charts, tables, and figures meet all of the following criteria?</p> <p>a. They are compatible with the procedure.</p> <p>b. They are legible and readable under expected conditions of use.</p> <p>c. Values can be extracted or interpolated easily and with required accuracy, e.g., nonlinear scales are not used.</p> <p>d. Units of scale and measurement are readily available and usable to the operator.</p> <p>e. Titles are descriptive of contents and use.</p>			

	Attribute	Yes	No	N/A
23	Do worksheets provide enough space to record data and perform necessary calculations? For example, in calibration procedures are there provisions for an “as found” column and an “as left” column?			
24	Does the procedure (or related data sheets or worksheets) provide for independent verification and signoff of computations?			
25	Are acceptance criteria and limits stated in quantitative terms?			
26	Are units expressed as ranges rather than point values whenever possible?			
27	Are acceptance criteria and limits stated compatible with limits specified in requirements documents?			
28	If computations are required by the procedure, are the computations based on technically accurate, complete, and up-to-date formulas?			
29	If items (valves, breakers, relays, solenoids, jumpers, fuses, switches) require alignment to perform the procedure, do the alignment instructions in the procedure meet all of the following criteria? a. Each item requiring alignment is individually specified (It is NOT acceptable to refer personnel to previous steps.) b. Each item is identified with a unique number or nomenclature. c. The position in which the item is to be placed is specified. d. The position in which the item is placed is verified and checked off or signed off.			
30	If any of the alignment instructions in step 29 are for system restoration, is the verification performed by someone other than the person performing the alignment?			
31	If any follow-on action, test, or procedure must be performed upon completion of the procedure, does the procedure or related document (e.g., work order) instruct the user regarding what follow-on action is required and whom to notify?			

	Attribute	Yes	No	N/A
32	Does the procedure provide instructions for reasonable contingencies? For example, if equipment is operating outside the range specified by the procedure, is the person instructed as to what action to take?			
33	Are contingencies written in a consistent style and expressed so that the conditional statement precedes the action statement?			
34	Are contingency instructions easy to understand? For example, if three or more conditions are associated with an action, they should be listed separately from and ahead of the action statement.			
35	Are the titles and numbers of all referenced documents identified correctly and consistently?			
36	Does the procedure contain provisions for coordinating the activities of others? For example, is there a checklist for a coordinator to record that an action has been completed?			
37	Are the instructions printed in both upper and lower case letters as conventionally used as opposed to all upper case letters? (Capitalization can be used to emphasize individual words in sentence, and must be used when referring to labels on equipment.)			
38	Is there consistent use of the following? a. Abbreviations, acronyms, and symbols b. Methods of emphasis			
39	Are the steps that must be performed in a fixed sequence clearly distinguishable from steps that do not have to be performed in a fixed sequence?			
40	Does each instructional step direct only one action?			
41	Does each instructional step meet the following criteria? a. The action to be taken is specifically identified (open, turn, shut). b. Limitations are expressed quantitatively, e.g., 2 turns, 80 (75-85) gpm. c. Equipment and parts are identified clearly and unambiguously.			

	Attribute	Yes	No	N/A
42	If a step contains three or more objects of an action, are they listed rather than embedded in the sentence? For example, if an operator is directed to close three or more valves, they should be displayed as a list rather than strung out in a sentence.			
43	Are instrument readings, control values, and other limits used to guide operator actions expressed in quantitative terms when possible?			
44	If the procedure specifies an action that must be performed at a later time or repeated at periodic intervals, does it provide a means to assist the operator in performing the step(s) within the required time frame? For example, if an action must be repeated every 15 minutes, are there spaces for the operator to record the times at which the action must be performed?			
Perform a Walk-through of the Procedure for Items #46 and #47				
45	Are equipment numbers and/or nomenclature used in the procedure the same as those which are displayed on the equipment?			
46	Are the units of measurement used in the procedure the same as those displayed on instruments?			
Observe a Simulation or Performance of the Procedure for the Following Items				
47	<p>Determine whether the amount and kind of information (level of detail) provided by the procedure are adequate for the intended users. Are the following criteria met?</p> <p>a. Can the procedure be performed in the sequence in which it is written?</p> <p>b. Can the user locate and identify all equipment referred to in the instructions?</p> <p>c. Where general rather than specific instructions are provided, can the user explain in detail how to perform the general instructions?</p> <p>d. Can the user perform the procedure without obtaining additional information from persons or documents not specified by the procedure?</p> <p>e. Can the user perform the procedure without obtaining direct assistance from persons not specified by the procedure?</p>			

	Attribute	Yes	No	N/A
48	If the procedure contains sequence-critical actions, is the sequence specified by the procedure correct? (Observe whether the operator performs sequence-critical actions in the sequence specified.)			
49	Does the procedure allow enough time to perform time-critical actions? (Observe whether the operator can perform time-critical actions in the time allowed, i.e., by equipment response, equipment location, distances involved, etc.)			
50	Does the procedure identify equipment adequately? (Determine whether the operator can readily identify equipment and items referred to in the procedure.)			
51	Are references to equipment in the procedure identical to the labels displayed on the equipment?			
52	If the answer to Item #51 is Yes, are references to equipment labels typed in upper case letters in the procedure?			
53	Does the procedure identify the location of each item of equipment adequately? (Observe whether the operator can locate switches, gages, etc. in a timely manner.)			
54	Is the sensitivity of the test instruments and tools being used adequate and are they in proper calibration?			
55	If bar code identifications are used confirm how they are developed and sample their accuracy.			
56	Where skill of the craft is applicable, are the procedural skill level expectations met by the training, experience and competence of the procedure user. Where skill of the craft is applicable, are the procedural skill level expectations met by the training, experience and competence of the procedure user.			

ATTACHMENT 1

Revision History for IP 42401

Commitment Tracking Number	Issue Date	Description of Change	Training Required	Training Completion Date	Comment Resolution Accession Number
N/A	10/27/10 CN 10-022	<p>Original issue to support inspections of operational programs described in IMC 2504, Construction Inspection Program – Inspection of Construction and Operational Programs</p> <p>Completed search of CNs for previous 4 years and no commitments were found.</p>	None	N/A	ML071090381