

PART 52, EMERGENCY OPERATING PROCEDURES

PROGRAM APPLICABILITY: 2504

42454-01 INSPECTION OBJECTIVES

To verify that plant emergency **operating** procedures are prepared to adequately control safety related functions in the event of indications of a system or component malfunction.

To determine the adequacy of management controls in implementing and maintaining a viable procedure system.

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

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

42454-02 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.

02.01 Sample Selection. Select a sample of at least 15 plant emergency **operating** procedures used by the licensee to correct and to mitigate emergencies and other significant plant events. Verify that each procedure is in the format specified in the administrative controls procedure. Verify that each procedure has been reviewed by a competent technical authority and found to be technically adequate to accomplish its stated purpose.

02.02 Procedure Administration. Verify that administrative controls and responsibilities have been established for the review, approval, and periodic updating of emergency operating procedures that conforms to license requirements.

02.03 Procedure Controls. Verify that controls exist 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- c. Control and disposition of outdated procedures.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 are 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. Verify that the procedures have been determined to accomplish their intended purpose, within the design characteristics and the safety review considerations.
- b. Verify that appropriate technical specification, vendor, or design operating limitations, such as heat up/cool down rates, pressure/temperature limits, reactivity limits, safety limits, Limiting Conditions of Operations (LCOs), and limiting safety system settings, are incorporated in the procedures.
- c. Verify that human factors principles (Appendix B, Procedure Usability) are incorporated into the procedures. Verify that the procedures are usable by the personnel intended. Evaluate the procedures against the writing style and format standards established in the licensee's Writer's Guide.
- d. Using the guidance in Attachment A, "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 Attachment A to determine that human factors principles were used to make 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 Attachment A are not evident in the initial sample, select additional 5 - 10 procedures for review. Document the results of the review.

02.05 Interviews. Interview facility staff to determine awareness and understanding of the established controls for temporary changes to procedures.

42454-03 RESOURCE ESTIMATE

For planning purposes, the direct inspection estimate is 96 hours of on-site inspection, consistent with the scope of the planned regional initiative(s) to be performed. The inspection hour's estimate is for budgeting purposes. The hours expended during an inspection should be tailored to the facility and accurately recorded.

42454-04 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 and NUREG-0737, Supplement, "Clarification of TMI Action Plan Requirements."

NUREG-0737, Supplement 1, "Clarification of TMI Action Plan Requirements"

NUREG-0899, "Guidelines for the Preparation of Emergency Operating Procedures"

NUREG/CR-2005, "Checklist for Evaluating Emergency Operating Procedures Used in Nuclear Power Plants"

NRC Information Notice 92-76, "Issuance of Supplement 1 to NUREG-1358, Lessons learned from the Special Inspection Program for Emergency Operating Procedures"

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

42454-05 COMPLETION STATUS

For completion the following must be present:

- a. Inspection of the minimum sample size required to make an assessment in accordance with the Reactor Oversight Process (ROP),
- b. the assessment results of the program are acceptable to the geographic Region, and
- c. transition to inspection under the ROP will constitute completion of this procedure in the Construction Inspection Program.

END

Appendices:

- A. Procedure Content
- B. Procedure Usability

Attachment 1: Revision History for IP 42454

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 operator 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. Startup procedures may also have special provisions for scram recoveries. The review should focus on whether the procedure adequately specifies plant conditions and prerequisites for startup and the limits in effect during the startup.

Shutdown Procedures: procedures that guide operations during and following a controlled shutdown and 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 are controlled by a mode switch.

Note: Both shutdown operations and 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 of the correct operation of systems which control or support 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 (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 **operating** 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 such items 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 such items 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 Local Power Range Monitor (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 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, format and organization.

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:

- The writing style is consistent among procedures within a department and within the same procedure type.
- The level of detail is appropriate for the complexity of the task and the expected ability of the users.
- Descriptions of actions to be taken are easy to understand and unambiguous.
 - Action instructions are written as separate and positive commands.
 - Short, simple sentences are used.
 - Multiple actions are written in order of sequence and clearly identify when actions must be completed in order of occurrence.
 - Acronyms and other abbreviations are used consistently and are defined explicitly.
 - Quantitative words are used in instructions.
- References to equipment or documents contain complete identification information, including plant unit applicability, and exactly match equipment labels.
- Numerical units used in procedures correspond to the units on the related instrumentation.
- Conditional statements are presented using the appropriate format.
 - IF and WHEN are used to present a condition.
 - THEN is used to present an action.
 - IF NOT is used in combination with THEN to present an alternative.
 - NOT is used to emphasize an opposite condition (NOT running).
 - AND is used to present all conditions that must be met before taking action.

- 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 increase the likelihood that the task will be performed successfully.

Procedures are more likely to be performed successfully if:

- Organization is hierarchical, logical, consistent, and reveals the organization to users through the use of headings.
- Step numbering and structure is not overly complex.
- Appendices and attachments provide explicit guidance for their allowed use and present relevant information that would be difficult to integrate into the procedure.
- Figures and charts are explicitly and uniquely identified so they are easy to find within the procedure.
- Procedure identification information is adequate to ensure the procedure is complete and current.
- 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.
- Job aids are used to help users to track their progress through a procedure where applicable.
- Warnings, cautions and notes (WCNs) are consistent within a department and within a procedure type.
 - WCNs are obvious and address a single topic.
 - WCNs are linked to the related procedure step.
 - WCNs contain no actions.
 - Warnings and cautions identify the consequence of wrong action.
 - Notes supply only supplemental information.
- The final step is clearly indicated.
- 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 it performs?			
5 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			
6 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
7	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 ___			
8	Is the location of page identification information consistent?			
9	Is the last page of the procedure clearly identified by marking, e.g., Page ___ of ___ or Final Page?			
10	If this is a temporary procedure, is it clearly marked with the expiration date?			
11	Do the immediate operator actions avoid referencing operators to other procedures for instructions?			
12	Are the titles and numbers of all referenced documents identified correctly and consistently?			
14	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?			
15	Does the procedure provide a means to check off that the following were observed or performed? a. Symptoms b. Automatic actions c. Immediate operator actions			
17	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.)			
18	Is there consistent use of the following? a. Abbreviations, acronyms, and symbols b. Methods of emphasis			

Attribute		Yes	No	N/A
19	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?			
20	Does each instructional step direct only one action?			
21	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.			
22	If a step contains three or more objects of an action, are they listed rather than imbedded in the sentence? For example, if an operator is directed to close three or more valves, they should be listed rather than strung out in a sentence.			
23	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.			
24	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?			
25	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.?			
26	Can the text of an explanation/caution be read without interruption by intervening steps or page turning?			
27	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.)			

Attribute		Yes	No	N/A
28	Are explanations/cautions provided to inform personnel when displays are based on secondary sensing modes? For example, is a caution provided when a light indicates only that a circuit is energized rather than the position of the valve?			
29	Are instrument readings, control values, and other limits used to guide operator actions expressed in quantitative terms when possible?			
30	Are quantitative limits expressed as ranges rather than single values?			
31	Are limits compatible with those stated in the emergency operating procedure technical guidelines?			
32	Are the contingencies provided for in the procedure consistent with those specified in the emergency operating procedure technical guidelines?			
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	If calculations are required, is space provided in the procedure to perform the computations and to record the results?			
36	Do required calculations use formulas and values that are compatible with the emergency operating procedure technical guidelines?			
37	Do graphs, charts, tables, and figures meet all of the following criteria? a. They are compatible with the procedure. b. They are legible and readable under expected conditions of use. c. Values can be extracted or interpolated easily and with required accuracy, e.g., nonlinear scales are not used. d. Units of scale and measurement are readily available and usable to the operator. e. Titles are descriptive of contents and use.			

Attribute		Yes	No	N/A
38	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 #39 and #40				
39	Are equipment numbers and/or nomenclature used in the procedure the same as those which are displayed on the equipment?			
40	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				
41	Are the emergency operating procedures readily identifiable and easily accessible?			
42	Does the procedure identify all major symptoms or combinations of symptoms associated with the emergency? (Determine whether the operator can describe major symptoms or combinations not identified by the procedure.)			
43	Does the procedure specify automatic actions associated with the emergency adequately? (Determine whether the operator can describe automatic actions not identified by the procedure.)			
44	Does the procedure specify all critical actions required to respond to the emergency? (Observe whether the operator performs critical actions not specified by the procedure.)			
45	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.)			
46	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, distances involved, etc.)			
47	Does the procedure identify equipment adequately? (Determine whether the operator can readily identify all equipment and items referred to in the procedure.)			
48	Are references to equipment in the procedure identical to the labels displayed on the equipment			

Attribute		Yes	No	N/A
49	If the answer to Item #48 is Yes, are references to equipment labels typed in upper case letters in the procedure?			
50	Are the units of measurement used in the procedure the same as those displayed on instruments?			
51	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.)			

ATTACHMENT 1

Revision History for IP 42454

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment and Feedback Resolution Accession Number
NA	07/29/08 CN 08-021	Initial issue to support inspections of operational programs described in IMC 2504, NON-ITAAC INSPECTIONS Completed review of CNs for previous 4 years and found no commitments.	None	ML071090407
NA	ML13232A368 09/09/13 CN 13-020	Researched commitments for 4 years and found none. Revision based on periodic review and update. Change title to more accurately reflect the procedures being inspected. Added Program Applicability, removed one reference, and made formatting changes.	None	N/A