TENNESSEE VALLEY AUTHORITY

5N 157B Lookout Place

April 23, 1986

Mr. Thomas Novak, Deputy Director
Division of PWR Licensing-A
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Novak:

In the Matter of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-391

In response to your letter to H. G. Parris dated July 22, 1985, the submittal for the Watts Bar Nuclear Plant concerning the Procedures Generation Package (PGP) is enclosed. It includes the reply to your questions, the revised PGP, and Writers' Guide.

The PGP has been incorporated into plant administrative procedures as part of the overall emergency procedures maintenance program. The PGP has been reviewed and approved by both the Plant Manager and the Plant Operations Review Committee (PORC).

The PGP and the Writers' Guide may be revised in the future based on experience gained both during the Watts Bar emergency instruction validation and verification program and Westinghouse Owners' Group efforts. This submittal reflects the current program at Watts Bar.

The Sequoyah Nuclear Plant submittal was made on January 13, 1986 and with this Watts Bar submittal, our response to your July 22, 1985 letter is complete.

If you have any questions, please telephone Fisher Campbell at FTS 858-4892.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R. Gridley, Director
Nuclear Safety and Licensing

Enclosures

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ENCLOSURE

ATTACHMENT

RESPONSE TO NRC

SAFETY EVALUATION REPORT (SER)

FOR

THE WATTS BAR

PROCEDURES GENERATION PACKAGE

A. NRC FINDINGS ON THE TECHNICAL GUIDELINES

SER FINDING TG.1 - Deviations from and additions to the generic technical guidelines that are of safety significance (including those required for the stated design differences) should be identified in the PGP. In addition, analysis or other technical justification supporting these deviations and additions should be provided.

WATTS BAR RESPONSE TO TG.1 - Watts Bar believes the following safety significant changes to the generic technical guidelines were made:

1. Upper Head Injection (UHI) was included into plant specific procedures.

2. Ice Condenser Containment was included into plant specific procedures.

3. The following Emergency Contingency Actions (ECAs) guidelines will not be incorporated into plant specific procedures.

   a. ECA-1.1 Loss of Emergency Coolant Recirculation

   b. ECA-1.2 LOCA Outside Containment

   c. ECA-2.1 Uncontrolled Depressurization of all Steam Generators

   d. ECA-3.1 SGTR With Loss of Reactor Coolant - Subcooled Recovery Desired

   e. ECA-3.2 SGTR With Loss of Reactor Coolant - Saturated Recovery Desired

   f. ECA-3.3 SGTR Without Pressurizer Pressure Control

4. The following event-based guidelines will not be incorporated into plant specific procedures.

   a. ES-0.3 Natural Circulation Cooldown With Steam Void in Vessel (with RVLIS)

   b. ES-0.4 Natural Circulation Cooldown With Steam Void in Vessel (without RVLIS)

5. Watts Bar deviates from the generic instrumentation assumption for Condensate Storage Tank (CST) level instrumentation.

6. Watts Bar deviates from the generic instrumentation assumption for Reactor Coolant System (RCS) wide range pressure.

Upper Head Injection (UHI)/Ice Condenser (IC) Containment Changes

The UHI/IC Emergency Response Guidelines (ERG) Development Program was performed by Westinghouse for TVA and Duke Power Company. The program objectives were to identify the differences (system design and analysis) between the generic high pressure (HP) reference plant and the UHI/IC plant in the areas of upper head injection and containment atmosphere control and to provide recommendations on how these differences can be

addressed in plant specific emergency operating procedures (EOPs). Westinghouse completed this program in July 1984 and provided TVA with documentation to identify differences from the HP version of the Westinghouse Owners Group (WOG) Revision 1 ERGs. Watts Bar used the WOG HP Revision 1 ERGs and Westinghouse UHI/IC changes in developing our plant specific EOPs in accordance with our PGP.

Emergency Contingency Actions (ECAs)

Watts Bar will not be implementing the following event-based ECA guidelines:

1. ECA-1.1 Loss of Emergency Coolant Recirculation

2. ECA-1.2 LOCA Outside Containment

3. ECA-2.1 Uncontrolled Depressurization of All Steam Generators

4. ECA-3.1 SGTR With Loss of Reactor Coolant - Subcooled Recovery Desired

5. ECA-3.2 SGTR With Loss of Reactor Coolant - Saturated Recovery Desired

6. ECA-3.3 SGTR Without Pressurizer Pressure Control

Watts Bar and Sequoyah presented these multiple failure ECA guidelines to the operators for training and validation/verification of the guidelines during 1985 Operator Requalification Training. However, the review by the operators concluded that the ECA guidelines appear to be of such low probability and so event specific that their inclusion would be detracting from the more probable E/ES procedures and the Function Restoration Guidelines (function-oriented guidelines). Sequoyah has previously made this position known to NRC in an August 21, 1985 letter from J. A. Domer to E. Adensam.

Event-Based Guidelines

Watts Bar has decided not to implement the following event-based ES guidelines.

1. ES-0.3 Natural Circulation Cooldown with Steam Void in Vessel (with RVLIS)

2. ES-0.4 Natural Circulation Cooldown with Steam Void in Vessel (without RVLIS)

The purpose of these procedures was cooldown and depressurization to cold shutdown under natural circulation conditions and allow for the potential formation of a void in the upper head region. The guideline was written in response to Generic Letter 81-21. It is based on having limited auxiliary feedwater (AFW) supplies. TVA believes that this procedure is not required because Watts Bar has an unlimited supply of water to AFW.

As discussed in Watts Bar's December 3, 1981 submittal to NRC on Generic Letter 81-21, the condensate storage tanks (CSTs) are the preferred source of cooling water to the steam generator. The minimum reserved volume of the CST described in section 10.4.9 of the FSAR and required in technical specifications is based on reaching the residual heat removal (RHR) system cut-in (350°F) within 6 hours after reactor trip. Because the Westinghouse natural circulation cooldown analysis allows a T_{cold} plant to cooldown at 50°F/h, Watts Bar will be able to remain at hot standby (557°F) for 2 hours before beginning cooldown and still meet the FSAR assumptions.

Additionally, the Essential Raw Cooling Water (ERCW) system is provided as the safety-grade backup source of cooling water. The ERCW is designed to deliver an essentially unlimited volume of cooling water at sufficient flow rates to the AFW system, such that the AFW system can remove residual heat over the entire range of reactor operation and cool the plant to the RHR system cut-in point.

For these reasons, Watts Bar concludes that the plant can be cooled down in the natural circulation mode. Cooldown using ES-0.2, Natural Circulation Cooldown, will preclude the formation of a void in the upper head. Sufficient water supplies preclude the need to cool down faster and initiate upper head voids. Watts Bar finds that the elimination of ES-0.3 and ES-0.4 is acceptable.

Condensate Storage Tank (CST) Level Instrumentation

The WOG Generic Instrumentation assumes that at least two channels of a delta P measurement system are available to monitor the level in each CST that is a primary water source to the auxiliary feedwater pumps. The Watts Bar CSTs have only one level indicator per tank. Per FSAR 10.4.9 and 9.2, the ERCW system and not the CST is considered the safety-grade supply to AFW pumps. Watts Bar finds this deviation acceptable.

Reactor Coolant System (RCS) Wide Range Pressure

The WOG Generic Instrumentation assumes that at least two RCS wide range pressure transmitters are connected to the RHR hot leg suction lines. These instruments are assumed to be subject to adverse containment conditions. Watts Bar decided that a more accurate indication is required than would be provided if these instruments were located inside containment. This problem was identified during a review of the necessary characteristics for these instruments. Watts Bar has relocated the transmitters outside containment to eliminate harsh environment errors. These instruments do meet the WOG guidelines with respect to range and number.

This response provides the necessary historical documentation for these safety significant changes to the technical guidelines.

SER FINDING TG.2 - Any additions to or deviations from the generic guidelines should be verified/validated. This verification/validation step can be accomplished separately or as a part of the EOP verification/ validation program. The PGP should discuss how the additions and deviations are to be verified/validated.

WATTS BAR RESPONSE TO TG.2 - The WOG performed a verification/ validation on the generic technical guidelines; therefore, there is no need for each utility to perform this step. Watts Bar is performing verification/validation on plant-specific procedures in accordance with Section D of the Watts Bar PGP. This includes verification/ validation to all additions to or deviations from the generic guidelines.

SER FINDING TG.3 - A meeting was held between the staff and the WOG Procedures Subcommittee on March 29, 1984, to discuss the task analysis requirements of Supplement 1 to NUREG-0737. The summary of the meeting is contained in an NRC memorandum from H. Brent Clayton to Dennis L. Ziemann dated April 5, 1984. At the meeting, the owners group made a presentation on the background of the Emergency Response Guideline (ERG) development program as it relates to the issue of task analysis. The presentation included a description of the (1) ERG background documents; (2) development of Revision 1 to the ERG; (3) interactions with NRC requirements, Supplement 1 to NUREG-0737; and (4) and overview of how the WOG had responded to the requirements. Based on the presentations, the staff commented that Revision 1 of the ERG and background documents provided an adequate basis for generically identifying information and control needs. As a result of the above meeting, the staff has made the following additional comments that should be acted upon by TVA and submitted as part of the PGP:

1. TVA should describe the process for using the generic guidelines and background documentation to identify the characteristics of needed instrumentation and controls. For the information of this type that is not available from the ERG and background documentation, TVA should describe the process to be used to generate this information (e.g., from transient and accident analyses) to derive instrumentation and control characteristics. This process can be described in either the PGP or the Detailed Control Room Design Review program plan with appropriate cross-referencing.

2. For potentially safety-significant plant-specific deviations from the ERG instrumentation and controls, TVA should provide in the PGP a list of the deviations and their justification. These should be submitted in the P-STG portion of the PGP, along with other technical deviations.

3. For each instrument and control used to implement the EOPs, there should be an auditable record of how the needed characteristics of the instruments and controls were determined. These needed characteristics should be derived from the information and control needs identified in the background documentation of Revision 1 of the ERG or from plant-specific information.

WATTS BAR RESPONSE TO TG.3 -

1. TVA has described the process to identify the characteristics of needed instrumentation and control during a meeting with the staff held on December 4, 1984 concerning Detailed Control Room Design Reviews (DCRDR) for all of TVA's nuclear facilities. (Refer to letter from Thomas J. Kenyon to TVA dated December 27, 1984.) TVA is revising its DCRDR program plan to include this process. Additionally, Watts Bar has prepared a plant specific procedure

covering control room design review. The following discussion is included in that procedure to describe the process Watts Bar will use to identify instrumentation and control needs.

The Watts Bar EOPs are based on the WOG ERG's. The guidelines, background documents, and executive volumes are used to help identify instrumentation and control needs. In those cases where plant specific actions/steps are utilized, a knowledge of the system/components being used and their required characteristics and responses based on upset and accident conditions is needed. FSAR, chapter 15 accident analysis, plant specific best estimate anaylsis, and other documents such as the WOG training programs for loss of reactor and secondary coolant and steam generator tube ruptures are to be appropriately utilized.

2. Watts Bar has reviewed the WOG Generic Instrumentation and Reference Plant Description Background Information and has determined that the response to question 2.A.1 addresses the potentially safety-significant plant-specific deviations from the ERG instrumentation and controls.

3. Task analysis is being performed on the emergency instructions and the function restoration guidelines as part of the Watts Bar detailed control room design review. A worksheet is prepared for each step/task in the procedure as part of this task analysis. The worksheet identifies the necessary instrumentation and controls and the required attributes/characteristics. Watts Bar believes this effort provides the record of the needed characteristics of the controls and instruments used to implement the EOPs.

B. NRC FINDINGS ON THE WRITERS' GUIDE

SER FINDING WG.1 - The writers' guide should clearly indicate what the layout and organization of the EOPs will be. Section B.1 (page 21) discusses procedure organization, but it only describes the coversheet, operator actions, and the foldout page.

1. The need for and location of entry conditions, automatic actions, immediate operator actions (discussed on page 24), and attachments also should be discussed in the writers' guide. See NUREG-0899, Section 5.4, for additional guidance.

2. Once the overall organization of the procedures is determined, the major headings for the procedures should be specified. In addition to what the headings are, the format and numbering (if any) of the headings should also be specified in the writers' guide.

WATTS BAR RESPONSE TO WG.1 - The writers' guide Section B has been revised to identify the overall organization of the procedures. The major sections are:

1. Plant Cover Page

2. Procedure Cover Page

3. Instruction Step Pages

4. Foldout Page

5. Appendix

6. Figures

7. Tables

8. Status Trees

Examples of the format of the Cover Pages, Instruction Step Page, and Status Tree are included in the writers' guide as Figures 1 through 5. We have attempted to retain the same basic organization as the Westinghouse Owner's Group (WOG) guidelines. Consequently, sections such as automatic actions and immediate operator actions will not be included.

SER FINDING WG.2 - Information should be presented in procedures so that interruptions in its flow are minimal. To achieve this, each procedure should be written so that an action step or a note should be completed on the page where it began. This guidance should be included in the writers' guide.

WATTS BAR RESPONSE TO WG.2 - The writers' guide Section C.1.o has been revised to state that each action step should be completely contained on one page. For those infrequent occurrences when a step must be continued on the subsequent page, the continuation will be identified on all pages that the step appears.

The writers' guide Section C.5.j has been revised to state that each note and caution should be completely contained on one page.

SER FINDING WG.3 - Placekeeping aids can assist the operators in keeping track of their position within a procedure. They are of particular importance when performing concurrent steps or procedures and in the situations where the user's attention may be diverted. The writers' guide should specify the use of some type of placekeeping aid.

WATTS BAR RESPONSE TO WG.3 - Section C.11 addresses the use of placekeeping aids. No signoff blanks are included because Watts Bar retained the WOG format.

SER FINDING WG.4 - The relationship of how the EOPs are written with regard to control room staffing considerations is very important. While it is indicated in the writers' guide (subsection C.1.i, page 23) that such characteristics should be taken into account, these should be discussed in detail. Thus, the writers' guide should address the following issues:

1. EOPs should be structured so that they can be executed by the minimum shift staffing and minimum control room staffing required by the Technical Specifications.

2. Instructions for structuring EOPs should be consistent with the roles and responsibilities of the operators.

3. Action steps should be structured to minimize the movement of personnel around the control room while carrying out procedural steps.

4. Action steps should be structured to avoid their unintentional duplication by different operators.

See NUREG-0899, Section 5.8, for additional guidance.

WATTS BAR RESPONSE TO WG.4 - This guidance has been incorporated into Section C.12 of the writers' guide.

SER FINDING WG.5 - Instructions should be written for various types of action steps that an operator may take to cope with different plant situations. The format for simple action statements should, therefore, be included in the writers' guide. In addition, the writers' guide should address the definition and format of the following types of action steps:

1. Steps that are used to verify whether the objective of a task or sequence of action has been achieved.

2. Steps of a continuous or periodic nature (repeatedly performed).

3. Steps for which a number of alternative actions are equally acceptable.

4. Steps performed concurrently with other steps.

See NUREG-0899, Section 5.7, for additional guidance.

WATTS BAR RESPONSE TO WG.5 -

1. An example of the format of instruction steps has been included as Figure 4 of the writer's guide. Instruction steps which require verification are denoted by the use of the appropriate action verbs such as verify or ensure. This guidance has been included in Section C.1.q of the writers' guide.

2. The WOG writers' guide dated September 1, 1983, Section 3.3.2, Continuous Steps, states:

> Many of the operator actions provided in a guideline imply continuous performance throughout the remainder of the guideline. This intent is conveyed by the use of appropriate action verbs such as monitor, maintain, or control.

Watts Bar has incorporate the WOG guidance into Section C.1.P of the writers' guide.

3. The WOG writers' guide dated September 1, 1983, Section 4.2.2, states:

> The right-handed column is used to present contingency actions which are to be taken in the event that a stated condition, event, or task in the left-hand column does not represent or achieve the expected result.

Watts Bar has incorporated the WOG guidance into Section C.3 of the writers' guide.

4. The WOG writers' guide dated September 1, 1983, Section 4.2, states:

> Actions required in a particular step should not be expected to be complete before the next step is begun. If assigned tasks are short, then the expected action will probably be completed prior to continuing. However, if an assigned task is very lengthy, additional steps may be performed prior to completion. If a particular task must be completed prior to continuation, this condition must be stated clearly in that step or substep.

Watts Bar has incorporated the WOG guidance into Section C.1.e the writers' guide.

SER FINDING WG.6 - It is important that an operator be able to quickly access the relevant EOPs or portions of EOPs. The writers' guide should address the availability and accessibility of the EOPs and their various parts and sections. See NUREG-0899, Subsections 5.5.7 and 6.1, for additional guidance.

WATTS BAR RESPONSE TO WG.6 - Portions of NUREG-0899, Section 6.1, have been included in Section I of the writers' guide. The NUREG recommendation to provide a technique to access specific sections within a procedure was not included because the procedures are very short (average length less than 8 pages). Also, the recommendation to provide emergency procedures at all locations where equipment is to be manually operated was not included because all local operation identified in the emergency procedures is directed by the control room, and the control room has access to the emergency procedures.

SER FINDING WG.7 - When major changes occur in the plant design, the Technical Specifications, the technical guidelines, the writers' guide, or the plant procedures, then the EOPs may need to be revised. These revisions should be subject to the PGP process. A statement of commitment to do this should be included in the writers' guide or elsewhere in the PGP.

WATTS BAR RESPONSE TO WG.7 - The guidance provided in NUREG-0899 Sections 6.2.1 to 6.2.4, for maintaining EOPs has been incorporated into Section H of the writers' guide.

SER FINDING WG.8 - To ensure that the reproduction or binding does not obscure material and to enhance the readability of the EOPs, the spacing of margins and lines within the procedure should be adequate and should be specified in the writers' guide.

WATTS BAR RESPONSE TO WG.8 - Section B of the Writers' Guide has been revised to include page margins and examples of page formats.

SER FINDING WG.9 - Conditional statements and logic statements will need to be used in the EOPs to describe a set of conditions or a sequence of actions. These statements have the possibility of being confusing, depending on the conditions that need to be observed. Thus, in addition to the information presented in Section C.4 (page 26), the following items should be addressed in the writers' guide.

1. The format and style of the logic statements should be included.

2. Some combinations of logic statements have significant potential for misinterpretation. Thus, to make it more clear to the procedures writer, examples of ambiguous logic statements that should be avoided should be included (i.e., combinations of AND and OR).

See NUREG-0899, Subsection 5.6.10, for additional guidance.

WATTS BAR RESPONSE TO WG.9 - Further guidance from NUREG 0899 has been incorporated into Section C.4 of the Writers' Guide.

SER FINDING WG.10 - Abbreviations and acronyms are discussed in Section F.6 (page 32), and a list of approved abbreviations and acronyms is provided in Table 2. Since a procedure or subprocedure can be entered at a location other than the beginning, because of branching instructions, the meaning of an unfamiliar abbreviation could be missed by the operator. Therefore, Section F.6 should be changed to state that only abbreviations and acronyms from the approved list (Table 2) may be used in the procedures. See NUREG-0899, Subsection 5.6.2, for additional guidance.

WATTS BAR RESPONSE TO WG.10 - Section F.6 of the Writers' Guide has been revised to state that only abbreviations and acronyms listed should be used.

SER FINDING WG.11 - Since copies of the EOPs should be complete (contain all of the information from the original) and legible, the criteria regarding completeness and legibility of the reproduced copies should be addressed in the writer's guide. See NUREG-0899, Subsection 6.2.2, for additional guidance.

WATTS BAR RESPONSE TO WG.11 - The guidance provided in NUREG-0899, Section 6.2.2, has been incorporated into Section H of the Writers' Guide.

SER FINDING WG.12 - Graphs, charts, tables, and figures are discussed in the Writers' Guide in Section G (page 33). In addition to the information presented in Section G, the Writers' Guide should also include information on the content (when they should be used and for what purpose), format, and location of the aids.

WATTS BAR RESPONSE TO WG.12 - The Writers' Guide has been revised (see Section G and Figure 5) to state that the instruction steps should explain the purpose and when graphs, charts, tables, and figures should be used. It establishes the margins for appendices and figures. Additionally, it states the location of appendices, graphs, charts, tables, and figures.

SER FINDING WG.13 - The Writers' Guide correctly states in Section C.8 (page 28) that cross-referencing of procedures should be minimized. However, for those times where referencing is needed, the Writers' Guide should provide content and format instructions for the referencing. See NUREG-0899, Subsection 5.2.2, for additional guidance.

WATTS BAR RESPONSE TO WG.13 - The guidance provided in NUREG-0899, Section 5.2.2, has been incorporated into Section C.8 of the Writers' Guide.

SER FINDING WG.14 - Section F.5 (page 32) discusses numerical values. Two additional items should be included in this section:

1. If a numerical value is used that includes decimal information (as opposed to fractions), and the numerical value is less than 1 and greater than -1, then the decimal point should be preceeded by a 0 (e.g., 0.25 or -0.25 rather than .25 or -.25).

2. Sub-part c of this section states that tolerances should be specified in parenthesis, while sub-part f states that adverse containment values will be enclosed by brackets. Due to the potential confusion to procedure writers, typists, and operators, an alternative system should be considered (e.g., enclosing "Adv. cntmt. conditions" with the appropriate value).

WATTS BAR RESPONSE TO WG.14 -

1. Section F.5 of the Writers' Guide has been revised to incorporate this guidance.

2. The Writers' Guide has been revised to delete the use of parentheses for tolerances. Section F.5.f has been revised to state that the phrase FOR ADVERSE CNTMT will be enclosed with the setpoint.

SER FINDING WG.15 - Critical Safety Function Status Trees are discussed in Section E (page 30). Format and content information regarding the Status Trees should be included in the Writers' Guide.

WATTS BAR RESPONSE TO WG.15 - The Writers' Guide has been revised to reference an example of the status tree format (see Figure 5). Section E states that the status tree content should be consistent with the generic guideline.

SER FINDING WG.16 - The Writers' Guide appears to present inconsistent information regarding the way the operator is expected to move through the EOPs. In Secton C.1.e (page 23) it is stated that, "Actions required in a particular step is begun unless specifically so stated." However, in Section C.2.c (page 24) it is stated that, "The user would normally move down the left hand column when the expected response to a particular step

is obtained." These statements are somewhat contradictory, depending upon the definition of "expected response to a particular step." The criteria for moving through the action steps should be stated more clearly in the Writers' Guide.

WATTS BAR RESPONSE TO WG.16 - We have incorporated the WOG Writers' Guide information regarding the way the operator is expected to move through the EOPs. A cross-reference is provided below:

WOG Writers' Guide dated September 1, 1983 (ERG Executive Volume Background Document)	Watts Bar Writers' Guide Section number
1) Section 4.2 page 17 1st paragraph from top of page	1) Section C.1.e
2) Section 4.2.1 page 19 1st paragraph from top of page	2) Section C.2.c
3) Section 4.2.1 page 19 3rd paragraph from top of page	3) Section C.2.d
4) Section 4.2.2 page 19 5th paragraph from top of page	4) Section C.3
5) Section 4.2.2 page 20 5th paragrah from top of page	5) Section C.3.d
6) Section 4.2.2 page 20 7th paragraph from top of page	6) Section C.3.f
7) Section 4.2.2 page 21 1st paragraph from top of page	7) Section C.3.g

SER FINDING WG.17 - Page identification information is discussed in Section B.2.d (page 22). The location on the page of the page identification information should be specified.

WATTS BAR RESPONSE TO WG.17 - Section B.2.d has been incorporated into Section A.3. The Writers' Guide has been revised to provide an example of the page identification information.

SER FINDING WG.18 - Vocabulary is discussed in Section F.4 (page 31) and a glossary is included in Table 1 (pages 35 and 36). In addition to the words listed in the glossary, the following words should be included because their use is discussed in the Writers' Guide: begin, close, open, place, start, and stop.

WATTS BAR RESPONSE TO WG.18 - The glossary has been revised to include the above words.

SER FINDING TO WG.19 - The instructional step numbering system discussed in Section B.3 (page 22) requires operators to review the document to obtain the entire step identifier, and does not provide the operators with a good perspective of where they are in relation to the entire document. This section should be revised to specify a numbering system that allows the complete step identifier to precede each step (i.e., substep "a" of step 2 would be written 2.a).

WATTS BAR RESPONSE TO WG.19 - WBN has incorporated the step numbering system recommended by the WOG guideline.

C. NRC FINDINGS ON VERIFICATION/VALIDATION

SER FINDING VV.1 - Subsections IV.D.1a, 2, 4, and 5 state that the various objectives of the verification/validation program "can" or "may" be met by a variety of means. These subsections should state specifically which method will be used to meet the objectives.

WATTS BAR RESPONSE TO VV.1 - The PGP has been revised to address this SER finding.

SER FINDING VV.2 - The EOPs will require a certain number of operators to carry out the various activities and steps as specified. Subsection IV.D.5 (page 10) should indicate that the EOPs will be exercised, during simulator exercises or control room walkthroughs, with the minimum control room staff size required by the facility Technical Specifications.

WATTS BAR RESPONSE TO VV.2 - Section D.4.5 of the PGP has been revised to address this SER finding.

SER FINDING VV.3 - To assure verification/validation of all EOPs, the program description should include an indication that the full complement of EOPs will be exercised, including the use of multiple (simultaneous and sequential) failures.

SER FINDING VV.4 - The validation program should be expanded to include a description of the criteria that will be used to select the scenarios to be run during the validation process. The criteria should be developed on the basis of what is needed to validate the procedures and should ensure that single, sequential, and concurrent failures are included. A review of the capabilities and the limitations of the simulator will then identify what can be validated on the simulator. For the parts of the EOPs that cannot be validated on the simulator, the criteria for selecting any additional validation that may be needed and the methods to be used, such as a control room walkthrough or a mock-up walkthrough, should be described.

WATTS BAR RESPONSE TO VV.3 and VV.4 - Per the PGP, Section D.4.3, the verification and validation is being performed by conducting simulator exercises, using the Westinghouse recommended test sequences. As a final conclusion by Westinghouse in its summary report on Emergency Response Guidelines Validation Program (WCAP-10204), the total number of test sequences can be reduced to that suggested in Table V-10 (of WCAP-10204). This test sequence was suggested by Westinghouse because it exercised a full complement of procedures minimizing the occurrence of performing redundant steps in similar procedures. Test sequence number 11 on inadequate core cooling (FR-C.1) could not be performed on the SQN/WBN simulator. Table top review is therefore being performed for this guideline. Test sequence 13 on Natural Circulation Cooldown (bubble in vessel head) will not be performed since this procedure was not implemented. The Natural Circulation cooldown is, however, being performed.

SER FINDING VV.5 - A description should be provided of the method by which multiple units and facilities will be handled in the verification/validation process to account for differences, if the differences are significant.

WATTS BAR RESPONSE TO VV.5 - There are no significant differences between the WBN units which would have an effect on verification and validation. Unit 2 will be licensed without UHI; however, WBN believes that this will have no impact on the verification and validation results.

SER FINDING VV.6 - Section IV.F (page 11) discusses resolution of discrepancies detected during the verification/validation program. This section should include the criteria or methods that will be used for determining the need to reverify and revalidate any resultant changes in the EOPs.

WATTS BAR RESPONSE TO VV.6 - The EI revision/maintenance program (Section IX) has been established. It provides guidance as to when EI revisions require V+V (Section IX.B).

SER FINDING VV.7 - Subsection IV.D.3 (page 9) lists several problem areas that are to be addressed during EOP verification/validation. Most of these items deal with evaluating the operator performing the procedure, not with evaluating the procedure itself. This subsection should address verification/validation of the procedure.

WATTS BAR RESPONSE TO VV.7 - Watts Bar believes the PGP is clear in its intent in this area, i.e., evaluation of the procedure.

D. NRC FINDINGS ON THE TRAINING PROGRAM

SER FINDING TP.1 - Although the PGP states that the SQN/WBN simulator will be used for operator training, it is our understanding that the simulator differs significantly enough from WBN so as not to be used for licensing examination purposes. Thus, it is important that the training program description be expanded to address the following items separately for SQN and WBN:

1. Discuss the method to be used to train the operators in areas where the simulator is not like the control room or does not react like the plant and in parts of the EOPs that cannot be run on the simulator. Specify that walkthroughs will be used where differences exist between the plant and the simulator.

2. Indicate the use of a wide variety of scenarios, including multiple and sequential failures, to fully exercise the EOPs on the simulator or during the walkthroughs and thus expose the operators to a wide variety of EOP uses.

3. Indicate that all EOPs will be exercised by each operator.

WATTS BAR RESPONSE TO TP.1 - The major concern is apparently the usage of TVA's PWR simulator for WBN operator training. It is true that there are enough differences between the simulator and WBN to make its use for license exams impractical. The major differences lie in system setpoints with minor differences in controls/instrumentation and location. The theory, design, and applications are still for a Westinghouse PWR plant, which make this simulator the most accurate and effective training aid for WBN operators.

A typical 8 hour simulator training period consists of 4 hours classroom discussion and 4 hours simulator operations. The WBN operators are thoroughly trained on the usage of WBN procedures during the classroom instruction. It is at this time that the differences are pointed out by the instructor. When the class moves to the simulator, the operators review the control boards and further discuss differences with the simulator instructor during the simulator exercises. This combination of classroom and simulator training is fully adequate to ensure that each operator understands the differences between the plant and the simulator.

The WBN operators are exposed to a wide variety of simulator exercises which require the usage of all WBN EOPs (excluding some FRG's and ECA's). The FRG's and ECA's that are not covered by simulator scenarios are covered in classroom discussion. A random sampling of the scenarios are used in each exercise.

SER FINDING TP.2 - It is not clear in Section H (page 17) whether the program is to be evaluated or whether operators are to be evaluated. The PGP should state that the operator's knowledge and performance of EOPs will be evaluated after training and that appropriate follow-up training will be conducted for individuals whose knowledge or performance is not acceptable.

WATTS BAR RESPONSE TO TP.2 - Each operator is exposed to these exercises in the initial training and in refresher training. The operator's knowledge and performance of EOPs will be evaluated after training and followup training will be conducted for individuals whose knowledge or performance is not acceptable. Section E.8 has been revised to include this type statement.

SER FINDING TP.3 - The training program should include a commitment to train each operator on revised EOPs prior to standing watch in the control room when revisions are implemented.

WATTS BAR RESPONSE TO TP.3 - A commitment to train each operator on EOP revisions has been made as part of the Licensed Requalification Training at WBN. As Emergency Procedures are revised, a sign-off sheet is placed in the appropriate manual and must be signed off in accordance with the shift turnover log. In addition to the above training, each licensed operator is required to read each EOP annually on a monthly rotation schedule.

Section E.6 has been revised to include WBN policy for the review of revisions to EOPs.

WBN believes that its training program in the use of EOPs is fully adequate and that the operators are capable of responding to any incident or accident. In order to maintain our program integrity and to ensure that our operators have the best possible training, a WBN specific simulator is being purchased. The estimated operational date for this simulator is June 1988.

ATTACHMENT

VIII. PROCEDURE GENERATION PACKAGE

A. INTRODUCTION

1. Purpose

The purpose of this Procedure Generation Package (PGP) is to describe the emergency instruction (EI) development at Watts Bar Nuclear Power Plant (WBN).

2. Scope

The PGP was developed in response to Supplement 1 to NUREG-0737, Item 7.2b, page 15. This document is a WBN plant specific PGP which implements, along with the Writers Guide in OSLA-46 and the EI revision 1 Maintenance Program in AI-3.4, the original PGP.

3. Organization

This document consists of the following four parts:

Plant-specific Technical Guideline,

Writers' Guide for EIs

EI Verification and Validation Program (V&V), and

EI Training Program

Each part describes the approach to be taken as part of the overall EI Implementation Plan for WBN.

B. PLANT-SPECIFIC TECHNICAL GUIDELINE

1.0 General

This instruction contains the method that will be used to convert the generic guidelines into EIs. Additionally, this instruction will specify the personnel who will write the EIs and the source documents they will use.

Because of the similarity between WBN and the generic plant used in the Westinghouse Owner Group (WOG) guidelines, WBN will use revision 1 of the generic guidelines to develop plant-specific Emergency Instructions (EIs). WBN contains two major differences from the WOG generic plant. These differences are the upper head injection system and the ice condenser. TVA has received the WOG guidelines taking into account these differences.

2.0 Personnel

Personnel selection will be based on familiarity with plant operations, knowledge of plant systems, understanding of WOG guideline development and the writers' guide (OSLA-46). The Operations and Engineering Sections at WBN will perform the work.

3.0 Source Documents

EI writers will use the following source documents to prepare EIs:

Writers' Guide (OSLA-46)
WOG generic guidelines and background documents
UHI/Ice Condenser Changes
Electrical Drawings
Flow Drawings
Administrative Instructions
Licensing Commitments Relating to EIs
FSAR
Derivations for Calculated Mathematical Values Used in EIs
Setpoint Verification Document
Step Deviation Document
Westinghouse Bulletins and Memos
Operations Instructions
Validation and Verification Records

4.0 Method

The writer will review the source documents and then construct draft EIs. The writer will also complete the Step Deviation Document. This document (Figure B.4) will be used to explain any variance between a WOG step and a WBN step.

The following are additional instructions for writing the EIs and for completing the form.

1. If it is determined that a generic step is compatible with WBN, then the step should be copied into the WBN instruction. Since the Technical basis of the step is explained in the WOG Background Document, there is no need to repeat this on the Step Deviation Document.

2. When a WOG step specifies a numerical value to be calculated, the value will be determined and put into the WBN instruction. The form should indicate where the method of derivation is located (e.g. setpoint verification document or other plant specific documentation).

3. When a WOG step requests plant-specific details or actions to be added to the instruction, add the information to the instruction. However, if the operator actions are highly routine or well within the knowledge of the operator, the specific steps may be deleted. Consideration shall be given to the minimum number, qualifications, training, and experience of the operating crew.

4. If the WOG guideline fails to identify or address systems or actions that are unique to WBN, then steps shall be included to encompass the necessary actions.

5. If a WOG step specifies an action that cannot be performed at WBN, the step will be deleted or modified.

6. Minor modifications to WOG steps are acceptable without extensive justification provided that the change does not alter the intent of the guideline. Examples of these types of changes are as follows:

   a. Deletions of level of detail (See item 3 above).

   b. Deletions of overly obvious actions called for in the WOG guidelines.

   c. Rewording of WOG steps to conform to standard WBN terminology.

   d. Rearranging WOG steps to streamline the procedure due to WBN control room design and for the operator convenience.

   e. Changes as allowed by background of UHI/IC guidelines.

5.0 Documentation

1. The completed WBN Step Deviation Document will be provided as a source document to assist in the EI verification process and in the revision, review, and approval process.

2. The completed Step Deviation Document should be maintained as a controlled document to be utilized by the EI Revision/ Maintenance program.

C. WRITERS' GUIDE (See OSLA-46)

1.0 General

A writers' guide (see OSLA-46) for EIs is a plant-specific document that provides guidelines on writing EIs, using good writing principles. In addition to establishing sound writing principles, the guide helps to promote consistency among all EIs and their revisions, independent of the number of EI writers.

The writers' guide will be revised, as necessary, based on feedback from operator training, experience, and validation.

2.0 Document Description

Information on the following major items are included in the plant-specific writers' guide for EIs:

a. EI Designation and Numbering
b. Instruction Organization and Format
c. Writing Instruction Steps
d. Foldout page
e. Status Trees
f. Mechanics of Style
g. Graphs, Charts, Tables and Figures
h. Maintaining EIs
i. Availability and Accessibility

The WBN Writers' Guide for EIs is based on the INPO EOP writing guidelines (INPO 82-017) and the Westinghouse Owners Group writers' guide. The WBN guide is provided in OSLA-46.

D. EI VERIFICATION AND VALIDATION PROGRAM

1.0 General

This document outlines the process by which WBN upgraded EIs will be initially verified and validated.

The objectives, specific criteria, methods of Verification and Validation (V&V), personnel and documentation to support the program will be discussed. It is intended that this will be an ongoing program and when significant modifications are made to procedures, a similar validation process will be conducted. In addition to the V&V program, a Control Room Design Review effort will be undertaken to identify human engineering discrepancies.

2.0 Objectives

In evaluating each of the objectives, consideration must be given to the human factors aspects. The verification/validation process will address all of the following questions:

1. Are the EIs technically correct, i.e., do they accurately reflect the technical guidelines and other EI source documents?

2. Are the EIs written correctly, i.e., do they accurately reflect the plant-specific writers' guide?

3. Are the EIs usable, i.e., can they be understood and followed without confusion, delays, and errors?

4. Is there a correspondence between the instructions and the control room/plant hardware, i.e., control equipment/ indications that are referenced are available (inside and outside of the control room), use the same designation, use the same units of measurement, and operate as specified in the instructions?

5. Are the language and level of information presented in the EIs compatible with the minimum number, qualifications, training, and experience of the operating staff?

6. Is there a high level of assurance that the instructions will work, i.e., will the instructions correctly guide the operator in mitigating transients and accidents?

3.0 Responsibilities

The Operations supervisor or his designee will be responsible for the V&V program. The reviewer or review team will be responsible for verifying that the criteria of the objectives are met and that discrepancies are documented. The Plant Operations Review Committee is responsible for final approval of the emergency instructions.

4.0 Method of Verification/Validation

It should be noted that to initially establish the validity of the EIs, to meet the above objectives, the personnel chosen to write the EIs will be familiar with plant equipment, operations, technical requirements, operator knowledge level, the writers' guide and the technical guideline. This is considered as a factor in the V&V process. Secondly, the generic guidelines were validated on a simulator to determine the effectiveness of the instruction network including technical content, instruction interrelationships, usability, human factor considerations, etc. This too, is considered a factor in this process.

The means by which additional V&V will be performed to meet each objective is as follows:

1. Are EIs technically correct, i.e., do they accurately reflect the technical guidelines and other EI source documents?

   a. The objective will be met by performing a step-by-step tabletop review of the EI. The reviewer(s) shall be familiar with plant equipment, operations, technical

requirements, operator knowledge level, and the technical guidelines. Additionally, the reviewer should not be the writer of the EI. Using the source documents, the reviewer(s) should address the following concerns:

1) Is the Step Deviation Document accurate and complete?

2) Is correct plant-specific information incorporated into the EIs, such as valve numbers, numerical values and operator tasks?

3) Have all calculated values been verified?

4) Are licensing commitments satisfied?

2. Are EIs written correctly, i.e., do they accurately reflect the plant writers' guide?

This objective will be met by performing a table-top review of the EI. The review will be a direct comparison between the writers' guide and the EI. The reviewer shall be a person familiar with the Writers' Guide for and should not be the writer of the EI.

3. Are EIs usable, i.e., can they be understood and followed without confusion, delays and errors?

Operations personnel will conduct simulator exercises for the Westinghouse recommended test sequences for V&V. If the simulator cannot model certain aspects of the Westinghouse test sequences, then a control room or simulator walk-through will be performed in lieu of the simulator exercise. The simulator crew and observer(s) will attempt to identify problems where the user:

a. Allows a limit to be exceeded.

b. Fails to detect a key signal or parameter.

c. Does not perform an action or step. This also includes action required to take place at some time later based on continuous monitoring of a parameter.

d. Performs an action not in the procedure.

e. Selects the wrong instruction.

f. Performs an inappropriate action out of sequence.

g. Has to re-read instruction steps (readability).

h. Takes excessive time to complete an action. This also includes action required to take place at some time later based on continuous monitoring of a parameter.

i. Fails to perform actions at the required time.

j. Fails to observe cautions or notes.

k. Has difficulty making transitions from one instruction to the next.

l. Is confused or uncertain about performance of an action.

Feedback received during EI operator training will be used to improve EI usability.

4. Is there a parallel between the instructions and the control room/plant hardware?

This objective will be met by performing a plant/control room walkthough. The reviewer(s) shall be familiar with WBN equipment and operations. The reviewer(s) should verify the following for plant equipment specified in the EI.

a. Equipment is available for operator use.

b. Equipment is identified properly.

c. Actual units of measure and the range of indicators/ recorders correspond to values specified in the EI.

5. Are the language and level of information presented in the EI compatible with the minimum number, qualifications, training, and experience of the operating staff?

This objective will be satisfied by having the Operations and Engineering Sections write the EIs, since they are familiar with the above. WBN EIs will be checked out on the simulator by Operations personnel prior to operator training, and during EI training sessions, the operator will be able to supply additional feedback to identify problems. The validation and verification when performed using the simulator will be completed using maximum of four operators to be consistent with minimum staffing in Tech Specs.

6. Is there a high level of assurance that the instructions will work, i.e., do the instructions guide the operator in mitigating transients and accidents?

The generic guidelines are backed up with computer analysis and, as stated earlier, were verified on a simulator. Additionally, WBN EIs will be tested on the simulator, control room or simulator walkthrough, or table-top review.

5.0 Discrepancy Detection

The purpose of the V&V program is to detect discrepancies. A reviewer or review team will be assigned to address each objective listed above. It will be the responsibility of the reviewer or review team to ensure that the criteria of the objectives are met and discrepancies are documented. Identified discrepancies will be documented on the EI Verification and Validation Record (Figures B.5 and B.6). The reviewer(s) should also make recommendations to resolve discrepancies when appropriate.

6.0 Discrepancy Resolution

When a discrepancy is identified, a resolution will be developed to satisfy the discrepancy. The solution to some discrepancies may involve correcting the instruction, while others may be addressed by operator training. The resolution will be written on the EI Verification & Validation Record. The verification of the EI is not complete until the discrepancies have been resolved. The Operations supervisor, or his representative shall have final approval of the disposition of each discrepancy.

7.0 Documentation

The EI Verification & Validation Record should be maintained as a controlled document to be utilized by the EI Revision/Maintenance Program.

E. EI TRAINING PROGRAM

1.0 General

The EI training program will be developed to support implementation of the EIs. The EI writer interfaces with the Power Operations Training Center to ensure a supportive program.

2.0 Program Description

When developing the EI training program, the following major items were considered:

1. what type of operator training should be provided (initial, refresher)

2. what method of operator training should be followed

3. what operator knowledge and skill level is desired

4. what instruction tasks exist that require operator decision-making

5. what training material is needed to support EI training requirements

6. what current operator licensing requirements exist

7. what method should be provided for operator feedback into the training program and EI development

8. what will be the effect on current plant operation while training operators on EIs not yet in place at the plant.

This description outlines the approach to be used to train licensed operators on EIs and to ensure the operators are informed and knowledgeable of future changes to the EIs.

3.0 Training Program Goals

The initial overall training goals for the EOP training program are as follows:

- to enable the operators to understand the structure of the EOPS
- to enable the operators to understand the technical bases of the EOPs
- to enable the operators to have a working knowledge of the technical content of the EOPs
- to enable the operators to use the EOPs under operational conditions

Training program objectives to these goals will be developed for each lesson plan.

4.0 Initial EOP Training Methods

The EOP training program is established to instruct operators in the EOPs. It consists of classroom instruction and simulator exercises.

a. Instruction

Classroom instruction sessions will be conducted. Included in the information presented during this method will be the following:

A typical 8 hour simulator training period consists of 4 hours classroom discussion and 4 hours simulator operations. The WBN operators will be thoroughly trained on the usage of WB procedures during the classroom instruction. It is at this time the differences will be pointed out by the instructor.

When the class moves to the simulator, the operators review the control boards and further discuss differences with the simulator instructor during the simulator exercises. This combination of classroom and simulator training is fully adequate to ensure that each operator understands the differences between the plant and the simulator.

Training will be conducted with all operators performing their normal control room functions. Additional training will be conducted where the members of a crew alternate responsibilities. This additional training is important to promote understanding of the other operators' responsibilities in the overall conduct of the actions and it should lead to enhanced communications within the control room.

5.0 Refresher Training

The WBN operators will be exposed to a wide variety of simulator exercises which require the usage of all WBN EOPs (excluding some FRGs and ECAs). The FRGs and ECAs that are not covered by simulator scenarios are covered in classroom discussion. A random sampling of the scenarios are used in each exercise.

Training on EOPs will be conducted in such a matter that each crew performs the simulator exercise with each operator performing the actions that he normally would be responsible for during an emergency incident. Licensed operators not assigned to a shift will participate in the simulator exercise as part of a control room crew.

The Power Operations Training Center and Operations Staff will participate in the development and execution of refresher training. The training staff is responsible for developing the scenarios, observing and evaluating the simulator exercises, and critiquing the results. Any additional training needs will be determined from the performance of the operators.

The scenarios will be varied sufficiently to ensure the operators do not develop a set pattern of responses to incidents but are able to respond to the symptoms as they develop.

6.0 Training On Revisions

A commitment to train each operator on EOP revisions has been made as part of the Licensed Requalification Training at WBN. As Emergency Procedures are revised, a signoff sheet will be placed in the appropriate manual and must be signed off in accordance with the shift turnover log. In addition to the above training each licensed operator will be required to read each EOP annyally on a monthly rotation schedule.

7. Inputs Into Training Program Changes

a. Supporting Training Material Changes

Changes to supporting training material will be factored into updated lesson plans and operator memorandums. Some of the supporting material identified to date is as follows:

- o WOG EOP
- o background information
- o associated WCAPs

b. Operator Feedback

Operator feedback resulting from EOP verification, EOP validation, and training critiques will be used to keep the training program and EOPs current and relevant.

8. Evaluation

The operators' knowledge and performance of EOPs will be evaluated after training and appropriate follow-up training will be conducted for individuals whose performance is not acceptable.

IX. EI REVISION/MAINTENANCE PROGRAM

A. INTRODUCTION

1.0 Purpose

The purpose of this EI revision/maintenance program is to describe the procedure to be followed when revision to the EIs become necessary due to technical revisions only.

2.0 Scope

This document was developed to meet the requirements for maintaining the EIs as specified in the Procedure Generation Package (PGP).

B. EI REVISION GUIDE

1.0 The revision to the instruction is necessary (i.e. technical error correction, new commitment, new industry philosophy, or plant design change).

2.0 An Unresolved Safety Question Determination (USQD) has been prepared and no USQ exists.

3.0 The guidelines of the writers' guide OSLA-46 were conformed to.

4.0 Revision does not conflict with previous V&V comments unless resolved by Operations supervisor or his representative.

5.0 Verification & Validation Document has been updated (controlled document)

a.	Simulator evaluation	Performed
b.	Table-top review	Performed
c.	Task analysis	Performed

6.0 Step deviation document has been updated (controlled document) for all technical changes

____	a.	WOG Generic Guidelines	Consulted
____	b.	WOG Background Document	Consulted
____	c.	WOG UHI/IC ERG Document	Consulted
____	d.	All other source documents as outlined in PGP	Consulted

7.0 Setpoint Verification Determination has been made.

8.0 Operator training conducted for all shift crews.

9.0 All the original requirements of the procedure generation package found in this AI have been met.

10.0 Type "A" variable list has been revised if required.

Rev. _____
Page _____ of _____

STEP DEVIATION DOCUMENT

STEP:

WOG STEP:

JUSITIFICATION OF DIFFERENCES:

WRITER _____ DATE _____

Figure B.4

EOP VERIFICATION & VALIDATION RECORD

Procedure No. _____ Title _____

Rev. No. _____ Rev. Date _____

Reviewer _____ Review Date _____

Final Approval _____ Page 1 of _____

STEP NO.	DISCREPANCIES AND RECOMMENDATIONS	FINAL RESOLUTIONS

Figure B.5

Page _____ of _____

EI VERIFICATION AND VALIDATION
CONTINUATION SHEET

STEP NO.	DISCREPANCIES AND RECOMMENDATIONS	FINAL RESOLUTIONS

Figure B.6

II. GLOSSARY

Align	Place systems or components (e.g., valves and breakers) in proper positions for accomplishing specified function.
Allow	To permit a stated condition to be achieved. For example, allow discharge pressure to stabilize.
Attempt	To make an effort to perform a task. This verb should only be used when there is a significant possibility the specified task may not be achieved.
Begin	To set into motion something that continues for some time.
Block	To prevent or inhibit the normal functioning of a device or control system.
Check	To note a condition and compare with some instruction condition.
Close	To change the physical position of a device to either prevent the flow of mass thru the device (such as valves, doors, etc.) or in the case of breakers to permit the flow of electrical current.
Complete	To perform a specified action or task to a final end.
Continue	To maintain a course of action or to resume a course of action which was interrupted.
Control	To manually or automatically operate equipment as necessary to satisfy instruction requirements.
Decrease	To cause a parameter to become smaller in magnitude. (Avoid its use because of oral communication problems.) "Lower" or "reduce" is preferred.
Determine	To ascertain the status or to resolve a question through an investigative process. Generally used to initiate an investigation upon which to base a decision.

II. GLOSSARY

Ensure	To observe that an expected characteristic or condition exists and, if necessary, to take actions to make the condition occur. Typically the expectation comes from some previous automatic or operator action.
Equalize	The process of making two or more variables the same.
Establish	To make arrangements for a stated condition.
Evaluate	To determine the significance or worth of something usually by careful appraisal or study. Generally to formulate a decision regarding a course of action by careful study of applicable conditions. For example, "Evaluate the need for continued containment spray system operation."
Faulted	Used to describe a secondary system component with a feedwater or steam break.
Implement	To carry out in conjunction with an ongoing evolution. To initiate and maintain a prescribed course of action(s).
Increase	To make or become greater or larger. (Avoid its use because of oral communication problems). "Raise" is preferred.
Initiate	To commence or begin. Generally used to cause the start or beginning of an effort which can not be completed in a short time.
Inspect	To examine closely in a critical manner. Generally used to require a search for a potential problem or error.
Intact	Describe a steam generator which has neither a tube rupture nor is faulted.
Investigate	To observe or study by close examination in a systematic manner. Generally used to cause a search for problems or information.
Isolate	To separate one item from another. Generally used to require the securing of flow to and from a component. For example, "Isolate the boron injection tank."

II. GLOSSARY

Local (Locally)	An action performed by an operator outside the control room.
Lower	To cause a parameter to become smaller in magnitude.
Maintain	To control a given parameter to some instruction condition continuously.
Manual (Manually)	An action performed by an operator in the control room. (The word is used in contrast to an automatic action, which takes place without operator intervention.)
Monitor	Similar to "check", except implies a repeated function.
Normal	A value of a process parameter experienced during routine plant operations.
Open	To change the position of a mechanical device to either permit the flow of mass through the device (such as valves, doors, etc.) or in the case of breakers to prevent the flow of electrical current.
Operate	To turn on or turn off as necessary to achieve the stated objective or function.
Place	To direct to a specific location. Generally used to direct the movement of a control device to a specified position. When used there should be direct correspondence between the directed position and the actual position as indicated on the associated control.
Prepare	To make ready for some purpose, use or activity. To plan in advance for an activity. Generally used to require all advanced planning and initial conditions be completed prior to performing a related activity.
Prevent	To keep from happening. Generally used to direct any necessary actions to preclude an action or condition from occurring.

II. GLOSSARY

Raise	To cause a parameter to become larger in magnitude. For example, "Raise RCS pressure."
Record	To set down in writing. Generally used to require the writing of information so as to create a permanent reference.
Reduce	To cause a parameter to become smaller in magnitude. For example, "Reduce RCS pressure."
Refer	Use as a supplement. Perform applicable actions of cited instruction and return to the controlling instruction.
Reset	To restore to an initial or previous state. Generally used to direct the placement of a component or control device to a pretripped or to a ready/standby condition.
Restore	To return to a former original condition. Generally used to require the reinstatement of a system or board function to a pretripped or a ready/standby condition.
Ruptured	Used in describing a steam generator with a tube(s) break.
Set	To adjust a device especially a measuring or control device to a desired position. Generally used to direct the positioning of a variable control device. For example, "Set diesel speed to 900 rpm."
Shall	Implies mandatory requirement.
Should	Implies nonmandatory, preferred, or desired method.
Shutdown	To stop or cease to operate. Generally used to direct the placing of a system or complex piece of equipment in a normal nonoperating condition.
Stable	In reference to process parameters, it means controllable within some desired range.
Start	To begin an activity or undertaking. Generally used to direct the placing of a piece of equipment from a shutdown to a running condition when such action is achieved by the placing of a control device in a corresponding "start" position.

II. GLOSSARY

Stop	To cease an activity or to cause an activity to cease. Generally used to direct the placing of a piece of equipment from a running to a shutdown condition when such action is achieved by the placing of a control device in a corresponding "Stop" or "Off" position.
Terminate	To bring to an end or to cease an activity. Generally used to direct the cessation of a system or complex function.
Throttle	To operate a valve in an intermediate position to obtain a given flow rate.
Trip	To direct the manual actuation of a control which will cause the associated device to cease operation in a short time frame.
Vent	To permit a gas or liquid confined under pressure to escape at a vent (e.g., "vent . . . pump").
Verify	To observe that an expected characteristic or condition exists and, if necessary, to take actions to make the condition occur. Typically the expectation comes from some previous automatic action (usually signoff required).

III. ABBREVIATIONS (Used in Instruction Body)

NOTE: Other abbreviations are used in valve checklists for brevity purposes since the valve number is the main identifier.

ABGTS	-	auxiliary building gas treatment system
AC	-	alternating current
ACB	-	air circuit breaker
AFW	-	auxiliary feedwater
AHU	-	air handling units
AI	-	administrative instruction
amp	-	ampere
AOI	-	Abnormal Operating Instruction
Auto	-	automatic
Aux	-	auxiliary
Avg	-	average
BA	-	boric acid
BAT	-	boric acid tank
Bd	-	board
BIT	-	boric injection tank
bkr	-	breaker
Bldg	-	building
BOP	-	bearing oil pump, Balance of Plant
CCP	-	centrifugal charging pump
CCS	-	component cooling system
CCW	-	condenser circulating water
Chem	-	chemistry, chemical

III. ABBREVIATIONS

CL	-	cold leg
CLA	-	cold leg accumulator
cntmt	-	containment
compt	-	compartment
COPS	-	cold over pressure protection system
CRDM	-	control rod drive mechanism
CST	-	condensate storage tank
CVCS	-	chemical and volume control system
DC	-	direct current
DG	-	diesel generator
DI	-	demineralizer
dp, ΔP	-	differential pressure
dpm	-	decade per minute
dr	-	drain
ECCS	-	emergency core cooling system
EGTS	-	emergency gas treatment system
EHC	-	electrohydraulic control
el	-	elevation
elev	-	elevation
ERCW	-	essential raw cooling water
FCV	-	flow control valve
FI	-	flow indicator
ft	-	feet
FOST	-	fuel oil storage tank
FW	-	feed water

III. ABBREVIATIONS

gal	-	gallon
GOI	-	General Operating Instruction
gpm	-	gallons per minute
HCV	-	hand control valve
Hg	-	mercury
HL	-	hotleg
HP	-	health physics
hp	-	horse power
hr	-	hour
hs	-	hand switch
HUT	-	holdup tank
HVAC	-	heating, ventilating, and air conditioning
HX	-	heat exchanger
in.	-	inch
inst	-	instrument
IR	-	intermediate range
IRM	-	intermediate range monitor
kW	-	kilowatt
lb	-	pound
LCV	-	level control valve
max	-	maximum
MCC	-	motor control center
MCR	-	main control room

III. ABBREVIATIONS

MD	-	motor driven
MFW	-	main feedwater
MG	-	motor generator
min	-	minute, minimum
MOV	-	motor operated valve
mR	-	millirem
MSIV	-	main steam isolation valve
MSR	-	moisture separator reheater
MW	-	megawatt
MWT	-	megawatt thermal
NIS	-	nuclear instrumentation system
NPSH	-	net positive suction head
NR	-	narrow range
NRC	-	Nuclear Regulatory Commission
PCB	-	power circuit breaker
PD	-	positive displacement
PNL	-	panel
PORV	-	power operated relief valve
PR	-	power range
press	-	pressure
PRT	-	pressurizer relief tank
psi	-	pounds per square inch
psia	-	pounds per square inch (absolute)
psid	-	pounds per square inch (differential)

III. ABBREVIATIONS

psig	-	pounds per square inch (gauge)
P-T	-	pressure-temperature
PTS	-	pressurized thermal shock
pzr	-	pressurizer
RCP	-	reactor coolant pump
RCS	-	reactor coolant system
RECIRC	-	recirculation
REG	-	regulator
REP	-	Radiological Emergency Plan
RHR	-	residual heat removal system
RNO	-	response not obtained
RM	-	radiation monitor
RPI	-	rod position indicator
RPS	-	reactor protection system
rpm	-	revolutions per minute
RR	-	radiation recorder
RTD	-	resistance temperature detector
RVLIS	-	reactor vessel level indication system
RWST	-	refueling water storage tank
Rx	-	reactor
SD	-	shutdown
sec	-	second
SFP	-	spent fuel pit
S/G	-	steam generator

III. ABBREVIATIONS

SGTR	-	steam generator tube rupture
SI	-	safety injection, surveillance instruction
SOI	-	System Operating Instruction
SR	-	source range
SRM	-	source range monitor
SRO	-	senior reactor operator
STM	-	steam
SUR	-	startup rate
T-avg	-	average temperature
T/C	-	thermocouple
T-cold	-	RCS cold leg temperature
Tech Spec	-	technical specifications
Temp	-	temperature
T-hot	-	RCS hot leg temperature
TI	-	Technical Instruction
T-ref	-	reference temperature
TSC	-	technical support center
turb	-	turbine
UHI	-	upper head injection
VAC	-	volts, alternating current
VCT	-	volume control tank
VDC	-	volts, direct current
Vent	-	ventilation
W	-	watt
WR	-	wide range

IV. WRITERS' GUIDE FOR EMERGENCY INSTRUCTIONS

SCOPE

The purpose of this section is to provide administrative and technical guidance and to specify Human Factors approaches to be used in the preparation of Emergency Instructions (EIs).

TABLE OF CONTENTS

F. Mechanics of Style

1. Spelling
2. Punctuation
3. Capitalization
4. Vocabulary
5. Numerical Values
6. Abbreviations, Acronyms and Symbols
7. Hyphens

G. Graphs, Charts, Tables and figures

H. Maintaining EIs

I. Availability and Accessibility

A. (EIs) Designation and Numbering

Each (EI) shall be uniquely identified. This identification permits easy administration of the process of instruction preparation, review, revision, distribution, and operator use.

1. Instruction Title

a. Every instruction shall have its own descriptive name that summarizes the scope of that instruction or states the event which it is intended to mitigate.

b. Consult AI-3.4 for instruction titles; any new titles should be consistent with the generic guideline title.

2. Instruction Numbering

a. (EIs) are to be subdivided into 3 categories:

1) Instructions for diagnosis or mitigation of design basis events (E-series).

2) Function Restoration instructions (FR-series) to address or respond to a challenge to a Single Critical Safety Function.

3) Emergency Contingency instructions (ECA-series) to address events that go beyond the design basis events and that are not easily covered in the E-series or which may complicate or reduce the effectiveness of the E-series instructions if included therein.

b. Alphanumeric Instruction Designators:

1) Design basis event instructions should be designated E.

Example: E-0, E-1, etc.

2) Subinstructions to these design basis event instructions should be designated as follows:

Example: ES-0.1, ES-1.1, etc.

3) Function Restoration instructions should be designated FR.

Example: FR-S.1, FR-H.3, etc.

4) Emergency contingency instructions should be designated ECA.

Example: ECA-1

5) Emergency Contingency instructions should be identified by decimals.

Example: ECA-1.1

c. Consult AI-3.4 for already approved instruction numbers and titles.

d. Refer to Figures 3 through 5 for examples of the page identification information.

3. Page Numbering

a. Each page of the (EIs) will be numbered near the top center of the page as in accordance with the plant administrative instructions.

Example: WBN
E-2 Unit 1 or 2
Page 1 of 3
Rev. 0

b. Each page will be numbered consecutively at the bottom center of the page.

c. The top heading and the bottom page number will define the borders of the page and will ensure that information is not lost during reproduction.

B. Instruction Organization and Format

1. Plant Cover Page (all instructions) will identify the EI, give its revision number and date, number of pages (so that missing pages can be identified), provide a place for review and approval signatures, and indicate the facility to which the EI applies. The format of the cover sheet is specified in the administrative instruction.

2. Instruction Cover Page (all procedures) will include the EI purpose, symptoms, and transition from other instructions. The purpose should contain a brief statement that describes what is intended to be accomplished. The symptoms should include a brief list of the conditions or parameters which might be observed prior to using the instruction. The transition from other instructions section should include the list of EIs which direct the operator to use the instruction. An exception is E-0 which does not include the transition from other instructions section. Refer to Figure 3 for examples of the procedure cover page.

3. Instruction Step Pages (all instructions) will present the stepwise operator instructions in a two-column format. The left-hand column is designated for operator actions and the right-hand column is designated for contingency actions when the expected response is not obtained.

Any immediate action steps will be identified by a note prior to the first action step.

Instruction Steps will be numbered as follows:

1. High-Level Step

   a. Substep

      1) Substep

         a) Substep

Substeps are lettered sequentially according to expected order of performance.

The completion of instructions steps will have END after the last step.

Refer to Figure 4 for an example of an instruction step page.

4. Foldout Page (as required) will summarize only that information which an operator should have continuously available. Margins should be at least 3/4 inches.

5. Appendixes and Attachments (as required) will present non-graphical data to supplement action steps. The use of appendixes will be referenced in the instruction steps. Each appendix should be uniquely identified and follow the instruction step pages. The margin next to the ring binder should be at least 3/4 inches. The side margins should be at least 1/2 inches.

6. Figures (as required) will present graphical data to supplement action steps. The use of figures will be referenced in the instruction steps. The figures should be uniquely identified and precede any appendixes. The margin next to the ring binder should be at least 3/4 inches. The side margins should be at least 1/2 inches.

7. Tables will be integrated into the steps where the use would simplify the step or steps necessary to perform the intended action.

8. Status Trees (as required) will present decision blocks to direct the operator to the appropriate FR. Refer to Figure 5 for an example of the status tree format. The status trees may be supplemented by figures and tables as required.

C. Writing Instruction Steps:

1. Step Length and Content

Instruction steps will be concise and precise. Conciseness denotes brevity; preciseness means exactly defined. Thus, instructions should be short and exact. General rules to be used for step length and content are as follows:

a. Instruction steps should deal with only one idea.

b. Short, simple sentences should be used in preference to long, compound, or complex sentences.

c. Complex instructions should be described in a series of steps, with each step made as simple as practicable.

d. All steps are assumed to be performed in sequence unless stated otherwise in a preceding NOTE.

* e. Actions required in a particular step should not be expected * to be complete before the next step is begun. If assigned * tasks are short, then the expected action will probably be * completed prior to continuing. However, if an assigned task * is very lengthy, additional steps may be performed prior to * completion. If a particular task must be completed prior to * continuation, this condition must be stated clearly in that * step or substep.

f. The objective of operator actions should be specifically stated. This includes identification of exactly what is to be done and to what. If a step contains three or more action items, they should be listed rather than embedded in the sentence.

g. Plant parameters which are presented by instrumentation available in the control room should be specifically identified.

h. Identification of components and parts should be complete.

i. Instruction content should be written to communicate to the user. Consideration should be given to the minimum number, qualifications, training, and experience of the operating crew.

j. Expected results of routine tasks need not be stated.

k. When actions are required based on receipt of an annunciated alarm, list the setpoint of the alarm for ease of verification.

l. When requiring resetting or restoration of an alarm or trip, list the expected results immediately following the resetting or restoration if it would be beneficial to the operator.

m. When considered beneficial to the user for proper understanding and performance, describe the system response time associated with performance of the instruction.

n. When system response dictates a time frame within which the instruction must be accomplished, prescribe such time frame. If possible, however, avoid using time to initiate operator actions. Operator actions should be related to plant parameters.

o. Each action step should be completely contained on one page. For those infrequent occurrences when a step must be continued on the subsequent page, the continuation will be identified on all pages that the step appears.

p. When operator action steps should be continuously performed throughout the remainder of the procedure, then use the appropriate action verbs such as monitor, maintain, or control.

q. Operator action steps which require verification should be denoted by the appropriate action verbs such as verify or ensure.

r. Steps should be written as follows:

Action Verb---object.

s. Positive or affirmative sentences should be used rather than negative ones, whenever possible.

2. Instruction Steps, Left-Hand Column

The left-hand column of the two-column format will be used for operator instruction steps and expected responses. The following rules of construction apply:

a. High level steps are those steps that tell the user "what" to do. Substeps of the high level step may be used to tell the user "how" to accomplish the high level step.

b. If only a single task is required by the step, then the high level step contains its own EXPECTED RESPONSE.

c. Left-hand column tasks should be specified in sequence as if they could be performed in that manner. The user would normally move down the left-hand column when the expected response to a particular step is obtained.

d. When the expected response is not obtained, the user is expected to move to the right-hand column for contingency instruction.

e. All instructions should end with a transition to either another EI or to some normal plant instruction.

f. Any immediate operator steps should be identified at the beginning of the instruction in NOTE form.

3. Instruction Steps, Right-Hand Column

The right-hand column is used to present contingency actions which are to be taken in the event that a stated condition, event, or task in the left-hand column does not represent or achieve the expected result. The following rules apply to the right-hand column:

a. Contingency actions should identify directions to override automatic controls and to initiate manually what is normally initiated automatically.

b. Contingency actions should normally be specified for steps or substeps for which the task requirements might not be satisfied. However, to avoid excessive clutter, it is permissible to delete obvious contingency actions.

c. Contingency actions should be numbered consistently with the expected response/action for substeps only. A contingency for a single-task high level step will not be separately numbered but will appear on the same line as its related step.

d. The user is expected to proceed to the next numbered step or substep in the left-hand column after taking contingency action in the right-hand column.

e. As a general rule, all contingent transitions to other instructions takes place out of the right-hand column. (Pre-planned transitions may be made from the left-hand column.)

f. If a contingency action cannot be completed, the user is expected to proceed to the next step or substep in the left-hand column unless specifically instructed otherwise. When writing the instructions, this rule of usage should be considered in wording subsequent left-hand column instructions.

g. If contingency action must be completed prior to continuing, that instruction must appear explicitly in the right-hand column step or substep.

4. Use of Logic Terms

Conditional statements or logic sequences are commonly used in EIs to describe a set of conditions or a sequence of actions. Because of their importance and complexity it is important that these statements be constructed using the principles and techniques of formal logic so that they are logically correct, unambiguous, and complete, i.e., that all statements are understandable and all conditions are covered. The logic approach used should be applied consistently throughout the EIs. Further, logic terms and sequences should be highlighted or emphasized so that the operator can clearly identify all conditions and the extent of a given logic sequence. Logic terms should be highlighted for emphasis by capitalizing and underlining.

The logic terms AND, OR, IF, IF NOT, NOT, THEN, and WHEN, are often used in EIs to describe a set of conditions, to sequence action steps contingent upon conditions, or to express complex combinations of conditions, other antecedents, and actions. Each of these logic terms should have a specific function, and should be used consistently within the EIs and in accordance with an accepted convention. Further, when used in combination, care must be taken to avoid vague and difficult to understand instructions. In the discussion that follows, examples illustrating acceptable methods for using logic terms and combinations of logic terms, are presented

Use of IF, IF NOT, WHEN, and THEN

When action steps are contingent upon certain conditions or combinations of conditions, the step should begin with the words IF, IF NOT, or WHEN followed by a description of the condition or conditions (the antecedent), and the word THEN, followed by the action to be taken (the consequent). For example:

IF letdown can NOT be established,
THEN establish excess letdown

WHEN cntmt press reduced to <ØB press,
THEN place Cntmt Spray Pumps in standby

Use of IF NOT should be limited to those cases where the operator must respond to the second of two possible conditions. IF should be used to specify the first condition. For example:

IF (condition 1), THEN (action 1). IF NOT, THEN (action 2).

The logic word THEN Should not be used at the end of an action to instruct the operator to perform another action within the same step, because it runs actions together. For example:

Verify all accumulators are isolated, THEN depressurize RCS

Actions which are embedded in this way (1) may be overlooked and not be performed, (2) make it difficult to verify the performance of each action step when a check-off or sign-off is used, and, (3) can be confused with a logic statement.

Use of AND

Action steps will normally be performed in sequence so that a conjunction such as "and" is not required between the steps. However, in the case of combinations of conditions, the word AND should be placed between the description of each condition. For example:

IF Condition 1
AND Condition 2
AND Condition 3
THEN Action

In order to simplify a long sequence of conditions, the word AND should not be used to join more than four conditions. If more than four conditions need to be joined, a list format should be used. For example:

IF all of the following conditions are met,

a) Condition 1
b) Condition 2
c) Condition 3
d) Condition 4
e) Condition 5

THEN (action)

When used as a simple or compound conjunction, the word "and" need not be emphasized (e.g., to connect actions in a step, as in: "stop SI pumps and place them in standby").

Use of OR

The word OR should be used to call attention to alternative combinations of conditions. The use of the word OR, for conditions, should be in the inclusive sense, i.e., any one or all conditions may be present. For example:

IF Condition 1

OR

IF Condition 2

THEN Action

For alternative actions, the use of OR should be minimized and priorities should be established where possible. If priorities cannot be established, and alternative actions are equally acceptable, then it is necessary to specify the exclusive "or" using an approach similar to that illustrated in the example that follows:

Start either number 1 diesel OR number 3 diesel, but not both.

Combinations of Logic Terms

The use of AND and OR, along with IF and THEN, within the same step should be avoided. When AND and OR are used together, the logic statements can be confusing and ambiguous. For example:

IF condition A AND condition B OR condition C occurs, THEN Action

This statement has two possible meanings:

(1) IF both condition A AND condition B occur, THEN Action

(2) IF both condition A AND condition B occur, THEN Action

OR

IF both condition A AND condition C occur, THEN Action

If the use of AND and OR within the same step cannot be avoided, the more explicit form (as illustrated in examples 1 and 2 above) should be used.

5. Use of Cautionary Information and Notes

a. Because the present action-step wording is reduced to the minimum essential, certain additional information is sometimes desired, or necessary, and cannot be merely included in training. This non-action information is presented as either a NOTE or a CAUTION.

b. CAUTION denotes some potential hazard to personnel or equipment associated with the following instructional step.

c. NOTE is used to present advisory or administrative information necessary to support the action instruction.

d. To distinguish this information from action steps, it will extend across the entire page.

e. CAUTION or NOTE which must be observed prior to the execution of a step shall preceed the step. CAUTION or NOTE applicable after the completion of a step may follow the step.

f. The word CAUTION or NOTE should be underlined and printed in large type.

g. CAUTIONS and NOTES should be able to be read completely without interruption by intervening steps or page turning.

h. CAUTIONS and NOTES should be accurate and concise.

i. As a general rule, neither a CAUTION or NOTE will be used to replace an instruction/operator action step. However, instruction transitions can be included as non-action information in a NOTE absolutely necessary.

Example:

Note: Foldout page should be open.

j. Each CAUTION or NOTE should be completely contained on one page.

6. Calculations

a. Use of formulas or the need for calculations should be minimized.

b. When calculations are required they should be simple.

c. Space should be provided to perform the computation and to record the results.

d. If value has to be determined in order to perform a procedural step, a chart or graph should be used whenever possible.

7. Emphasis

a. Avoid overuse of underlining and capitalizations.

b. Underlining key words and phrases is permissible, but this practice should be used with discretion. Too much underlining may result in reduced effectiveness; too little underlining may result in key words or phrases not standing out when necessary.

8. Referencing and Branching to Other Instructions or Steps

Information necessary to perform a task should be consolidated in one place, if possible. The need to go from one instruction (or part) to another during a sequence of actions is disruptive and can cause errors or unnecessary delays. Consequently, once the sequence of actions has begun, they should continue without interruption. Reference to other parts of the Emergency Instructions should be minimized. When cross-referencing is necessary, a method should be used which is quick, creates the least amount of disruption or chance of error, describes why the operator is leaving one part and going to another, and indicates if he or she needs to return. For example, an EI may call for starting a reactor coolant pump. This action should be carried out following the steps specified in the system operating instruction (SOI), and it may be within the operator's capability to start a reactor coolant pump without providing the steps to do so in the EIs. The specific SOI should, however, be referenced in the EI, and used by the operator if necessary.

If the operator is expected to leave the current instruction and not return, then use the term "Go to". If the operator is to use another instruction as a supplement but not leave the current instruction, then use the term "Refer to".

9. Component Identification & Location

With respect to identification of components, the following rules are to be followed:

a. Equipment, controls, and displays will be identified in operator language (common usage terms). These terms may not always match engraved names on panels but will be complete.

b. When the engraved names and numbers on panel placards and alarm windows are specifically the item of concern in the instruction, the engraving should be quoted verbatim and emphasized by using all capitals.

c. If the component is seldom used or it is felt that the component would be difficult to find, location information should be given following the identification.

10. Level of Detail

a. Avoid excessive detail for routine operations. Any information which an operator is expected to know (based on training and experience) should not be included. The desired level of detail is one in which enough details are presented so that the operator has all the information he needs, but not so many details that the operator becomes burdened or confused by superficial or redundant information. The Validation and Verification Program will help determine if the level of detail is adequate.

b. Constructing steps that are concise and precise will aid in reducing the level of detail. Many actuation devices (switches) in the control room are similar, even though the remotely performed functions are not, so certain action verbs listed here are recommended.

1) Use "start/stop" for power-driven rotating equipment.

2) Use "open/close" for valves.

3) Use "open/close" for electrical breakers.

4) Use "place in AUTO" to refer to equipment when actuation is to be controlled by automatic logic circuitry.

11. Placekeeping Aids

It is important that the operator keeps track of the current step while he is performing the designated action. If an operator cannot keep his place within the instruction without assistance, then the operator should use some type of markings on the step for a placekeeping aid. Checkmarks or initials are examples of acceptable placekeeping aids.

12. Control Room Staffing and Division of Responsibilities

a. This section considers staffing in the control room, and the division of responsibility and leadership among the control room staff as it applies to the use of EIs. The variable nature of control room events and staff capabilities, and the turnover in control room shift crews, make the goals of this section difficult to achieve. However, the following guidelines are important to the efficient and accurate development, and execution of EIs, and should be followed to the extent possible.

b. The EIs should be structured so that the number of people required to carry out specific actions, concurrent actions, and other responsibilities, does not exceed the minimum shift staffing required by a plant's Technical Specifications.

c. During an emergency, it is vital that the actions of the control room staff be carried out efficiently and accurately. This will be determined in part by the quality of the EIs and the training of the operators. However, for the benefits of good procedures and training to be realized, it is important that control room personnel operate as a team with pre-established leadership roles and divisions of responsibility. The leadership roles and division of responsibilities are outlined in the plant administrative instruction.

d. The number and qualifications of personnel available in the control room will determine the number of sequential actions, concurrent actions and other responsibilities that can be carried out, and the efficiency with which they can be carried out. The following goals should be considered in writing the EIs:

- o Minimize physical conflicts between personnel (carrying out actions at the same locations at the same time, or crossing paths),
- o Avoid unintentional duplication of tasks by control room personnel,
- o Ensure that the control room supervisor should be able to keep up with staff actions and plant status.

D. Foldout Page

1. A single foldout page is supplied for all E-series and ECA-series instructions. The foldout page will be titled "FOLDOUT" and will use a single column format (vs. two-column).

2. Each set of operator information will be numbered sequentially and have an explanatory title. The title will be capitalized and underlined for emphasis.

E. Status Trees

1. Critical Safety Function Status Trees will be located in FR-0, Status Trees.

2. The format and content should be consistent with the generic guideline. Refer to Figure 5.

F. Mechanics of Style

1. Spelling

Spelling should be consistent with modern usage. When a choice of spelling is offered by a dictionary, the first spelling should be used.

2. Punctuation

Punctuation should be used only as necessary to aid reading and prevent misunderstanding. Word order should be selected to require a minimum of punctuation.

3. Capitalization

Capitalization may be used in the instruction for emphasis in the following cases:

a. Plant Locations

1) Capitalize major plant areas or buildings

e.g. Auxiliary Building

b. Systems and Components

1) Capitalize the titles of plant systems

e.g. Residual Heat Removal System

2) Capitalize the title of major plant equipment

e.g. Charging Pump

3) When words from a title of a system are used but do not reference the system directly, the words should be in lower case.

c. Major headings should be fully capitalized.

d. Fully capitalize nameplate engravings, alarm window engravings, switch or circuit breaker positions and controller modes of operation.

e. Logic terms should be fully capitalized and underlined.

f. High level steps in the Expected Response column (left-hand column of instructions) should be capitalized and underlined.

g. Key expected values for plant parameter should be fully capitalized.

h. Titles of instructions will be capitalized whenever referenced within any instruction.

4. Vocabulary

Words used in instructions should convey precise understanding to the trained person. The following rules apply.

a. Use simple words. Simple words are usually short words of few syllables. Simple words are generally common words.

b. Use common usage if it makes the instruction easier to understand.

c. Use words that are concrete rather than vague, specific rather than general, familiar rather than formal, precise rather than blanket.

d. Define key words that may be understood in more than one sense.

* e. Some words have unique meanings. Refer to Section II for a glossary of terms.

f. In some cases, certain other words should be avoided simply because they are not adequately defined when used without modification. These inlcude: rapidly and slowly. The same words become acceptable when some clarification is provided.

Example: Rapidly (up to 100°F/HR) cool down the RCS.

These words can be used without clarification, when the meaning would not present confusion.

5. Numerical Values

a. All numerical values presented in the instructions should be consistent with what can be read on instruments in the control room (i.e., consistent with instrument scale and range).

b. The number of significant digits presented should be equal to the reading precision of the indicator.

c. Acceptance values should be stated in such a way that any addition or subtraction operations are avoided, if possible. This is done by stating acceptance values as limits. Examples: 2500 psig maximum, 350°F minimum, between 450°F and 500°F. Tolerances can be expressed by stating the nominal value followed by the acceptable range in parenthesis.

Example: 550 (540-560)°F

Avoid: 550°F ±10°F

d. Engineering units should always be specified when presenting numerical values for process parameters. They should be the same as those used on the control room displays.

e. When a generic guideline specifies a numerical value to be calculated, the method of derivation should be documented and verified.

f. To identify values to be used during adverse containment conditions, the adverse containment values will be enclosed in brackets and the phrase FOR ADVERSE CNTMT will be enclosed with the setpoint.

g. If a numerical value is used that includes decimal information (as opposed to fractions), and the numerical value is less than 1 and greater than -1, then the decimal point should be preceeded by a 0 (e.g., 0.25 or -0.25 rather than .25 or -.25).

6. Abbreviations, Acronyms and Symbols

a. Minimize the use of abbreviations. Abbreviations may be used where necessary to save time and space, and when their meaning is unquestionably clear to the intended reader.

b. Periods should be omitted from acronyms and abbreviations.

c. The plural of an acronym should have no apostrophe (i.e., RCPs).

* * * d. Refer to section III for approved list of abbreviations and acronyms. Abbreviations and acronyms not in section III should be avoided.

7. Hyphens

a. The hyphen should be omitted unless its omission would result in confusion.

b. Examples for acceptable use of hyphens are:

U-235, N-16, pre-position, twenty-one and one-half.

G. Graphs, Charts, Tables and Figures

1. They should be legible, readable, and easy to use under the expected condition of use.

2. Units of scale and measurement should be readily available and usable to the operator.

3. Titles should be descriptive of contents and use.

4. Printed aids should be compatible with the instruction.

5. Graphs, charts, tables, and figures may be included in the instruction step pages or separately as an appendix or figure. The instruction steps should explain the purpose and when the graph, chart, table, or figure should be used.

H. Maintaining EIs

1. EIs should be controlled within the existing plant document control system consistent with the administrative instructions.

2. All copies of EIs should be clearly legible. When it is necessary to replace the entire procedure because of revisions, use, wear, etc., the quality of the replacement copy should be equal to that of the original. Personnel who reproduce pages should ensure that when copies are made, the entire page is reproduced (i.e., that no instructions or parts of instructions are omitted).

3. Periodically evaluate the EIs considering the following:

a. Evaluation of the technical adequacy of the EIs in light of operational experience and use, training experience, and any simulator exercises and control room walk-throughs,

b. Evaluation of the organization, format, style, and content as a result of using the instructions during operations, training, simulator exercises and walk-throughs,

c. Evaluation of staffing and staff qualifications relevant to using the EIs.

4. When changes occur in the plant design, Technical Specifications, Technical Guidelines, Writer's Guide, other plant instructions or control room that will affect the EI, the EIs should be revised on a timely basis to reflect these changes. In addition when operating and training experience, simulator exercises, control room walk-throughs, or other information indicate that incorrect or incomplete information exists in the EI, the EIs should be revised on a timely basis. These changes should be reviewed to ensure consistency with the Procedure Generation Package (PGP) requirements stated in AI-3.4 and the requirements of this Writer's Guide. Operators should be encouraged to suggest improvements to the EIs.

I. Availability and Accessibility

An adequate number of hard copies of EIs should be available in the control room, and at other locations where the EIs may need to be referred to (e.g., technical support center). The distribution of EIs is controlled by the administrative instructions.

The location of EIs within the control room is primarily dictated by control room layout. EIs should be located so that they are immediately accessible to operators while they perform their control room duties. Also, EIs should be usable without interfering with work station activities and without covering up controls and displays.

Accessibility refers to the ease with which the operator can identify and access the relevant Emergency Instructions. The EIs should be uniquely identifiable and should be labeled to facilitate rapid identification and access to any procedure.

REFERENCES

A. INPO Guidelines 82-017, EOP Writing Guideline

B. WOG ERG Writers' Guide

ATTACHMENTS

Figure 1 - Plant Cover Page

Figure 2 - History of Revision and Review

Figure 3 - Procedure Cover Page

Figure 4 - Instruction Step Page

Figure 5 - Status Tree

FIGURE 1

PLANT COVER PAGE
E-0

PROCEDURE TITLE
&
NUMBER

WATTS BAR NUCLEAR PLANT

EMERGENCY INSTRUCTION

E-0

REACTOR TRIP OR SAFETY INJECTION

UNIT 1 OR 2

REVIEW AND APPROVAL
DATES AND SIGNATURES

CURRENT REVISION LEVEL 3

Responsible Section Operations

Prepared By J. Smith/T. Huth

Revised By J. Smith/T. Huth

Submitted By R E Hawkins
Supervisor

PORC Review Date 12/19/85

Approved By
Plant Manager

Date Approved 12/19/85

TOTAL NUMBER OF PAGES

Last page of this instruction: 12

1C	Doc Control Unit, 1520 CST2-C
1C	NRC
1C	NSRS, 249 A HBB-K
1C	Plant Master File
	Plant Manager
1C	Supt (O&E)
	Supt (Maint)
	Plant Adm Svs Supv
1C	ASE Duty Station
	Building Services Supv
	Chem Lab
	Chem Engg Unit Supv
	Chief, Nuclear Safety Staff
1C	Chief, Nuclear Training Branch
	Chief, Quality Audits Br, 1350 CUBB-C
1C	Compliance Unit
	Component Engg & Svs Group
	DPSO-WBN
	Dwg & Vendor Manual Supv
	Elect Maint Supv
1C	Staff Reference Copy
1C	Engg Section Supv
	Health Physics Lab
	Health Physics Supv
	Industrial Safety Supv
	Instr Maint Supv
	Instr Shop
	Materials Unit Supv
	Mech Maint Supv
	Mech Engg Unit Supv
	Modifications Manager
1W	Operating Instruction Coordinator
2C	Operations Supv
1W	Operator Training Classroom
1C	Operations Training Sect Supv
	P&S Supv
1C	Plant QA Supv
	Plant Training Officer
	Power Stores Unit Supv
1C	Preop Test Supv
	Public Safety
1C	Reactor Engg Unit Supv
1C	Shift Engr's Office
	Support Svs Supv
2C	Tech Support Center
1C	Unit 1 Control Rm
1C	Unit 2 Control Rm
1C	John Raulston, NEB, W10A63 C-K
	Site Director
1C	Watts Bar Tech Svs
	Design Svs Manager
	Regulatory Engineer
1C	DNPEC Assessment Team
1W	Inpo
1C	SSE-NRC

OS/6

FIGURE 2

HISTORY OF REVISION AND REVIEW
E-0

WBN
E-0
Page 1 of 1

HISTORY OF REVISION/REVIEW

REV NO	Date	Revised Pages	REASON FOR CURRENT REVISION (INCLUDE ALL TEMPORARY CHANGE NUMBERS)
0	2/13/85	New	NUREG 0737 commitment
1	4/12/85	2 & 10	Announce reactor trip, SI; change S/G setpoint; delete rod indication
2	6/14/85	6	To reflect NRC commitment SER-5.4.3
3	12/19/85	All	Incorporate items from additional FRs and ECAs

FIGURE 3

PROCEDURE COVER PAGE
E-0

LEFT MARGIN - 10
RIGHT MARGIN - 90

LINE 4 -- HEADING
CENTERED

TITLE CENTERED

TRIPLE SPACE

PAGE NUMBER
CENTER AT BOTTOM

WBN
E-0 Unit 1 or 2
Page 1 of 12
Rev. 3

REACTOR TRIP OR SAFETY INJECTION

A. PURPOSE

This instruction provides actions to ensure proper response of the automatic protection systems following manual or automatic actuation of a reactor trip or safety injection, to assess plant conditions, and to identify the appropriate recovery instruction.

B. SYMPTOMS

1. FOR REACTOR TRIP:
   a. Any reactor trip annunciator LIT
   b. Rapid decrease in neutron flux indication
   c. Rod bottom lights LIT
   d. Rapid decrease in load
2. FOR SAFETY INJECTION:
   a. Any SI annunciator LIT
   b. ECCS pumps running

FIGURE 4

INSTRUCTION STEP PAGE

LEFT MARGIN - 10
RIGHT MARGIN - 90

TAB - 19

TAB - 65

TAB - 10

AT LEAST DOUBLE SPACED

AT LEAST TRIPLE SPACED

PAGE NUMBER

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E-0 Unit 1 or 2
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Rev. 3

REACTOR TRIP OR SAFETY INJECTION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	Note: Steps 1 through 12 are IMMEDIATE ACTION STEPS.	
	Note: FOLDOUT PAGE should be open.	
	Note: STATUS TREES should be monitored WHEN transitioned to another instruction.	
1	Ensure Reactor Trip a. Reactor trip breakers - OPEN b. Neutron flux - DECREASING	IF reactor can NOT be tripped, THEN go to * FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS
2	Ensure Turbine Trip a. Turbine stop valves - CLOSED	
3	Ensure Shutdown Boards Energized a. Generator PCB - OPEN (normally 30 sec delay) b. Station service transferred c. Voltage on SD boards	IF one complete train of SD boards energized, THEN continue with the next step IF no complete train of SD boards energized, THEN go to * ECA-0.0, LOSS OF ALL AC POWER
4	Check If SI Actuated a. ANNOUNCE REACTOR TRIP SAFETY INJECTION	Check if SI is required. IF required THEN manually actuate SI. IF NOT required THEN go to * ES-0.1, REACTOR TRIP RESPONSE

FIGURE 5

STATUS TREE

HEADING TO BE ADJUSTED FOR BINDING

AT LEAST 3/4 INCH MARGIN

AT LEAST 1/2 INCH MARGIN

PAGE NUMBER

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FR-0 Unit 1
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Revision 3

F-0.1 SUBCRITICALITY