ATTACHMENT 1

PROCEDURES GENERATION PACKAGE

FOR

BEAVER VALLEY POWER STATION, UNIT 2

August 1, 1984

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SECTION 1

Introduction

I. The Procedures Generation Package (PGP) has been developed in response to Supplement 1 of NUREG-0737, part 7.2.b. Its purpose is to describe the process for translating generic Westinghouse Emergency Response Guidelines (ERGs) into plant specific Emergency Operating Procedures (EOPs). This description includes the work necessary to complete the initial draft of the function-oriented EOPs and for maintaining these EOPs after implementation.

II. The PGP consists of the following sections:

- Section 1 - Introduction
- Section 2 - Initial Emergency Operating Procedure Development
  - Plant Specific Technical Guidelines
  - Program for Verification/Validation
- Section 3 - EOP Administrative Controls Following Initial Implementation
  - Purpose
  - Applicability
  - Definitions
  - Responsibilities
  - References
  - Instructions
  - Appendices
  - Tables and Figures
- Section 4 - Training Program Description
- Section 5 - Reference Plant/BVPS Unit 2 Plant Comparison
- Section 6 - References

SECTION 2

Initial Emergency Operating Procedure Development

I. Plant Specific Technical Guidelines

A. The generic Westinghouse Owners Group ERGs, Rev. 1, dated September 1, 1983, which are based on the re-analysis of transients and accidents as described in NUREG-0737 item I.C.1, will be used as the technical guidelines from which plant specific EOPs will be drafted. The resulting EOPs will direct operator actions to mitigate the consequences of plant accidents and transients while maintaining the plant in a safe condition without the need for prior diagnoses of the event.

B. The following major items were considered in the methodology used in translating the Westinghouse ERGs into plant specific EOPs:

1. Identification of design differences between the Westinghouse reference plant and Beaver Valley Unit 2. These differences are itemized in Section 5.

2. Mechanics of conversion

3. Plant specific technical information

4. Documentation requirements

5. Use of background documents supplied with the technical guidelines

6. Best use of extensive operating experience.

C. Mechanics of Conversion

1. The designated EOP writers obtained and reviewed the following EOP source documents appropriate to the specific procedure generated.

a. Westinghouse Owners Group, Emergency Response Guidelines Revision 1, dated September 1, 1983.

b. Corresponding Westinghouse Owners Group Background Documents (Procedure specific, and Generic Issues).

c. Beaver Valley Power Station, Unit 2 Final Safety Analysis Report.

d. Beaver Valley Power Station, Unit 2 Technical Specifications.

e. As built plant drawings.

2. The EOP draft was generated in accordance with the EOP Writers Guide contained in Section 3, Appendix A.

   a. By following the guidelines found in the generic ERGs and the EOP Writers Guide, the resulting draft EOPs have been prepared utilizing acceptable human factors principles.

   b. The direct involvement of a human factors specialist during the CRDR will further ensure the correct application of human factors principles as applied to the draft EOPs during performance of the CRDR.

3. The designated EOP writer generated EOP drafts, attempting to follow to the maximum extent possible, the ERGs. A step by step correspondence between the draft EOP and the ERG, although ideal, is most probably not possible. It was therefore important that the writer attempt to maintain consistency of intent between the EOP and the ERG, while incorporating those deviations deemed necessary to account for:

   a. Equipment/plant condition differences between the ERG reference plant and BVPS Unit 2.

   b. Licensing commitments for BVPS Unit 2.

   c. Resolutions of deficiencies identified by the BVPS EOP Verification or Validation Programs.

   d. Recommendations obtained from BV-1 operator experience.

4. The EOP writer will document all deviations as identifie in Step 3 above on the "EOP-ERG Deviation Form" (Figure 53.B-1 in Section 3). This documentation is necessary to:

   a. Provide required information during EOP verification.

   b. Provide required basis information during future EO revision.

   c. Provide documentation to allow for adequate evaluation of the safety significance of the deviation during review prior to final approval.

   d. Provide justification for the deviation during vali dation of the EOP.

e. Demonstrate to the NRC, upon request, that all deviations to the ERGs have been recorded and the safety significance of each has been determined.

NOTE: Examples of deviations that do not constitute a change in mitigation strategy include:

- changes in wording to clarify the intent of a step
- change in step order to accommodate plant design
- deletion of a step to accommodate plant design
- addition of a step to accommodate plant design
- addition of notes, cautions or steps based on existing operating procedures, operator experience, or plant license commitments

5. If a significant deviation is determined to exist during the review, it can remain as part of the EOP provided an analysis has been prepared for review that demonstrate that the deviation is acceptable and that the plant can be brought to a safe condition.

   a. A deviation which has safety significance (significant deviation) shall be reported to the NRC along with the analysis or technical justification.

6. The EOP writer will generate a background document providing a step by step description of the EOP in accordance with the BVPS Unit 2 EOP Background Document Writers Guide. (Appendix B of Section 3.)

D. Control Room Instrumentation and Controls

1. The generic ERGs have as their basis, the re-analysis of transients and accidents from which the operator information and control needs necessary for mitigation of the events were identified. Consistency will be maintained between the operator information and control needs identified in the generic ERGs and the draft EOPs.

2. The CRDR task analysis, which includes a verification of instrumentation activity, will utilize the draft EOPs in order to:

a. identify the characteristics of the instrumentation and controls needed to satisfy the operators information and control requirements.

b. determine the availability and suitability of existing instruments and controls to satisfy these requirements.

3. The CRDR task analysis will be documented to provide feedback to the EOP development effort and resolve any resulting human engineering deficiencies in accordance with the CRDR Program Plan.

4. Deviations to the ERG background document equipment qualification statements need not be addressed as this issue is being documented separately under 10CFR50.49 and the review of instrumentation identified in Regulatory Guide 1.97. To do so could influence the EOP development objective for maintaining consistency between the generic ERGs and draft EOPs.

a. The results of the approved Regulatory Guide 1.97, Rev. 2, review of the NRC's Safety Evaluation Report (SER) for BV-2 will provide feedback to the operation instrumentation and control requirement, if required.

b. Additional deviations may be identified by the review of the NRC's SER and as such will be reviewed to determine their safety significance.

II. Program for Verification/Validation

A. The programs for verification and validation provide assurance that each draft EOP is:

1. Technically correct in that it accurately reflects the generic technical guidelines.

2. Written correctly in that it accurately reflects the EOP Writers Guide.

3. Useable in that the procedure can be understood and followed by trained operators, without confusion, delays or errors.

4. Operationally correct in that there is a corre spondence between the procedure and the control room/plant hardware, and that the language and level of information presented in the EOP is compatible with the minimum number, qualification, training and experience of the operating staff.

5. Capable of directing the operating staff in managing emergency conditions.

B. The verification program is described in Appendix F of Section 3.

1. The detailed instructions of this program provides the administrative process to be followed in determining if each EOP is technically correct and written correctly. This verification program includes:

   a. a process for identifying discrepancies

   b. a process for resolving discrepancies

   c. a feedback mechanism for evaluating changes to the EOP which may result from the verification process

2. This verification program was prepared following guidance contained in the Emergency Operating Procedures Verification Guidelines written by the Emergency Operating Procedures Implementation Assistance (EOPIA) Review Group and published by INPO.

C. The validation program includes: table-top, control room walk-through and simulator validation.

1. The validation programs provide the administrative process to be followed in determining if the procedure is useable and operationally correct. The validation program includes:

   a. a process for identifying discrepancies

   b. a process for resolving discrepancies

   c. a feedback mechanism for evaluating changes to the EOP which may result from the validation process.

2. All three programs will be used for validating EOPs with one exception:

   Due to the dual licensing concept sought by BVPS, the BVPS-1/BVPS-2 EOPs will be duplicated as much as possible while allowing for plant specific differences. BVPS-1 simulator validated EOPs will be used when possible to validate the BVPS-2 EOPs and plant specific differences which cannot be simulated by the BVPS-1 simulator will receive extensive table-top validation and control room walk-through validation.

3. Detailed instructions for each of the validation programs are included in Section 3. Each EOP will be validated using at least one of the following methods:

   a. Table-Top Validation; Appendix C, Section 3

b. Control Room Walk-Through Validation; Appendix D, Section 3

c. EOP Validation on the Simulator; Appendix E, Section 3

4. The criteria for selecting scenarios, when used, will be developed as part of the CRDR to assure procedures can be used by the operators in the control room with minimum shift staffing. The following bases will be used to select the final set of event sequences when developing a scenario so that:

   a. They represent the example events that are recommended for analysis in Section 3.8 of NUREG-0700 as determined applicable.

   b. They represent a good cross-section of the operation of safety-related systems and equipment.

   c. They represent event sequences from Section 15 (Accident Analysis) of the FSAR.

   d. They represent a good cross-section of the events to which specific human factors engineering evaluation criteria can be applied for which significant problem areas were identified during the CRDR operating experience review.

5. This validation program was prepared following the guidelines contained in the Emergency Operating Procedures Validation Guidelines written by the Emergency Operating Procedures Implementation Assistance (EOPIA) Review Group and published by INPO.

SECTION 3

EOP Administrative Controls Following Initial Implementation

DUQUESNE LIGHT COMPANY

BEAVER VALLEY POWER STATION

OPERATING MANUAL

CHAPTER 53.B.1

EMERGENCY OPERATING PROCEDURES

EXECUTIVE VOLUME

UNIT 2

DUQUESNE LIGHT COMPANY
Beaver Valley Power Station Unit 2
Operations Startup Manual

APPROVAL SHEET - NONADMINISTRATIVE

UNIT 2 - OPERATING MANUAL

CHAPTER 53.B - Emergency Operating Procedures Executive Volume
SECTION 1 - Generation, Revision, Review, and Approval of Emergency Operating Procedures

Prelim Issue

| Rev. No. | Pages Issued | Approval | | Effective Date |
|---|---|---|---|---|
| | | Signature | Date | |
| 0 | i through 7, Appendix A<br>i through 18, Appendix B<br>i through 6, Appendix C<br>1 through 5, Appendix D<br>1 through 6, Appendix E<br>1 through 6, Appendix F<br>1 through 3, Tables<br>53.B.1 through 53.B.4, Figures<br>53.B.1 through 53.B.18 | W F Swiderski | 7/9/84 | Not to be issued until EOPs are completed |

# CHAPTER 53 B.1
# GENERATION, REVISION, REVIEW, AND APPROVAL OF EMERGENCY OPERATING PROCEDURES

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## I. PURPOSE

This procedure identifies and describes the process requirements for the preparation, revision, review and approval of Emergency Operating Procedures (EOPs), and EOP supporting documents (eg., administrative procedures, background information).

## II. APPLICABILITY

This procedure applies to all station personnel, vendors and consultants who prepare or revise EOPs.

## III. DEFINITIONS

A. BV-1 Control Room Simulator - A full scale model of the BV-1 Control Room that dynamically models plant operating characteristics and responses to a given set of conditions.

B. Emergency Operating Procedures (EOPs) - Symptom and function based plant procedures directing operator actions necessary to mitigate consequences of transients and accidents.

C. Emergency Response Guidelines (ERGs) - Westinghouse Owners Groups (WOG) generic technical guidelines that provide the bases for the development of the EOPs.

D. EOP Source Documents - Documents or records upon which EOPs are based.

E. EOP Validation - The evaluation performed to determine that the actions specified in the EOPs will mitigate plant transients and accidents and that the EOPs can be followed by trained operators to manage the emergency conditions in the plant.

F. Scenario - A structured plan of parameter and plant symptom changes that provide operating cues for conducting the assessment of the EOPs in the mitigation of plant transients and accidents.

G. Significant Deviation - A difference between the ERGs and EOPs that changes the overall mitigation strategy or intent delineated by the ERG that is significant to safety.

H. Simulator Validation - A method of EOP validation whereby control room operators perform actual control functions on the BV-1 Control Room Simulator in response to a scenario for an observer/review team.

I. Table-Top Validation - A method of EOP validation in a classroom environment whereby qualified personnel explain and/or discuss EOP action steps, for an observer/reviewer in response to a scenario or as part of an actual industry operating experience review.

J. Walk-Through Validation - A method of EOP validation whereby control room operators conduct a step-by-step enactment in the control room and plant, of their actions in response to a scenario for an observer/review team without carrying out the actual control functions.

IV. RESPONSIBILITIES

A. The Nuclear Station Superintendent is responsible for final approval of all EOPs, EOP revisions, and revisions to EOP administrative procedures.

B. The Nuclear Station Operating Supervisor (NSOS) or his designee is responsible for the following:

1. Review and maintenance of EOPs and EOP supporting documents.

2. Review and approval of all discrepancies discovered in such documents during the review process prior to document implementation.

3. Assign appropriate personnel to draft or revise an EOP or refer the EOP to the appropriate station departments.

V. REFERENCES

A. "Guidelines for the Preparation of Emergency Operating Procedures", (NUREG-0899) August 1982.

B. "Emergency Operating Procedures Implementation Guidelines", (INPO 82-016) June 1982.

C. "Emergency Operating Procedures Writing Guideline", (INPO 82-017) July 1982.

D. "Emergency Operating Procedures Verification Guideline", (INPO 83-004) March 1983.

E. "Emergency Operating Procedures Validation Guidelines", (INPO 83-006) July 1983.

F. "Westinghouse Owners Group Emergency Response Guidelines", (HP-Revision 1) September 1983.

VI. INSTRUCTIONS

A. The development of EOPs, EOP revisions, or revision to EOP supporting documents (eg., administrative procedures, background information, etc.) shall be identified by the NSOS or his designee.

1. This type of activity will normally be initiated by:

a. action by the WOG-ERG subcommittee

b. plant modifications

c. plant procedures revision

d. feedback from plant operators or training group.

2. An EOP writer designated by the NSOS or his designee shall generate a draft EOP or EOP revision in accordance with the following guidance:

a. Obtain and review appropriate EOP source documents for the EOP being generated to assure previous conclusions reached and assumptions made during the initial drafting of the EOP is not invalidated.

- WOG-ERG (most current approved revision)
- WOG-ERG Background Documents (procedure specific and generic issues)
- BVPS Unit 2 FSAR
- BVPS Unit 2 Technical Specifications
- BVPS Unit 2 Operating Manual
- Previous EOP draft deviation sheets
- As built plant drawings (eg., P&ID, elementaries)
- Additional information as appropriate

b. Any revision to the EOPs not initiated by the WOG must be reviewed against the source documents. This is to assure the mitigation strategy is maintained and that a deviation significant to safety is not incorporated which could invalidate the analysis which forms the basis for the acceptability of the symptom based EOPs.

c. Follow to the maximum extent possible the ERGs or guidance provided by the WOG for all revisions to the EOPs initiated by an ERG revision. This avoids, if possible, significant deviations which constitute a change in mitigation strategy. A step-by-step correspondence between the EOP draft and the ERG, although ideal, will most probably not be possible. Therefore, it is important that the writer attempt to maintain correspondence of intent, while incorporated those deviations deemed necessary to account for:

1) Known equipment/plant condition differences between the ERG reference plant and BVPS Unit 2.

2) Resolutions of deviations identified in previous Verification and Validation efforts.

3) BVPS 2 licensing commitments.

4) Operations department recommendations.

d. Generate the draft or revision in accordance with the "Writers Guide for Emergency Operating Procedures", Appendix A of this procedure.

e. Draft a background information document or revise the existing background information document in accordance with "Writers Guide for EOP Background Information", Appendix B of this procedure.

f. Document any deviations between the ERGs and the EOP on the "EOP-ERG Deviation Form" (Figure 53.B-1). This documentation is required to:

1) Provide required information during EOP verifications.

2) Provide required basis information for future EOP revisions.

3) Provide documentation to allow for adequate evaluation of the safety significance of the deviation during the EOP review prior to final approval.

4) Provide justification of the deviation during validation of the EOP.

Note: Examples of deviations that do not constitute a change in mitigation strategy include, but not limited to:

- Changes in wording to clarify step intent.
- Changes in step order to accomodate plant design.
- Deletion or addition of steps to accomodate plant design.
- Addition of Notes, Cautions or Steps based on existing operating procedures, experience or licensing commitments.

3. All draft EOPs or revisions to existing EOPs shall undergo a procedure validation prior to implementation.

   a. Validation will demonstrate that the operating staff can manage the emergency condition through the EOP's use and the EOP is operationally correct in respect to the following:

      1) Usability - i.e., the EOP can be understood and followed by trained operators, without confusion, delays or errors.

      2) Technically correct - i.e., there is a correspondence between the EOP and the control room/plant hardware.

      3) Operationally correct - i.e., the language and level of information presented in the EOP is compatible with the minimum number, qualifications, training and experience of the operating staff.

      4) Effective - i.e., there is a high level of assurance that the procedure will work.

   b. The NSOS or his designee shall determine the extent and duration of the EOP validation effort. This determination should be based on the complexity and scope of the draft or revision, but must address the usability, technical and operational correctness, and the effectiveness as described above.

   c. The validation evaluation criteria (Table 53.B-1) should be utilized when selecting specific methods

of validation. The validation effort will consist of either a table-top, walk-through or simulator method of validation OR a combination of those methods.

1) The validation method and evaluation criteria shall be documented on the "Validation Evaluation Criteria", form (Figure 53.B-2) for each draft EOP or EOP revision.

d. Detailed instructions for performance and documentation of each method of validation are contained in:

1) Appendix C, "Detailed Instructions for Performance of Table-Top Validation".

2) Appendix D, "Detailed Instructions for Performance of Control Room Walk-Through Validation".

3) Appendix E, "Detailed Instructions for Performance of EOP Validation on the Simulator".

4. All draft EOPs or EOP revisions shall undergo procedure verification prior to implementation.

a. Verification of the EOPs will assure that consistency has been maintained between EOP source documents and the EOPs by determining that they are:

1) Technically correct, i.e., they accurately reflect the generic technical guidelines.

2) Written correctly, i.e., they accurately follow the guidance of the "Writers Guide for Emergency Operating Procedures", Appendix A of this procedure.

b. Detailed instructions for the performance and documentation of EOP verification are contained in Appendix F, "Detailed Instructions for Performance of EOP Verification", of this procedure.

5. The configuration of the EOPs will be controlled by allowing revisions only on an entire EOP set basis. There will be NO page-by-page changes permitted for any procedure in the EOP set. Due to the complex

referencing and branching that occurs within the EOPs, revision to the complete set may be required if any step number changes are made.

-END-

# APPENDIX A

## Writer's Guide For
## Emergency Operating Procedures

APPENDIX A

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# APPENDIX A

## I. INTRODUCTION

A. Purpose

1. The purpose of this document is to provide administrative and technical guidance on the preparation of Emergency Operating Procedures (EOPs).

B. Scope

1. This writers guide applies to the writing of all EOPs and subsequent revisions to EOPs.

## II. EOP DESIGNATION AND NUMBERING

A. Each EOP shall be uniquely identified. This indentification will permit efficient administration of the process of procedure preparation, review, revision, distribution, and operator use.

B. Title Page

1. One Title Page shall be placed in the front of the EOP set to identify and introduce the EOPs (See Figure 53.B-3).

C. Procedure Title

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

2. The title should be consistent with the generic guidelines title.

D. Procedure Numbering

1. EOPs are to be subdivided into 3 categories:

a. Procedure for diagnosis or mitigation of design basis events (E-series).

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

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c. Emergency Contingency procedures (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 procedures if included therein.

2. Alphanumeric Procedure Designators

a. Design basis event procedures should be designated E, using the same number as designated by the generic guideline.

Example: E-0

b. Subprocedures to these design basis event procedures should be designated as follows:

Example: E-0; ES-0.1, ES-0.2, etc.
E-1; ES-1.1, ES-1.2, etc.

c. Function Restoration procedurs should be designated FR, using the same alphanumeric system used by the generic guideline.

Example: FR-H.3, FR-C.1, FR-I.2, etc.

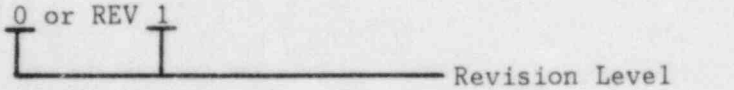
d. Emergency contingency procedures and subprocedures should be designated ECA, using the same decimal number used by the generic guideline.

Example: ECA-1.1, ECA-0.0, ECA-0.1, ECA-0.2 etc.

E. Revision and Issue Numbering and Designation

1. One or two digits following the word "REV" will be used to designate the revision level of the EOP.

Example: RFV 0 or REV 1



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2. One or two digits following the word "ISSUE" will be used to designate the revision level of the ERG utilized as a reference to the EOP.

Example: ISSUE 1
└ Revision Level of the Reference ERG

3. The procedure revision and issue numbers are to be placed at the bottom right margin of each page.

4. To identify revisions to the text of an EOP, a change bar located in the left margin alongside the text change will be used to indicate a change in the left column, and a bar in the right margin will indicate the text change in the right column.

5. A Non-Administrative - Approval Sheet (See Figure 53.B-4) will be maintained to track revisions. This Approval Sheet shall be placed behind the Title Sheet and shall record revisions for the entire EOP set.

F. Page Numbering

1. Each page of the procedure will be identified by:

a. The page number shall be specified as "PAGE ___ OF ___" to be centered at the bottom of each page.

III. FORMAT

A. Page Format

1. Each page of the EOPs shall include the BVPS unit designator followed by the Operation Manual chapter number that the EOPs will be placed in, at the upper right corner of the page.

Example: 2.53.A
-- Operating Manual
BVPS Unit Designator

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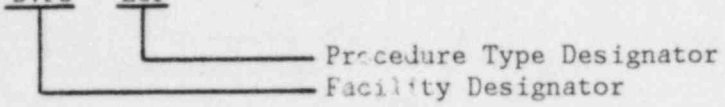
2. Each page of the EOPs shall include a facility designator and identification as an EOP which shall be centered on the top of each page.

Example: BVPS - EOP




3. A dual-column format shall be used. The left-hand column is desinated for operator action or expected plant response, and the right-hand column is designated for contingency actions to be taken when the expected response is not obtained. A sample page format is presented in Figure 53.B-5.

4. Step numbering and identification shall be in the format presented in Figure 53.B-5.

5. A border shall frame the procedure page to ensure that information is not cut off of a page during reproduction as shown on Figure 53.B-5.

6. The margins of each procedure page shall allow sufficient space that the border is clearly visable and space exists on the left side margin to allow hole punches for a standard ring binder.

7. The procedure steps should be separated by a minimum of two line spaces. Procedure sub-steps shall be separated by a minimum of one line space.

B. Procedure Organization

1. Cover Sheet

a. Each procedure shall have a Cover Sheet (See Figure 53.B-6) which shall contain the following sections:

1) Procedure Number; which conforms to the requirements of II.D.1. and 2., "Procedure Numbering".

2) Title; which shall be stated for operator association with the symptoms.

3) Purpose; which states the purpose or intended objective of the procedure in a specific, concise form.

4) Symptoms or Entry Conditions; which includes only those alarms, indications, operating conditions, automatic system actions, or other unique conditions that the operator is to consider in deciding to use the EOP.

2. Operator Actions Section

a. The remaining section of the procedure is the Operator Actions Section which shall contain the following sections:

1) STEP; the actions or expected responses shall be numbered using alpha-numeric convention in a sequential order with circled steps indicating IMMEDIATE ACTION STEPS.

2) ACTION/EXPECTED RESPONSE; operator actions and expected plant responses should be short concise identificable instructions that provide appropriate directions for the user.

3) RESPONSE NOT OBTAINED; these steps shall parallel the ACTION/EXPECTED RESPONSE steps and provide operator guidance when the expected plant response specified is not obtained.

IV. WRITING INSTRUCTIONAL STEPS

A. Instruction Step Length and Content

1. Instructions should be short and concise. Genral rules to be used in meeting these objectives 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 evolutions should be prescribed in a series of steps, with each step made as simple as practicable.

d. Objects of operator actions should be specifically stated. This includes identification of exactly what is to be done and to what.

APPENDIX A

e. Limits should be expressed quantitatively whenever possible.

f. Mandatory sequence of steps is assumed unless otherwise stated.

g. Identification of components and parts should be complete.

h. Instruction content should be written to communicate to the user.

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

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

k. 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.

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

m. 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.

n. Units of measure specified in procedural steps shall be consistent with actual units used on plant instruments.

o. When anticipated system response may adversely effect instrument indications, describe the conditions that will likely introduce instrument error and means of determining if instrument error has occured by using a NOTE.

p. When additional confirmation of system response is considered necessary, prescribe the backup readings to be made.

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B. Instruction Column

1. The left column of the dual-column format will contain the operator instructional steps. The following rules are established for this column, in addition to the general rules above.

   a. Expected indications should be presented in this column.

   b. Operator actions in this column should be appropriate for the expected indications.

C. Response Not Obtained Column

1. Contingency actions will be presented in the right column of the dual-column format. Contingency actions are operator actions that should be taken in the event a stated condition, event or task does not represent or achieve the expected result. The need for contingency action occurs in conjunction with tasks involving verification, observation, confirmation and monitoring.

2. Contingency actions will be specified for each circumstances in which the expected results or actions might not be achieved. The contingency actions should identify, as appropriate, directions to override automatic controls and to initiate manually what is normally automatically initiated.

D. Use of Logic Terms

1. The logic terms AND, OR, NOT, IF, IF NOT, WHEN, and THEN are necessary to describe precisely a set of conditions or sequence of actions. When logic statements are used, logic terms will be highlighted so that all the conditions are clear to the operator. Emphasis will be achieved by using capitilization and underlining. All letters of the logic terms shall be capitalized and the logic term shall be underlined.

2. The use of AND and OR within the same action should be avoided. When AND and OR are used together, the logic can be very ambiguous.

3. The dual-column format used equates to the logic, IF NOT the action in the left column, THEN follow the action specified in the right column. Refer to Figure 53.B-5.

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4. Use other logic terms as follows:

   a. When attention should be called to combinations of conditions, the word AND should be placed between the description of each condition. The word AND should not be used to join more than three conditions. If four or more conditions need to be joined, a list format should be used.

   b. The word OR should be used when calling attention to alternative combinations of conditions. The use of the word OR should always be in the inclusive sense. To specify the exclusive "OR" the following may be used: "either A OR B but not both".

   c. When action steps are contingent upon certain conditions or combinations, the step shall begin with the word IF or WHEN followed by a description of the condition or conditions (the antecedent), a comma, the word THEN followed by the action to be taken (the consequent). WHEN is used for an expected condition. IF is used for an unexpected but possible condition.

   d. Use of IF NOT should be limited to those cases in which the operator must respond to the second of two possible conditions. IF should be used to specify the first condition.

   e. THEN should not be used at the end of an action step to instruct the operator to perform the next step because it runs actions together.

E. Use of Cautionary Information and Notes

1. 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.

   a. CAUTION describes some potential hazard to personnel or equipment associated with the following instructional step.

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

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2. The entire contents of a CAUTION or NOTE should be able to be read completely without interruption by intervening steps and shall be completed on the same page started.

3. CAUTIONS and NOTES should be accurate and concise.

4. The following format shall be used to denote a CAUTION:

   a. To distinquish a CAUTION from action steps, a box composed of astrisks will outline the CAUTION information and will extend across the entire page as shown in Figure 53.B-5.

   b. The word CAUTION shall be underlined and printed in large type.

   c. The CAUTION information will immediately precede the step to which it applies.

   d. Multiple statements included under a single descriptive heading shall be separetly identified.

5. The following format shall be used to denote a NOTE:

   a. To distinguish a NOTE from action steps and CAUTION information, the NOTE shall be enclosed in boxes (framing) and will extend across the entire page as shown in Figure 53.B-5.

   b. The word NOTE shall be underlined and printed in large type.

   c. The NOTE will immediately precede the step to which it applies.

   d. Multiple statements included under single descriptor heading shall be separately identified.

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

F. Calculations

1. Mathematical calculations should be avoided in the EOPs. If a value has to be determined in order to perform a

procedural step, a chart or graph should be used whenever possible.

G. Referencing and Branching to Other Procedures or Steps

1. Referencing implies that an additional procedure or additional steps will be used as a supplement to the procedure presently being used.

   a. Referencing other steps within the procedure being used, either future steps or completed steps, should be minimized.

   b. When only a few steps would be involved in the referencing, the steps should be stated in the procedure as they are needed.

2. To minimize potential operator confusion, branching will be used when the operator is to leave one procedure or step and use another procedure or step.

   a. Use the key words "GO TO" to direct the operator to leave the present step and not return until directed.

   b. Specify information as to procedure and step directed to.

3. Use the key words "Refer to" when the operator is directed to use a procedure or attachment as a guideline concurrently with the procedure in use.

4. Use quotation marks to emphasize the title of the referenced or branched procedure; examples: GO TO E-1, "Loss of Reactor Coolant"; GO TO Step 20.

H. Component Identification

1. 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 procedure, the engraving

should be quoted verbatim and emphasized by using all capitals.

c. The names of plant system titles are emphasized by initial capitalization. When the word "system" is deleted from the title because of brevity and is understood because of the context, the title is also emphasized by initial capitalization.

d. If the component is seldom used, or if it is felt that the component would be difficult to find, the benchmark information should be specified in brackets and location information should follow.

Example: [2SIS*MOV864A] at BB-A

I. Level of Detail

1. Too much detail in EOPs should be avoided in the interest of being able to effectively execute the instructions in a timely manner. The level of detail required is the detail that a newly trained and licensed operator would desire during emergency conditions.

2. To assist in determining the level of EOP detail, the following general rules apply.

a. For control circuitry that executes an entire function upon actuation of the control switch, the action verb appropriate to the component suffices without further amplification of how to manipulate the control device; for example "CLOSE Pressurizer Spray Valves [2RCS-PCV455A(455B)]". Recommended action verbs are as follows:

- For power-driven rotating equipment, use START, STOP.
- For valves, use OPEN, CLOSE, or THROTTLE.
- For power distribution breakers, use SYNCHRONIZE, CLOSE, and OPEN.
- For control switches with a positional placement that establishes a standby readiness condition, the verb "Set" should be used, along with the engraved name of the desired position. Positional placements are typically named "AUTO" or "NORMAL"; for example, SET PORV control switches in AUTO.

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- For multiposition control switches that have more than one position for a similar function, placement to the desired position should be specified; for example, "Place Sample Return Valve Control Switch in NORMAL".

- Standard practices for observing for abnormal results need not be prescribed within procedural steps. For example, observation of noise, vibration, erratic flow, or discharge pressure need not be specified by steps that start pumps.

J. Printed Operator Aids

1. When information is presented using graphs, charts, tables, and figures, these aids must be self explanatory, legible and readable under the expected conditions of use and within the reading precision of the operator.

2. Units of Measure

   a. Units of measure on figures, tables, and attachments should be given for numerical values that represent observed, measurement data, or calculated results. A virgule (slant line) should be used instead of "per". For example: ft/sec., lbs/hr., etc.

3. Titles and headings

   a. Capitalization should be used for reference to tables, figures, titles of tables, figures within text material, and column headings within a table.

      Examples: Refer to Figure 201 for . . .
      as shown in Table 20 . . .
      Equipment Power Supplies, etc.

4. Figure, Table, and Attachment Numbering

   a. Sequential arabic numbers should be assigned to figures, tables, and attachments in separate series. The sequence should correspond with the order of their reference in the text. The symbol "#" and abbreviation "No." are unnecessary and should not be used. The number alone suffices.

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Examples: Figure 1, Figure 2, etc. Table 1, Table 2, etc. Attachment 1, Attachment 2, etc.

b. Page identification for attachments should consist of a block of information that identifies:

1) Procedure number

2) Attachment number

3) Page number

4) Revision number

Page numbering of attachments shall conform with the requirements Section II.F.1.a., "Page Numbering". The first page of an Attachment will be PAGE 1 OF __.

V. MECHANICS OF STYLE

A. Spelling

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

B. Punctuation

1. Punctuation should be used only as necessary to aid reading and prevent misunderstandings. Word order should be selected to require a minimum of punctuation. When extensive punctuation is necessary for clarity, the sentence should be rewritten and possibly made into several sentences. Punctuation should be in accordance with the following rules:

a. Brackets - shall be used to indicate equipment benchmark numbers. (i.e., [2RSS*121A(P21B)(P21C)(P21D)].

b. Colon - shall be used to indicate that a list of items is to follow, for example: Restore cooling flow as follows:.....

c. Comma - Use of many commas is a sign the instruction is too complex and needs to be rewritten. Therefore, evaluate the number of commas to ensure the instruction is not too complex. Use a comma after conditional phrases for

clarity and ease of reading. Example: WHEN level decreases to 60 inches, THEN start pump ....

d. Parentheses - shall be used to indicate alternative items in a procedure or instruction. Usually denotes B train components (i.e., [2SIS*MOV836A(836B)].

e. Periods - shall be used at the end of complete sentences and for indicting the decimal place in numbers.

f. Capitalization - shall be used to emphasize the directing of equipment operation, for example: CLOSE PRZR PORV(s). "GO TO" shall be capitalized when directing branching to other procedures. All accronyms and logic words shall be captialized.

g. Hyphenation - shall be used between elements of a compound word when standard usage calls for it. When doubt exists, the compound word should be restructured to avoid hyphenation.

C. Use of Underlining

1. Underlining will be used for emphasis of the following items:

a. The major task defined in each step.

b. Logic terms (i.e., IF, THEN, IF NOT, etc.)

c. Headings of CAUTIONS and NOTES (i.e., CAUTION, NOTE).

d. Headings of Attachments, and columns in attachments.

D. Vocabulary

1. Words used in procedures should convey precise understanding for a trained person. The following rules apply:

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

b. Use common usage if it makes the procedure 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. Verbs with specific meanings should be used.

f. Equipment status should be denoted as follows:

1) Operable/operability - These words mean that a system, subsystem, train, component, or device is capable of performing its specified function(s) in the intended manner. Implicit in this definition is the assumption that all necessary attendent instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication or other auxiliary equipment required for the system, subsystem, train, component or device to perform its function(s) are also capable of performing related support function(s).

2) Operating - This word means that a system, subsystem, train, component, or device is in service and is performing its specified function(s) and that Equipment Clearances, or other conditions do not prevent it from maintianing that service.

3) Available - This word means that a system, subsystem, train, component, or device is operable and can be used as desired; however, it need not be in service.

4) Additional terms are listed in Table 53.B-2.

E. Numerical Values

1. The use of numerical values should be consistent with the following rules:

a. Arabic numerals should be used.

b. For numbers less than unity, the decimal point should be preceded by a zero; for example 0.1.

c. The number of significant digits should be equal to the number of significant digits available from the display and the reading precision of the operator.

d. Acceptance values should be specified in such a way that addition and subtraction by the user is avoided if possible. This can generally be done by stating acceptance values as limits. Examples: 510F maximum; 300 psig minimum; 580 to 600F. For calibration points, statement of the midpoint and its lower and upper limits would accomplish the same purpose: For example: 10 milliamperes (9.5 to 10.5). Avoid using ±.

e. Engineering units should always be specified for numerical values of process variables. They should be the same as those used on the control room displays, for example: psig instead of psi.

F. Abbreviations, Letter Symbols, And Acronyms

1. The use of abbreviations should be minimized because they may be confusing to those who are not throughly familiar with them. Abbreviations may be used where necessary to save time and space, and when their meaning is unquestionably clear to the intended reader. Consistency should be maintinaed through the procedure.

2. Capitalization of abbreviations should be uniform. If the abbreviation is comprised of lower case letters, it should appear in lowercase in a title or heading. The period should be omitted in abbreviations except in cases where the omission would result in confusion.

3. Letter symbols may be used to represent operations, qualities, elements, relations and quantities.

4. An acronym is a type of symbol formed by the initial letter or letters of each of the successive parts or major parts of a compound term. Acronyms may be used if they are defined, or commonly used.

5. Abbreviations, symbols, and acronyms should not be overused. Their use should be for the benefit of the reader. They can be beneficial by saving reading time, ensuring clarity when space is limited and communicating mathematical ideas.

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6. Refer to Table 53.B-3 for a list of approved acronyms and abbreviations.

VI. CONTINUOUSLY MONITORED CONDITIONS

A. Since plant symptom changes may occur, items not identified by the EOP are addressed by the use of: "Symptomatic Response/Unexpected Conditions" and/or "Critical Safety Function Status Trees".

1. Symptomatic Response/Unexpected Conditions

a. Provides a mechanism to identify operator actions that should be performed any time a listed symptom appears during the performance of an EOP.

b. The information listed will be contained on one page in the format presented in Figure 53.B-7.

c. A Symptomatic Response/Unexpected Conditions sheet will be provided for each E-series and ECA-series procedure which will appear on the back side of each page in the procedure body.

2. Critical Safety Function Status Trees (CSF)

a. Provides a mechanism to address potential challenges to the state of plant safety that could occur at any time during an EOP which would require a transition to a FRP.

b. The CSF should be formated as presented in Figure 53.B-8.

c. The information shall be completed on one page and be assigned its own unique number. i.e., F-0.1, etc.

d. Line pattern coding shall be provided from each last branch to its terminum which will be referred to as colored paths in the EOPs and FRPs as follows:

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e.

| Severity | Designation |
|---|---|
| RED path | solid heavy lines |
| ORANGE path | dashed heavy lines |
| YELLOW path | dotted heavy lines |
| GREEN path | hollow lines |

-END-

# APPENDIX B

## Writer's Guide For
## Emergency Operating Procedures
## Background Information

# APPENDIX B

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# APPENDIX B

## I. PURPOSE

The purpose of this detailed instruction is to provide guidance in the preparation of Background Information for EOPs, to ensure uniformity in the information presented.

## II. SCOPE

This writers guide applies to the writing of all EOP Background Information Documents and their subsequent revisions.

## III. FORMAT

A. Background Information Title Sheet

1. The completed set of EOP Background Information will have a title sheet as shown in Figure 53.B-9.

B. Table of Contents

1. A table of contents will be placed behind the title sheet listing the EOP Background Documents covered in the same sequence as the EOP set.

C. Chapter Title Sheets

1. Each EOP Background Information package shall have a title sheet as shown in Figure 53.B-10.

2. This title sheet shall have the same procedure title and number as it's associated EOP.

D. Revision and Draft Numbering, Designation, and Approval

1. A standard BVPS-2 Non-Administrative Approval Sheet shall be placed after the Background Information Title Sheet. This sheet identifies the revision level and individual EOPs and pages affected by each revision.

2. Each page of the Background Information package shall clearly identify revisions in effect as follows:

a. Numbers following the word "REV" shall be used to designate the revision level of the Background Information Package.

b. The revision number will be placed in the lower right margin of each page of the background

information package directly beneath the Issue number of the EOP.

c. Revisions to the text will be clearly marked by a revision bar in the right margin of the affected pages adjacent to the change.

d. The revision level shall be the same as that of its associated EOP.

3. Each page of the Background Information Package shall clearly identify its issue in effect as follows:

a. Numbers following the word "ISSUE" shall be used to designate the Issue level.

b. The issue level shall be the same as the latest revision level of the source WOG-ERG. i.e., WOG-ERG REVISION 1 shall be denoted on the EOP Background Documents ISSUE 1.

E. Page Numbering and Designation

1. Each page shall be sequentially numbered using arabic numbers.

2. The page number shall be specified by: "PAGE __ OF __".

F. Station and Unit Designation

1. Each page shall include a station designator and indication that the document is part of the EOP series located at the top of each page.

i.e., BVPS - EOP
- EOP: Procedure Series Designator
- BVPS: Beaver Valley Power Station Designator

2. Each page shall include the BVPS unit designator followed by the Operating Manual Chapter in which the document is placed which will be located in the upper right margin of each page.

i.e., 2.53.B
- 53: Operating Manual Chapter
- 2: BVPS Unit 2 Designator

G. Content

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1. Each background information package shall contain the following sections arranged as shown on referenced figures.

   - Introduction (Figure 53.B-11)
   - Recovery /Restoration Techniques (Figure 53.B-11)
   - Step Description Tables (Figures 53.B-12)

2. The information presented in each section is explained in Section IV of this Appendix.

IV. ORGANIZATION

A. The background information package for each EOP should be arranged as follows and present the following information:

1. Title Sheet conforming to the requirements of Section III.C.

2. Introduction presenting the same information found on the EOP cover sheet including:

   - A discussion of event symptoms the EOP is intended to mitigate
   - A discussion of possible entry conditions, transitions or symptoms
   - A discussion of possible exit conditions.

3. Recovery/Restoration Techniques presenting a discussion of the operator stratagies involved while performing the major action steps of the EOP. This consist of the following.

   a. High Level Action Summary - provides the major catagcry of operator actions to be discussed prior to entry into the more specific details provided in the step description tables.

   b. Key Decision Points - presents situations covered in the EOP where the operating staff would probably request TSC staff advice, i.e., when alternate response stratagies may be available.

4. Step Description Tables - provide a separate detailed description for each Step, Caution or Note by providing

the following information items. When an item is not applicable, it should be denoted N/A and not left blank or deleted.

a. STEP, CAUTION OR NOTE - Repeats the High-Level Step, CAUTION or NOTE verbatum.

b. PURPOSE - summarizes the purpose or intent of the step, caution or note.

c. BASIS - Explain or technically justify the requirement to perform the referenced step. This step should state any assumptions made and describe any unique step construction or objective intended. This step may also be used to explain any theory behind the specified corrective action.

d. ACTIONS - List the decisions the operator is required to make and any task he must perform. It should summarize the actions performed by the EOP step. Contingency actions should be included.

e. INSTRUMENTATION - List preferred instrumentation or indications the operator should use to perform a required task or monitor plant conditions. This list should also include the benchboard identification of required instrumentation.

f. CONTROL/EQUIPMENT - List the controls or equipment which the operator is expected to use to perform a task. This section should also provide benchmark identification of required equipment controls.

g. KNOWLEDGE - List knowledge or training requirements that are unique to the understanding or prformance of the step which is beyond the knowledge required by operator training for day-by-day normal plant operations.

## V. WRITING BACKGROUND INFORMATION

### A. Mechanics of Style

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

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2. Punctuation should be consistent with "Writers Guide for Emergency Operating Procedures", (Appendix A) Section V.B.

3. Grammatical style in the usage of sentences and phrases should take the following into consideration:

   - Sentence construction should imitate normal conversational style.
   - Overly long and/or complex sentences should be avoided.
   - Complete sentences should be used in all sections requiring text.
   - Phrases may be used in supplying lists.
   - Additional grammatical guidance is found in Appendix A.

4. The vocabulary or choice of words selected must convey precise meaning to the expected readers. Simple words typical of common usage by the operators are preferred.

5. Acronyms and abbreviations should be consistant with usage in the EOP. Some approved acronyms and abbreviations are listed in Table 53.B-3.

6. Details presented in background information should provide the following:

   - The theory behind the performance of a step to the maximum extent possible.
   - sufficient information such that it can be utilized to train operators in the implementation of the EOPs.
   - sufficient description of components utilized in the EOP to mitigate the accident such as to avoid operator confusion in identification of equipment.

B. Printed Format

1. A minimum of one and one-half inch left side margin shall be used to permit use of a standard ringed binder without punching holes in written matter.

2. A minimum of one inch right side margin is permitted.

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3. A minimum of one line space shall be permitted between a major subject heading and the following subject matter.

4. A minimum of one line space shall be permitted between the subject matter of one major subject and subsequent major subject heading.

-END-

# APPENDIX C

## Detailed Instructions For Performance of Table-Top Validation

APPENDIX C

I. PURPOSE

The purpose of this detailed instruction is to provide guidance in performing table-top validation of EOPs and to ensure uniformity in documentation of EOP table-top validation.

II. VALIDATION PROCESS

A. The validation process will be conducted in three parts; preparation, assessment and resolution.

1. The preparation phase of validation includes actions required of various members of the assigned Review Team to ensure satisfactory completion of the review.

a. Review Team Chariman

1) The Review Team Chairman will normally be the author of the draft EOP or the revision being considered.

2) The Review Team Chairman shall:

a) Select the approach used for this validation method which may consts of:

- a step-by-step, word-by-word review, or
- evaluation against some scenario.

b) If a scenario is selected it need not be described in detail but should ensure that all "Action/Expected Responses" and "Response Not Obtained" steps are examined. This description shall be documented on the "Table-Top Validation Summary Form" (Figure 53.B-13) and shall include as a minimum:

- Initial plant conditions at the time of the event, including status of all major ECCS equipment.
- Plant operating history prior to event

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- A list of actions that will have been accomplished during performance of EOPs prior to entry into the EOP under review

- Assumption concerning plant response to operator actions

- Necessary information to guide the review flow path at transition points (i.e., plant response that guide the review team through the procedure vice transition to a different procedure).

c) Select the appropriate evaluation criteria to be applied during this phase of validation from Table 53.B-1 and obtain the necessary approval on form "Validation Evaluation Critiera" (Figure 53.B-2).

d) Ensure all members of the Review Team are provided the draft EOP or revision, appropriate EOP background documents, scenario description (if appropriate) and a list of the evaluation criteria to be applied. These materials should be made availabe prior to the meeting to allow the team members an opportunity for familiarization.

e) Ensure the applicable deviation forms "EOP-ERG Deviation Form" (Figure 53.B-1) are available for review during the Assessment Phase.

b. The required number of Review Team Members will be selected by the procedure author with the concurrence of the NSOS or his designee.

1) The review team members will normally consist of:

a) The designated review team chairman

b) Senior Reactor Operator

c) Reactor Operator

d) Shift Technical Advisor

e) A member of the Training Department staff

f) Any additional members required as determined by the review team chairman.

2) The review team members should, upon receiving the draft EOP or revision, review the material and familiarize themselves with the draft and the criteria for evaluation. They should record any comments, criticism or recommendations appropiate for reference during the Assessment Phase.

2. The assessment phase of the validation will consist of a review of the draft EOP or EOP revision by the Review Team, and will be conducted in a seminar environment. Members of the team will perform the following functions:

a. Review Team Chairman will direct the review effort by:

1) Reviewing with the team the approach selected for this validation effort (eg. use of a scenario, or word-by-word review).

2) Reviewing with the team the evaluation criteria to be applied (Figure 53.B-2).

3) Initiating the team review.

4) Pointing out each deviation from the WOG guidelines during the course of team review and explaining the justification for the deviation. (Figure 53.B-1)

5) Directing the team through the successful completion of the EOP by providing necessary plant response information at key transition points.

b. Review Team Members shall:

1) Participate in the review of the EOP draft and make comments, criticisms, or recommendations appropriate to the procedure by applying the evaluation criteria.

2) Evaluate each deviation from the ERGs to determine if the change constitutes a change in over all strategy significant to safety and if the strategy presented by the WOG is acceptable for BVPS Unit 2.

c. Review Team Recorder shall ensure that the required validation documentation is initiated during the team review. This documentation consists of:

1) "Table-Top Validation Summary Form" (Figure 53.B-13).

2) "Validation Discrepancy Sheet" (Figure 53.B-14) recording all comments, or recommendations made during the review.

3) Recording any additional deviations from the ERGs that the team identified on "EOP-ERG Deviation Form" (Figure 53.B-1).

3. The resolution phase of the validation will consist of evaluating and resolving all discrepancies identified during the Assessment Phase.

a. The Review Team Chairman will:

1) Review all discrepanices recorded during the assessment phase.

2) Research and propose resolutions for all discrepancies.

3) Forward the proposed resolutions for all discrepancies, the discrepancy sheets and the Validation Summary Form to the NSOS and Procedures Group for review and incorporation of resolutions into final draft EOPs.

4) Determine with the concurance of the NSOS or his designee if follow-up Validation or Verification of the EOP draft or revision is required.

b. The responsible Procedures Engineer will incorporate the proposed resolutions into the procedure following the appropriate reviews and approvals.

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III. DOCUMENTATION

A. The following documentation of Table-Top Validation shall be maintained for each draft EOP or EOP revision.

1. Completed "Table-Top Validation Summary Form" (Figure 53.B-13).

2. Completed "Validation Discrepancy Sheets" from assessment phase (Figure 53.B-14).

3. Completed "Validation Evaluation Criteria" sheets used during the review (Figure 53.B-2).

4. A completed "EOP-ERG Deviation Form" for each deviation (Figure 53.B-1).

-END-

# APPENDIX D

## Detailed Instructions for Performance of Control Room Walk-Through Validation

APPENDIX D

I. PURPOSE

The purpose of this detailed instruction is to provide guidance in performing control room walk-through validation of EOPs and to ensure uniformity in documentation of the validation.

II. VALIDATION PROCESS

A. This validation process will be conducted in three parts; preparation, assessment and resolution.

1. The preparation phase of validation includes actions required of various members of the assigned Observer/Reviewer Team to ensure satisfactory completion of the review.

a. The NSOS shall:

1) Designate an individual knowledgeable in EOP usage and formatting as the Team Leader who shall:

a) Obtain and become familiar with the appropriate source documents.

b) Select the approach for this validation method which may consist of:

- a step-by-step, word-by-word examination, or

- evaluation against some scenario to exercise specific portions of the EOP draft.

c) If a scenario is selected it need not be described in detail but should ensure that all "Action/Expected Responses" and "Response Not Obtained" steps are examined. This description should be documented on the "Table-Top Validation Summary Form" (Figure 53.B-13) and should include as a minimum:

- Initial plant conditions at the time of the event, including status of all major ECCS equipment.

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- Plant operating history prior to event
- A list of actions that will have been accomplished during performance of EOPs prior to entry of the EOP under review
- Assumption concerning plant response to operator actions
- Necessary information to guide the review flow path at transition points (i.e., plant responses that guide the review team through the procedure vice transition to a different procedure).

d) Select the appropriate evaluation criteria to be applied during this phase of validation from Table 53.B-1 and obtain the necessary approval on form "Validation Evaluation Criteria" (Figure 53.B-2).

e) Ensure all members of the Review Team are provided the draft EOP or revision, appropriate EOP background documents, scenario description (if applicable) and a list of the evaluation criteria to be applied during the walk-through/talk-through validation. These materials should be made available prior to the meeting to allow the team members an opportunity for familiarzation.

f) Select one of the following options for performing this validation method and then organize the observer/review team.

- one-on-one; one observer/reviewer and one operator.
- one-on-crew; one observer/reviewer and one operating crew.
- team-on-crew; observer/reviewers and the operating crew.
- team-on-one; observer/reviewers and one operator.

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g) The Team Leader will select team members with the concurrence of the NSOS or his designee.

2) Select a typical operating crew to exercise the draft EOP or EOP revision.

b. Observer/Review Team

1) The observer/review team may consist of the following depending upon the option selected for conducting this validation effort.

a) The designated Observer/Review Team Leader.

b) A member with experience applying human factors principles.

c) A member of the procedure writing staff (when required).

d) A Senior Reactor Operator

e) Additional data takers as determined necessary by the team leader.

2) The review team members should upon receiving the draft EOP or revision, review the material and familiarize themselves with the draft and the criteria for evaluation. They should record any comments, criticism or recommendations appropriate for reference during the Assessment Phase.

2. The assessment phase of the validation will consist of a step-by-step walk-through in the control room and plant of the draft EOP or EOP revision being validated. The members of the Observer/Review Teams shall perform the following functions:

a. Team Leader will direct the effort by:

1) Briefing the operator(s) participating in the walk-through on the draft EOP or EOP revision, and the intent of the walk-through. The briefing will consist of:

• an explanation of the objective of the

assessment including what the operators are expected to do.

- reviewing the team approach selected for this validation effort (eg., use of scenarios, or word-by-word review).
- an explanation of the criteria provided on Figure 53.B-2, "Validation Evaluation Criteria", that will be used in evaluating the procedure or revision.
- an explanation of the overall strategy of the procedure or revision.
- a description of any scenario(s) to be used during the walk-through
- familiarizing the operators with the draft EOP or EOP revision.

2) Initiating the walk-through and providing changing plant parameters and guidance to the operators and observer/review team.

3) Ensuring that the required validation documentation is completed during this effort. This documentation consists of:

- "Control Room Walk-Through Validation Summary Form" (Figure 53.B-15).
- "Validation Discrepancy Sheet" (Figure 53.B-14) recording all comments or recommendations made during the review.
- Recording any additional deviations from the ERGs that the team identified on "EOP-ERG Deviation Form" (Figure 53.B-1).

4) Stopping the walk-through for discussion of identified discrepancies (when appropriate).

b. Team Members will participate in the validation effort by observing the operators during the walk-through to:

1) Evaluate the draft procedure using the criteria specified.

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2) Record all identified discrepancies and comments including operators comments on the "Validation Discrepancy Sheet" (Figure 53.B-14).

3) Propose resolutions for discrepancies during the debriefing.

c. Upon completion of the walk-through, the entire team (Observer/Reviewers, Leader and Operators) shall conduct a debriefing to include:

1) Discussion of discrepancies or problems identified during the walk-through.

2) Discussion of possible resolutions to all identified discrepanices.

3) A summary of the overall assessment of the draft EOP or EOP revision.

3. The resolution phase of the validation will consist of evaluating and resolving all discrepancies identified during the assessment phase.

a. The Team Leader shall perform the following functions:

1) Review all discrepancies and comments from the assessment phase.

2) Research and propose resolutions for all discrepancies.

3) Forward the proposed resolutions for all discrepancies, the discrepancy sheets, and the Validation Summary Form to the NSOS and Procedures Group for review and incorporation of resolutions into final draft EOPs.

4) Determine with the concurrence of the NSOS or his designee if follow-up Validation or Verification of the EOP draft or revision is required.

b. The responsible Procedures Engineer will incorporate the proposed resolutions into the procedure following the appropriate review and approvals.

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III. DOCUMENTATION

A. The following documentation of the control room walk-through validation shall be maintained for each draft EOP or EOP revision.

1. Completed "Control Room Walk-Through Validation Summary Sheet", Figure 53.B-15.

2. Completed "Validation Discrepancy Sheets" (Figure 53.B-14) from the assessment phase.

3. Completed "Validation Evaluation Criteria" sheets (Figure 53.B-2) used during the review.

4. A completed "EOP-ERG Deviation Form" (Figure 53.B-1) for each deviation.

-END-

APPENDIX E

I. PURPOSE

A. The purpose of this detailed instruction is to provide guidance in performing EOP validation on the BVPS Unit 1 simulator, and to ensure uniformity in documentation of the validation.

B. Due to the dual licensing concept sought by BVPS, the BVPS-1/BVPS-2 EOPs will be duplicated as much as possible while allowing for plant specific differences. BVPS-1 simulator validated EOPs will be used when possible to validate the BVPS-2 EOPs and plant specific differences which cannot be simulated by the BVPS-1 simulator will receive extensive table-top validation and control room walk-through validation.

II. VALIDATION

This validation process will be conducted in three parts; preparation, assessment and resolution.

A. The preparation phase of validation includes actions required of various members of the observer/reviewer team to ensure satisfactory completion of the review.

1. The NSOS or his designee shall:

a. Select a typical operating crew to exercise the draft EOP or EOP revision.

b. Designate an individual knowledgeable in EOP usage and formatting as the Team Leader. This team leader shall:

1) Obtain and become familiar with the appropiate source documents.

2) Select the appropriate evaluation criteria to be applied during this phase of validation from Table 53.B-1 and obtain the necessary approval on "Validation Evaluation Criteria" form (Figure 53.B-2).

3) In conjunction with a training representative, determine the scenario(s) and malfunctions to be employed in the simulator validation. The scenario need not be described in detail, but should ensure that the EOP objectives stated in the PURPOSE and the background information

are satisfied. The scenario description should include as a minimum:

- Initial plant conditions at the event initiation, including status of all major ECCS equipment.
- Plant operating history prior to the event.
- A list of actions that will have been accomplished during performance of other procedures prior to entry into the EOP being validated.
- Necessary information to guide the review flow path at transition points (i.e., plant responses that guide the review through the procedure, vice transition to a different procedure).

4) Ensure all members of the observer/reviewer team are provided appropriate background information, scenario description (if applicable) and a list of the evaluation criteira to be applied during the simulation. These materials should be made available prior to the simulation briefing to allow the team members an opportunity for familiarization.

5) Ensure that all materials to be used by the operating team participating in the validation are available (eg., draft EOPs, necessary graphs and tables, related reference materials).

6) Ensure appopriate forms for documentation of the validation are available, and used during the review.

7) Select one of the following options for performing this validation:

- one-on-one, one observer/reviewer and one operator
- one-on-crew, one observer/reviewer and an operating crew
- team-on-crew; observer/reviewers and the operating crew

APPENDIX E

- team-on-one; observer/reviewer and one operator.

8) Select the observer/reviewer team members with the concurrence of the NSOS or his designee.

9) Coordinate with Training Section the scheduling of the simulator to accomplish the validation effort.

2. The Observer/Reviewer team may consist of the following members depending on the option selected in II.A.1.b.7) above for conducting the validation effort.

- The designated observer/reviewer team leader.
- A member with experience in application of human factors principles.
- Member of procedure writing staff (when required).
- Additional data takers as deemed necessary by the team leader.
- One control room operating crew, to include an SRO two ROs and one STA.
- Personnel required for operation of the simulator (eg., a simulator instructor).

a. The review team members should, upon receiving the draft EOP or revision, review the material and to the extent possible familiarize themselves with the EOP and the criteria for evaluation specified. For extensive additions or revisions to the EOP set, this may be accomplished through formal group training.

B. The assessment phase of the validation will consist of an objective observation of the performance of the draft EOP on the simulator, applying specific evaluation criteria to determine the acceptability of the EOP. Members of the observer/reviewer team shall perform the following functions:

1. Team Leader will direct the effort by:

a. Briefing the control room operating team prior to beginning the simulator run. This brief will consist of:

debriefing on the "Validation Discrepancies Sheet", (Figure 53.B-14).

- Provide proposed resolutions for discrepancies during the debriefing.

3. Operating Crew Members will:

- Assume normal watch standing positions prior to initiation of the scenario.
- Operate the simulator referencing the EOPs being validated as to allow for evaluation by the observers.
- During the debriefing, identify any problems encountered during the simulation, and propose resolutions to the problems.

C. The resolution phase of the validation will consist of evaluating and resolving all discrepancies identified during the assessment phase.

1. The Team Leader shall perform the following functions:

a. Review all discrepancies and comments from the assessment phase.

b. Research and propose resolutions for all discrepancies.

c. Forward the "Validation Discrepancy Sheet" (Figure 53.B-14) containing the proposed resolutions, and the "Summary of EOP Validation on the Simulator" form (Figure 53.B-16) to the NSOS and Procedures Group for review and incorporation of resolutions into the final draft EOPs.

d. Determine, with the concurrence of the NSOS or his designee, if follow-up Validation or Verification of the EOP draft, or EOP revision is required.

III. DOCUMENTATION

The following documentation of the validation of EOPs on the simulator shall be maintained for each draft EOP or EOP revision.

A. Completed "Summary of EOP Validation on the Simulator" Form (Figure 53.B-16).

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B. Completed "Validation Discrepancy Sheet" (Figure 53.B-14) from the assessment phase.

C. Completed "Validation Evaluation Criteria" sheets (Figure 53.B-2) used during the review.

D. A completed "EOP-ERG Deviation Form" (Figure 53.B-1) for each deviation.

-END-

# APPENDIX F

## Detailed Instructions For Performance of EOP Verification

APPENDIX F

I. PURPOSE

The purpose of this detailed instruction is to provide guidance in determining that consistency has been maintained between EOP source documents and the EOPs, and to ensure uniformity in documentation of this verification process.

II. VERIFICATION PROCESS

A. The process of EOP verification consists of three phases: preparation, assessment, and resolution.

1. Preparation

a. The Nuclear Station Operating Supervisor or his designee (the appropriate supervisor if EOP draft preparation has been performed by another station group), shall appoint the necessary personnel as evaluators to conduct the comparative evaluation. Personnel shall be designated based on operations experience, understanding of plant hardware, the WOG ERGs and the EOP writers guide.

b. The designated evaluators shall obtain and review the appropriate EOP source documents. This review should be made to familiarize the evaluators with the draft EOP or EOP revision, and the criteria to be applied during the evaluation (Table 53.B-4).

2. The assessment phase of the verification process shall consist of a step-by-step comparitive evaluation between the source documents and the draft procedure or EOP revision by the evaluator to include the following areas:

a. Review of the draft procedure or EOP revision to examine written correctness. This review will address the following:

1) Legibility

2) Format consistency

3) Information presentation

4) Procedure presentation

5) Identification Information

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b. Review the procedure or revision to examine technical accuracy. This review will address the following areas:

1) Entry conditions or symptoms information

2) Instruction step, caution or note information

3) Quantitative information

4) Plant hardware information

5) Operator Instrumentation and Controls Needs

c. The review for written correctness and technical accuracy will be made by applying the appropriate criteria delineated in the Evaluation Criteria Checklist (Table 53.B-4).

d. The evaluator will record for each step, note, or caution of the EOP or revision, any discrepancy noted on the "EOP Verification Discrepancy Sheet" (Figure 53.B-17). The proposed resolution of the discrepancy should also be recorded.

e. A summary, documenting that the comparitive evaluation was performed and indicating that each step, note or caution was either acceptable, or listing the applicable discrepancy sheet shall be recorded on the "EOP Verification Summary Sheet" (Figure 53.B-18).

3. The resolution phase of the validation will consist of evaluating and resolving all discrepancies identified during the assessment phase.

a. The assigned Procedure Engineer will:

1) Review all discrepancies and comments from the assessment phase.

2) Incorporate proposed resolutions, or make appropriate corrections to the EOP draft or revision.

3) Document the discrepancy resolution on the Discrepancy Sheet, and the Verification Summary Sheet.

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b. The evaluator shall determine, with the concurrence of the Nuclear Station Operating Supervisor, or his designee, if follow-up Verification or Validation of the draft EOP or EOP revision is required.

III. DOCUMENTATION

A. The documentation developed through out the verification process will be maintained by the Procedures Group and shall include:

1. Completed "EOP Verification Summary Sheets" (Figure 53.B-18).

2. Completed "EOP Verification Discrepancy Sheets" (Figure 53.B-17).

-END-

# APPLICATION OF VALIDATION EVALUATION CRITERIA

| Validation Principles | | | | | | | |
|---|---|---|---|---|---|---|---|
| Procedure Characteristics | Level of Detail | Understandability | Plant Compatibility | | | Operator Compatibility |
| Validation Method | EOPs contain sufficient information, consistent with training, for the operators to manage emergency conditions in the plant | EOPs are written so that they are readily comprehended by the operators | EOPs are compatible with control room hardware | EOPs are compatible with plant responses | EOPs are compatible with remotely located hardware and responses | EOPs are compatible with shift manning levels and policies |
| Table-Top Method | X | X | O | O | O | P |
| Walk-Through Method | X | X | P | O | P | X |
| Simulator Method | X | X | X | X | P | X |

Legend:

X - Evaluation can be made with method.
P - Evaluation can be partially made with method.
O - Evaluation cannot be made with method.

Table 53.B-1

## VALIDATION EVALUATION CRITERIA

This list is intended to provide a basis for determining what evaluation criteria must be utilized to evaluate the acceptability of an EOP draft or revision with respect to usability, operational correctness and effectiveness. The list is not intended to be all inclusive, nor will every criterion apply to evaluation of every step in all drafts or revisions. The list will give guidance in determining a set of criteria appropriate for a specific evaluation effort, and provide guidance in determining what the overall program for satisfactory validation (i.e., for a given revision are all three methods of validation required?)

| METHOD | | | | |
|---|---|---|---|---|
| T-T | W-T | S | | |
| | | | I. | USABILITY |
| | | | A. | LEVEL OF DETAIL |
| x | x | x | 1. | Is there sufficient information to perform the specified actions at each step? |
| x | x | x | 2. | Are the alternatives adequately described at each decision point? |
| x | x | x | 3. | Are the labeling, abbreviations, and location information as provided in the EOP sufficient to enable the operator to find the needed equipment? |
| x | x | x | 4. | Is the EOP missing information needed to manage the emergency condition? |
| x | x | x | 5. | Are the contingency actions sufficient to address the symptoms? |
| x | x | x | 6. | Are the titles and numbers sufficiently descriptive to enable the operator to find referenced and branched procedures? |

LEGEND:

x - may be evaluated with this method of validation
o - cannot be evaluated with this method of validation
T-T - table-top validation method
W-T - walk-through validation method
S - simulator validation method

Table 53.B-1

| T-T | W-T | S | | |
|---|---|---|---|---|
| | | | I. B. | UNDERSTANDABILITY |
| x | x | x | 1. | Is the EOP easy to read? |
| x | x | x | 2. | Are the figures and tables easy to read with accuracy? |
| x | x | x | 3. | Can the values on figures and charts be easily determined? |
| x | x | x | 4. | Are caution and note statements readily understandable? |
| x | x | x | 5. | Are the EOP steps readily understandable? |
| | | | II. | OPERATIONAL CORRECTNESS |
| T-T | W-T | S | A. | PLANT CAMPATIBILITY |
| x | x | x | 1. | Can the actions specified in the procedure be performed in the designated sequence? |
| x | x | x | 2. | Are there alternate success paths that are not included in the EOPs? |
| o | x | x | 3. | Can the information from the plant instrumentation be obtained, as specified by the EOP? |
| o | o | x | 4. | Are the plant symptoms specified by the EOP adequate to enable the operator to select the applicable EOP? |
| o | o | x | 5. | Are the EOP entry conditions appropriate for the plant symptoms displayed to the operator? |

LEGEND:

x - may be evaluated with this method of validation
o - cannot be evaluated with this method of validation
T-T - table-top validation method
W-T - walk-through validation method
S - simulator validation method

Table 53.B-1

| T-T | W-T | S | | |
|---|---|---|---|---|
| | | | II. A. | PLANT COMPATIBILITY |
| x | x | x | 6. | Is information or equipment not specified in the EOP required to accomplish the task? |
| o | o | x | 7. | Do the plant responses agree with the EOP basis? |
| x | x | x | 8. | Are units of measure in the EOP the same as those used on the equipment? |
| o | o | x | 9. | Are the instrument readings and tolerances stated in the EOP consistent with the instrument values displayed on the instruments? |
| o | x | o | 10. | Are the instrument readings and tolerances specified by the EOP for remotely located instruments accurate? |
| o | x | x | 11. | Is the EOP physically compatible with the work situation (too bulky to hold, binding would not allow them to lay flat in work space, no place to lay the EOPs down to use)? |
| | | | II. B. | OPERATOR COMPATIBILITY |
| o | x | x | 1. | If time intervals are specified, can the procedure action steps be performed on the plant within the designated time intervals? |
| o | x | x | 2. | Can the procedure action steps be performed by the operating shift? |

LEGEND:

x - may be evaluated with this method of validation
o - cannot be evaluated with this method of validation
T-T - table-top validation method
W-T - walk-through validation method
S - simulator validation mehtod

Table 53.B-1

| T-T | W-T | S | | |
|---|---|---|---|---|
| | | | II. B. | OPERATOR COMPATIBILITY |
| x | x | x | 3. | If specific actions are assigned to individual shift personnel, does the EOP adequately aid in the coordination of actions among shift personnel where necessary? |
| x | x | x | 4. | Can the operating shift follow the designated action step sequences? |
| x | x | x | 5. | Can the particular steps or sets of steps be readily located when required? |
| x | x | x | 6. | Can procedure exit points be returned to without omitting steps when required? |
| x | x | x | 7. | Can procedure branches be entered at the correct points? |
| x | x | x | 8. | Are EOP exit points specified adequately? |

LEGEND:

x - may be evaluated with this method of validation
o - cannot be evaluated with this method of validation
T-T - table-top validation method
W-T - walk-through validation method
S - simulator validation mehtod

Table 53.B-1

## GLOSSARY

| | |
|---|---|
| Check | To note a condition and compare with some procedure requirement. |
| Control | To manually or automatically operate equipment as necessary to satisfy procedure requirements. |
| Establish | To make arrangements for a stated condition.<br>Example: Establish normal pressurizer pressure and level control. |
| Faulted | Used to describe a secondary system component with a feedwater or steam break. |
| Initiate | To begin a process (begin is preferred). |
| Intact | Describes a steam generator which has neither a tube rupture nor is faulted. |
| Local (Locally) | An action performed by the operator outside the control room. |
| Maintain | To control a given plant parameter to some procedure requirement continuously.<br>Example: Maintain steam generator level in the narrow range. |
| Manual (Manually) | An action performed by the 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. |
| Ruptured | Used in describing a steam generator with a tube(s) break. |
| Stable | In reference to process parameters, it means controllable within some desired range. |
| Throttle | To operate a valve in an intermediate position to obtain a certain flow rate. (control is preferred). |
| Verify | To observe that an expected characteristic or condition exists. Typically the expectation comes from some previous automatic or operator action. |

Table 53.B-2

## ABBREVIATIONS AND ACRONYMS FOR EOPs

| Abbreviation/Acronym | Description |
|---|---|
| AC | Alternating Current |
| ACS | Chilled Water System |
| ACB | Air Circuit Breaker |
| AFW | Auxiliary Feedwater |
| Amp | Amperes |
| ASS | Auxiliary Steam System |
| ATWS | Anticipated Transient Without A Scram |
| AUTO | Automatic |
| Aux | Auxiliary |
| BAT | Boric Acid Tank |
| Batt | Battery |
| BB | Benchboard |
| BIT | Boron Injection Tank |
| Bkr | Breaker |
| Bldg | Building |
| BLDN | Blowdown |
| Brg | Bearing |
| BRS | Boron Recovery System |
| BSCP | Building Service Control Panel |
| BTU | British Thermal Units |
| CCP | Component Cooling Water (Primary System) |
| CCS | Component Cooling Water (Secondary System) |
| CFM | Cubic Feet Per Minute |
| CHG | Charging |
| Chgr | Charger |
| CHS | Chemical Volume Control System |
| Ci | Curies |
| CIA | Containment Isolation Phase A |
| CIB | Containment Isolation Phase B |
| Clr | Cooler |
| CNMT | Containment |
| CNS | Condensate System |
| Comp | Compressor |
| COND | Condenser |
| CRDM | Control Rod Drive Mechanism |
| CSF | Critical Safety Function |
| CSS | Containment Spray System |
| CVS | Containment Ventillation System |
| CWS | Circulating Water System |

Table 53.B-3

ABBREVIATIONS AND ACRONYMS FOR EOPs (Continued)

| Abbreviation/Acronym | Description |
|---|---|
| DC | Direct Current |
| DG | Diesel Generator |
| Disch | Discharge |
| dP | Differential Pressure |
| DVS | Reactor Coolant Vent And Drain System |
| ECCS | Emergency Core Cooling System |
| EOP | Emergency Operating Procedure |
| EPP | Emergency Preparedness Procedures |
| ESF | Engineered Safeguards Features |
| ESS | Extraction Steam System |
| FCV | Flow Control Valve |
| FI | Flow Indicator |
| FIC | Flow Indicating Controller |
| FK | Flow Controller |
| FNC | Fuel Pool Cooling System |
| FR | Flow Recorder |
| FRP | Functional Restoration Procedures |
| FW | Feedwater |
| FWE | Auxiliary Feedwater System |
| FWI | Feedwater Isolation |
| FWS | Main Feedwater System |
| Gal | Gallons |
| Gen | Generator |
| GPM | Gallons Per Minute |
| GWS | Gaseous Waste System |
| HC | Hand Controller |
| HCV | Hand Control Valve |
| Hdr | Header |
| HDS | Heater Drain System |
| HHSI | High Head Safety Injection |
| HIC | Hand Indicating Controller |
| $H_2O$ | Water (in. $H_2O$) |
| Hr | Hours |
| Htr | Heater |
| Hx | Heat Exchanger |
| In | Inlet |
| Isol | Isolation |
| IX | Ion Exchanger |
| KV | Kilovolts |
| KVA | Kolovoltamperes |
| KW | Kilowatts |

Table 53.B-3

ABBREVIATIONS AND ACRONYMS FOR EOPs (Continued)

| Abbreviation/Acronym | Description |
|---|---|
| LC | Level Controller |
| LCV | Level Control Valve |
| LHSI | Low Head Safety Injection |
| LI | Level Indicator |
| LMS | Leak Monitoring System (Containment) |
| LOCA | Loss of Coolant Accident |
| LR | Level Recorder |
| LTDN | Letdown |
| Lvl | Level |
| LWS | Liquid Waste Disposal System |
| MCC | Motor Control Center |
| MFW | Main Feedwater |
| Min | Minutes |
| MOD | Motor Operated Damper |
| MOV | Motor Operated Valve |
| MSIV | Main Steam Isolation Valve |
| MSS | Main Steam System |
| MVA | Megavoltamperes |
| MW | Megawatts |
| MWe | Megawatt Electrical |
| MWt | Megawatt Thermal |
| NBI | Vibration Monitoring |
| NIS | Reactor Nuclear Instrument System |
| NMI | Intermediate Range Nuclear Power |
| NMP | Power Range Nuclear Power |
| NMS | Source Range Nuclear Power |
| Non-regen | Non-regenerative |
| NR | Nuclear Recorder |
| N.R. | Narrow Range |
| NSS | Nuclear Shift Supervisor |
| OCB | Oil Circuit Breaker |
| OM | Operating Manual |
| OST | Operations Surveillance Test |
| Pb | Pushbutton |
| PCM | Percent Mille Reactivity |
| PCV | Pressure Control Valve |
| PDWST | Primary Demineralized Water Storage Tank |
| P.F. | Power Factor |
| PI | Pressure Indicator |
| PIC | Pressure Indicating Controller |
| PK | Pressure Controller |

Table 53.B-3

ABBREVIATION AND ACRONYMS FOR EOPs (Continued)

| Abbreviation/Acronym | Description |
|---|---|
| Pnl | Panel |
| PORV | Power Operated Relief Valve |
| Pp | Pump |
| PR | Pressure Recorder |
| Press | Pressure |
| Pri | Primary |
| PRT | Pressure Relief Tank |
| PRZR | Pressurizer |
| PSIA | Pounds Per Square Inch, Absolute |
| PSID | Pounds Per Square Inch, Differential |
| PSIG | Pounds Per Square Inch, Gauge |
| PT | Potential Transformer |
| Pwr | Power |
| QSS | Quench Spray System |
| Rad Waste | Radioactive Waste |
| RCCA | Rod Cluster Control Assembly |
| RCP | Reactor Coolant Pump |
| RCS | Reactor Coolant System |
| Recirc | Recirculation |
| Regen | Regenerative |
| RHS | Residual Heat Removal System |
| RNO | Response Not Obtained |
| RPM | Revolutions Per Minute |
| RQI | Radiation Monitor |
| RR | Radiation Recorder |
| RSS | Recirculation Spray System |
| RTD | Resistance Temperature Detector |
| RV | Relief Valve |
| RVLIS | Reactor Vessel Level Indicating System |
| RWST | Refueling Water Storage Tank |
| Rx | Reactor |
| Sec | Seconds |
| Ser. Bldg. | Service Building |
| SG | Steam Generator |
| SGC | Steam Generator Clean-up |
| SGTR | Steam Generator Tube Rupture |
| SI | Safety Injection |
| SIS | Safety Injection System |
| SLI | Steam Line Isolation |
| SOV | Solenoid Operated Valve |
| SPDS | Safety Parameters Display System |

Table 53.B-3

ABBREVIATIONS ANC ACRONYMS FOR EOPs (Continued)

| Abbreviation/Acronym | Description |
|---|---|
| Stby | Standby |
| Stm | Steam |
| Suct | Suction |
| Sup | Supply |
| SUR | Start Up Rate |
| SVS | Atmospheric Steam Dump System |
| Swbd | Switchboard |
| SWE | Standby Service Water System |
| Swgr | Switchgear |
| SWS | Service Water System |
| Swyd | Switchyard |
| Sync | Synchronize |
| TAVG | Average Reactor Coolant Temperature |
| TCOLD | Cold Leg Reactor Coolant Temperature |
| THOT | Hot Leg Reactor Coolant Temperature |
| TC | Thermocouple |
| Tfmr | Tranformer |
| TG | Turbine Generator |
| TI | Temperature Indicator |
| TIC | Temperature Indicating Controller |
| TK | Tank |
| TR | Temperature Recorder |
| Turb | Turbine |
| VAC | Volts Alternating Current |
| Vac | Vacuum |
| Vac Bkr | Vacuum Breaker |
| VB | Vertical Board |
| VCT | Volume Control Tank |
| VDC | Volts Direct Current |
| Vlv | Valve |
| W.R. | Wide Range |
| WSS | Solid Waste Disposal System |
| X-tie | Cross-tie |
| X-conn | Cross connect |

Table 53.B-3

## VERIFICATION EVALUATION CRITERIA CHECKLIST

I. Written Correctness

A. Legibility

1. Are the printed borders visible on all procedure pages?

2. Are the text, tables, graphs, figures, and charts legible to the evaluator?

B. EOP Format Consistency

1. Do the following section exist in each EOP:

a. Cover Page that includes a "PURPOSE" and "ENTRY CONDITIONS OR SYMPTOMS" Section.

b. The cover page is consistent with page layout specified in Writers Guide.

c. ACTION OR INSTRUCTION STEP pages.

d. ACTION OR INSTRUCTION STEP pages are consistent with sample page layout in Writers Guide.

C. Identification Information

1. Is the procedure title descriptive of the purpose of the procedure?

2. Does the cover sheet correctly provide the following:

a. Procedure title

b. Procedure number

c. Unit number

d. Revision number

e. Number of pages

Table 53.B-4

I. C. 3. Does each page correcly provide the following:

a. Procedure designator.

b. Revision number.

c. Page ___ of ___ numbers.

4. Does the procedure have all its pages in the correct order?

D. Information Presentation

1. Are instruction steps numbered correctly?

2. Are operator-optional sequence steps identified?

3. Are instruction steps constructed to comply with the following?

a. Steps deal with only one idea.

b. Sentences are short and simple.

c. Operator actions are specifically stated.

d. Objects of operator actions are specifically stated.

e. Objects of operator actions are adequately stated.

f. If there are three or more objects they are listed separately as substeps.

g. Punctuation and capitalization are proper.

h. Abbreviations are correct and understanable to the operator.

4. Do instruction steps make proper use of logic structure?

5. When an action instruction is based on receipt of an annunciator alarm, is the setpoint of the alarm identified?

6. Are precautions and cautions used appropriately?

Table 53.B-4

I. D. 7. Are precautions and cautions placed properly?

8. Are precautions and cautions constructed to comply with the following:

a. They do not contain operator actions.

b. They do not use extensive punctuation for clarity.

c. They make proper use of emphasis.

9. Are notes properly used?

10. Are notes properly placed?

11. Are notes worded so that they do not contain operator actions?

12. Are numerical values properly written?

13. Are values specified in such a way that mathematical operations are not required of the user?

14. Is a chart or graph provided in the procedure for necessary operator calculations?

15. Are units of measurements in the EOP the same as those used on instruments?

E. Procedure Referencing and Branching

1. Do the referenced and branched procedures identified in the EOPs exist for operator use?

2. Is the use of referencing minimized?

3. Are referencing and branching instructions correctly worded?

a. "GO TO" (branching)

b. "REFER TO" (referencing)

4. Do the instructions avoid routing users past important information such as cautions preceding steps?

5. Are the exit conditions compatible with the entry conditions of the referenced or branched procedure?

Table 53.B-4

II. Technical Accuracy

A. Entry Conditions or Symptoms Information

1. Are the entry conditions of the EOP listed correctly?

2. If additional entry conditions have been added, do they comply with the following:

a. Appropriate entry conditions for which the EOP should be used.

b. Not excessive.

B. Instructional Step, Caution, and Note Information

1. Are EOP/ERG differences:

a. Documented

b. Explained

2. Is the ERG technical foundation (strategy) changed by the following chages in EOP steps, cautions, or notes:

a. Elimination

b. Addition

c. Sequence

d. Alteration

3. Are correct, plant-specific adaptations incorporated per ERG:

a. Systems

b. Instrumentation

c. Limits

d. Controls

e. Indications

Table 53.B-4

II. B. 4. Have licensing commitments applicable to EOPs been addressed?

5. Are differences between the licensing commitments and the EOPs or ERGs documented?

C. Quantitative Information

1. Do the quantitative values, including tolerance bands, used in the EOP comply with applicable EOP source document?

2. Where ERG values are not used in the EOP, are the EOP values computed accurately?

3. When calculations are required by the EOP, are equations presented with sufficient information for operator use?

D. Plant Hardware Information

1. Is the following plant hardware specified in the EOP available for operator use:

a. Equipment

b. Controls

c. Indicators

d. Instrumentation

2. Do instruments and controls have needed characteristics to meet operator information and control requirements.

a. Visual Displays

1) Displays should indicate values in a form usable by the operator without mental conversion.

2) Displays should be sensitive to operator use of information (trending requirements, calculation, etc.)

3) Scale units should be consistent with the degree of precision and accuracy needed by the operator.

Table 53.B-4

II. D. 2. a. 4) Scale ranges should span the expected range of operational parameters.

5) Zone markings should be used to show the operator the implications of various readings.

b. Controls

1) Control positions should be sufficient for required control actions.

2) The precision and range of a control should not exceed the need.

3) Operators should be provided with feedback on control actions and system response.

Table 53.B-4

EOP-ERG DEVIATION FORM

BVPS - EOP 2.53.B.1

EOP-ERG DEVIATION

| Procedure No. | EOP Step No. | Deviation Sheet No. |
|---|---|---|

PURPOSE OF STEP:

DEVIATION TO BE RESOLVED:

| SOURCE | # | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|---|
| WOG-ERG Step(s) | | | |
| BVPS-EOP Step(s) | | | |

(Continued on back)

REV 0

Figure 53.B-1
(1 of 2)

EOP-ERG DEVIATION FORM (Backside)

BVPS-EOP 2.53.B.1

(continued from front)

JUSTIFICATION OF DEVIATING STEP:

SIGNIFICANT DEVIATION

Is this a significant deviation?

___ No

___ Yes; and it has been found acceptable for inclusion in the procedure

PLANT SPECIFIC INFORMATION/REFERENCES:

REV 0

Figure 53.B-1
(2 of 2)

VALIDATION EVALUATION CRITERIA

BVPS - EOP 2.53.B.1

VALIDATION EVALUATION CRITERIA

VALIDATION METHOD: _____ EOP TITLE: _____

EOP NUMBER: _____ _____

REVISION NUMBER: _____

DATE OF REVIEW: _____

Description of Criteria: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

PREPARED BY: _____ Date: _____
Review Team Chairman/Team Leader

APPROVED BY: _____ Date: _____
NSOS or designee

REV 0

Figure 53.B-2

EOP TITLE PAGE

DUQUESNE LIGHT COMPANY
BEAVER VALLEY POWER STATION
OPERATING MANUAL

CHAPTER 53.A
EMERGENCY OPERATING PROCEDURES
UNIT 2

Figure 53.B-3

NONADMINISTRATIVE APPROVAL SHEET

DUQUESNE LIGHT COMPANY
Beaver Valley Power Station Unit 2
Operations Startup Manual

APPROVAL SHEET - NONADMINISTRATIVE

UNIT 2 - OPERATING MANUAL

CHAPTER 53.B - Emergency Operating Procedures Executive Volume
SECTION 1 - Generation, Revision, Review and Approval of Emergency Operating Procedures

| Rev. No. | Pages Issued | Approval | | Effective Date |
|---|---|---|---|---|
| | | Signature | Date | |
| | | | | |



Figure 53.B-4

## EOP PROCEDURE PAGE FORMAT



| NUMBER | TITLE |
|---|---|
| ES-0.1 | Reactor Trip Response |

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 8. | Transfer Condenser Steam Dump to Pressure Control Mode | IF condenser steam dump NOT available, THEN use residual heat release valve.<br><br>IF residual heat release valve NOT available, THEN use SG atmospheric steam dumps. |

CAUTION

On natural circulation, RTD by-pass temperatures and associated interlocks will be inaccurate.

NOTE

RCP(s) should be run in order of priority to provide normal PRZR Spray.

| | | |
|---|---|---|
| 9. | Check RCP Status - AT LEAST ONE RUNNING | Attempt to start one RCP. GO TO Attachment 6;<br><br>IF a RCP can NOT be started THEN verify natural circulation:<br><br>a. RCS subcooling based on core exit thermocouples - GREATER THAN (Later)F.<br><br>b. Steam Generator pressures - STABLE OR DECREASING.<br><br>c. RCS Hot Leg Temperatures - STABLE OR DECREASING.<br><br>(Step continued next page) |



Figure 53.B-5

EOP COVER SHEET



| NUMBER | TITLE |
|---|---|
| ES-0.1 | Reactor Trip Response |

A. PURPOSE

This procedure provides the necessary instructions to stabilize and control the plant following a Reactor Trip without a Safety Injection.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from E-0, "Reactor Trip or Safety Injection", step 7, when SI is neither actuated or required.



Figure 53.B-6

SYMPTOMATIC RESPONSE/UNEXPECTED CONDITIONS

Symptomatic Response/Unexpected Conditions

1. RCP TRIP CRITERIA
   Trip all RCPs if BOTH conditions listed below occur:
   a. Charging/HHSI pumps - AT LEAST ONE PUMP RUNNING
   b. RCP Trip Parameter - LESS THAN (later) [(later) ADVERSE CNMT]

2. SI ACTUATION CRITERIA
   Actuate SI and GO TO E-0, "Reactor Trip or Safety Injection" Step 1, if EITHER condition listed below occurs:

   - RCS subcooling based on core exit TCs - LESS THAN (later)F [(later) F ADVERSE CNMT]

   - PRZR level - CANNOT BE MAINTAINED GREATER THAN 5% [(later)% ADVERSE CNMT]

3. RED PATH SUMMARY
   a. SUBCRITICALITY - Nuclear power greater than 5%
   b. CORE COOLING - Core exit TCs greater than 100 F

   -OR-

   Core exit TCs greater than 700 F
   AND RVLIS full range less than (later) %
   with no RCPs running

   c. HEAT SINK - Narrow range level in all SGs less than 5% AND total feedwater flow less than 350 gpm.
   d. INTEGRITY - Cold leg temperature decrease greater than 100°F in last 60 minutes AND RCS cold leg temperature less than (later) F
   e. CONTAINMENT - Containment pressure greater than 45 PSIG

4. AFW SUPPLY SWITCHOVER CRITERION

   Refer to O.M. 2. (later) "Response to Low PDWST Level" IF PDWST level less than (later) inches.

ISSUE 1
REV 0

Figure 53.B-7

## CRITICAL SAFETY FUNCTION STATUS TREE

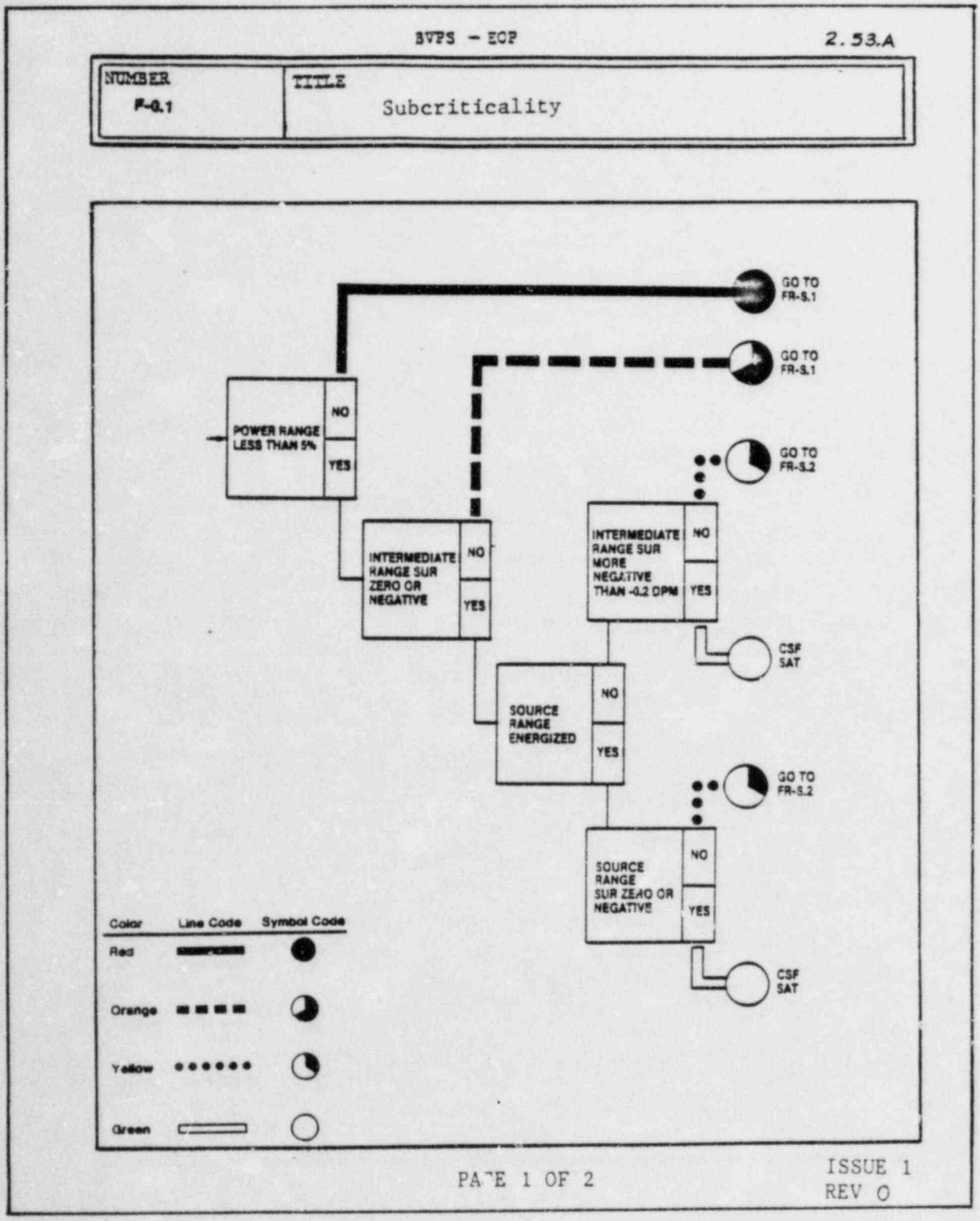


Figure 53.B-8

PRELIM ISSUE REV 0

BACKGROUND INFORMATION TITLE SHEET

DUQUESNE LIGHT COMPANY
BEAVER VALLEY POWER STATION
OPERATING MANUAL

CHAPTER 53.B.4
EMERGENCY OPERATING PROCEDURES
BACKGROUND INFORMATION
UNIT 2

Figure 53.B-9

CHAPTER TITLE SHEET

BVPS - EOP
Executive Volume

2.53.B.4

Background Information

For

Emergency Operating Procedure

ES-0.0

REDIAGNOSIS

ISSUE 1
REV 0

Figure 53.B-10

# INTRODUCTION - RECOVERY/RESTORATION TECHNIQUES



I. INTRODUCTION

A. Procedure ES-0.0, "Rediagnosis", provides a mechanism for the operator to either confirm that he is in the proper procedure or to direct him to the Optimal Recovery Procedure that should be in effect. Procedure ES-0.0 is entered based on operator judgement and is exited after the operator confirms that he is in the appropriate series of procedures or is directed to the appropriate procedure. Rediagnosis only applies to Optimal Recovery Procedures, not to Function Restoration Procedures.

II. RECOVERY/RESTORATION TECHNIQUE

A. The objective of the recovery/restoration technique incorporated into procedure ES-0.0 is a summary of diagnostic steps in the Optimal Recovery Procedures to allow the operator to quickly confirm that he is in the correct series of procedures.

B. The following subsection provides a summary of the major categories of operator actions for procedure ES-0.0, "Rediagnosis".

1. High Level Action Summary

a. Check If Any Steam Generator Is Intact

The operator should first determine if any SG is intact. If none of the SGs are intact, then the appropriate procedure would be ECA-2.1, "Uncontrolled Depressurization Of All Steam Generators".

b. Check If All Steam Generators Are Intact and If Faulted SG(s) Isolated

The operator should determine if any SGs are not intact. If so, he then confirms that any SGs not intact are isolated or he is directed to E-2, "Faulted Steam Generator Isolation".

c. Check If There Is A SGTR

If any SG is intact and all SGs not intact are isolated, the operator then determines if any SG has a ruptured tube. If any tube is ruptured, then the appropriate procedure is either an E-3 or ECA-3 series procedure. If no tubes are ruptured, then the appropriate procedure is either an E-1 or ECA-1 series procedure.

2. Key Decision Points

N/A



Figure 53.B-11

STEP DESCRIPTION TABLE FOR ES-0.0



STEP DESCRIPTION TABLE FOR ES-0.0 STEP 1

**STEP**

**Check If Any SG Is Not Faulted**

PURPOSE

To determine if any SG is non-faulted.

BASIS

If all SGs are faulted and the main steamlines are isolated, the appropriate procedure is ECA-2.1, "Uncontrolled Depressurization Of All Steam Generators", since that procedure deals with controlling feed to faulted steam generators to stabilize and then cool down the plant. If the main steamlines are not isolated, the appropriate transition is to E-2, "Faulted Steam Generator Isolations", which will isolate the steamlines and then check for a non-faulted steam generator.

ACTIONS

Determine if any SG pressure is stable or increasing.
Determine if a controlled cooldown is in progress.
Determine if main steamlines are isolated by checking YELLOW SLI lights lit.
Determine if procedure E-2, "Faulted Steam Generator Isolation" is in effect.
Determine if procedure ECA-2.1, "Uncontrolled Depressurization Of All Steam Generators", is in effect.
Transfer to E-2, "Faulted Steam Generator Isolation", step 1.
Transfer to ECA-2.1, "Uncontrolled Depressurization Of All Steam Generators", step 1.

INSTRUMENTATION

SG pressure indication [2MSS*PI475(485)(495)] on VB-C.
RCS temperature indication [2RCS*T1413(423)] on VB-A.
Main steamline isolation valves position indication on BB-C.

CONTROL/EQUIPMENT

N/A

KNOWLEDGE

Expected pressure response of faulted SGs.



Figure 53.B-12

## TABLE TOP VALIDATION SUMMARY FORM

BVPS - EOP 2.53.B.1

TABLE TOP VALIDATION SUMMARY FORM

EOP NUMBER: _____ EOP TITLE: _____

REVISION NUMBER: _____ _____

DATE OF REVIEW: _____

REVIEW COMMITTEE MEMBERS: JOB DESCRIPTION

Author/Moderator _____ _____

Recorder _____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

SCENARIO DESCRIPTION: _____

_____

_____

_____

_____

_____

DISCREPANCIES: YES ____ NO ____ (IF YES, ATTACH COPY)

RESOLUTION REVIEWED BY: _____ DATE: _____
(S/S or Designee)

REV 0

Figure 53.B-13

## VALIDATION DISCREPANCY SHEET

BVPS - EOP 2.53.B.1

VALIDATION DISCREPANCY SHEET

VALIDATION METHOD: _____

EOP NUMBER: _____ EOP TITLE: _____

REVISION NUMBER: _____ _____

STEP NUMBER: _____

DISCREPANCY: _____

_____

_____

_____

_____

Observer(s)/Reviewer(s)/Recorder: _____

RESOLUTION: _____

_____

_____

_____

_____

RESOLUTION OF DISCREPANCY BY: _____

HAS THE RESOLUTION RESULTED IN AN EOP CHANGE REQUIRING RESOLUTION ?

YES _____ NO _____ DATE COMPLETED: _____

HAS THE RESOLUTION RESULTED IN AN EOP CHANGE REQUIRING RE-VERIFICATION ?

YES _____ NO _____ DATE COMPLETED: _____

RESOLUTION REVIEWED AND APPROVED ?

YES _____ NO _____ DATE APPROVED: _____

ALL CHANGES INCORPORATED ? _____

REV 0

Figure 53.B-14

## CONTROL ROOM WALK-THROUGH VALIDATION SUMMARY FORM

BVPS - EOP 2.53.B.1

CONTROL ROOM WALK-THROUGH VALIDATION SUMMARY FORM

EOP NUMBER: _____ EOP TITLE: _____

REVISION NUMBER: _____ _____

DATE OF WALK-THROUGH: _____

WALK-THROUGH PARTICIPANTS:

Observer(s)/Reviewer(s) _____

_____

_____

_____

Operating Crew Members _____

_____

_____

_____

SCENARIO DESCRIPTION: _____

_____

_____

_____

_____

DISCREPANCIES: YES ____ NO ____ (IF YES, ATTACH COPY)

RESOLUTION REVIEWED BY: _____ DATE: _____

USER'S SIGNATURE

REV 0

Figure 53.B-15

## SUMMARY OF EMERGENCY OPERATING PROCEDURE VALIDATION ON THE SIMULATOR

BVPS - EOP 2.53.B.1

SUMMARY OF EMERGENCY OPERATING PROCEDURE VALIDATION ON THE SIMULATOR

EOP NUMBER: _____ EOP TITLE: _____

REVISION NUMBER: _____ _____

DATE OF SIMULATION: _____

SIMULATION PARTICIPANTS:

| | | Job Description |
|---|---|---|
| Observer(s)/Reviewer(s) | _____ | _____ |
| | _____ | _____ |
| | _____ | _____ |
| | _____ | _____ |
| | _____ | _____ |
| | _____ | _____ |
| Operating Crew(s) | _____ | _____ |
| | _____ | _____ |
| | _____ | _____ |
| | _____ | _____ |
| | _____ | _____ |
| | _____ | _____ |

SCENARIO DESCRIPTION: _____

_____

_____

_____

_____

DISCREPANCIES: YES _____ NO _____ (IF YES, ATTACH 3 PR's)

RESOLUTION REVIEWED BY: _____ DATE: _____
(SRO's or Designee)

REV 0

Figure 53.B-16

## EOP VERIFICATION DISCREPANCY SHEET

BVPS - EOP 2.53.B.1

EOP VERIFICATION DISCREPANCY SHEET

NUMBER ____

EOP NUMBER: _____ EOP TITLE: _____

REVISION NUMBER: _____ _____

EOP STEP NUMBER: _____

DISCREPANCY: _____

_____

_____

_____

_____

_____

_____

RESOLUTION: _____

_____

_____

_____

_____

_____

_____

RESOLUTION INCORPORATED BY: _____ DATE: _____

REV 0

Figure 53.B-17

## EOP VERIFICATION SUMMARY SHEET

BVPS - EOP 2.53.B.1

EOP VERIFICATION SUMMARY SHEET

EOP NUMBER: _____ EOP TITLE: _____

REVISION NUMBER: _____ _____

SCOPE OF VERIFICATION: (reason) Initial for EOP Implementation

_____

EOP SOURCE DOCUMENTS USED:

1. Westinghouse Owners Group Emergency Response Guidelins, Rev. 1
2. FSAR, Unit 2
3. 
4. 
5. 

| VERIFICATION RESULTS | ACCEPTABLE | DISCREP. SHEET # (s) |
|---|---|---|
| 1. Written Correctness | | |
| a. Legibility | _____ | _____ |
| b. Format Consistancy | _____ | _____ |
| c. Identification Information | _____ | _____ |
| d. Information Presentation | _____ | _____ |
| e. Proc. Ref. and Branch. | _____ | _____ |
| 2. Technical Accuracy | | |
| a. Entry Cond. or Symptoms | _____ | _____ |
| b. Inst. Step, Cautns, Notes | _____ | _____ |
| c. Quantitative Information | _____ | _____ |
| d. Plant Hardware Information | _____ | _____ |
| e. Oper. Infor. and Control Needs | _____ | _____ |

VERIFICATION PERFORMED BY: _____ DATE: _____

RESOLUTIONS INCORPORATED BY: _____ DATE: _____

REV 0

Figure 53.B-18

SECTION 4

Training Program Description

I. Program Objectives

A. To provide training to appropriate personnel on the updated EOPs or subsequent major revisions prior to implementation.

B. To provide the technical bases of the upgraded EOPs including how plant systems, subsystems, components, etc., relate to the EOPs, plus their function and use during transients and accidents.

C. To provide a working knowledge of the technical content of the EOP which establishes the know-how to perform each step in all EOPs so that the EOP objectives are achieved.

D. To demonstrate the ability of individuals and crews to execute the upgraded EOPs under operational conditions as modeled on the Beaver Valley Unit 1 Simulator and achieve safe, stable or shutdown conditions.

E. To provide reasonable assurance that the methods to be used in training are adequate.

II. Scope of Training

A. This training program will instruct plant operators on the upgraded EOPs and will consist of classroom and simulator training. This will be completed prior to initial implementation of these EOPs.

B. Training will be conducted with all operators performing their normal control room functions. Additional training will be conducted where members of a crew alternate responsibilties.

C. Classroom Instruction

1. The philosophy behind the approach to the upgraded EOPs will be reviewed.

2. Each procedure prepared for implementation will be reviewed in a step-by-step format. Each step and its associated background document will be discussed and, where necessary, emergency contingency actions and function restoration guidelines followed.

a. Discussion includes:

1) actions necessary for accident mitigation

2) control of safety functions

3) accident evaluation and diagnosis

4) procedure direction to achieve a safe, stable or shutdown condition. (Areas or steps not exercised by simulator operation will be addressed.)

b. The EOP under discussion and its background document are the student's main reference and study material.

3. After the classroom training has been completed, operations crews are scheduled for simulator exercises. (Areas or steps not exercised by simulator operations covered in the classroom phase will be reviewed during simulator exercises.)

D. Simulator Training

1. Simulator sessions will be designed to enable students to demonstrate that they can carry out an EOP successfully during simulated transients and accident conditions.

   a. Scenarios incorporating possible multiple simultaneous or sequential failures will be developed to exercise the specified EOP.

   b. Students will use the new or revised EOPs during simulator exercises.

2. Each operator will exercise each upgraded EOP during simulator training.

3. A simulator walk-through or control room walk-through or a desk top review will be performed as part of the EOP training if the following should occur:

   a. A realistic simulator scenario cannot be developed, or

   b. an accurate duplication of plant response cannot be achieved.

4. Performance evaluations will be completed for each EOP evolution scenario conducted during simulator training.

SECTION 5

Reference Plant/BVPS Unit 2 Plant Comparison

The following are differences determined to exist between BVPS-2 and the ERG reference plant. The ERG reference plant is described in the Westinghouse Owners Group ERG Executive Volume.

1. Reactor Trip Actuation System

   The reference system and the BVPS Unit 2 Systems are essentially the same.

2. Engineered Safeguards Features Actuation System

   a. Safety Injected Signal

      - Safety Injected initiating signals are identical for the described reference system and BVPS Unit 2.

      - Plant systems and components that are automatically actuated by an SI signal are similar for the described reference plant and BVPS Unit 1 with exceptions as noted in following descriptions.

      - RESET/BLOCK features of the SI signal actuation logics are identical for the described reference plant and BVPS Unit 2.

   b. Containment Spray Signal

      - Containment spray signals are automatically initiated by the same parameters for the reference plant and BVPS Unit 2.

      - Identical to the reference plant, High-High containment pressure, or manual operator initiation will automatically initiate containment spray system actuation and containment isolation phase B.

      - Containment Isolation Phase B (CIB) on BVPS-2 will actuate the Containment Spray Systems which are integrated with the CIB signal. On the reference plant CIB is automatically initiated by the Containment Spray Actuation signal which is independent of the CIB Actuation signal. Actuation reset capability of the containment spray system and CIB are accomplished by common actuation reset push buttons respectively (one for each train) and therefore are always accomplished simultaneously. This actuation reset arrangement varies from the described

reference plant in that CIB and containment spray system as described in the reference plant may be actuated and reset independently. This difference offers no significant problem since the reset capability does not provide any signal to change status of equipment but merely allows the operator to take manual control of the respective equipment.

c. Auxiliary Feedwater Start Signal

- The BVPS Unit 2 AFW start signals and the reference plant start signals are similar.

- In both the reference plant and BVPS Unit 2 automatic functions initialed by an AFW pump start signal are similar with the exception that the steam driven AFW pump receives the first start signal on 2/3 Low-Low SG water level on any one SG and the motor driven AFW pumps will start if the steam driven AFW pump fails to come up to speed. On 2/3 Low-Low SG water level in any two SG(s) the motor driven AFW pumps receive a start signal. All other auto start signals are identical to the reference plant.

d. Containment Isolation Phase A (CIA)

CIA actuation and reset logics are identical for BVPS Unit 2 and the reference plant.

e. Containment Isolation Phase B Signal (CIB)

See Containment Spray Signal description (Section 5.2.b).

f. Main Steamline Isolation Signal (SLI)

- SLI actuation signals and resulting automatic actions are identical for the reference plant and BVPS Unit 2 with following exception: BVPS Unit 2 does not have individual steam generator isolation, all steam generators are isolated simultaneously.

- SLI Reset capabilities are identical for the reference plant and BVPS Unit 2.

g. Containment Ventilation Isolation Signal

BVPS-2 uses a sub-atmospheric type containment and as thus does not utilize containment ventilation the same way as the reference plant. BVPS-2 only uses containment ventilation systems in the

capacity for containment purge during Modes 5 and 6.

h. Main Feedwater Isolation Signal (FWI)

- FWI actuation signals, and resulting automatic isolation are identical for the reference plant and BVPS Unit 2.

- RESET/BLOCK capabilities are identical for the reference plant and BVPS Unit 2.

3. Nuclear Instrumentation System (NIS)

The reference system and the BVPS Unit 2 system are essentially the same.

4. Rod Control Instrumentation System

The reference system and the BVPS Unit 2 system are essentially the same.

5. Radiation Instrumentation System

The reference system and the BVPS Unit 2 system are essentially the same.

6. Containment Instrumentation System

The reference system and the BVPS Unit 2 system are essentially the same.

7. Reactor Coolant System (RCS)

The BVPS Unit 2 RCS performs the same functions as the reference plant. It does have three distinct variations in configuration, these being:

- a three loop design vice four

- three pressurizer PORVs vice two

- loop isolation valves

8. Safety Injection System (SI)

The BVPS Unit 2 SI system performs similar functions as those described for the reference plant. The BVPS Unit 2 SI system is slightly different in configuration than the described reference plant. These differences are:

- BVPS Unit 2 does not have a subsystem corresponding to the reference plant High-Head SI subsystem. SI flow at high pressure (greater than approximately 305 psi) is provided exclusively by the

charging/HHSI subsystem. This system corresponds to the reference plant charging/SI subsystem.

- BVPS Unit 2's BIT is flanged off from the SI system and will not be used. The BIT isolation valves are designated Cold Leg Injection Isolation Valves.

- The BVPS Unit 2 LHSI subsystem does not interface with the Residual Heat Removal System (RHS). These systems are completely segregated. (See description of RHS system Section 5.9).

- The BVPS Unit 2 SI-Accumulator subsystem has a minimum pressurization requirement of 605 psig.

- The BVPS Unit 2 Cold Leg Recirculation mode does not utilize the LHSI pumps taking a suction from the containment sump and discharging to the charging/HHSI pump suction. This same action is accomplished by a seperate recirculation spray pump system taking a suction from the containment sump and discharging to the charging/HHSI pump suction.

- During Hot Leg Recirculation mode, BVPS-2 does not simultaneously supply borated water to both the hot legs and cold legs, only to the hot legs.

9. Residual Heat Removal System (RHS)

The BVPS Unit 2 RHS system is constructed similarily and operates identically to the reference system. The singular difference between the systems is that the BVPS RHS system is provided with two pumps (independent of the LHSI pump) utilized for Reactor Coolant circulation while utilizing RHS system. The BVPS Unit 2 RHS system is totally confined within the containment, where the reference plant dual purpose LHSI/RHS pumps are located in the safeguards building. (See description of difference of the LHSI system in Section 6.8).

10. Chemical and Volume Control System (CVCS)

The reference plant the BVPS Unit 2 CVCS systems are essentially the same. The one exception to their similarity is the BVPS system has three centrifugal charging/HHSI pumps vice the reference systems two centrifugal and one positive displacement pump.

11. Component Cooling Water System (CCP)

The reference system and the BVPS Unit 2 system are essentially the same.

12. Service Water System (SWS)

The reference system and the BVPS Unit 2 system are essentially the same.

13. Containment Spray System

The reference system and the BVPS Unit 2 system performs the same functions with the following difference: BVPS-2 containment spray pumps are not capable of being aligned to the containment sump for recirculation spray. On low RWST level the spray pumps stop. However, spray is then provided by a seperate recirculation spray system which is capable of maintaining the containment sub-atmospheric for 30 days following a DBA. This seperate recirculation spray system prevents providing a RWST flow path directly to the containment sump.

14. Containment Atmospheric Control System

The Containment Atmospheric Control System in the reference plant, and that utilized at BVPS Unit 2 perform nearly identical functions. The major appearant difference is in the safety qualification, and major function of the reference plant fan cooler in containment. The reference plant has safety grade fan coolers tasked with post-accident containment heat removal. This differs from BVPS in that the containment fan coolers are not safety grade, and although their operation is described under post-accident conditions, the design requirements for post-accident heat removal requirements are satisified by the Containment Spray System (See Section 5.13). On the reference plant the containment far coolers are located on the refueling deck. At BVPS the fans are located at the containment sump level and receive a shunt trip signal on high containment sump level.

15. Main Steam System (MS)

The reference system and the BVPS Unit 2 system are designed to perform the same functions. Five major physical difference exist in the configuration of the systems.

- The BVPS system has three vice four steam generators (SGs).

- The BVPS SGs are isolated by trip and non-return valves vice simple isolation valves.

- The BVPS MS system has an additional steam release path provided by the Residual Heat Release valve. This valve presents an air operated to open, spring return to close, valve capable of relieving approximately 200k lbm/hr (1.7% thermal power). This release corresponds to reactor decay heat and

RCS pump heat 20 to 25 minutes after a full power reactor trip.

- The design and normal operating pressures of the BVPS MS system are slightly lower than those described in the reference plant. (ie., 1075/1005 respectively vice 1185/1100.)

- The BVPS steam supply to the turbine-driven AFW pump originates from each of the three SGs and has manual isolation capability from individual SGs. The SG(s) cannot be remotely isolated if an AFW auto start signal is present, but swing check valves are supplied in the supply lines to minimize the probabiltiy of simultaneous SG depressurization during SLB accidents. The steam supplies are administratively controlled to provide steam from 2 of 3 SG(s) at all times.

16. Main Feedwater and Condensate System

The reference system and BVPS Unit 2 system perform the same functions. One significant difference in system configuration is that the BVPS has two motor-driven feed pumps (two motors per pump) and a motor-driven startup feedwater pump vice one motor-driven and two turbine-driven pumps in the reference plant.

17. Auxiliary Feedwater System (AFW)

The reference system and BVPS Unit 2 system perform identical functions. The only significant difference between the BVPS system and the reference system is that any of the three pumps are aligned to all three SG(s) following an AFW start and the steam driven AFW pump is normally aligned to receive steam from only two SG(s) at any one time.

18. Steam Generator Blowdown System

The reference system and BVPS Unit 2 system are essentially the same.

19. Sampling System

The reference system and BVPS Unit 2 system are essentially the same.

20. Spent Fuel Storage and Cooling System

The reference system and BVPS Unit 2 system are essentially the same.

21. Control Rod Drive Mechanism Cooling System

The reference system and BVPS Unit 2 system are essentially the same.

22. Control Rod Drive System

The reference system and BVPS Unit 2 system are essentially the same.

23. Turbine Control System

The reference system and BVPS Unit 2 system are essentially the same.

24. Electrical Power Systems

The reference system and the BVPS Unit 2 system are essentially the same with the exception of the containment fan coolers are not powered from an emergency power supply.

25. Pneumatic Power System

The reference system and the BVPS Unit 2 system are essentially the same with the exception of Pressurizer PORVs. On the reference plant these valves are pneumatically operated. On BVPS Unit 2 these valves are hydraulically opened and spring closed by pressurizer fluid. BVPS-2 has two air compressors which are dedicated as Containment Instrument Air Compressors vice supplying the containment air system from the station instrument air system.

SECTION 6

References


- NUREG-0899
- Westinghouse Emergency Response Guidelines, Rev. 1, September 1, 1983
- EOP Implementation Guideline (INPO 82-016), June 1982
- EOP Writing Guideline (INPO 82-017), July 1982
- EOP Verification Guideline (INPO 83-004), March 1983
- EOP Validation Guidelines (INPO 83-006), July 1983
- Letter to the NRC dated March 14, 1984 (Carey to Varga) documenting a conference call which provided clarification for identifying deviations when writing plant-specific EOPs from generic ERGs (ND1SLE:0118)
- Letter WOG-84-164, dated December 17, 1982; Supplement 1 to NUREG-0737
- NUREG-0700