

PROCEDURES GENERATION PACKAGE  
FOR THE  
HOPE CREEK GENERATING STATION

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

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Revision 1

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## 1.0 INTRODUCTION

### 1.1 Purpose

This document identifies the elements to be used by Public Service Electric and Gas Company's (PSE&G) Hope Creek Generating Station to develop its Emergency Operating Procedures (EOPs). The EOP's will provide the operator with directions to mitigate the consequences of a broad range of accidents and multiple equipment failures.

This document is based upon the NRC Guidelines for Preparation of Emergency Operating Procedures, NUREG-0899, August, 1982.

### 1.2 Scope

This document was developed in response to supplement 1 to NUREG-0737, Item 7.2b. The guidance provided in this document applies only to the Hope Creek EOPs and not to other procedures.

### 1.3 Background

Shortly after the accident at TMI, the NRC formed the Bulletins and Orders Task Force (B&OTF) within the Office of Nuclear Reactor Regulation. The Task Force was responsible for reviewing and directing the NRC activities associated with the Three Mile Island-type accident for all operating plants, to assure their continued safe operation.

On the basis of the NRC's review, it was concluded that the General Electric (GE) designed boiling water reactor (BWR) plants were quite capable of coping with small break LOCA's and feedwater transients, with or without stuck open relief valves.

The NRC did, however, identify improvements in the systems, procedures and analysis which will make the GE designed BWRs less susceptible to core damage during accidents and transients, coupled with system failures or operator errors. One of the recommendations from the B&OTF was to restructure and reformat the current EOPs from an event basis to a symptom basis. The symptom-based Emergency Operating Procedures would be categorized according to general plant symptoms, such as loss of coolant inventory, as opposed to several separate existing associated procedures, i.e., LOCA Inside Containment, LOCA Outside Containment and Loss of Normal Feedwater.

Shortly after the TMI accident, the Owner's Groups were formed to study and resolve problems associated with the operation of their plants. The GE Owner's Group concurred with the NRC and recommended that the Emergency Operating Procedures for nuclear plants be restructured and reformatted to a symptom basis, as opposed to the more event-specific basis.

The BWR Owners' Group developed Emergency Procedure Guidelines (EPGs) to be used by the utilities to develop Symptom-Based or Function-Oriented Emergency Operating Procedures. The Emergency Procedure Guidelines, Revision 2, NEDO-24934, June, 1982 were reviewed by the Office of Nuclear Reactor Regulation. An SER was issued and the EPGs were issued to all licensees on February 8, 1983 (Generic Letter 83-05).

## 2.0 PLANT-SPECIFIC TECHNICAL GUIDELINES

### 2.1 General

The BWROG-EPGs will be used as a basis for the Hope Creek Plant-Specific Technical Guidelines (P-STG). The format and arrangement of the Hope Creek Guidelines closely parallels the BWROG-EPGs and contains plant-specific information for Hope Creek.

Since the Hope Creek P-STG is based upon the BWROG-EPGs, which has been validated by the Owners' Group and evaluated by the NRC, there is no requirement to validate the Hope Creek P-STG.

### 2.2 Description of Conversion Methodology

The methodology for the conversion of the BWROG-EPGs to the Hope Creek P-STG is described in paragraph 3.2.1. The Hope Creek P-STG will be developed from Revision 3 of the EPGs with deviations documented on Figures 1 and 2. The methodology for conversion of the Hope Creek P-STG to the EOPs is described in paragraph 3.2.2.

#### 2.2.1 BWROG-EPG to P-STG

BWROG-EPG background information will be used to determine the intent of the Guidelines and their applicability to Hope Creek. Where applicability is verified, the generic Guidelines will be converted to a plant-specific guideline that meets the intent of the source Guideline. This will help ensure that the prescribed operational sequence results in the desired plant condition endpoint. Where inapplicability of a Guideline is verified, technical justification of adaptation or omission will be provided.

The EOP writers will reference a variety of source documents for plant specific information. These source documents include (but are not limited to) the following:

- BWROG-EPGs
- FSAR
- Draft Technical Specifications
- System Descriptions
- Currently Approved Procedures
- Logic Diagrams
- System Flow Diagrams

As each step of the BWROG-EPGs is converted into the Hope Creek P-STG, the information on Figure 1 will be completed by the writer. The justification section will be used to provide plant-specific technical information or explain deviations from Revision 3 of the BWROG-EPGs.

Each step of the Hope Creek P-STG that presents a safety-significant deviation from the BWROG-EPGs Rev. 3 will have an Engineering Evaluation attached to the Figure 1. The engineering evaluation will validate any safety-significant deviations by ensuring they are technically correct.

#### 2.2.2 P-STG to EOP

The writers will convert the P-STG steps into a "logic" type flowchart format thru direct incorporation where possible. In all cases, the intent of the P-STG step will be included. The format and style of this conversion will be governed by Appendix A.

As each step of the Hope Creek P-STG is converted to an EOP step, the information on Figure 2 will be completed by the writer. Where direct incorporation of a step cannot be accomplished, the justification section will be used to briefly describe EOP step equivalency. The information of Figure 2 will also be completed for EOP steps which incorporate plant specific directives.

BWROG-EPG Rev. \_\_\_\_  
H.C. P-STG Rev. \_\_\_\_  
Page \_\_\_\_ of \_\_\_\_

GUIDELINE CONVERSION  
DOCUMENTATION

BWROG STEP:

H.C. P-STG STEP:

JUSTIFICATION:

Prepared By: \_\_\_\_\_

Date: \_\_\_\_\_

Figure 1



BWROG-EPG Rev. \_\_\_\_\_  
OP-EO.ZZ-\_\_\_\_\_ Rev. \_\_\_\_\_  
Page \_\_\_\_\_ of \_\_\_\_\_

PROCEDURAL STEP CONVERSION  
DOCUMENTATION

H.C. P-STG STEP:

OP-EO.ZZ STEP:

JUSTIFICATION:

Prepared By: \_\_\_\_\_

Date: \_\_\_\_\_

Figure 2

### 3.0 FLOWCHARTS

#### 3.1 Utilization of Flowcharts

Flowcharts are utilized for the Operator Action Steps of the Hope Creek EOPs. These flowcharts provide the operator with visible guidance, which will help the operators place the plant into a safe condition quickly and consistently.

The major deficiencies of event-type EOP's are (1) they required the operator to diagnose the specific event in order to mitigate the consequences of that event and, (2) they did not address multiple failures or unavailability of various equipment.

The Hope Creek EOPs will be designed to minimize these deficiencies. This will be accomplished by selecting entry conditions to the EOP which are indications of potential emergency conditions or conditions which, if not corrected, could degrade into an emergency. This gets the operator into the EOP quickly. Once the EOP is entered, the order of priority is established by the values and trends of the monitored parameters as the operator executes the procedures.

There is no need for the operator to attempt to memorize the Operator Action Steps because they are visible on the flowcharts which are to be placed in the Control Room.

If an entry condition occurs the operator enters and executes the EOP(s), the operator may exit the EOP(s) by clearing all the entry conditions for that procedure, or by a step within the EOP directing the operator to another procedure.

## 4.0 EOP WRITER'S GUIDE

### 4.1 General

The EOP Writer's Guide is a document that provides specific, detailed instructions to personnel writing or revising EOPs. In addition to establishing sound writing principles, the guide promotes consistency of format, usage, and technical presentation among all EOPs and revisions, independent of number of different EOP writers. The Writer's Guide will be revised as necessary to reflect valid feedback resulting from procedure validation, training, and operator experience.

The Hope Creek EOP Writer's Guide is based upon the requirements of NUREG-0899, "Guidelines for the Preparation of Emergency Operating Procedures", August, 1982, and the industry's Emergency Operating Procedures Writing Guideline, INPO-82-017, July 1982.

### 4.2 Document Description

The Writer's Guide contains detailed information on the following major topics:

- o EOP Designation and Numbering - This section contains instructions for procedure numbering and revision numbering.
- o Procedure Format - This section contains instructions for page format, procedure organization, and instructional step numbering. Additionally this section contains instructions for flowchart content, symbol coding, functional flow and branching.
- o Flowchart Guidelines - This section contains instructions on step length, step content, use of logic terms, component identification, level of detail, and step numbering.
- o Mechanics of Style - This section contains instructions for spelling, hyphenation, punctuation/nomenclature, vocabulary, numerical values, etc.

A complete copy of the Hope Creek EOP Writer's guide is included as Appendix A.

## 5.0 EOP VERIFICATION PROGRAM

### 5.1 General

Verification of the Emergency Operating Procedures will confirm that static aspects of the procedures, such as component designations, setpoints, and format, are correct in accordance with the EOP source documents, the generic guidelines, and the Hope Creek Writer's Guide. The verification plan is modeled after INPO Guideline 83-004, "Emergency Operating Procedures Verification Guideline."

### 5.2 Verification Program Description

The Hope Creek verification program for EOPs will address the following objectives:

- o EOPs are technically correct, i.e., they accurately reflect the Plant-Specific Technical Guidelines and other EOP source documents.
- o EOPs are written correctly, i.e., they accurately reflect the Plant-Specific Writer's Guide.
- o The information presented in the EOPs will be consistent with the qualifications, training, and experience of the operating staff.

The verification includes the following:

- o Verification of the correctness and completeness of the plant-specific information merged with the generic guidelines.
- o The application of human factors principles to the EOPs as delineated in the Hope Creek Writer's Guide.
- o Verification of the compliance of the resultant EOPs with the generic guidelines from which they were developed.
- o Verification of the compliance of the EOPs with applicable operating, system, and administrative procedures.

A complete copy of the Work Plan for EOP Verification and Validation at Hope Creek Generating Station is included as Appendix B.

## 6.0 EOP VALIDATION PROGRAM

### 6.1 General

Validation of the Emergency Operating Procedures will confirm the dynamic usability of the procedures by the operator and the operability of the equipment. The validation plan is modeled after INPO Guideline 83-006, "Emergency Operating Procedures Validation Guideline."

### 6.2 Validation Program Description

The Hope Creek validation program for EOPs will address the following objectives:

- o The EOPs are usable, i.e., they can be understood and followed with a minimum of confusion, delays, and errors.
- o The instructions presented in the EOPs will be consistent with the shift manpower, qualification, training, and experience of the operating staff.
- o Assurance that the procedures will work, i.e., that the procedures guide the operator in mitigating transients and accidents.

The validation plan includes the following:

- o Comparison of the level of information presented in the EOPs with the minimum crew staffing required by the Technical Specifications, qualification, training, and experience of the operating shift.
- o Determination that the EOPs can be understood and followed without confusion, errors, and delays.
- o Determination that there is a high level of assurance that the EOPs will be effective in providing operator guidance towards the mitigation of transients and accidents.
- o Simulator exercises and control room walk-throughs will be used for EOP Validation.

- o Scenarios will be developed to ensure all EOPs possible will be exercised on the simulator. These scenarios will include multiple failures, both simultaneous and sequential.
- o Control Room walk-throughs will be performed on all EOPs not exercised on the simulator to ensure the steps which cannot be performed on the simulator are covered.

A complete copy of the Work Plan For EOP Verification and Validation at Hope Creek Generating Station is included as Appendix B.

## 7.0 EOP TRAINING PROGRAM

### 7.1 General

EOP training will be a vital element in the overall operator training program at Hope Creek. A unified effort on the part of the training department and the EOP writers will result in operators who are knowledgeable in both the use and the intent of these procedures.

### 7.2 Training Program Development

When developing training in the area of EOP's, the following major items will be considered:

- o What type of operator training should be provided (initial, requalification).
- o What method of operator training should be followed (classroom and/or simulator, etc.).
- o What operator knowledge and skill level is required.
- o What training material is needed to support EOP training requirements.
- o What current operator licensing requirements or guidelines exist.

### 7.3 Training Program Objectives

The objectives of this training program will include:

#### 7.3.1 Review of the requirements for the EOP's from:

- o NUREG-0737 TMI II Task Action Plan
- o Supplement 1 to NUREG-0737-Emergency Planning Requirements
- o NUREG-0899 - Guidelines for the preparation of Emergency Operating Procedures

#### 7.3.2 Discussion and review of the philosophy of the BWR Owners' Group Emergency Procedure Guidelines (EPG's) including:

- o BWR Owners' Group Generic Guidelines



- o Need for symptom oriented procedures as opposed to event oriented procedures
  - o Entry conditions and exit criteria
  - o Use of flowcharts for operator actions
- 7.3.3 Discussion of EOP flowchart development from the BWR Guidelines through the use of the Plant Specific Technical Guidelines.
- 7.3.4 Understanding of the content and use of each EOP. This will include careful review and walk-through of procedure steps to ensure operator knowledge of technical bases, location of instrumentation, and use of the procedures.
- 7.3.5 Successful performance of a series of dynamic, practical exercises using the Hope Creek Generating Station's plant-referenced simulator to satisfactorily exercise each appropriate EOP.

#### 7.4 Training Methods and Evaluation

Prior to implementation of the EOP's, operator training will be conducted using classroom discussion and/or simulator exercises.

- 7.4.1 Classroom discussions will be utilized to provide the operators with instruction on the full complement of EOP's. The discussions will include a careful review and walk-through of procedure steps to ensure operator knowledge of:
- o Technical basis for the procedural steps
  - o Location of instrumentation
  - o Procedural use and philosophy behind the procedures
  - o Procedural interrelationships
  - o Flowchart use
  - o Procedures which cannot be exercised on the simulator



Upon completion of classroom training, the operator's knowledge of the procedures will be evaluated via written examination.

- 7.4.2 Simulator exercises will be used to reinforce classroom training and to provide the operators with practical experience in utilizing and executing appropriate procedures as a shift (crew). This training will also serve to develop the operator's understanding of their responsibilities (roles) during an event and to develop their ability to work together as a team. A wide variety of scenarios will be used, including multiple (simultaneous and sequential) failures.

After training, the operator's knowledge of and performance using the EOP's will be evaluated. Included in this evaluation will be an assessment of the operator's knowledge of their responsibilities (roles) during an event and their ability to effectively work together as a team.

7.4.3 Requalification Training

All licensed operators will participate in control room walk-throughs using the EOP's during requalification training. The walk-throughs will be conducted in the control room or using the plant-specific simulator.

The training and operations staffs will participate in presenting requalification training. Participants in the requalification training program will critique the EOP's exercised during the training program. Any additional training needs will be determined from this critique and formal feedback discussed in 7.4.5.

#### 7.4.4 Training on Revisions

Training on minor procedure revisions will be conducted through a program of preshift briefings or lectures in the requalification program. Training on major revisions will be conducted by the use of classroom instruction and walk-throughs in the control room or on the plant-specific simulator. If operational considerations do not allow control room walk-throughs, and the plant-specific simulator is not available, training on major revisions will be conducted during classroom instruction.

#### 7.4.5 Operator Feedback

Operator feedback resulting from EOP training will be solicited and documented. This information will be collected following initial training and each requalification segment as specified by the Nuclear Training Center Instructor Development Manual. Additional training needs will be determined from this evaluation.

## 8.0 SYSTEM FUNCTION AND TASK ANALYSIS

A system function and task analysis was performed during the Control Room Design Review (CRDR) and is described in the Hope Creek Generating Station CRDR summary report. The objective of the system function and task analysis was to determine the information and control requirements associated with control room operator emergency response tasks in order to allow a systematic analysis of the completeness and adequacy of the control room equipment to support emergency response. The data from the CRDR task analysis is being used in the preparation of the EOPs. The task analysis will be updated on the completed EOPs. This will be done as part of the CRDR. The task analysis provides integration between the EOPs and CRDR.

Additional information regarding the System Function and Task Analysis is contained in a document titled "Control Room Design Review Summary Report," dated August 6, 1984. This document has been submitted to the NRC. The results of the updated task analysis on the Control Room instrumentation information will be provided in a supplemental report to the CRDR.