

PROCEDURES GENERATION PACKAGE

PUBLIC SERVICE COMPANY

OF

COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

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1. INTRODUCTION

1.1 PURPOSE

The purpose of this Procedures Generation Package is to describe the development of emergency procedures at Public Service Company's Fort St. Vrain Nuclear Generating Station. The Fort St. Vrain nuclear plant is a high-temperature gas-cooled reactor located near Platteville, Colorado.

1.2 SCOPE

This document was developed in response to Supplement 1 to NUREG-0737, Item 7.2b, page 15.

1.3 ORGANIZATION

This document consists of the following parts:

- Introduction
- Program Description
- Verification and Validation Program
- Training Program
- Guidelines For Preparation of Emergency Procedures (OAP-2) (Attachment 1).

2. PROGRAM DESCRIPTION

2.1 GENERAL

In conjunction with other activities related to NUREG-0737, Supplement 1, most notably the control room design review and safety parameter display system, Public Service Company is in

the process of defining critical safety functions and re-writing certain plant procedures. This document pertains to the methodology for generating a particular subset of plant procedures that deals with emergency operations and monitoring and restoration of critical safety functions. These procedures are part of a much more comprehensive set of operational, maintenance, and administrative procedures at Fort St. Vrain.

2.2 STRUCTURE OF EMERGENCY OPERATIONS

Emergency plant operation at Fort St. Vrain will be conducted using a parallel path approach. On one path are event-oriented emergency procedures. On the parallel path are symptom-oriented critical safety function restoration procedures. A symptom-oriented diagnostic procedure, invoked when certain transient conditions, such as reactor scram, occur, determines which path is initially used by control room operators. The diagnostic procedure will instruct operators to take certain immediate actions. It will then direct the operators to verify that the symptoms indicating normal critical safety functions are present. If the critical safety functions are normal, the diagnostic procedure will direct the systematic identification of the precipitating event and indicate which event specific procedure should be used. If critical safety functions are threatened, the operators will be instructed to use the

appropriate symptom-oriented critical safety function restoration procedure.

The event-oriented emergency procedures will be used when a particular precipitating event can be unambiguously identified using the diagnostic procedure. While an event-oriented procedure is being conducted, one individual in the control room will be responsible for monitoring the status of all Fort St. Vrain critical safety functions. The safety parameter display system will be used as the primary monitoring tool, but critical safety function monitoring procedures will also be provided. If any critical safety function is lost, or is in imminent danger of being lost, the event-oriented procedure will be abandoned and one, or more, critical safety function restoration procedure(s) will be immediately invoked and will dictate further operator actions. This parallel path approach takes advantage of the best characteristics of both event- and symptom-oriented procedures.

2.3 MECHANICS OF WRITING PROCEDURES

Since generic guidelines do not exist for the High Temperature Gas-Cooled reactor, the mechanics of the generation of a new emergency procedures set will be somewhat different than those used by light water plants, but will accomplish the same objectives.

2.3.1 Preparation

Because Fort St. Vrain is a unique type of plant, there are no owner's group emergency procedure guidelines from which to generate plant-specific procedures. There is, however, an existing approved set of emergency operating procedures implemented at Fort St. Vrain. During the control room design review task analysis, it was noted that many procedures in the existing emergency operating procedure set do not, in fact, relate to "emergencies", but to abnormal situations that can be (and are) dealt with on a fairly routine basis (e.g., single circulator trip). To meet the control room design review task analysis requirements, a basis for a new set of procedures, dealing strictly with symptom-oriented critical safety function monitoring and restoration was developed and analyzed in the Fort St. Vrain control room mockup.

Subsequent to the control room design review, Public Service Company has undertaken to restructure their old emergency procedures set into those that are truly "emergency" procedures and those that really deal with abnormal operational events. In preparation for re-writing the emergency operating procedures for the present effort, a set of existing procedures dealing with emergency events will be defined. Also, a complete

set of critical safety function monitoring and restoration procedures will be defined - based on the analysis done for safety parameter display system development and for the control room design review. From that point, the methodology described in the remainder of this Procedures Generation Package will be used to generate the new procedures.

2.3.2 Writing New Procedures

A procedures writing team will convert those procedures that have been retained through the selection process into the format defined by the Emergency Procedure Writer's Guide to be described in section 2.3.3. One new procedure will be generated for each event represented in the retained procedure set. Since the existing procedure set has already been approved by the Nuclear Regulatory Commission, no new analysis will be required to convert to the new procedure format. If any events are identified during the selection process that are deemed important enough to require procedural guidance, the new procedures will be written for them as well.

The critical safety function monitoring and restoration procedures will be formatted in accordance with the Writer's Guide. The critical safety function monitoring procedure will be adapted from the algorithms used in

the safety parameter display system to define the status of individual critical safety functions. The flow charts and task analyses that were produced by the control room design review will be used in the development of the critical safety function restoration procedures. A check will be performed on the critical safety function restoration procedures to make certain they are appropriate and complete.

2.3.3 Writer's Guide

A guide for writing Fort St. Vrain emergency and critical safety function procedures has been developed from the following references:

- Emergency Operating Procedures Writing Guideline (INPO-82-017)
- FORT ST. VRAIN PROCEDURE SYSTEM, Procedure G-2.

This guide is entitled "Guidelines For Preparation of Emergency Procedures", and includes detailed requirements for procedure format, organization, level of detail, content, and style. This guide is included in this Procedures Generation Package as Attachment 1.

3. VERIFICATION AND VALIDATION PROGRAM

3.1 GENERAL

The verification and validation activities at Fort St. Vrain will confirm the written correctness of the procedures and determine whether the actions specified in the procedures can be performed in the Fort St. Vrain control room. Verification and validation are separate activities. Each will be described below.

3.2 VERIFICATION

A verification/validation team will be established before (or during) the procedures writing effort. The verification/validation team may include some or all of the individuals on the procedure writing team, but it will also include a human factors specialist, a training specialist, and at least one licensed control room operator who did not participate in the procedures writing effort.

For verification, the verification/validation team will check each emergency and critical safety function procedure to ensure that the following conditions are met:

- Each procedure is technically correct, i.e., it accurately reflects either the existing procedure or the flowchart developed for a particular critical safety function.
- Each procedure is written correctly according to the writer's guide.

- The language and level of information presented are compatible with the qualifications, training, and experience of the range of individuals on the operating staff.
- The information and control requirements embodied in each procedure are available from the displays and controls in the Fort St. Vrain control room.

3.3 VALIDATION

After verification, the procedures will be revised to reflect changes recommended by the verification/validation team. Documentation will exist that lists controls and displays in the Fort St. Vrain control room that satisfy the control and information requirements identified during verification. Validation will consist of observing and recording operator actions while walking through each emergency and critical safety function procedure in the Fort St. Vrain control room mockup. This process is similar to the task analysis walk-throughs that were conducted for the control room design review. The objectives of the validation are the following:

- To determine whether the controls and instruments identified during verification are, in fact, the controls and instruments used by operators to accomplish procedural objectives.
- To determine whether the language and content of the procedures is compatible with the knowledge and training of Fort St. Vrain control room operators.
- To determine whether the procedures can be completed in a timely manner by the people on the shift operating staff.

- To generally provide a high level of assurance that the procedures will work, i.e., the procedures correctly guide the operating crew to mitigate transients and accidents.

After validation is completed, a written record of walk-through observations will exist that will be retained for use in future procedure revisions.

4. TRAINING PROGRAM

4.1 GENERAL REQUIREMENTS

A training segment will be developed that deals specifically with emergency plant operation. This course segment will be made a part of the Reactor Operator Training Program, the Senior Reactor Operator Training Program and the Licensed Operator Requalification Program.

4.2 PROGRAM DESCRIPTION

Training for both licensed operators and license candidates will consist of classroom instruction and control room/mockup walk-throughs. Implementation of training will be conducted in the following manner:

4.2.1 Classroom instruction sessions for the Reactor Operator Training Program and the Senior Reactor Operator Training Program will be conducted to introduce operators to the concepts of critical safety functions and the emergency procedures. Procedures will be presented during classroom sessions to enable the

operator to describe the overall structure of emergency procedures, describe the parallel path approach to emergency operation, have a working knowledge of the technical content of the emergency operating procedures, understand the technical bases of the emergency operating procedures, and describe the emergency responsibilities of each member.

4.2.2 Control Room/Mockup Walk-throughs for the Reactor Operator Training Program and the Senior Reactor Operator Training Program will be conducted to familiarize the operator with the particular displays and controls to be used when performing emergency tasks. The walk-throughs will enable the operator to be exposed to the emergency operating procedures in an operational setting and will provide the opportunity for the operator to demonstrate the use of the emergency procedures. The walk-throughs will be performed by an operating staff composed of trainees. Trainees will play the role of a particular shift position while performing emergency procedure walk-throughs. The operator's training in the use of the procedure in a control room/mockup setting will be documented using Job Performance Measures in accordance with the Fort St. Vrain Training Management Procedures.

4.2.3 After all licensed operators have received initial training on the emergency procedures, they will receive a course segment related to emergency operation during requalification training. This course segment will consist of a condensed version of the classroom portion of initial training. Additionally, the classroom segment for requalification will include; training on new emergency operating procedures, descriptions of any significant transients or accidents (since the previous requalification class) that have required the use of emergency procedures and solicitation of feedback from operators concerning their use of the emergency procedures. The requalification training segment will also include walk-throughs in the control room/mockup similar to those conducted for initial training.

4.2.4 Training on minor emergency operating procedure revisions is conducted through required reading using material derived from the plant Operational Information Assessment Group. Training for major revisions to the emergency operating procedures will be conducted as pre-shift sessions or as Operations Seminars.

4.3 TRAINING EVALUATION

4.3.1 Evaluation of the effectiveness of training will be accomplished by the Fort St. Vrain training staff. The training staff will determine whether the objectives of the training program have been met by using a combination of written tests and the satisfactory completion of the Job Performance Measures associated with the emergency procedures. A minimum grade of 80% on the written test and a satisfactory on the Job Performance Measures will be required for successful course segment completion.

4.4 TRAINING PROGRAM CHANGES

4.4.1 Incorporation of changes to training materials which relate to the Emergency Procedures and Operator feedback will be accomplished using the Training Development process outlined in the Fort St. Vrain Training Management Procedures.