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WRITER'S GUIDE FOR EMERGENCY AND ABNORMAL PROCEDURES

McGUIRE NUCLEAR STATION

Response to Supplement 1
to NUREG-0737, Rev. 4

TABLE OF CONTENTS

1.0 INTRODUCTION

This Writer's Guide for Emergency and Abnormal Procedures was prepared for use at McGuire Nuclear Station, Duke Power Company. Much of the information in the guide is applicable to procedures in general. However, the guide is intended specifically for use in preparing emergency procedures (EPs) and abnormal procedures (APs). Whenever the word "procedure" is used alone, it should be assumed to refer to both EPs and APs.

1.1 References

- Current Duke Power Company APM 4.2, Administrative Instructions for Permanent Station Procedures
- Duke Power Company review input
- Duke Power Company "Nuclear Production Department Procedure Development Guide," April 1, 1986
- NUREG-0899, Guidelines for the Preparation of EOPs
- Institute of Nuclear Power Operations, "Emergency Operating Procedures Writing Guidelines," INPO 82-017, July 1982

1.2 Purpose

This writer's guide provides specific guidance in the preparation of emergency and abnormal procedures. Readability and accessibility of information are of major concern. The purpose of the guide is to ensure that writers produce procedures that are readable, complete, convenient, accurate, consistent, and acceptable to control room personnel.

1.3 Guide Information

Before attempting to develop or review procedures, the writer should become thoroughly familiar with the EP/AP section of OMP 1-2, Use of Procedures, as well as the information in this guide. This section introduces some ideas for the use of the guide and its different sections.

1.3.1 Guide Structure

General principles such as formatting and guidance on procedure style and content are in the main body of the document. Examples of procedures are located in appendices, as are several other aids, including:

- Dictionary of Acronyms and Abbreviations
- Constrained Language List
- Punctuation Handbook
- Guidelines for Word Processing.

1.3.2 Guide Usage

The best way to use the guide is to start by becoming familiar with its structure. The Table of Contents is a detailed outline of how the guide is structured.

The writer's guide is intended as a reference for the writer when writing emergency or abnormal procedures. It has tabs to aid in quickly accessing required information. The Table of Contents may also aid in identifying the section containing information being sought.

The information in the guide is structured so that pertinent information needed to develop a procedure is covered first and that used to enhance the procedure is covered later in the guide.

While collecting information and organizing the procedure, the section on the procedure development process, Section 1.4, will be the most helpful. For procedure format information, the format principles section, Section 2.0, is the appropriate reference. For constructing sentences and developing notes and cautions, the style and and content section, Section 3.0, will provide the appropriate guidance.

For an example of both an EP and an AP, refer to Appendices 1 and 2. For acceptable abbreviations, refer to the Dictionary of Acronyms and Abbreviations in Appendix 3. Refer to the Constrained Language List in Appendix 4 when selecting appropriate terms. Appendix 5, Punctuation Handbook can be referenced for guidance on correct punctuation. Guidelines for Word Processing in Appendix 6 provides proper layout and spacing information for those typing and proofreading the procedures.

EPs will be verified and validated in accordance with the procedures contained in OMP 4-2, Verification Process For Emergency Procedures and OMP 4-3, Validation of Emergency Response Capability System. Verification is a two phase process in which both written correctness and technical accuracy are verified. Validation ensures the procedure, plant, operator and training work together to manage an emergency condition.

1.3.3 Guide Changes

The writer's guide will be maintained by the Operations Document Development Section. Recommended changes should be addressed to the Operating Engineer, Document Development. Revisions to the writer's guide will be approved and issued in the same manner as Management Procedures as explained in Section 9.0 of OMP 1-1, Administration of Operations Management Procedures.

1.4 Procedure Development Process

This section is intended to help the writer prepare to write. It is important that the appropriate references and information, including the writer's guide, be readily available.

1.4.1 Procedure Development Objectives

There are certain requirements of procedures to be used by control room operators during emergency and abnormal operating conditions. Operators must first of all trust that the information within their procedures is technically accurate and complete. Operators must also find that the information presented is easily accessed, read, and understood. The procedure writer must be familiar with the rules of usage for EPs/APs as outlined in OMP 1-2, Use of Procedures.

- Technical Accuracy: Procedures must be technically complete and accurate. Emergency procedure content is to be based on plant-specific Emergency Procedure Guidelines (EPGs).

- Information Presentation: The writer's guide provides information for translating the technical information into procedures. The procedure writer must present technically accurate information so that the user can understand it. In addition, the guide ensures that procedures will be consistent in organization, format, style, and nontechnical content.

1.4.2 Collecting Information

The procedure writer must collect information in two categories: technical information and user information. Both are equally important since a technically accurate procedure may not be user friendly if the user was not considered during the development process.

1.4.2.1 Technical Information

To ensure technical accuracy, the most up-to-date technical information should be collected. Sources of this information should include engineering drawings, system descriptions, vendor manuals, Technical Specifications and plant-specific Emergency Procedure Guidelines.

1.4.2.2 User Information

The amount of user information collected will have an affect on a procedure's level of detail. Enough detail should be included such that the least experienced, qualified user can use the procedure.

1.4.3 Drafting The Procedure

The drafting stage will be a major factor affecting whether a procedure becomes a good usable document. The writing style should place minimal demands on the user and should match the user's language ability. In drafting, the writer should strive to:

- Use the appropriate and correct format and writing style according to the requirements of Sections 2.0 and 3.0 of this guide.
- Make the procedure readable.
- Make the procedure easy to use and understand.
- Express ideas clearly and concisely.
- Use consistent format, style, and technical content.

A copy of this guide should be available for referencing whenever writing or revising procedures.

When the procedure is complete, it should be reviewed to ensure accuracy, adequacy and usability. Following the review, revisions may be required. Any revision should adhere to the same requirements as the original draft.

1.4.4 Reviewing the Procedure

The procedure writer should perform a self-review of the procedure prior to the formal review process. The Verification Checklists from OMP 4-2, Verification Process for Emergency Procedures, can be used to analyze the specific technical content, human factors, and communication features of the procedure. A technique called structured reading can also be used to objectively analyze and review a procedure. Section 4.2 of the NPD Procedure Development Guide describes this technique.

Refer to APM 4.2, Administrative Instructions for Permanent Station Procedures, for administrative requirements. By following APM 4.2, it is ensured that the appropriate personnel formally review and approve the procedure throughout the development process.

1.4.5 Procedure Verification

The EP verification process has two objectives:

- Written Correctness - To ensure that procedures conform to the format and other principles specified in this writer's guide.

- Technical Accuracy - To ensure that the procedures are technically accurate, consistent with plant-specific EPGs, and include all appropriate licensing commitments.

Procedure verification shall be performed in accordance with OMP 4-2, Verification Process for Emergency Procedures.

1.4.6 Procedure Validation

The EP validation process will be used to ensure that procedures are:

- Structured logically to provide sufficient information for qualified operators to perform their duties in an emergency.

- Compatible with plant responses, plant hardware, training, and available staffing.

The validation process will be performed in accordance with OMP 4-3, Validation of Emergency Response Capability System.

1.5 Procedure Change Process

When changes occur in the plant design, Technical Specifications, writer's guide, plant specific EPGs, or other plant procedures that affect the EPs or APs, the procedures shall be revised promptly to reflect these changes. The Operations Document Development section will handle EP/AP changes and is responsible for reviewing the changes to ensure that the appropriate consistency is maintained with the plant-specific EPGs, and with the writer's guide.

Procedure changes shall be made in accordance with OMP 1-2, Use of Procedures.

1.6 Procedure Availability And Accessibility

The EPs and APs will be located in the Control Room and in the Technical Support Center (TSC). They will be separately bound ard uniquely identified by procedure number and title.

2.0 FORMAT PRINCIPLES

In this section, procedure format refers to the procedure's physical layout on the page, and to certain format elements common to all procedures.

2.1 Organization Of Procedures

All EPs and APs are to have a common structure consisting of the elements shown below. The format shall be procedure text divided into sections, followed by enclosures. Subprocedures having separate text and enclosures are used to describe additional, subsequent actions necessary to regain normal plant conditions or to accomplish shutdown. The AP format shall be the same as that of the EP, except that AP subprocedures are designated as "cases" and include symptoms and immediate action sections as well as subsequent action sections.

EPs	APs
Cover Page	Cover Page
A. Purpose	Table of Contents
B. Symptoms or Entry Conditions	A. Purpose
C. Immediate Actions	
D. Subsequent Actions	Cases
Enclosures	B. Symptoms
	C. Immediate Actions
Subprocedures	D. Subsequent Actions
Purpose	Enclosures
Entry Conditions	
Subsequent Actions	
Enclosures	

2.1.1 Cover Page

Use the Procedure Process Record (Form 34731) as a cover page and include the following information (see Appendix 1 for an example of a cover page):

- Procedure number (ID No.)
- Changes incorporated into present revision
- Station name
- Procedure title
- Procedure preparer and the date of preparation
- Signature and date of a qualified reviewer
- Appropriate approval signatures and approval dates
- Other review/approval signatures and dates as necessary.

2.1.2 Table of Contents

Prepare a Table of Contents only for APs that have more than one case. Identify the title and page number for each case within the procedure. EPs do not utilize a table of contents due to the controlled nature of EP transitions and the referencing of specific step numbers in the transition statements.

2.1.3 Purpose

The purpose statement should briefly state the objective(s) to be achieved through use of the procedure. Because the purpose statement is a training aid, and not expected to be read during performance of the procedure, there are no stringent format requirements (see Appendices 1 and 2).

2.1.4 Symptoms Or Entry Conditions

This section is a summary of those conditions which require entry into the procedure.

For all APs and for EPs that are entry procedures into the EP set (EP/01, EP/09) a summary of the symptoms (plant conditions, alarms, etc.) should be provided. Symptoms should be listed in order of importance, with the most important one mentioned first. The importance of a symptom is especially related to its ability to identify a particular condition. Symptoms found in several abnormal conditions should be listed last. Use bullets (•) to list the symptoms (see Appendix 2, page 2).

For EPs which can only be entered by transition from previous procedures, a summary of the entry conditions, including procedure number and step number, should be provided. These entry conditions will be listed using bullets.

Example:

B. <u>Entry Conditions</u>

This procedure is entered from:

- EP/2/A/5000/01, SAFETY INJECTION, step 13, when a Pzr PORV is stuck open and its isolation valve can not be closed.

2.1.5 Immediate Actions

Specify the immediate operator actions to be taken for the procedure in the two-column format described in Section 2.3. Limit immediate actions to those positive steps that must be performed before there is an opportunity to refer to the appropriate procedure. If there are no immediate actions, write "None" below the section heading.

2.1.6 Subsequent Actions

Specify the operator actions necessary to return the plant to a normal, stable, or safe, steady-state condition. Use the two column format described in Section 2.3. After the last step in the Subsequent Actions section, write the word "END" centered on the page in capital letters and underlined.

2.1.7 Enclosures

Append any materials (e.g., graphics, parts of referenced OPs, or operator aids) that are neither included in the body of the procedure nor immediately available in the control room, but which are essential to carrying out the procedure. Appended materials are to be called "enclosures" and are to be located at the end of the procedure. Foldout pages should be used for enclosures when the operator is required to refer to an enclosure frequently. Text in enclosures may use the two column format or the single column, full page width format. Arrange enclosures in numerical order.

2.1.8 Subprocedures (EPs only)

Subprocedures are additional actions which would be included under "D. Subsequent Actions", but lend themselves to being separately bound for Control Room use. Subprocedures contain procedure text and enclosures necessary to regain normal plant conditions or to accomplish shutdown. EP subprocedures are identified by an additional number designator in the procedure number:

Examples:

EP/1/A/5000/01	"Main"
EP/1/A/5000/03	Procedures
EP/1/A/5000/1.1	Subprocedures
EP/1/A/5000/3.1	

2.1.9 Cases (APs Only)

Abnormal procedures may be divided into cases to address related transients or conditions. The following formatting requirements apply to APs containing cases (see example in Appendix 2):

- Cases shall be designated with Roman numerals (e.g., Case I, Case II, etc.).
- The AP purpose shall appear on page one of the procedure.
- Each case shall contain a Symptoms, Immediate Actions and a Subsequent Actions section.

2.2 Page Format

All pages of the EPs and APs, with the exception of the cover page, shall use the same page structure. This page structure uses a pre-printed border with page heading boxes. The pages containing operator action steps shall be written in a two-column format within the printed border.

2.2.1 Page Headings

The page heading consists of three blocks of information that may include:

- Procedure/subprocedure number
- Procedure title
- Case designation and title (APs only)
- Enclosure number and title
- Page number.

2.2.1.1 Procedure Number

In the left block of the page heading include the procedure number.

Example:

EP/1/A/5000/01

The procedure number is a unique identification number developed in accordance with Section 4.2 of the APM.

2.2.1.2 Procedure Title

Provide a short but descriptive title to allow the operator to easily identify the procedure and the conditions under which the procedure should be used. Locate the title on each page, except for the cover page, in the upper center as shown in the example in Appendix 1. On the cover page, locate the title in the space provided.

2.2.1.3 Case Designation And Title (APs Only)

If there are cases within an AP, provide the case designation and title directly below the procedure title. Initially capitalize the major words in the case title and designation.

Examples:

A. LOSS OF ELECTRICAL POWER
Case I
Loss of ETA or ETB

B. LOSS OF ELECTRICAL POWER
Case II
Unit Blackout

2.2.1.4 Enclosure Number and Title

Procedure, subprocedure, and case enclosures shall have the enclosure number and title provided directly below the document title. Initially capitalize all major words in the enclosure title.

Examples:

A. LOSS OF ELECTRICAL POWER
Enclosure 1
B/O Loads Sequenced Onto Diesel Generators

B. POST-LOCA COOLDOWN AND DEPRESSURIZATION
Enclosure 3
Placing ND Systems In RHR Mode

2.2.1.5 Page Numbers

The cover page of all procedures is not numbered.

For procedures with a Table of Contents, identify the page with an "i" in the upper right heading block. If necessary, use "ii", etc., to identify any succeeding pages of the Table of Contents.

The remaining pages of the procedure are numbered in consecutive order in the "Page ___ of ___" format. The first number is the sequential page and the second number is the total pages. Do not include enclosures in the total page count.

Example:

PAGE NO.
2 Of 6

Each enclosure is numbered separately using the same format. Place the page number in the upper right heading block.

2.2.2 Two-Column Structure

The pages for presentation of operator action steps shall use a two-column format within the printed border. The left column is designated for expected operator action and response, and the right column is designated for contingency actions when the expected response in the left column is not obtained. These columns shall be titled "ACTION/EXPECTED RESPONSE" and "RESPONSE NOT OBTAINED".

2.2.3 Page Breaks

Start separate pages for the following:

- Cover page
- Table of Contents
- Each EP subprocedure
- Each case (APs only)
- A. Purpose
- C. Immediate Actions (EPs only)
- Each enclosure

When possible, avoid splitting steps or substeps between pages.

Cautions and Notes should not be carried from one page to another. Additionally, the caution or note statement should appear on the same page as the step/substep to which it applies.

2.3 Step Format

Step numbering and indentation contribute to a procedure's readability. Numbered steps help users keep their place in a sequence of tasks. Indentation creates "white space" on the page, which is a "space clue" to users as to what level they are working on (step, substep, etc.) Whenever possible, do not split steps and related substeps between pages.

2.3.1 A/ER Column

For the "Action/Expected Response" column, use high-level action steps with lower level substeps. Substeps are lettered/numbered sequentially according to expected order of performance.

Example:

1. High-level step
   a. Substep
      1) Substep
         a) Substep.

If the substep order is not important, or they comprise a list, the substeps are designated by bullets (♦).

Example:

Verify VI valves to Containment - OPEN:

♦ 2VI-129B (A Ess Header Cont Isol Otsd)

♦ 2VI-160B (B Ess Header Cont Isol Otsd)

♦ 2VI-150B (Lwr Cont Non Ess Hdr C/I Otsd).

2.3.2 RNO Column

Do not number high level RNO steps. They will appear directly across from their high level step in the A/ER column. Designate RNO substeps as follows:

♦ If the A/ER substep has a specific RNO substep, then place the RNO substep directly across the page from the A/ER substep and number/letter it the same as the A/ER substep.

Example:

A/ER	RNO
a. Any NC Pump - RUNNING	a. Verify natural circulation.

- If the A/ER substep is designated by a letter or number and no RNO exists for the substep, then the corresponding space in the RNO column will be blank.

- If a RNO applies to the high level step, then the RNO substeps are numbered based on sequential performance (number/letter) or nonsequential/list (bullets). In these cases the substeps in the RNO column will not match the substeps in the A/ER column.

Examples:

A.

A/ER	RNO
Establish Letdown:	Establish excess letdown:
a.	1.
b.	2.
c.	3.

B.

A/ER	RNO
Maintain NC System subcooling - GREATER THAN 50°F.	Establish 50°F subcooling: a. Limit NC System cooldown rate to less than 100°F/HR (50°F/Hr if no NC Pumps running). b. Dump steam to condenser OR Dump steam with SM PORVs.

2.3.3 In-Text Graphics

Procedure graphics are nontext materials that support a procedure, such as graphs and tables. Usually graphics are included in a procedure as enclosures. Small tables (less than a full page) may be integrated into the body of a procedure for the convenience of the user.

When a table is integrated into the body of a procedure it should be placed immediately following the step where it is first mentioned.

Tables may extend across the width of the page and are not limited by the two-column (A/ER, RNO) format.

Refer to the table in a procedure step with instructions on its use or an explanation of its purpose. Do not place the table in the procedure without an explanation.

Give each column in the table a heading. Include the units for the data in parenthesis in the heading; do not repeat the units in the column.

Use the same type style and size as the procedure text.

Always place horizontal lines above and below the column headings and at the bottom of the table. Place horizontal lines between each entry when needed for clarity.

Place vertical lines between columns unless there is sufficient white space for clarity.

Example:

A/ER	RNO
Initiate NC System cooldown:	
a. Check lowest ruptured S/G pressure - GREATER THAN 585 PSIG	a. GO TO EP/2/A/5000/5.1, SGTR WITH CONTINUOUS NC SYSTEM LEAKAGE - SUBCOOLED RECOVERY, step 1.
b. Determine core exit temperature at which cooldown should be stopped.	

Lowest Ruptured S/G Pressure (PSIG)	Core Exit T/C Temperature (20°F Subcooled) (°F)
1200	529
1100	526
1000	515
900	502
800	488
700	472
585	452

2.4 Placekeeping Aids

Sign-off blanks are used by the user to monitor procedure progress. Provide a single line to the left and adjacent to the step number for all high-level steps in the "Action/Expected Response" (A/ER) column.

3.0 STYLE AND CONTENT OF PROCEDURES

The following approach to style and content emphasizes the use of concise performance steps. Information should be presented in a simple, familiar, and unambiguous manner. Consistency in style and sentence structure improve the readability and understandability of the procedure. Applying the following guidelines will ensure that style and content remain consistent from procedure to procedure.

3.1 Step Sentence Structure

The structure of a step affects the rate at which it is read and understood. The following guidelines will aid in developing steps that are read quickly and are easily understood. The guidelines apply to both the "Action/Expected Response" (AER) and "Response Not Obtained" (RNO) columns unless otherwise specified.

3.1.1 Command Statements

Write action steps as simple command statements. Begin the sentence with an action verb (e.g. open, close, verify, etc.) followed by the object of the action (usually the equipment name).

Examples:

	Action verb	Object
A.	Check	NC pressure.
B.	Close	1NI-178B (Train 1B ND To C & D CL).

Add other grammatical elements such as adverbs (action verb modifiers) or object modifiers as necessary to convey the appropriate instructions.

Examples:

	Adverb	Action verb	Object
A.	Manually	operate	equipment

	Action verb	Object	Object modifier
B.	Throttle	CA flow	to maintain NR level 30%.

Use short sentences and conditional statement clauses (conditional statements are discussed in Section 3.2).

Minimize the use of articles (the, a, an) unless they are needed for clarity.

Use the same sentence/clause style for main steps as well as substeps.

3.1.1.1 A/ER Column Steps

In the A/ER column show expected responses or indications to operator actions following a command statement in all capital letters. Separate the expected response from the action step with a hyphen. If a high-level task requires multiple actions, then specify subtasks. Following each subtask, show the expected response. Do not show expected responses for simple control manipulations or actions.

Examples:

A. Check S/G NR levels - GREATER THAN 5%.

B. Check Containment conditions:

- Containment pressure - NORMAL
- Containment Sump level - NORMAL.

3.1.1.2 RNO Column

Unlike the AER column, action steps in the RNO column are written in sentence format. Do not show the expected responses in the manner discussed in Section 3.1.1.1.

When contingencies exist for an RNO step, use statements separated by a space for each alternative action.

Example:

A/ER	RNO
Check Pzr PORVs - CLOSED	IF "Pzr Press" less than 2215 PSIG, THEN manually close PORVs. IF any valve can not be closed, THEN manually close its Isol valve.

If the RNO contains multiple contingency actions for a single high-level action in the AER column, the phrase "Perform the following:" should be used in the introductory high-level statement.

Example:

A/ER	RNO
Check Containment pressure - HAS REMAINED LESS THAN 3 PSIG.	Perform the following: a. Verify Sp components on. b. Verify NS Pump flow. c. Stop all NC Pumps. d. Stop all RV Pumps. e. Ensure VE Fans running.

As a general rule, all contingent transitions to other procedures should take place out of the RNO column. Deliberate transitions may be made from the AER column.

3.1.2 Positive Statements

Avoid using negative words in the A/ER column when possible. Write instructional or procedural steps as positive statements. Generally, positively stated sentences/clauses are more readily comprehended.

Examples:

A. **THIS** -- Maintain cooldown rate less than 100°F/hr.

B. **NOT THIS** -- Do not cool down greater than 100°F/hr.

3.1.3 One Thought Per Step

Use only one main action per procedure step. Do not combine unrelated actions into a compound sentence or clause. A compound sentence or clause that combines related actions is acceptable, however, the inclusion of more than one action in a procedure step should be avoided. See Section 3.2.2 for guidance on the use of "and".

Examples:

A. **THIS** -- Verify ECCS operation and flow.

B. **THIS** -- **IF** NC pressure less than 1520 PSIG, **THEN** ensure correct valve alignment and NI pump operation.

3.1.4 Performer Identification

For instructional or procedural steps, use the understood "you" as the subject of each sentence. When a step is written, such as "Check S/G levels," the understood subject is the Control Room Operator.

Where actions stated in the procedure are to be performed by someone other than the Control Room Operator, identify the performer of the action.

Example:

THIS -- Notify chemistry to sample NC System boron concentration every eight hours.

The word "locally" should not be used as a "performer identification" word. Although to "locally" open an MOV implies that an operator must be dispatched, this is not the intended function of the word. "Locally" only specifies that an action to be performed outside of the Control Room is to be done at the specified component or device when other alternatives exist (e.g., local control panel, ASP, etc.). When "locally" is used in an action step, "dispatch operator" should also be used.

Example:

THIS -- Dispatch operator to locally stop NF Pumps.

"Locally" does not have to be used if the location of the component or device is included as a substep.

Example:

THIS -- Dispatch operator to open Sequencer DC control power breaker:

- A Train, 2EVDA Bkr 6 (Vital Battery Area 733')
- B Train, 2EVDD Bkr 8 (Vital Battery Area 733')

3.1.5 Multiple Objects

When a sentence has two objects write them joined with a conjunction or listed separately.

When the sentence has three or more objects, list them vertically.

Examples:

A. Verify VI valves to containment - OPEN:

- 2VI-129B (A Ess Header Cont Isol Otsd)
- 2VI-160B (B Ess Header Cont Isl Otsd)
- 2VI-150B (Lwr Cont Non Ess Hdr C/I Otsd).

B. Establish RN flow to NC Pumps by opening:

- 2RN-276A and 2RN-277B (RB Non Ess Ret Inside/Outside Isol)
- 2RN-252B and 2RN-253A (RB Non Ess Sup Outside/Inside Isol)
- 2RN-40A (Train 2A To Non-Ess Hdr Isol).

3.2 Conditional Statement Structure

The logic terms **AND**, **OR**, **IF**, **IF NOT**, **THEN**, and **WHEN** are used in procedures to describe a set of conditions, to sequence action steps contingent upon conditions, or to express complex combinations of conditions and actions. Each of these logic terms has a specific function and should be used consistently throughout the procedures and in accordance with an accepted convention. When used in combination, care must be taken to avoid vague and difficult to understand instructions.

3.2.1 Use Of **IF**, **IF NOT**, **WHEN**, and **THEN**

When action steps are dependent upon certain conditions or combinations of conditions, begin the step with the words **IF** or **WHEN** followed by a description of the condition or conditions, and the word **THEN**, followed by the action to be taken. Use **IF** for an unexpected but possible condition. Use **WHEN** for an expected condition. Generally, the operator should proceed with the next steps in the procedure and complete the action for the **WHEN** statement upon meeting the stated conditions. If the operator must remain in the step containing the **WHEN** statement until it can be completed, clearly indicate this requirement in the step. Conditional statements should not be started in the middle of a line but at the beginning of the column on the next line down.

Examples:

A. **IF**, **THEN** and **WHEN** used correctly.

- **IF** Condenser not available, **THEN** use S/G PORVs to dump steam.
- **WHEN** at least one S/G NR level increasing, **THEN** throttle CA to maintain NR level at 38%.
- **WHEN** NC System subcooling greater than 75^{0}F **AND** PZR level greater than 5% (32%), **THEN** **GO TO** step 22.

B. IF used incorrectly.

- Check IF NC pumps can be started.

This statement should be written:

- Check if NC pumps can be started.

The two-column format equates to the following logic: "IF NOT" the expected response in the left-hand column, THEN perform the contingency action in the right-hand column." These implied logic terms should not be repeated in the right-hand column contingency. However, logic terms may be used to ensure there is no confusion as to what condition(s) the RNO step actually applies, and to introduce a secondary contingency in the right-hand column.

Examples:

A.

A/ER	RNO
Check Pzr PORVs - CLOSED	IF Pzr pressure less than 2215 PSIG, THEN manually close PORVs.

B.

A/ER	RNO
Any NV Pump running and aligned for normal charging.	IF NV Pumps aligned for SI flow, THEN perform the following: 1) Ensure RN aligned to AB non-essential header. 2) Start #1 PD Pump. 3) Close 1NV-238 (Charging Line Flow Control).

The word THEN should not be used at the end of an action to provide instructions for additional action within the same step, because it runs actions together.

Example:

A. THEN used incorrectly.

Notify Chemistry to obtain NC boron sample, THEN adjust VCT Makeup Control System for shutdown boron concentration PER OP/2/A/6150/09, BORON CONCENTRATION CONTROL.

IF NOT logic statements can be confusing, so do not use the logic term IF NOT. Where different actions are required for two possible conditions, state each condition with its required actions.

Examples:

A. **THIS**-- Check NC pressure:

1) IF greater than 195 PSIG, THEN GO TO step 8.

2) IF less than 195 PSIG, THEN ensure correct valve alignment and ND pump operation.

B. **NOT THIS**-- Check NC pressure:

- IF greater than 195 PSIG, THEN GO TO step 8,

  IF NOT, THEN ensure correct valve alignment and ND pump operation.

3.2.2 Use Of **AND**

Action steps will normally be performed in sequence so that a conjunction such as "and" is not required between steps. However, in the case of combinations of conditions, the word **AND** should be placed between the descriptions of conditions, but only when used as a logic term to indicate a decision point.

Examples:

A. **AND** used correctly as a logic term.

THIS -- **WHEN** subcooling greater than 75°F **AND** Pzr Level greater than 5% (32%), **THEN RETURN TO** step 21.

B. **AND** used incorrectly as a logic term.

NOT THIS -- IF S/G B OR C faulted, THEN locally unlock **AND** close SM to TD CA Pump Manual Isol valve:

- S/G B, 2SA-2
- S/G C, 2SA-1.

NOT THIS -- Start desired ND pump **AND** ensure its miniflow valve opens.

3.2.2.1 LONG SEQUENCES

To simplify a long sequence of conditions, do not use the word **AND** to join more than two conditions. When joining more than two conditions, use a list with "bullets".

Example:

IF all of the following:

- Condition 1
- Condition 2
- Condition 3
- Condition 4.

THEN . . . .

3.2.2.2 CONJUNCTION

When used as a simple or compound conjunction, combining related actions, do not emphasize the word "and" in the same manner as when it is used as a logic term.

Examples:

A. THIS-- Reset Phase A Cont Isol and verify Reset lights - LIT.

B. THIS-- IF S/G B OR C faulted, THEN dispatch operator to locally unlock and close SM To TD CA Pump Manual Isol valve:

- S/G B, 2SA-2
- S/G C, 2SA-1.

Use the main step/substep structure to list multiple actions necessary to achieve the main step's objective.

Example:

Align charging flowpath:

- Open 2NV-244A and 2NV-245B (Charging Line Cont Isol Otsd)
- Open 2NV-241 (Seal Inj Flow Control)
- Open 2NV-238 (Charging Line Flow Control).

3.2.3 Use Of OR

The word "or" will be used in the following four ways:

- Use the word OR in logic statements to call attention to alternative combinations of conditions. Use the logic word OR in the inclusive sense (any one or all conditions may be present).

  Example:

  A. OR used correctly as a logic term (inclusive sense).

  THIS-- IF Reactor Vessel UR Level less than 97% OR Pzr level behavior indicates upper head void, THEN increase Pzr level to 50% (78%).

- When "OR" is used to call attention to alternative conditions that are not incorporated into a logic statement format, the "OR" should be capitalized and centered between the two conditions. "OR" used in this manner should not be underlined to ensure it is not mistaken for a logic term. When used to give alternative conditions, "OR" should be used in the inclusive sense (any one or all conditions may be present).

  Example:

  A. Secondary heat sink:

  - Total feed flow available to intact S/G(s)-GREATER THAN 450 GPM

    OR

    NR Lvl in any intact S/G - GREATER THAN 5% (18%).

- "OR" is also used to list alternative operator actions. The use of alternative actions should be minimized and priorities established where possible. If priorities cannot be established, and alternative actions are equally acceptable, then it is necessary to use "OR" in the "exclusive sense" (one and only one of the alternative actions is to be performed). When "OR" is used in the exclusive sense, the step should clearly indicate only one of the actions is to be performed.

Example:

A. Establish KC flow to NC Pumps:

a) Open 1KC-338B (NC Pump Sup Hdr Outside Isol)
b) Open 1KC-424B and 1KC-425B (NC Pumps Ret Hdr Inside/Outside Isol)
c) Open 1KC-3A (Rx Bldg Non Ess Return Isol) and 1KC-230A (RB Non Ess Sup Isol)

OR

Open 1KC-18B (Rx Bldg Non Ess Return Isol) and 1KC-228B (RB Non Ess Sup Isol).

- When "or" is used to list alternative components related to only one action, "or" should not be emphasized by capitalization.

Example:

A. Stop NV Pump 1A or 1B.

3.2.4 Combination Of Logic Terms

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

Example:

A. Incorrect use of AND and OR.

NOT THIS-- IF condition A AND condition B OR condition C occurs, THEN GO TO step 5.

This statement has two possible meanings that make it ambiguous:

If the use of AND and OR within the same step cannot be avoided, then use the more explicit form (as illustrated below) to eliminate confusion.

Example:

A. **AND** and **OR** used correctly.

THIS-- **IF** both condition A **AND** condition B occur, **THEN GO TO** step 5.

OR

IF both condition A **AND** condition C occur, **THEN GO TO** step 5.

Do not use **"AND/OR"** in logic sequences to avoid ambiguity.

3.3 Individual Steps

The procedure user is trained to perform every action step and to perform it in the sequence given unless the procedure specifically states otherwise or unless bullets indicate sequence is not important. Action steps and conditional statement structures are discussed in Sections 3.1 and 3.2. Use the following guidelines when developing procedure steps.

3.3.1 Step Sequencing

Technical necessity shall be the overriding consideration for sequencing tasks and action steps. However, control room instrument arrangements should also be considered. In general, use the following guidelines:

- Write action steps in the order in which they are to be performed or verified to have occurred.
- Some series of steps must be performed in an exact sequence. Indicate these steps by using the previously designated alphanumeric system.
- Indicate nonsequential substeps by placing a bullet (♦) prior to each substep.
- Consider control room layout when sequencing steps. If technical sequence is not important, order steps so that the operator moves left-to-right or right-to-left along the control board.

3.3.2 Verification Steps

Verification steps should be used to determine whether the objective of a task or a sequence of actions has been achieved.

Separate verification steps/substeps should be used following a sequence of automatic or manual actions, or to ensure prerequisite conditions before initiating an action.

3.3.3 Diagnostic Steps

To aid operators in verifying that they are in the correct procedure or section, and to direct them to the correct procedure or section when necessary, diagnostic steps should be included in EPs. These steps should assist the operator in determining the cause of alarms or automatic protective systems actuation and direct him to the appropriate procedure or section.

For diagnostic steps, first instruct the operator to verify or check for a condition. Criteria that the operator will use to evaluate a condition, including expected values, should be shown as substeps or listed with bullets (♦) in the left column.

Conditional statements should be used in the right column to provide transitions to another step, section, or procedure.

Example:

A/ER	RNO
Check Containment conditions: ♦ Containment radiation monitors 1EMF-51A, 51B, 1EMF-3, 1EMF-16 - NORMAL ♦ Containment Pres - NORMAL ♦ Containment Sump Lvl -NORMAL ♦ "Ice Cond Lower Inlet Doors Open" alarm (1AD9-A5) - DARK.	GO TO EP/1/A/5000/02, HIGH ENERGY LINE BREAK INSIDE CONTAINMENT, step 1.

3.3.4 Nonsequential Steps

Some operator actions may be required during performance of a task, but not at a specific point in the sequence of steps. For example, some steps may be performed when a certain parameter such as temperature or level is reached, but not before.

Locate nonsequential steps at the first possible point at which they may be required.

Write nonsequential steps so that the operator clearly understands when the action is to be performed.

Example:

WHEN NC System subcooling reaches $0^{o}F$, **THEN** decrease charging flow to 32 GPM while maintaining subcooling.

3.3.5 Equally Acceptable Actions

When any one of several alternatives is acceptable, describe the action to be taken and list all of the alternatives below. Use a bullet (♦) to designate each alternative.

Example:

Start one of the following NC pumps:

- NC Pump 1A
- NC Pump 1B
- NC Pump 1C
- NC Pump 1D.

3.3.6 Recurrent Steps

Recurrent steps are actions that may need to be repeated at various intervals. These steps will usually require the operator to monitor or control some plant parameter.

If the intervals are easily defined (for example, following specific plant responses), repeat the step at each point at which it is to be performed.

If the intervals are not specific, describe conditions that require repeating the steps, and those for which the step is no longer required.

Recurrent procedure steps do not require placekeeping aids.

Notes should be used to remind the operator of the repetitive monitoring or controlling actions required by recurrent steps.

Recurrent steps may also be incorporated into an enclosure and used as a foldout page to remind the operator to continuously monitor or perform specific tasks.

3.3.7 Time Dependent Steps

Some operator actions are required at specified time intervals or some time after an action has taken place. In writing time-dependent steps, specify the time intervals as precisely as possible. Give the operator information about the time interval involved followed by the action to be taken.

Examples:

A. After 9 minutes, ensure VX operation.

B. After 5 minutes:

a. Open 1NV-13A (Letdn Orif 1A Otlt Cont Isol)

b. Close 1NV-10A (Letdn Orif 1B Otlt Cont Isol).

3.4 Cautions

Cautions are informational statements used in the procedure along with the steps. Cautions never contain required action steps.

3.4.1 Purpose

Caution statements shall be used to attract the operator's attention to essential or critical information which must be observed to prevent actions which could result in damage to equipment, loss of plant stability, injury to plant personnel, or endanger public health and safety.

3.4.2 Format

Designate cautions as follows:

- Capitalize, underline and use bold type for all letters in the word **CAUTION**.
- Write cautions across the page from margin to margin using bold type. For exact margin settings, see Appendix 6.
- Multiple cautions under a single heading shall be separately identified by noting them with bullets (♦).

3.4.3 Content

Make caution statements brief. Only include essential information. The following information, where applicable, should be contained in caution statements, ordinarily in the order indicated:

- Precautions necessary to avoid or minimize the hazard
- Specific nature of the hazard
- Location of the source of the hazard
- Consequences of failing to heed the caution
- Time consideration when critical.

Example:

CAUTION **Do not exceed 5750KW load on a 4160V bus when it is being supplied by a D/G.** (precaution) **Overloading the D/Gs will result in potential engine failure due to excessive crankshaft and piston stresses.** (hazard)

Caution statements shall not contain action steps. If an action is required, write a step, not a caution.

Passive action sentences (usually using "shall," "should," or "may") may be used to provide emphasis to caution statements, and to clearly separate them from steps. Do not use the methods described in Section 3.8.4 for emphasis within cautions as a general rule. For example, do not capitalize and underline logic words such as "if", "then" and "not". However, fully capitalize procedure titles and capitalize the first letter of each word in specific nomenclature and system names.

3.4.4 Placement

Place cautions immediately before the steps or substeps to which they apply. If a caution is general enough to apply to an entire procedure, subprocedure, or section, place the caution before the first applicable action step.

Cautions shall precede notes when they occur together.

All the lines of text for caution statements shall appear on one page. Caution statements shall be placed on the same page as the action steps to which they apply.

3.5 Notes

Notes are informational statements used in the procedure along with the steps. Notes never contain required action steps.

3.5.1 Purpose

Note statements are included to provide advisory or administrative information to the operator concerning specific steps or specific sequences of steps. This information should enhance the understanding of the procedure and would otherwise be difficult to find and incorporate into the procedure. Notes generally should contain information that is of most use to the inexperienced operator to aid in interpreting steps. Notes must be brief and easily understood.

3.5.2 Format

Designate notes as follows:

- Capitalize underline and bold all letters in the word **NOTE**.

- Write notes across the page from margin to margin. For exact margin settings, see Appendix 6.

- Multiple notes included under a single heading shall be separately identified by using bullets (♦).

3.5.3 Content

Make notes as brief as possible, still including essential information.

Do not write action steps in notes. If an action is required, write a step, not a note.

Passive action sentences (usually using "shall", "should", or "may") may be used to provide emphasis to notes and to clearly separate them from steps.

Example:

NOTE Enclosure 1 of this procedure should be open.

Do not use the method described in Section 3.8.4 for emphasis within notes as a general rule. For example, do not capitalize and underline logic words such as "if", "then", "not". However, fully capitalize procedure titles and capitalize the first letter of each word in specific nomenclature and system names.

3.5.3 Placement

Place notes immediately before the steps or substeps to which they apply. If a note is general enough to apply to an entire procedure, subprocedure or section, place the note before the first action step.

3.6 Referencing and Branching

Referencing within and between procedures should be kept to a minimum. It is better to reproduce small sections of a procedure than to reference the operator to another procedure or section.

3.6.1 Definitions

The term "referencing" means routing the user to other steps or sections within the same procedure or to another procedure. After performing the referenced instructions, the user returns to the point from which he was referenced.

The term "branching" means routing the user to another procedure or series of steps in the same procedure. The user does not return to the initial procedure or step.

3.6.2 Referencing

Use "REFER TO" or "PER" when the procedure user is directed to another procedure, section, or enclosure, but will be returning to, or remaining within, the controlling procedure/section/enclosure.

Examples:

A. IF CA flow greater than 450 GPM can not be established THEN REFER TO EP/2/A/5000/13.1, LOSS OF SECONDARY HEAT SINK, step 1.

B. Vent Reactor Vessel PER EP/1/A/5000/16.3, RESPONSE TO VOIDS IN REACTOR VESSEL.

3.6.3 Branching

- Use GO TO when the operator will discontinue use of the current procedure or section and stay in the branched procedure or section. GO TO is also used to send the operator to another series of steps in the same section when he does not return to the current step.

  Example:

  15 hours after event initiation, GO TO EP/1/A/5000/2.4, TRANSFER TO HOT LEG RECIRCULATION, step 1.

- Use RETURN TO when the operator will discontinue use of the current procedure or step and return to a procedure he was in initially or to a step that was previously performed/read.

  Examples:

  A. WHEN subcooling greater than 25°F AND NC System inventory adequate, THEN RETURN TO step 23.

  B. RETURN TO step 14.

3.6.4 Format

- When the operator is directed to another procedure, list the new procedure number first, followed by its title. Include the section, enclosure, and step number as appropriate.

Examples:

A. **WHEN** pressure control is restored, **THEN GO TO** EP/1/A/5000/04, STEAM GENERATOR TUBE RUPTURE, step 12.

B. **IF** no upper head void, **THEN** start at least one NC Pump **PER** OP/1/A/6150/02A, REACTOR COOLANT PUMP OPERATION, Enclosure 4.1.

- When referencing AP cases, list the procedure number and title, followed by the case number and case title. Do not fully capitalize the AP case number or title.

Example:

REFER TO AP/1/A/5500/06, LOSS OF S/G FEEDWATER, Case II, Loss Of Normal CA Supply, step C.1.

- When directing the operator to another step in the same section, use only that step number.

Example:

IF NC System depressurization must continue with void, **THEN GO TO** step 16.

3.7 Word Usage

3.7.1 Action Verbs

The verb is the most important word in a sentence. Therefore, the choice of verb to describe the desired action deserves attention. Select a verb that precisely describes the action and use it consistently in that context. Performance errors may result when verb meanings are not applied consistently. Use the list of recommended verbs and their definition in Appendix 4.

3.7.2 Vocabulary

The vocabulary used in procedures should be easily read and understood by Control Room Operators.

- Use specific control board nomenclature and terminology that operators and other plant personnel understand.
- Use short, commonly found words.
- Do not use contractions such as "don't" or "can't". Instead, use "do not" or "cannot".
- Avoid the use of synonyms. Always use the same word, term, or phrase for a given subject or action.
- Use specific words that precisely describe the task or action of the operator. Avoid vague instructions such as "check frequently" or "throttle slowly". Where possible, use specific intervals or guidelines.

Ordinarily, avoid the following words and terms in procedure steps:

Adequate	If necessary	Maximum
Available	If required	Minimum
As necessary	Immediately	Rapidly
Attempt	Initiate	Slowly
Gradually		

These words are acceptable however, when clarification is provided either in parenthesis or substeps, or if it is not possible to quantify the evolution.

Example:

Verify proper CM System operation:

a. Standby Hotwell and CM Booster Pmps - RUNNING

b. 2CM-420 (Load Rejection Bypass Valve) - OPEN.

(In this example the potentially ambiguous word "proper" is defined by the substeps).

3.7.3 Component Nomenclature

- Refer to valves by giving valve number, followed by exact control board nomenclature in parentheses. Capitalize the first letter in each word of the nomenclature.

  Example:

  Open 2NV-241 (Seal Inj Flow Control)

  The following valves are exceptions and are referred to by their noun names only:

  - Pzr PORVs
  - MSIV and Bypasses
  - SM PORVs
  - Pzr Spray Control
  - S/G Feed Reg and Bypasses.

- Refer to equipment names by using exact control board nomenclature in initial caps.

- Refer to control board gauges, switches and switch positions by giving the exact nomenclature in quotation marks. Capitalize the first letter in each word.

Examples:

A. Select "Press" on "Steam Dump Select".

B. Check "Containment Press" - NORMAL.

A generic reference can be made to control room gauges without using exact nomenclature.

Example:

Check S/G levels - AT 38%.

- To signify the exact wording of an alarm or annunciator, use quotation marks and capitalize the first letter in each word.

Examples:

A. "Safety Injection Actuated" status light - LIT

B. "Ice Cond Lower Inlet Doors Open" alarm - DARK

- When two or more devices have the same nomenclature except for the train/component designators (Train A and B; Phase X, Y, Z, etc.) the devices may be indicated by listing the nomenclature once and placing the other train/component designations as follows:

Examples:

A. "Swgr ETA UV On Phase X, (Y), (Z)" status lights - LIT

B. Close 1SM-77A, 76B, 75A, 74B (S/G Otlt Hdr Bldwn C/Vs).

3.7.4 Abbreviations, Acronyms and Symbols

Use only those abbreviations, acronyms, or symbols that are familiar and clearly understood by operators.

- Generally, avoid abbreviating words, phrases, or names unless the system or component is frequently and commonly referred to by an abbreviated form. Use only the accepted abbreviations or acronyms found in Appendix 3.

- If a single abbreviation can represent two different words, ensure the context of the sentence clearly denotes the intended use of the abbreviation. If it is possible an operator may confuse the meaning of the abbreviation; spell the words.

- To make an abbreviation or acronym plural, add a lower case "s": e.g. CFPTs, not CFPT's. Reserve the apostrophe for indicating possessive cases.

- When referring to specific operating devices or equipment, use the precise label nomenclature, including abbreviations, acronyms, or symbols.

- The following symbols may be used:

  % Percent
  = equal to
  °F Degrees Fahrenheit
  °F/hr Degrees Fahrenheit
  °C Degrees Celsius
  + Plus
  - Minus
  " Inches
  ' Feet
  # Number

  Ordinarily, the above symbols should be used when the text includes numerals. When a number or parameter is written as a word, the word description of the symbol should be used. However, if necessary to enhance the readability of a sentence, a combination of symbols, numbers and words may be used.

  Inequalities are to be expressed in words rather than symbols: i.e., "greater than, less than". These words are always appropriate for comparing pressures, temperatures, levels and flowrates. The words "above" and "below" should not be used in this context.

3.8 Mechanics Of Style

3.8.1 Spelling

Spelling should be based on a current American dictionary. When a dictionary offers a choice of spellings, use the first listed.

Be consistent in spelling throughout procedures. Several industry teams have varying spellings, such as "startup" and "start-up". Use the spelling most commonly used at Duke Power, and use it consistently.

3.8.2 Punctuation

Generally, standard American English rules for grammar and punctuation should be used. Refer to Appendix 5 for guidelines on correct punctuation.

3.8.3 Capitalization

Use capitalization for emphasis or attention as described below:

- Capitalize the first letter of the following:
  - Each word in section headings (underlined)
  - Each word in case titles
  - First word in a sentence
  - First word in a phrase used in a list
  - Each word in alarm nomenclature (with quotation marks)
  - Each word in exact control board gauge, switch and switch position nomenclature (with quotation marks)
  - Proper nouns, such as the station, or building name, or a person's title
  - Each word in valve or damper nomenclature (in parenthesis).

  Examples:

  A. 1CA-4 (CA Pmps Suct From UST)

  B. 1AVS-D-5 (VE A Trn Recirc Damp)

- Each word in major system names

  Examples:

  A. Nuclear Instrumentation System
  B. Emergency Core Cooling System

- Each word in system functions

  Examples:

  A. Safety Injection
  B. Feedwater Isolation
  C. Reactor Trip

- Each word in specific plant equipment/structures and control board switch/indications that cannot be expressed exactly.

  Examples:

  A. Rx Trip Breaker 1B
  B. Steam Dump Controller (only one controller)
     NV Pump 1A
     Containment Sump

- Each word in plant conditions

Examples:

A. Hot Standby
B. Cold Leg Recirculation
C. Natural Circulation

- Write the following items in all capital letters:
  - Procedure numbers and titles
  - Acronyms (CST, LOCA, VCT)
  - System designators (ND, NC, VI)
  - Expected responses (A/ER column) to operator actions

    Examples:

    A. S/G W/R levels - INCREASING

    B. Check any NC pump - RUNNING

3.8.4 Emphasis Techniques

Emphasize important aspects of the procedure in the following manner (see example in Appendix 1):

- Capitalize, bold and underline, the following:

NOTE
CAUTION
GO TO
RETURN TO
PER
REFER TO

IF
AND
OR
WHEN
THEN

— **Only when used in logic statements.**

- Use quotation marks to set off annunciator or alarm legends, switch positions and nomenclature, gauge nomenclature, or words/phrases to be spoken, such as an announcement.

Examples:

A. "E/S Load Seq Actuated" status lights (1S1-14) - LIT

B. Depress "Man" pushbutton on "Steam Dump Ctrl" and lower controller output to 0%.

3.8.5 Units and Numerals

- Use the units of measurement that actually appear on the instruments specified.
- Use units of measurement familiar to the operator.
- Use Arabic numerals unless specific equipment nomenclature contains Roman numerals.
- Use Arabic whole numbers whenever possible.
- If whole numbers must be divided, use decimals.
- Limit the numbers used in the procedure for parameter indications to one-half of the smallest increment that can be read on the instrument (i.e., if an instrument meter is divided into 50 pound increments, then the procedure should not specify actions based on readings of less than 25 pound increments).

3.8.6 Tolerances

- Provide tolerances where appropriate. Give nominal values and ranges in immediately understood terms, avoiding the need for interpretation. If there is no specific desired value, provide the tolerance as a range.

  Example:

  Take Turbine to manual control and decrease pressure to 400-410 PSIG by closing governor valves.

- Use specific values without ranges when it is desirable to control a parameter as close to a specific value as practical. The operator is expected to use his best judgment based upon current plant conditions and the intent of the procedure step in determining how close to the exact value the parameter actually comes.

  Examples:

  A. Throttle CA flow to maintain NR Lvl 38%.

  B. Manually dump steam to reduce "Stm Hdr Pressure" to 1090 PSIG.

3.8.7 Formulas and Calculations

Avoid the use of formulas and calculations where possible. When calculations are required, they should be as simple as possible, and space should be provided for the calculations.

3.9 Location Information

Assume that the action occurs in the Control Room for most steps in emergency procedures. For any actions performed outside the Control Room identify only that the actions are outside the Control Room, unless a very infrequently used component is involved.

- Identify local, in-plant activities at a specific component as follows:

  Example:

  Dispatch operator to locally trip Control Rod Drive M/G Sets.

- Identify the location of infrequently used components.

  Example:

  Dispatch operator to de-energize D/G Sequencer control power breakers:

  - 1EVDA Bkr 6, D/G 1A (AB-733, BB-46)
  - 1EVDD Bkr 8, D/G 1B (AB-733, BB-46).

3.10 ENCLOSURES

Supplemental information or detailed instructions which would unnecessarily complicate the flow of the procedure should be placed in an enclosure to that procedure. Ordinarily, tables, large lists, and graphs should be incorporated into the procedure as enclosures, however, refer to Section 2.3.3 for use of graphics in the text. If necessary, assistance may be obtained from the Production Support or Corporate Graphics Arts Department to develop suitable graphs for use as enclosures.

When enclosures are used, instruct the user in the text of the procedure as to the intended use of the enclosure and its location (i.e., enclosure number).

- Format enclosure pages as follows (see example in Appendix 1):

  - Enclosure page headings shall be the same as other procedure pages with the exception that the enclosure number and enclosure title will be included directly below the procedure title.

- Enclosures shall be numbered consecutively within a procedure.
- Enclosures may use either the two column format of the body or a single column, full page width format.

- When using graphs, ensure:
  - Lines on the graph are clearly reproducible.
  - Scales are consistent with the accuracy needed by the user. Extensive approximation or interpolation should be avoided.
  - Grid lines on the graph are lighter in weight than the axes and the data being presented.

- When using tables, ensure:
  - Each column has a heading. Include the units for the data in parentheses in the heading. Do not repeat the units all the way down the column.
  - Use the same type style and size as the procedure text.
  - Always place horizontal lines above and below the column headings and at the bottom of the table. Place horizontal lines between each entry when needed for clarify.
  - Place vertical lines between columns unless there is sufficient white space for clarity.

APPENDIX 1

EMERGENCY PROCEDURE EXAMPLE

An attempt has been made to make the procedure which follows technically accurate. However, in some instances, the text has been modified to provide examples of points previously mentioned in the guide.

Form 34731 (R5-88)

Duke Power Company
PROCEDURE PROCESS RECORD

(1) ID No. EP/1/A/5000/01 .
Change(s) 0 to 2 Incorporated

PREPARATION

(2) Station McGuire Nuclear

(3) Procedure Title Safety Injection

(4) Prepared By Len Firebaugh Date 8/2/88

(5) Reviewed By _____ Date _____

Cross-Disciplinary Review By _____ N/R _____

(6) Temporary Approval *(if necessary)*

By _____ (SRO) Date _____

By _____ Date _____

(7) Approved By _____ Date _____

(8) Miscellaneous

Reviewed/Approved By _____ Date _____

Reviewed/Approved By _____ Date _____

(9) Comments (For procedure reissue indicate whether additional changes, other than previously approved changes, are included. Attach additional pages, if necessary.)
Additional Changes Included. ☐ Yes
☐ No

(10) Compared with Control Copy _____ Date _____

(11) Requires change to FSAR not identified in 10CFR50.59 evaluation? ☐ Yes
If "yes", attach detailed explanation. ☐ No

Completion

(12) Date(s) Performed _____

(13) Procedure Completion Verification

☐ Yes ☐ N/A Check lists and/or blanks properly initialed, signed, dated or filled in N/A or N/R, as appropriate?

☐ Yes ☐ N/A Listed enclosures attached?

☐ Yes ☐ N/A Data sheets attached, completed, dated and signed?

☐ Yes ☐ N/A Charts, graphs, etc. attached and properly dated, identified and marked?

☐ Yes ☐ N/A Procedure requirements met?

Verified By _____ Date _____

(14) Procedure Completion Approved _____ Date _____

(15) Remarks *(attach additional pages, if necessary)*

Response to Supplement 1
to NUREG-0737, Rev. 4

A. Purpose

This procedure provides actions to:

1) Verify proper response of the automatic protection systems following an automatic actuation of Safety Injection with NC pressure greater than 1955 PSIG or any manual actuation,
2) To assess plant conditions and
3) To identify the appropriate recovery procedure.

B. Symptoms

1. Symptoms that a Safety Injection has occurred:
   - "Safety Injection Actuated" status light lit
   - NV, NI and ND Pumps running.

2. Symptoms that require a Safety Injection if one has not occurred:
   - 2/4 Pzr pressure channels less than 1845 PSIG
   - 2/3 Steam Line pressure channels in any line less than 585 PSIG
   - 2/3 Containment pressure channels greater than 1 PSIG.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Immediate Actions	
NOTE Foldout page should be reviewed.	
____ 1. Manually exercise Rx Trip Train 1A and 1B switches.	
____ 2. Verify Reactor Trip: ♦ Rod bottom lights - LIT ♦ Reactor Trip and Bypass Breakers - OPEN ♦ Neutron flux - DECREASING.	GO TO EP/1/A/5000/11.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, step 1.
____ 3. Verify Turbine/Generator trip:	
a. Turbine Throttle and Governor valves - CLOSED	a. Manually trip Turbine. IF Turbine will not trip, THEN: 1) Stop both DEH Pumps. 2) Place Turbine in manual and close Governor valves at "Fast Rate". 3) Locally trip Turbine. IF Turbine will not trip, THEN close all MSIVs.
b. Generator Breakers 1A and 1B - OPEN.	b. Manually open breakers.
____ 4. Verify 1ETA and 1ETB - ENERGIZED.	Try to restore power to deenergized bus while continuing with this procedure. IF no onsite AC power is available, THEN GO TO EP/1/A/5000/09, LOSS OF ALL AC POWER, Immediate Actions, step 4.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. Verify Load Sequencers actuated: ♦ "E/S Load Seq Actuated Train A, (B)" status lights - LIT	Manually initiate SI.

D. Subsequent Actions

1. REFER TO RP/0/A/5700/01, NOTIFICATION OF UNUSUAL EVENT.

CAUTION Monitor lights may not be aligned properly for other than initial entry into this procedure.

2. Check ESF Monitor Light Panel:

a. Groups 1, 2, 5, 7 - DARK	a. Manually align equipment. IF "Safety Inject Train A, (B)" lit, THEN check OAC Tech Spec program 13 to determine misaligned valves. IF OAC is out of service, THEN REFER TO Enclosure 2.
b. Groups 3 and 6 - LIT	b. Manually open valves in group 3. Manually close valves in group 6.
c. Ss and St components in group 4 - LIT.	c. Manually align equipment. IF "Cont Isol Phase A Train A, (B)" not lit, THEN manually initiate Phase A isolation. IF still not lit, THEN check OAC Tech Spec program 13 to determine misaligned valves.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
____ 3. Verify position of the following valves:	
a. ND Pump Miniflows:	
1) Check both "ND Flow To NC Loops A & B , (C & D)" indicators - LESS THAN 500 GPM	1) IF flow from either ND Pump greater than 1000 GPM, THEN ensure 1ND-68A and 1ND-67B (ND Pump & Hx Miniflow) closed. GO TO step b.
2) Verify 1ND-68A and 1ND-67B (ND Pump & Hx Miniflow) - OPEN.	2) Manually open valves.
b. Containment isolation valves - CLOSED:	b. Manually close valves.
• 1IA-508A (VI To Upper Pers Airlock Isol)	
• 1IA-516A (VI To Lower Pers Airlock Isol)	
• 1NS-5551A (N/R Cont Press Signal Isol)	
• 1NS-5550B (N/R Cont Press Signal Isol)	
• 1MISV-5580 (EMF38, 39, 40 Smp Sup C/I Otsd)	
• 1MISV-5582 (EMF 38, 39, 40 Smp Ret C/I Otsd)	
• 1MISV-5581 (EMF 38, 39, 40 Smp Sup C/I Insd)	
• 1MISV-5583 (EMF 38, 39, 40 Smp Ret C/I Insd).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. Verify SI flow:	
a. "NV Pmps To Cold Leg Flow" indicator - FLOW INDICATED	a. Locally start pumps and align valves.
b. NC pressure - LESS THAN 1520 PSIG	b. GO TO step 5.
c. "1A, (1B) NI Pump Flow" indicators - FLOW INDICATED	c. Locally start pumps and align valves.
d. NC Pressure - LESS THAN 195 PSIG	d. GO TO step 5.
e. "ND Flow To NC Loops A & B, (C & D)" indicators - FLOW INDICATED.	e. Locally start pumps and align valves.
NOTE Seal injection flow should be maintained to all NC Pumps.	
5. Monitor NC Pump trip criteria:	
a. One NV or NI Pump - FLOW INDICATED	a. GO TO step 6.
b. NC System subcooling - GREATER THAN 0°F.	b. Stop all NC Pumps.
6. Verify CA flow to all intact S/Gs.	Manually start pumps and align valves PER Enclosure 3. IF CA flow greater than 450 GPM can not be established, THEN REFER TO EP/1/A/5000/13.1, LOSS OF SECONDARY HEAT SINK while continuing with this procedure.
7. Verify KC Pumps - RUNNING.	Manually start pumps.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. Verify RN System operation:	
a. RN Pumps - RUNNING	a. Manually start pumps.
b. Throttle Unit 2 RN flow to minimum for existing plant conditions.	
c. Check "RN To 1A, (1B) D/G Hx Flow" - AT DATA BOOK TABLE 8.10A VALUE.	c. Throttle valves for required flow: ♦ 1RN-73A (A D/G Hx Outlet Isol) ♦ 1RN-174B (B D/G Hx Outlet Isol).
9. Verify VC System operation:	
a. Control Rm AHUs - ON	a. Manually start AHUs.
b. CR Area AHU - ON	b. Manually start AHU.
c. Cont Rm Outside Air Press Fan - ON	c. Place "Cont Rm Outside Air Press Fan" switch to "On".
d. CR Area Chiller - ON.	d. Manually start chiller.
10. Check if main steamlines should be isolated:	
a. Any S/G pressure - LESS THAN 585 PSIG	a. GO TO step 11.
b. Verify the following - CLOSED: ♦ All MSIV and MSIV Bypasses ♦ All SM PORVs.	b. Manually close valves.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
____ 11. Check Containment pressure - HAS REMAINED LESS THAN 3 PSIG.	Perform the following: a. Verify Sp components in Monitor Light Group 4 are lit. IF not lit, THEN manually initiate both trains of Phase B & Cont Spray. IF OAC is out of service, THEN REFER TO Enclosure 2 for Sp components. b. Verify flow from both NS Pumps. IF flow not verified, THEN manually start pumps and align valves. c. Stop all NC Pumps. d. Stop all RV Pumps. e. Ensure VE Fans running. f. Ten minutes after Sp signal ensure the following on: • H_2 Skim Fans • Cont Air Ret Fans.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
____ 12. Check NC System heat removal:	
a. Check NC T-Avg - STABLE AT OR TRENDING TO 557°F.	a. IF temperature less than 557°F AND decreasing, THEN: 1) Reset MSRs and ensure steam dumps closed. 2) IF cooldown continues, THEN control total CA flow. Maintain total CA flow greater than 450 GPM until "S/G NR Lvl" increasing in at least one S/G. a) Reset CA Modulating Valve Resets. b) Throttle CA Control valves. c) Stop #1 TD CA Pump as necessary. 3) IF cooldown continues, THEN close MSIVs and Bypasses. IF temperature greater than 557°F AND increasing, THEN: ♦ Dump steam to condenser OR ♦ Dump steam using SM PORVs.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION If at any time a Pzr PORV opens, the following step should be repeated.

13. Check Pzr PORVs and Spray Control valves:

a. Pzr PORVs - CLOSED

a. IF "Pzr Press" less than 2315 PSIG, THEN manually close Pzr PORVs.

IF any valve can not be closed, THEN manually close its Isol valve.

IF Isol valve can not be closed, THEN place "PORV Overpress Protection Select" switch to "Lo Press Mode" and close Pzr PORV.

IF PORV can not be closed OR can not be isolated, THEN GO TO EP/1/A/5000/02, HIGH ENERGY LINE BREAK INSIDE CONTAINMENT, step 1.

b. Pzr Spray Control valves - CLOSED.

b. IF "Pzr Press" less than 2260 PSIG, THEN manually close valves.

IF valves can not be closed, THEN stop NC Pump(s) supplying failed spray valve(s).

14. Check Containment conditions:

- Containment radiation monitors 1EMF-51A, 51B, 1EMF-9, 1EMF-16 - NORMAL
- Containment pressure - NORMAL
- Containment sump level - NORMAL
- "Ice Cond Lower Inlet Doors Open" alarm (1AD9-A5) - DARK.

GO TO EP/1/A/5000/02, HIGH ENERGY LINE BREAK INSIDE CONTAINMENT, step 1.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15. Check steam lines intact: ♦ S/G pressure - CONSTANT OR INCREASING OR DECREASING IN A CONTROLLED MANNER ♦ All S/Gs - PRESSURIZED.	IF any S/G depressurized OR decreasing in an uncontrolled manner, THEN GO TO EP/1/A/5000/03, STEAM LINE BREAK OUTSIDE CONTAINMENT, step 1.
16. Check S/G Tubes intact: ♦ S/G levels - NOT INCREASING IN AN UNCONTROLLED MANNER ♦ 1EMF-33, Condenser Air Ejector Exhaust - NORMAL ♦ 1EMF-34(L), S/G Sample (Lo Range) - NORMAL BEFORE ISOLATION ♦ 1EMF-24, 25, 26, 27, Steamline Hi Rad - NORMAL.	GO TO EP/1/A/5000/04, STEAM GENERATOR TUBE RUPTURE, step 1.
17. Check main steam header intact: ♦ "Steam Header Pressure" - CONSTANT OR INCREASING OR DECREASING IN A CONTROLLED MANNER ♦ Steam header - PRESSURIZED.	IF decreasing in an uncontrolled manner, OR depressurized, THEN GO TO EP/1/A/5000/03, STEAM LINE BREAK OUTSIDE CONTAINMENT, step 1.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18. Check S/G levels:	
a. "S/G NR Lvl" - INCREASING	a. Maintain total feed flow greater than 450 GPM until level increasing in at least one S/G.
b. Control CA flow to maintain levels at no load: 1) Reset CA Modulating Valve Resets 2) Throttle CA Control valves 3) Stop #1 TD CA Pump as necessary.	b. IF any level continues to increase with control valves closed, THEN close affected S/G isolation valves: • 1CA-62A and 1CA-66A (CA Pump To S/G A Isol) • 1CA-58A and 1CA-54A (CA Pump To S/G B Isol) • 1CA-46B and 1CA-50B (CA Pump To S/G C Isol) • 1CA-42B and 1CA-38B (CA Pump To S/G D Isol).
19. Check SI termination criteria:	
a. NC System subcooling - GREATER THAN 50°F	a. Do not terminate SI. GO TO step 21.
b. Pzr level - GREATER THAN 5%	b. Do not terminate SI. GO TO step 21.
c. NC pressure - STABLE OR INCREASING	c. Do not terminate SI. GO TO step 21.
d. Secondary heat sink: • Total feed flow to S/Gs GREATER THAN 450 GPM OR • "S/G NR Lvl" in any intact S/G - GREATER THAN 5%.	d. IF neither condition satisfied, THEN GO TO EP/1/A/5000/13.1, LOSS OF SECONDARY HEAT SINK, step 1.
20. GO TO EP/1/A/5000/1.2, SI TERMINATION FOLLOWING SPURIOUS SI, step 1.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
____ 21. REFER TO EP/1/A/5000/10, CRITICAL SAFETY FUNCTION STATUS TREES.	
____ 22. Check Aux building radiation - NORMAL.	Evaluate cause of abnormal conditions. IF the cause is a loss of NC System inventory outside containment, THEN GO TO EP/1/A/5000/08, LOCA OUTSIDE CONTAINMENT.
____ 23. Check PRT conditions - NORMAL.	Evaluate cause of abnormal conditions.
____ 24. RETURN TO step 14.	

END

1. NC PUMP TRIP CRITERIA

   IF flow verified from one NV or NI Pump
   AND NC System subcooling less than or equal to 0°F
   THEN stop all NC Pumps.

2. NV PUMPS RECIRCULATION VALVE OPERATION

   - IF NC pressure less than 1500 PSIG
     AND NV Pumps injecting through SI flowpath,
     THEN ensure Recirculation valves closed.

   - IF NC pressure greater than 2000 PSIG,
     THEN ensure Recirculation valves open.

3. CA SUCTION SOURCES

   IF suction pressure drops to 2 PSIG, THEN:
   a. Verify automatic swapover to RN supply
   b. Close 1CA-11A, 9B, 7A (CA Pump Suction Isol).

4. CHARACTERISTICS OF NATURAL CIRCULATION

   - NC System subcooling - GREATER THAN 0°F
   - S/G pressures - STABLE OR DECREASING
   - Core exit T/Cs - STABLE OR DECREASING
   - NC hot leg temperatures - STABLE OR DECREASING
   - NC cold leg temperatures - AT SATURATION TEMPERATURE FOR S/G PRESSURE.

   IF natural circulation not verified, THEN increase dumping steam.

Form 34912 (8-82)

EP/1/A/5000/01	SAFETY INJECTION Enclosure 2 Safety Injection Alignment Checklist	PAGE NO. 1 OF 9

Valve Number	Nomenclature	Position	Initial
	1MC-1		
1BB-5A	A S/G BLOWDN CONT ISOL	CLOSED	
1BB-6A	B S/G BLOWDN CONT ISOL	CLOSED	
1BB-7A	C S/G BLOWDN CONT ISOL	CLOSED	
1BB-8A	D S/G BLOWDN CONT ISOL	CLOSED	
1BB-1B	A S/G BLOWDN CONT ISOL	CLOSED	
1BB-2B	B S/G BLOWDN CONT ISOL	CLOSED	
1BB-3B	C S/G BLOWDN CONT ISOL	CLOSED	
1BB-4B	D S/G BLOWDN CONT ISOL	CLOSED	
	1MC-2		
1SV-19	A SM PORV	* CLOSED	
1SV-13	B SM PORV	* CLOSED	
1SV-7	C SM PORV	* CLOSED	
1SV-1	D SM PORV	* CLOSED	
1SM-7AB	A S/G SM ISOL	* CLOSED	
1SM-5AB	B S/G SM ISOL	* CLOSED	
1SM-3AB	C S/G SM ISOL	* CLOSED	
1SM-1AB	D S/G SM ISOL	* CLOSED	
1SM-12	A SM ISOL BYPASS	* CLOSED	
1SM-11	B SM ISOL BYPASS	* CLOSED	
1SM-10	C SM ISOL BYPASS	* CLOSED	
1SM-9	D SM ISOL BYPASS	* CLOSED	
1CF-153B	CF TEMPER TO B S/G CA NOZZLE	CLOSED	
1CF-104	A S/G CF CNTRL VLV BYP	CLOSED	
1CF-32	A S/G CF CNTRL VLV	CLOSED	

* PHASE B ISOLATION.

APPENDIX 2
ABNORMAL PROCEDURE EXAMPLE

The example which follows illustrates the structuring of cases within abnormal procedures. Only the first page of each case is presented.

Form 34731 (R5-88)

Duke Power Company
PROCEDURE PROCESS RECORD

(1) ID No. AP/2/A/5500/03
Change(s) 0 to 2 Incorporated

PREPARATION

(2) Station McGuire Nuclear

(3) Procedure Title Load Rejection

(4) Prepared By Len Firebaugh Date 8/3/88

(5) Reviewed By _____ Date _____

Cross-Disciplinary Review By _____ N/R _____

(6) Temporary Approval *(if necessary)*

By _____ (SRO) Date _____

By _____ Date _____

(7) Approved By _____ Date _____

(8) Miscellaneous

Reviewed/Approved By _____ Date _____

Reviewed/Approved By _____ Date _____

(9) Comments (For procedure reissue indicate whether additional changes, other than previously approved changes, are included. Attach additional pages, if necessary.)
Additional Changes Included. ☐ Yes
☐ No

(10) Compared with Control Copy _____ Date _____

(11) Requires change to FSAR not identified in 10CFR50.59 evaluation? ☐ Yes
If "yes", attach detailed explanation. ☐ No

Completion

(12) Date(s) Performed _____

(13) Procedure Completion Verification

☐ Yes ☐ N/A Check lists and/or blanks properly initialed, signed, dated or filled in N/A or N/R, as appropriate?

☐ Yes ☐ N/A Listed enclosures attached?

☐ Yes ☐ N/A Data sheets attached, completed, dated and signed?

☐ Yes ☐ N/A Charts, graphs, etc. attached and properly dated, identified and marked?

☐ Yes ☐ N/A Procedure requirements met?

Verified By _____ Date _____

(14) Procedure Completion Approved _____ Date _____

(15) Remarks *(attach additional pages, if necessary)*

Response to Supplement 1
to NUPEG-0737, Rev. 4

TABLE OF CONTENTS

AP/2/A/5500/03	LOAD REJECTION	PAGE NO. 1 OF 16

A. Purpose

The purpose of this procedure is to identify operator actions following a large load rejection or DEH runback for the following cases:

Case I Full Load Rejection
Case II 50% Load Rejection
Case III Partial Load Rejection.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

B. Symptoms

- Bus lines 2A and 2B lost
- Both Generator Breakers open
- "DEH Turbine Runback" alarm.

C. Immediate Actions

____ 1. Check control rods:		
	a. "CRD Selector" - IN AUTO	a. Place in "Auto".
	b. Control Rods - MOVING IN.	b. Place "CRD Selector" to "Man" and insert to reduce T-Ave = T-Ref.
____ 2. Verify proper response from Turbine Generator:		
	a. Check Generator Breakers - OPEN	a. IF breakers closed, THEN ensure governor valves close to reduce load to plant auxiliaries. GO TO step 3.
	b. Verify governor valves close to maintain Turbine speed at 1800 RPM.	b. Place Turbine in manual and control speed at 1800 RPM.
____ 3. Verify proper CM System operation:		
	a. Standby Hotwell and CM Booster Pmps - RUNNING	a. Manually start pumps.
	b. 2CM-420 (Load Rejection Bypass Valve) - OPEN.	b. Manually open valve.

D. Subsequent Actions

____ 1. Announce occurrence on paging system.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

B. Symptoms

- Either Generator Breaker opens
- Loss of one offsite bus line
- Either main CF Pump trip
- "DEH Turbine Runback" alarm.

C. Immediate Actions

____ 1.	Check control rods:	
	a. "CRD Selector" - IN AUTO	a. Place in "Auto".
	b. Control Rods - MOVING IN.	b. Place "CRD Selector" to "Man" and insert to reduce T-Ave = T-Ref.
____ 2.	Verify "Turb Imp Press" - DECREASING TO 400 - 410 PSIG.	Take Turbine to manual control and decrease pressure to 400-410 PSIG by closing governor valves.
____ 3.	Verify proper CM System operation:	
	a. Standby Hotwell and CM Booster Pmps - RUNNING	a. Manually start pumps.
	b. 2CM-420 (Load Rejection Bypass Valve) - OPEN.	b. Manually open valve.

D. Subsequent Actions

____ 1.	Announce occurrence on paging system.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

B. Symptoms

- "OTDT Turb Runback Block Rod Withdrawal Alert Ctrl" alarm
- "OPDT Turb Runback Block Rod Withdrawal Alert Ctrl" alarm
- "H_2 - KG Panel Trouble" alarm
- "DEH Turbine Runback" alarm.

C. Immediate Actions

____ 1.	Check control rods:	
	a. "CRD Selector" - IN AUTO	a. Place in "Auto".
	b. Control Rods - MOVING IN.	b. Place "CRD Selector" to "Man" and insert to reduce T-Ave = T-Ref.
____ 2.	Verify proper response from Turbine Generator: • Governor valves modulating - CLOSED • Generator output - DECREASING	Take manual control and decrease load as necessary
____ 3.	Verify proper CM System operation:	
	a. Standby Hotwell and CM Booster Pmps - RUNNING	a. Manually start pumps
	b. 2CM-420 (Load Rejection Bypass Valve) - OPEN.	b. Manually open valve.

D. Subsequent Actions

____ 1.	Announce occurrence on paging system.	

APPENDIX 3
DICTIONARY OF
ACRONYMS AND ABBREVIATIONS

McGUIRE NUCLEAR STATION
ACRONYMS AND ABBREVIATIONS

NOTE 1: Those abbreviations indicated by an asterisk (*) should be used rather than spelling out the word or phase. As a rule, all other words should be completely spelled out unless space limitations require abbreviation, or unless the context in which the abbreviation is used makes it easily understood or unless specific component nomenclature is being used.

NOTE 2: Pumps are abbreviated by using the two-letter system designation with the word "pump" when the pump name corresponds to the system in which it is located. For example, NC Pump (Reactor Coolant Pump) is in the Reactor Coolant System (NC System). This rule does not hold for pumps with names which do not correspond to the system in which they are located. In this case, use an abbreviation which most logically corresponds to the pump's actual name, taking care not to use an abbreviation that will become confused with a two-letter system designation.

McGUIRE NUCLEAR STATION
ACRONYMS AND ABBREVIATIONS

A

Above Seat Drain	Abv Seat Drn
Absolute Back Pressure	ABP
Accumulator	Accum
Acknowledge	Ack
Administration	Admin
Administration Building HVAC	*VM
Air Circuit Breaker	ACB
Air Conditioner	A/C
Air Handling Unit	*AHU
Alarm	Alm
Alternate	Alt
Alternating Current	*AC
American Society of Mechanical Engineers	*ASME
Ampere	*Amp
Annulus Ventilation	*VE
Annunciator	Annun
Area Radiation Monitor	*EMF
Assistant Shift Supervisor	ASS
Atmosphere	Atmos
Auctioneered	Auct
Auto Stop Trip	AST
Automatic	*Auto
Auxiliary	*Aux
Auxiliary Building	AB
Auxiliary Building Ventilation	*VA
Auxiliary Feedwater Pump Turbine	CA Pump Turb
Auxiliary Feedwater	*CA
Auxiliary Oil Pump	AOP

Auxiliary Steam	*AS
Average	Ave
Average Temperature	*T-Ave
Axial Flux Difference	*AFD

B

Barometer	Barom
Basement	Bsmt
Battery	Batt
Bearing	Brg
Bearing Oil Pump	BOP
Blackout	*B/O
Boiler	Blr
Booster	Bstr
Boric Acid	B/A
Boric Acid Batching Tank	*BABT
Boric Acid Tank	*BAT
Boron Injection Surge Tank	*BIST
Boron Injection Tank	*BIT
Boron Recycle	*NB
Boron Thermal Regeneration	*NR
Breaker	Bkr
Breathing Air	*VB
British Thermal Unit	*BTU
Building	Bldg
Burnable Poison Rod Assembly	BPRA
Bypass	Byp
Steam Generator Blowdown	*BB
Steam Generator Blowdown Pump	*BB Pump
Steam Generator Blowdown Blowoff Pump	*BB Blowoff
Steam Generator Wet Layup	*BW

C

Cabinet	Cab
Cable	Cbl
Carrier	Carr
CO_2 Generator Purge	*GP

Channel	Ch
Charging	Chrg
Check	Chk
Chemical	Chem
Chemical Mixing Tank	CMT
Chilled Water	*YC
Closed	Clsd
Cold Leg	CL
Compartment	Compt
Component Cooling	*KC
Compressor	Cmp
Computer	Cmptr
Computer Room Air Conditioning	*VJ
Concentration	Conc
Condensate	*CM
Condensate Booster Pump	*CM Bstr Pump
Condensate Storage	*CS
Condensate Storage Tank	*CST
Condenser Circulating Water	*RC
Condenser Circulating Water Intake Screen Backwash	*RS
Condenser, Conductivity (determined by context)	Cond
Condenser Steam Air Ejector	*CSAE (*ZJ)
Condenser Tube Cleaning (Amertap)	*RA
Containment Ventilation Cooling Water	*RV
Containment	Cont
Containment Air Release and Addition	*VQ
Containment Air Return and Hydrogen Skimmer	*VX
Containment Lower Compartment Ventilation	*VL
Containment Purge	*VP

Containment Upper Compartment Ventilation	*VU
Containment Liner	CP
Containment Isolation (if space limit requires)	C/I
Containment Spray	*NS
Chemical and Volume Control	*NV
Control	Cntrl
Control Rod Drive	CRD
Control Rod Drive Mechanism	CRDM
Control Rod Drive Ventilation	*VR
Control Room	C/R
Control Room Ventilation	*VC
Control Valve	C/V or Cntrl Vlv
Conventional Chemical Addition	*YA
Conventional Sampling	*CT
Conventional Waste System	*WC
Cooler	Clr
Cooling	Clg
Coordinate	Coord
Corridor	Corr
Counts Per Second	*CPS
Critical Safety Function	*CSF
Crossconnect	X-Connect
Crossover	X-Over
Crossunder	X-Under
Auxiliary Feedwater	*CA
Heating Boiler Feedwater	*CB
Feedwater	*CF
Feedwater Pump Seal Injection	*CL
Condensate	*CM
Containment Liner	*CP
Condensate Storage	*CS
Conventional Sampling	*CT
Degrees Centigrade	*°C

Feedwater Pump Turbine	*CF Pump Turb
Motor Driven Auxiliary Feedwater Pump Unit 1	*CA Pump 1A or 1B
Turbine Driven Auxiliary Feedwater Pump Unit 1	* #1 TD CA Pump

D

Data Gathering & Averaging	DGA
Decades Per Minute	*DPM
Decontamination	*Decon
Degrees Centigrade	*°C
Degrees Fahrenheit	*°F
Demineralizer or Demineralized	Demin
Demineralized Water	*YM
Detector	Det
Deviation	Dev
Diesel Generator	*D/G
Diesel Generator Fuel Oil	*FD
Diesel Generator Engine Cooling Water	*KD
Diesel Generator Lube Oil	*LD
Diesel Building Ventilation	*VD
Diesel Generator Starting Air	*VG
Diesel Generator Intake and Exhaust	*VN
Diesel Generator Room Sump Pumps	*WN
Diesel Generator Crankcase Vacuum	*ZD
Differential	Diff
Differential Pressure	*D/P
Digital Electro-Hydraulic	*DEH
Digital Rod Position Indication	*DRPI
Direct Current	*DC
Discharge	Disch
Disintegrations Per Second	*DPS
Down	Dwn
Drain	Drn
Drinking Water	*YD
Dump Valve	Dump

E

Elevation	Elev
Emergency	Emer
Emergency Bearing Oil Pump	EBOP
Emergency Core Cooling System	*ECCS
Emergency Oil Pump	EOP
Emergency Seal Oil Pump	ESOP
Engineered Safeguards	E/S
Engineered Safety Feature	*ESF
Enthalpy	*H
Environmental Water Quality	*RQ
Equipment	Equip
Equipment Decontamination	*WE
Essential	Ess
Evaporator	Evap
Event Recorder	ER
Excess	Exs
Exciter	Exc
Exhaust	Exh
Expansion	Exp
Voltage to Pneumatic Converter	E/P Cvtr

F

Fail Closed	F/C
Fail Open	F/O
Feeder	Fdr
Feedwater Pump Seal Injection	*CL
Feedwater Pump Turbine	*CF Pump Turbine
Feedwater Pump Turbine Lube Oil	*LF
Feedwater Pump Turbine Hydraulic Oil	*LP
Feedwater Pump Turbine Steam Seal	*TF
Feedwater	*CF
Feet or Foot (determined by context)	Ft
Filter	Filt

Filtered Water System	*YF
Final Safety Analysis Report	*FSAR
Fire Protection (Interior)	*RF
Fire Protection (Exterior)	*RY
First, Second, Third	1st, 2nd, 3rd
Floor and Equipment Drain System	*WF
Floor Drain Tank	*FDT
Flow	Flo
Frequency	Freq
Fuel Pool Ventilation	*VF
Degrees Fahrenheit	*°F
Refueling Water Storage Tank	*FWST
Heating Boiler Gas	*FB
Fuel Handling Components	*FC
Diesel Generator Fuel Oil	*FD
Heating Boiler Fuel Oil	*FS
Refueling Water	*FW

G

Gallons Per Minute	*GPM
Gaseous Waste Disposal	*WG
Generator	Gen
Generator Circuit Breaker	Gen Bkr
Generator Air Side Seal Oil Pump	GSOP (AIR SIDE)
Generator Hydrogen Side Seal Oil Pump	GSOP (H2 SIDE)
Generator Seal Oil	*LG
Generator Seal Oil Backup Pump	GSOBP
Generator Stator Cooling Water	*KG
Glycol	Gly
Governor	Gov
Governor Valve	GV
Ground	Gnd
Groundwater Drainage	*WZ

Hydrogen Blanket	*GB
Generator Hydrogen	*GH
Nitrogen	*GN
Oxygen	*GO
CO_2 Generator Purge	*GP
Hydrogen Bulk Storage	*GS

H

Handling	Hdlg
Header	Hdr
Health Physics	*HP
Heat Exchanger	*HX
Heating Boiler Feedwater	*CB
Heat Ventilation and Air Conditioning	*HVAC
Heater	Htr
Heating Boiler Gas	*FB
Heating Boiler Fuel Oil	*FS
Hertz	*Hz
High	*Hi
High Efficiency Particulate Air	*HEPA
High Pressure	H/P
High Pressure Stop Valve	HPSV
Hot Leg	HL
Hydraulic	Hydr
Hydrogen	*H_2
Hydrogen Blanket	*GB
Hydrogen Bulk Storage	*GS
Hydrogen Ion Concentration	*PH
Hydrogen Recombiner	H2 Recom
Enthalpy	*H
Tritium	H_3
Heater Bleed Steam	*HA-HG
MSR Steam	*HM
Heater Relief Valve	*HR

MSR Drain	*HS
Heater Vent	*HV
Heater Drain	*HW
I	
Ice Condenser Refrigeration System	*NF
Impulse	Imp
Inadequate Core Cooling Monitoring System	ICCS
Inboard	I/B
Incore Instrumentation	*ENA
Incore Instrumentation Room Ventilation System	*VT
Independent Verification	IV
Initiate	Init
Injection	Inj
Inches	In
Input/Output	I/O
Inside	Insd
Instrument	Inst
Instrument Air System	*VI
Instrument And Electrical Group	*IAE
Intercept Valve	IV
Interlock	Intlk
Intermediate Range	*IR
Inverter	Invtr
Isolation	Isol
Current to Voltage Converter	I/E Cvtr
J	
Jacket	JKT
K	
Component Cooling	*KC
D/G Engine Cooling Water	*KD
Spent Fuel Cooling System	*KF
Generator Stator Cooling Water	*KG
Recirculating Cooling Water	*KR
Volts x 1000	*KV
Vars x 1000	*KVAR
Watt Hours x 1000	*KWH

Watts X 1000	*KW

L

Laundry and Hot Shower Tank	LHST
Letdown	L/D
Level	Lvl
Liquid	Liq
Liquid Waste Recycle	*WL
Liquid Waste Release No	LWR #
Load Control Center	LCC
Load Frequency Control	LFC
Locked Closed	LC
Locked Open	LO
Lockout	Lckot
Loss of Coolant Accident	*LOCA
Low	*Lo
Lower	Lwr
Lower Level Intake	LLI
Low Level Intake Pump	LLI Pump
Low Pressure	L/P
Low Pressure Service Water	*RL
Low Pressure Stop Valve	LPSV
Lubrication	Lube
D/G Lube Oil	*LD
Feedwater Pump Turbine Lube Oil	*LF
Generator Seal Oil	*LG
Main Turbine Hydraulic Oil	*LH
Feedwater Pump Turbine Hydraulic Oil	*LP
Main Turbine Lube Oil and Purification	*LT

M

Main Control Board	MCB
Main Oil Pump	MOP
Main Turbine Hydraulic Oil	*LH
Main Turbine Lube Oil and Purification	*LT

Main Turbine Oil Tank	MTOT
Main Vacuum	*ZM
Manual	Man
Maximum	Max
Main Steam to Auxiliary Equipment	*SA
Main Steam Bypass to Condenser	*SB
Main Steam Leads and Headers	*SH
Main Steam	*SM
Main Steam to Feedwater Pump Turbine	*SP
Main Steam Vent to Atmosphere	*SV
McGuire Nuclear Station	MNS
Measure	Meas
Mechanical	Mech
Megavars	*MVAR
Megawatt	*MW
Megawatt Electrical	*MWE
Megawatt Hour	*MWH
Megawatt Thermal	*MWT
Mezzanine	Mezz
Million Pounds Per Hour	MPPH
Mini Flow	MF
Minimum	Min
Mixing and Settling Tank	MST
Moderating	Moder
Moisture Separator Reheater	*MSR
Moisture Separator Reheater Steam	*HM
Moisture Separator Reheater Drain	*HS
Motor	Mtr
Motor Control Center	MCC
Motor Driven	MD
Motor Driven Auxiliary Feedwater Pump Unit 1	*CA PUMP 1A or 1B
Motor Generator	*M/G
Motor Operated Disconnect	*MOD
Mulsifyre	Mulsi

N

Narrow Range	*NR
Negative	Neg
Net Positive Suction Head	NPSH
Nil Ductility Temperature	NDT
Nitrogen	*N_2
Nitrogen	*GN
Non-Essential	Non-Ess
Non-Licensed Operator	NLO
Normal	Norm
Nozzle	Nozz
Nuclear Control Operator	NCO
Nuclear Instrumentation	N/I
Nuclear Instrumentation System	NIS
Nuclear Sampling	*NM
Nuclear Service Water	*RN
Nuclear Steam Supply System	*NSSS
Boron Thermal Regeneration Demineralizer	NR Demin
Reactor Coolant Drain Tank	*NCDT
Boron Recycle	*NB
Reactor Coolant	*NC
Residual Heat Removal	*ND
Ice Condenser Refrigeration	*NF
Safety Injection	*NI
Boron Thermal Regeneration	*NR
Containment Spray	*NS
Chemical and Volume Control	*NV

O

Operations	Ops
Operator Aid Computer	*OAC
Orifice	Orif

Outboard	O/B
Outside	Otsd
Overcurrent	OC
Over Power Differential Temperature	*OPDT
Overspeed Protection Controller	*OPC
Over Temperature Differential Temperature	*OTDT
Overvoltage	OV
Oxyyen	*O_2
Oxygen (System)	*GO

P

Package	Pkg
Panel	Pnl
Panelboard	Pnlbd
Parts Per Billion	*PPB
Parts Per Million	*PPM
Penetration	Pent
Percent Milli	*PCM
Permanent Magnet Generator	PMG
Permissive	Permis
Personnel Air Lock	PAL
Plant	Plt
Plant Heating Water	*YH
Pneumatic	Pneu
Positive	Pos
Positive Displacement Pump Unit 1	*#1 PD Pump
Pounds	Lb
Pounds Per Hour	*lb/hr
Pounds Per Square Inch	*PSI
Pounds Per Square Inch Absolute	*PSIA
Pounds Per Square Inch Differential	*PSID
Pounds Per Square Inch Gauge	*PSIG
Power	Pwr
Power Circuit Breaker	*PCB
Power Factor	P/F
Power Operated Relief Valve	*PORV
Power Range	*PR
Pressure	Press

Pressurizer	*Pzr
Pressurizer Relief Tank	*PRT
Primary	Pri
Process Control System	PCS
Process Digital Control	PDC
Process Radiation Monitor	*EMF
Program	Prog
Protection	Prot
Pump	Pmp
Purifier or Purification	Purif
Hydrogen Ion Concentration	*PH

R

Radial	Radl
Radiation	Rad
Radiation Monitor	*EMF
Reactor	Rx
Reactor Building	RB
Reactor Coolant	*NC
Reactor Coolant Drain Tank	*NCDT
Reactor Makeup Water	RMW
Reactor Makeup Water Storage Tank	*RMWST
Reactor Vessel	Rx Vsl
Reactor Vessel Liquid Inventory System	*RVLIS
Reciprical	Recip
Reciprocating Charging Pump Unit 1	*#1 PD Pump
Recirculating Cooling Water	*KR
Recirculation	Recirc
Recorder	Rec
Recycle Holdup Tank	*RHT
Recycle Monitor Tank	RMT
Red (Bus)	R
Refrigeration	Refrig
Refueling Water Storage Tank	*FWST
Refueling Water System	*FW
Regenerative	Regen
Regulator	Reg
Reheat Stop Valve	RV

Removal and Restoration	R&R
Required	Reqd
Reservoir	Res
Residual Heat Removal System	*ND
Resistance Temperature Detector	*RTD
Return	Ret
Reverse	Rev
Revolutions per Minute	*RPM
Rod Control Cluster	RCC
Rod Control Cluster Assembly	*RCCA
Rod Drive Motor Generator	*M/G
Rod Position Indication System	RPI
Roof Drains System	*WD
Room	Rm
Condenser Tube Cleaning	*RA
Condenser Circulating Water	*RC
Fire Protection System (Interior)	*RF
Low Pressure Service Water	*RL
Nuclear Service Water	*RN
Environmental Water Quality	*RQ
Condenser Circulating Water Intake Screen Backwash	*RS
Containment Ventilation Cooling Water	*RV
Fire Protection System (Exterior)	*RY

S

Safety Injection Actuation	*SI
Safety Injection (System)	*NI
Safety Parameter Display System	*SPDS
Sample	Smpl
Sanitary Waste Treatment	*WT
Seal Oil Backup Pump	GSOB Pump
Secondary	Sec
Sequencer, Sequence	Seq

Service	Serv
Service Building and Warehouse Ventilation	*VW
Setpoint	Stpt
Shift Supervisor	SS
Shutdown	S/D
Shutdown Waste Gas Decay Tank	SWGDT
Solenoid	Sol
Solid State Protection System	*SSPS
Solid Waste Disposal	*WS
Source Range	*SR
Spent Fuel Cooling	*KF
Stage	Stg
Standby	Stdby
Standby Nuclear Service Water Pond	*SNSWP
Standby Shutdown Facility	*SSF
Standpipe	S-PIPE
Startup	S/U
Startup Rate	*SUR
Station Air	*VS
Status (Lite)	Stat
Steam	Stm
Steam Generator	*S/G
Steam Generator Blowdown	*BB
Steam Generator Blowdown Pump	*BB Pump
Steam Generator Blowdown Blowoff Pump	*BB Blowoff Pump
Steam Generator Tube Rupture	*SGTR
Steam Generator Wet Layup	*BW
Stop Valve	SV
Storage	Stor
Strainer	Strnr
Suction	Suct
Supply	Sup
Switchgear	Swgr
Switchyard	Swyd
Synchronized, Synchronizing, Synchroscope	*Sync

System	Sys
Main Steam to Auxiliary Equipment	*SA
Main Steam Bypass to Condenser	*SB
Turbine Crossover	*SC
Steam Lead Drains	*SD
Main Steam Leads and Headers	*SH
Main Steam	*SM
Main Steam to Feedwater Pump Turbine	*SP
Main Steam Vent to Atmosphere	*SV

T

Tank	Tnk
Technical Specifications	*Tech Specs
Temperature	Temp
Thermal Barrier	Therm Bar
Thermocouple	T/C
Thermostat	T-Stat
Three-Way	3-Way
Thrust	Thr
Train	Trn
Transducer	Transd.
Transfer	Trans
Transformer	Xfmr
Transmitter	Xmtr
Trouble	Trbl
Turbine	Turb
Turbine Building	TB
Turbine Building Sump Pump	*WP
Turbine Building Ventilation	*VO
Turbine Crossover	*SC
Turbine Driven	TD
Turbine Driven Auxiliary Feedwater Pump Unit 1	*1 TD CA Pump
Turbine Generator	T/G

Turbine Supervisory Instrument	TSI
Turning Gear	T-GR
Average Temperature	*T-Ave
Reactor Coulant Cold Leg Temperature	*TC
Reactor Coolant Hot Leg Temperature	*TH
Reference Temperature	*T-Ref
Turbine Exhaust	*TE
Feedwater Pump Turbine Steam Seal	*TF
Turbine Generator	*TG
Turbine Leakoff and Steam Seal	*TL
Turbine Services	*TS

U

Under Frequency	UF
Under Voltage	UV
Unwatering	*WU
Upper	Upr
Upper Head Injection	*UHI
Upper Surge Tank	*UST

V

Vacumm	Vac
Vacuum Priming	*ZP
Valve	Vlv
Valve Position Indication	VPI
Vars x 1000	*KVAR
Ventilation	Vent
Ventilation Unit Condensate Drain Tank	*VUCDT
Vibration	Vib
Voltage to Pneumatic Converter	E/P Cvtr
Volts	*V
Volts Alternating Current	*VAC
Volts Direct Current	*VDC
Volts x 1000	*KV
Volume Control Tank	*VCT
Auxiliary Building Ventilation	*VA

Breathing Air	*VB
Control Room Ventilation	*VC
Diesel Building Ventilation	*VD
Annulus Ventilation	*VE
Fuel Pool Ventilation	*VF
Diesel Generator Starting Air	*VG
Instrument Air	*VI
Computer Room Air Conditioning	*VJ
Containment Lower Compartment Ventilation	*VL
Administration Building HVAC	*VM
Diesel Generator Intake and Exhaust	*VN
Turbine Building Ventilation	*VO
Containment Purge	*VP
Containment Air Release and Addition	*VQ
Control Rod Drive Ventilation	*VR
Station Air	*VS
Incore Instrument Room Ventilation	*VT
Containment Upper Compartment Ventilation	*VU
Service Building and Warehouse Ventilation	*VW
Containment Air Return and Hydrogen Skimmer	*VX

W

Waste Drain Tank	WDT
Waste Evaporator Feed Tank	*WEFT
Waste Gas Decay Tank	WGDT
Waste Monitor Tank	WMT
Water	Wtr
Watt Hours x 1000	*KWH
Watts x 1000	*KW
Wide Range	*WR
Conventional Waste	*WC
Roof Drains	*WD
Equipment Decontamination	*WE
Floor and Equipment Drains	*WF
Gaseous Waste Disposal	*WG

Liquid Waste Recycle	*WL
Waste Monitoring	*WM
Diesel Generator Room Sump Pump	*WN
Waste Oil Storage	*WO
Turbine Building Sump Pump	*WP
Solid Waste Disposal	*WS
Sanitary Waste Treatment	*WT
Unwatering	*WU
Yard Drains	*WY
Groundwater Drainage	*WZ

X

Crossconnect	X-Connect
Crossover	X-Over
Crossunder	X-Under
Transformer	Xfmr
Transmitter	Xmtr

Y

Yard Drains	*WY
Yellow (Bus)	Y
Conventional Chemical Addition	*YA
Chilled Water	*YC
Drinking Water	*YD
Filtered Water	*YF
Plant Heating Water	*YH
Makeup Demineralized Water	*YM

Z

Diesel Generator Crankcase Vacuum	*ZD
Condenser Air Ejector	*ZJ
Main Vacuum Priming	*ZM
Vacuum Priming	*ZP

APPENDIX 4
CONSTRAINED LANGUAGE LIST
AND INDEX

CONSTRAINED LANGUAGE LIST

Activate	Formally institute special activity/function. To place into operation.
Adjust	Bring to a specified or more satisfactory condition or state.
Align	Place systems or components, for example, valves and breakers, in proper positions for accomplishing specified function.
Can	Refers to possible response of equipment.
Check	Determine present status.
Close	For valves, generally involves completely stopping flow, e.g., Close 1NC-31 (Pzr PORV). For electrical devices, such as breakers, refers to making an electrical connection to supply power.
Complete	To accomplish specific procedural requirements.
Consult	To confer or seek expert advise.
Cycle	To perform a process which ends where it began.
De-energize	Remove power supply.
Depress	Refers to pushbutton operation.
Determine	Implies technical knowledge. Make a decision based on operational knowledge.
Dispatch	To send off or away with speed.
Drive	Movement of reactor control rods, either in or out.
Energize	Supply power.
Ensure	Take necessary/appropriate actions to guarantee component, reading, etc. is as specified.
Establish	Perform actions necessary to meet stated condition.
Evaluate	Appraise the situation. Implies technical knowledge.
Faulted	Refers to a steam generator that has a secondary break.
Go To	Proceed to and remain where specified. In the case of procedures, discontinue use of present procedure and perform actions of cited procedure.
If	Establishing a prerequisite which must be met before performing step. Provides starting statement of optional actions.
Implement	Commence a required program or series of procedures.

Initiate	Take actions to begin a process.
Inspect	Examine or review present condition.
Intact	Refers to a steam generator that is not faulted or ruptured and is available as a heat sink.
Isolate	Remove from service.
Load	To conduct an electrical component to a source of power.
Locally	Take action outside the control room.
Maintain	Take appropriate actions to prevent fluctuation/changing.
Manually Initiate	Operator action which activates a function which is normally initiated automatically due to plant conditions.
Manually Trip	Operator action to activate a Reactor Trip or stop an operating piece of equipment such as a pump.
May	Refers to an operation which is possible, but perhaps is not necessary.
Modulate	Position a valve to a required position by use of controller to establish a required parameter.
Monitor	Periodically check status. Observe current trend.
Notify	Inform specified personnel.
Open	For valves, generally involves removing barrier to allow flow, e.g., Open 1NC-31 (Pzr PORV). For electrical devices, such as breakers, refers to breaking an electrical connection which removes a power supply.
Operate	Perform a function or control equipment to accomplish a specific purpose.
Per	As specified in or by named procedure.
Perform	To do or bring about.
Place	Physically position a switch to the specified location.
Rack in	Place an electrical breaker in place by physically connecting it to its associated power source.
Rack out	Remove an electrical breaker from service by physically disconnecting it from its associated power source.
Record	Document requested information on form provided.
Refer To	Use as a supplement. Perform actions of cited procedure and return to controlling procedure.
Regulate	Control or restrict.
Reset	To remove an active output signed from a retentive logic device even with the input signal still present.
Restore	Return to service.
Return To	Go back to procedure/step as directed.

Rotate	Turn a rotary multiposition switch to the required position. In reference to pump, hand-rotate before energizing.
Ruptured	Refers to a steam generator that has a primary to secondary leak.
Secure	Remove from service. Take appropriate action to prevent return.
Shall	Implies mandatory requirement.
Shift	Specifies changing mode of operation.
Should	Implies nonmandatory, preferred, or desired method.
Stabilize	Hold or maintain steady; minimize fluctuations.
Start	To originate motion of an electrical or mechanical device.
Stop	Cease from operating or moving. Shutdown.
Survey	Inspect, examine. Complete survey form.
Suspend	Stop actions at that point. Leave system as it stands at that time.
Throttle	Place a valve in an intermediate position to restrict flow to the required amount.
Trip	Effect a complete and total immediate shutdown.
Try	To make a continued effort when success may not be immediately obtainable.
Verify	To observe that an expected condition exists.

CONSTRAINED LANGUAGE INDEX

Switch Actions

Depress

Place

Rotate

Miscellaneous

Can

If

Per

Technical Knowledge Actions

See Mental Actions

Valve Actions

Align

Close

Open

Throttle

APPENDIX 5
PUNCTUATION HANDBOOK

PUNCTUATION HANDBOOK

1.0 PUNCTUATION

1.1 Apostrophe

- Use an apostrophe to indicate possession.

  Eample:

  Foreman's desk.

- An apostrophe is used to indicate a contraction. Do not use contractions, such as "can't" or "it's."
- Avoid the use of apostrophes to indicate plurals, especially with acronyms. For example, use ACBs as the plural of ACB.

1.2 Brackets

- Do not use brackets. ([ ])

1.3 Colon

- Use a colon to indicate a series or list.

  Example:

  Ensure the following valves are open:

  - 2CA-2 (CA Pump Suct From Hotwell)
  - 2CA-4 (CA Pump Suct From UST)
  - 2CA-6 (CA Sup Frm CA Storage Tank).

- Use a colon after steps to indicate substeps.

  Example:

  Establish letdown:

  a. Open letdown line isolation valves:

  - 2NV-1A (NC L/D Isol To Regen Hx)
  - 2NV-2A (NC L/D isol To Regen Hx)

- 2NV-7B (Letdown Cont Isol Outside).

b. Place 2NV-124 (Letdown Press Control) in "Man" and close.

- Use a colon to indicate ratios or proportions. Avoid the use of ratios, if possible.

1.4 Comma

- Use a comma to set off an introductory clause or phrase.

Example:

IF Pzr Press less than 2315 PSIG, THEN manually close Pzr PORVs.

- Use a comma to separate elements for clarity or emphasis.

Example:

GO TO EP/1/A/5000/01, SAFETY INJECTION, Step D.13.

- Use a comma to separate items in a series.

Example:

Containment radiation monitors 2EMF-51A, 2EMF-51B, 2EMF-2, 2EMF-3 = NORMAL.

- Use a comma to separate five or more digits.

Examples:

THIS-- 10,000 ppm

THIS-- 2260 PSIG

NOT THIS-- 2,260 PSIG

1.5 Dash (-)

- Do not use the dash.

1.6 Ellipsis (. . .)

- Do not use the ellipsis.

1.7 Exclamation point (!)

- Do not use the exclamation point.

1.8 Hyphens (-)

- Avoid use of hyphens. Use a dictionary as a guide for determining those words which must appear hyphenated.
- Use hyphens to indicate syllable breaks where a word must be carried over from one line to another. Wherever possible, avoid breaking words.

  Example:

  Check NI pump in-
  dicators for flow.

- Use a hyphen only if it appears in component numbers.

  Example:

  2CA-38 (TD CA Pump To S/G D Isol).

- Use a hyphen to seperate expected responses from the action step.

  Example:

  Check S/G NR Lvls - INCREASING.

1.9 Italics

- Do not use italics.

1.10 Parentheses

- Use parentheses to set off explanatory or supplementary information.

  Examples:

  - Check Pzr Level - GREATER THAN 17% (45%).
  - 2NV-459A (Variable) - CLOSED.

- Use a single parenthesis after third- or fourth-level numbers or letters.

  Example:

  1) or a)

- Enclose component nomenclature which follows a component number in parentheses.

  Example:

  2SM-14 (SM To CSAE)

1.11 Periods

- Use a period to indicate the end of a sentence.

  Example:

  Verify Containment Pressure is less than 3.0 PSIG.

- Use a period after initials.

  Example:

  L. Flagg

- Follow first and second level step numbers/letters with a period.

  Example:

  1. or a.

- Use a period after major steps which are not followed by substeps.

  Example:

  GO TO EP/2/A/5000/11.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, step 1.

- Use a period after the last substep following a major step.

  Example:

  Control CA flow to maintain NR
  Lvl at no load:
  1) Reset CA Modulating Valve Resets
  2) Throttle CA Control Valves
  3) Stop #2 TD CA Pump.

- Use a period after the last item in a list.

  Example:

  Verify Reactor Trip:

  - Rod bottom lights - LIT
  - Neutron Flux - DECREASING.

1.12 Question Mark (?)

- Do not use the question mark.

1.13 Quotation Mark (")

- Use quotation marks to set off annunciator, switch, and switch position nomenclature.
- Use quotation marks to set off unique words (e.g. "N/A").
- Use a quotation mark to acknowledge specifically reproduced material.

  Example:

  10 CFR 50, Appendix B, states, "Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished."

1.14 Semicolon (;)

- Avoid the use of semicolons, since they encourage long sentences.

1.15 Slants (/)

- Use slants with procedure numbers.

  Example:

  EP/1/A/5000/2

- Use slants with units of measure.

  Example:

  Maintain NC cooldown less than $100^{\circ}F/hr$.

APPENDIX 6
GUIDEL'NES FOR WORD PROCESSING

GUIDELINES FOR WORD PROCESSING

1.0 COVER PAGE

1.1 Use Duke Power Company Procedure Process Record (Form 34731).

1.2 In spaces provided in upper-right hand corner, type the following:

- Procedure number
- Change information.

1.3 Place station name in initial capital letters on line provided.

1.4 Place procedure title in all capital letters on line provided.

2.0 TABLE OF CONTENTS

2.1 Place procedure number in the left corner.

2.2 Place page number in the right corner.

2.3 Number pages with i, ii, iii, iv.

2.4 Place procedure title in the center of header box at the top of the page.

2.5 Center Table of Contents on line 15.

2.6 Place the page heading over right column.

2.7 Organize and type table as shown below:

2.7.1	For Abnormal Procedures:	Page
	A. Purpose	1
	Case I. Title	5
	Case II. Title	8

3.0 SECTION HEADINGS

3.1 Place section heading at left margin.

3.2 Type headings as follows:

A. Purpose

B. Symptoms or Entry Conditions

C. Immediate Actions

D. Subsequent Actions

Enclosures

4.0 PAGE BREAKS

4.1 Place Table of Contents on a separate page.

4.2 Start C. Immediate Actions on a new page (except for APs).

4.3 Place each enclosure on a separate page.

4.4 Whenever possible keep a step and its associated substeps on one page. If page break occurs in the middle of a step, place the complete step on the second page when practical.

4.5 Cautions and notes appear on the same page as the step to which they pertain.

4.6 Start each case or subprocedure on a separate page.

5.0 SPACING - TABLE OF CONTENTS

5.1 Type TABLE OF CONTENTS on line 15.

5.2 Double-space the following:

- Before case titles
- After case titles
- Before section headings
- After section headings.

5.3 Triple-space the following:

- After Table of Contents header.

6.0 SPACING - PROCEDURE BODY

6.1 Single-space within the following:

- A step
- A substep
- A note
- A caution.

6.2 Double-space the following:

- Between substeps
- After section heading.

6.3 Triple-space the following:

- Before section headings
- Before notes
- Before cautions
- After notes
- After cautions
- Between major steps
- Before END.

7.0 SPACING - COLUMNS

7.1 Ensure all spacing is in elite (12 characters per inch) scale.

7.2 Place check-off/initial lines in spaces 7-11 inclusive.

7.3 Place section letters (A, B, C) in spaces 12-13.

7.4 Place step numbers in spaces 13-14.

7.5 Place period in space 15.

7.6 Place "Action/Expected Response" column margins at 18 and 52.

7.7 Begin typing major steps in space 18.

7.8 Begin typing substeps letters or bullets in space 18 (body on space 22).

7.9 Place "Response Not Obtained" column margins at space 57 and 94.

7.10 Begin RNO column step letters or bullets on space 57 and body on 61.

8.0 MARGINS

8.1 Use the following margins:

- Left - 3/4 inch, elite space 7
- Right - 3/4 inch, elite space 94
- Bottom - 1 inch.

9.0 CAUTIONS

9.1 Begin typing the caution statement at space 13.

9.2 Type the word **CAUTION** in capital letters, bold and underline it.

9.3 Triple-space preceding and following the caution.

9.4 Type a caution and its associated step on the same page.

9.5 Type cautions as follows:

CAUTION If SI flow cannot be verified, symptoms should be monitored for AP/1/A/5500/05, INADEQUATE CORE COOLING.

10.0 NOTES

10.1 Begin typing the note statement at space 13.

10.2 Type the word NOTE in capital letters, bold and underline it.

10.3 Triple-space preceding and following the note.

10.4 Type note and its associated step on the same page.

10.5 Type notes as follows:

NOTE The following action will cause the Pressurizer Relief Tank rupture disk to break.

11.0 CAPITALIZATION

11.1 The following appear in all capital letters:

- Procedure/Subprocedure titles
- Procedure code (EP, AP)
- System designators of two or more letters
- Engineering/equipment prefixes
- The word NOTE
- The word CAUTION
- Acronyms
- Other emphasized words.

11.2 The following appear in initial capital letters:

- Case titles
- Section headings
- Major system names
- System functions
- Unique plant equipment
- Proper nouns
- Plant conditions
- Annunciator legends.
- Switch and gauge nomenclature

12.0 PAGE NUMBERS AND HEADINGS

12.1 Using the EP form #34913 place the following information in the provided spaces:

- Procedure number (upper left corner)
- Symptom/title(s) (upper middle block)
- Page number (for example: 1 of 16) (upper right corner).

13.0 CHECK-OFF/OPERATOR INITIAL LINES

13.1 Place check-off/operator initial lines in the left margin.

13.2 Provide check-off/operator initial lines for each high-level immediate action and subsequent action step.

14.0 STEP BREAKDOWN

14.1 Number major steps.

14.2 When sequence of actions is important, use lowercase letters to order substeps.

14.3 When actions do not have to be performed in a specific sequence, use bullets with substeps.

14.4 For third-level substeps, use a number followed by a single parenthesis.

15.0 FONT

15.1 Use unadorned font (no serifs). For example, Letter Gothic (shown below) is an acceptable font.

LETTER GOTHIC ABCDEFGHIJKLMNOPQRSTUVWXYZ
(12 Pitch) abcdefghijklmnopqrstuvwxyz
!@#$%¢&*()_+[]"'?/.,

16.0 FORM USAGE

16.1 Use form without column headings for the following:

- Table of Contents page
- Purpose-symptoms page
- Enclosure page(s).

16.2 Use form with "Action/Expected Response" and "Response Not Obtained" columns for the following:

- Immediate action pages.
- Subsequent action pages.

17.0 BOLD PRINT

17.1 Use bold print for the following:

- **IF**, **THEN**, **WHEN**, **OR**, **AND**, when used in logic statements.
- **CAUTION**, **NOTE**
- **GO TO**, **RETURN TO**, **REFER TO**, **RNO**.

Operations Management Procedure 4.2
Approved [signature]
Revision 1 Date 8/25/83

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
VERIFICATION PROCESS FOR EMERGENCY PROCEDURES

1.0 PURPOSE

1.1 The purpose of this procedure is to define the administrative process used in the verification of Emergency Procedures and to assign responsibilities for carrying out the activities of the process.

2.0 REFERENCES

2.1 Emergency Operating Procedures Verification Guideline, INPO 83-004.

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

2.3 MNS Writer's Guide For Emergency and Abnormal Procedures.

2.4 Component Verification and System Validation Guideline, INPO 83-047 (NUTAC).

3.0 DESCRIPTION

3.1 The verification process will consist of two phases:

A. Written Correctness - To ensure procedures conform to the format and other principles as specified in the Writer's Guide.

B. Technical Accuracy - To ensure that the Emergency Procedures are consistent with the plant specific Emergency Procedure Guidelines, which are based on Vendor Guidelines and include all appropriate licensing commitments.

3.2 Both phases of verification should be completed prior to validation of the Emergency Response Capability System and must be completed prior to final approval of all Emergency Procedures and changes to them.

4.0 RESPONSIBILITIES

4.1 Superintendent of Operations*

A. Shall approve all Emergency Procedures and their revisions.

4.2 Operating Engineer Over Document Development (OEDD) or his/her designee.

A. Shall have overall responsibility for both phases of the verification process.

B. Shall determine when verification is needed.

C. Shall have ultimate responsibility to resolve any conflicts arising during the resolution of discrepancies in the verification process.

D. Shall manage the written correspondence evaluation portion of the [illegible]

*In his/her absence the Superintendent of Technical Services, Superintendent of Maintenance, Superintendent of Integrated Scheduling, or Station Manager can fulfill this [illegible]

4.3 Manager of Nuclear Engineering

A. Shall manage the technical accuracy evaluation portion of the process.

5.0 REPORTING REQUIREMENTS

None

6.0 VERIFICATION OF WRITTEN CORRECTNESS

6.1 Preparation Phase

The OEDD or his/her designee shall designate personnel to perform the verification for written correctness. The verifier should be familiar with the Writer's Guide and Control Room and be a person other than the procedure writer or reviewer.

6.2 Assessment Phase

A. Overall Procedure Specific Review

1. The verifier will make a general review of the Emergency Procedure and document his/her designee review by initialing the procedure - general portion of the evaluation criteria (Attachment 1, Section I). If a criteria is not met, he/she will leave the sign off blank until it is resolved. Record any discrepancy on Attachment 2. If a criterion does not apply then "N/A" the sign off.

B. Step-by-Step Review

1. The verifier will then make a step-by-step review of the Emergency Procedure, or of the applicable changes if this is a reissue, and document this review by initialing the step-specific portion of the evaluation criteria

(Attachment 1, Section II). If a criteria is not met, he/she will leave the sign off blank until it has been resolved. Record any discrepancy on Attachment 2. If a criterion does not apply, "N/A" the sign off.

6.3 Resolution Phase

The verifier shall forward the reviewed procedure along with Attachments 1 and 2 to the procedure writer for resolution. If there are no discrepancies, the verifier will document this on Attachment 2. The procedure writer will document his/her response to the verifier's comments on Attachment 2 and change the procedure as necessary. Attachment 1 Section III will then be completed and signed by the writer and the verifier. If a resolution cannot be reached by the verifier and writer, the OEDD will resolve the comment.

6.4 Documentation Phase

The procedure writer will maintain the verifier's comments and the resolutions of the comments (Attachment 2) along with Attachment 1 with the revised Emergency Procedures. This documentation shall accompany the procedure (or changes) for final approval and be retained with the procedure in Master File.

6.5 Procedure Changes

All reissues of Emergency Procedures will be verified for written correctness as explained above. Any changes made using a Procedure Change form are generally of a minor nature and will not necessarily require written correctness verification. This evaluation will be documented on the change form.

7.0 VERIFICATION OF TECHNICAL ACCURACY

7.1 Preparation Phase

The Nuclear Safety Analysis Section of Nuclear Engineering at the General Office will perform the verification of technical accuracy. This verification will be performed per their procedure MNSA-103, Workplace Procedure for Technical Review and Verification of Nuclear Station Emergency Procedures and Guidelines.

7.2 Assessment Phase

The OEDD or his/her designee shall request performance of the verification process by either A or B below.

A. Normal Procedure

The OEDD or his/her designee shall transmit to the Safety Analysis Section a copy of the new or revised Emergency Procedure. A description of the revision will be described on Safety Analysis Form MNSA-103.2. A requested date for the completed verification should be included.

B. Expedited Procedure

For situations warranting an expedited technical verification, the OEDD or his/her designee shall initiate a request for verification by phone. The information necessary for the technical verification process will then be transmitted orally or by telecopy. The results of the technical verification will then be returned by phone and constitute the necessary approval for implementation of the revision. This review will be documented on the procedure change form in the Miscellaneous Review Section. Formal documentation shall be undertaken shortly thereafter and completed according to the normal procedure.

7.3 Resolution Phase

The verifier shall forward his/her comments to the procedure writer for resolution on Form 103.3 of procedure MNSA-103 (attached for information only as Attachment 3). The procedure writer will document his/her response to the reviewer's comments on the same attachment and change the procedure as required. If a resolution cannot be reached by the verifier and writer, the OEDD or his/her designee will ensure resolution prior to procedure appoval.

7.4 Documentation Phase

The content of the technical verification for each Emergency Procedure revision shall be maintained permanently by the Reactor Safety Section.

Form MNSA-103.3 of procedure MNSA-103 will be used as documentation of the process and will accompany the procedure for final approval and be retained with the procedure in Master File.

7.5 Procedure Changes

The OEDD or his/her designee shall determine the need for technical verification for each Emergency Procedure revision. Technical verification is required unless the revision consists of editorial changes, not effecting the technical accuracy of the procedure. If this verification is not required, it will be documented on the procedure cover sheet or procedure change form.

7.6 Contacts

Nuclear Engineering Services - General Office

Primary	Extension	Home Phone
H. J. Lee, Jr. (Jacky)	7565	333-9117

First Alternate		
G. B. Swindlehurst (Gregg)	5176	366-14[illegible]
Second Alternate		
P. M. Abraham (P.M.)	4520	821-9541
Management		
K. S. Canady (Ken)	4712	376-4426

8.0 ATTACHMENTS

Attachment 1 - Written Correctness Evaluation Criteria Checklist

Attachment 2 - Writer's Guide Discrepancy Form

Attachment 3 - Emergency Procedure/Guideline Technical Verification Certificate

WRITTEN CORRECTNESS EVALUATION CRITERIA CHECKLIST

Procedure/Subprocedure Number _____

Performed By/Date _____/_____

I. Procedure - General

A. Format

_____ 1. Printed borders are visible on all procedure pages.

_____ 2. The text, tables and graphs are legible.

_____ 3. The general format of the procedure is consistent with the Writer's Guide example, ie:

a. Actions section presented in a dual column format.

b. Page layout consistent with sample format.

c. Required sections are present.

_____ 4. Procedure contains all its pages in the correct order with correct procedure number, title and page _____ of _____ numbers on each page.

_____ 5. Enclosures are labeled with number and title.

B. Style and Content

_____ 1. The title is descriptive of the purpose of the procedure.

II. Step - Specific

A. Format

_____ 1. Steps are numbered correctly.

_____ 2. Nonsequential substeps are designated with bullets.

_____ 3. Check-off or initial sign-off lines are provided for high level steps.

B. Style and Content

_____ 1. Steps deal with only one idea.

_____ 2. Steps are short with ambiguous words and phrases avoided.

_____ 3. The text stipulates precisely what actions or decisions are required.

_____ 4. The action to be taken is specifically identified and written as follows:

Action Verb - Object

_____ 5. If there are more than two objects, they are listed.

_____ 6. Punctuation conforms with standard American English usage (Appendix 5 of Writer's Guide).

____ 7. Capitalization conforms with standard American English or with specifications for emphasis in Writer's Guide.

____ 8. Only abbreviations, acronyms and symbols appearing in the Writer's Guide are used.

____ 9. In conditional statements the IF statements are listed first.

____ 10. Caution statements are emphasized to standout from the text.

____ 11. Caution and note statements do not contain action steps.

____ 12. Caution statements and note statements (where required) precede the applicable step.

____ 13. Formulas and calculations are minimized. Where calculations are necessary, space is provided.

____ 14. Referenced procedures are identified by both title and number.

____ 15. The use of referencing other procedures is minimized and is used only to eliminate excessive detail.

____ 16. The instructions to "REFER TO" and "GO TO" other procedures are used correctly.

____ 17. Exit conditions are compatible with the entry conditions of the referenced procedure.

C. Control Board Compatability

____ 1. Equipment or instrumentation referenced is available and located where specified.

_____ 2. Equipment or instrumentation nomenclature match Control Room or local labeling.

_____ 3. Instrumentation units match actual control board units of measurement.

_____ 4. Where sequence of order is not specified or required, equipment is listed in a left to right (right to left for Unit 2), top to bottom order.

III. Any discrepancies identified by the verification have been resolved and incorporated.

_____ Date _____

Procedure Writer

_____ Date _____

Verifier

Writer's Guide Discrepancy Form

Procedure Number _____

Discrepancy	Resolution

NUCLEAR STATION
EMERGENCY PROCEDURE/GUIDELINE
TECHNICAL VERIFICATION CERTIFICATE

Station _____ Unit _____
Document _____
_____
_____ Dated _____

STATEMENT OF CERTIFICATION

This document has been verified in accordance with Reactor Safety Procedure RS-003, "Technical Verification of Nuclear Station Emergency Procedures and Guidelines", and meets all applicable criteria as follows:

YES	NO	N/A	
___	___	___	Technical content and accuracy.
___	___	___	Consistent with applicable vendor guidelines.
___	___	___	Consistent with applicable plant specific guidelines.
___	___	___	Consistent with FSAR licensing basis.
___	___	___	Based on sound operating principles and engineering judgement.

This document does not meet the criteria required for certification. The items on the following pages require further revision or justification.

Verified By_____ Date_____

Title_____ Organization_____

Reviewed By_____ Date_____

Title_____ Organization_____

The following items require further revision or justification:

Response: By_____ Date_____

Operations Management Procedure No.

Approval Ernie Thomas

Revision 1 Date 8/25/88

DUKE POWER COMPANY

McGUIRE NUCLEAR STATION

VALIDATION OF THE EMERGENCY RESPONSE CAPABILITY SYSTEM

1.0 PURPOSE

The purpose of this procedure is to define the administrative process used in validation of the Emergency Response Capability (ERC) System. ERC is defined as a System made up of the following components: the control room operating crew, the plant as seen from its control room (instrumentation, controls), the emergency procedures, and the operator training program. This procedure applies to the initial system validation process as well as to an on-going validation program.

2.0 REFERENCES

2.1 Emergency Operating Procedures Validation Guidelines, INPO 83-006.

2.2 Guidelines for the Preparation of Emergency Operating Procedures, NUREG 0899.

2.3 Component Verification and System Validation Guideline, INPO 83-047 (NUTAC)

3.0 DESCRIPTION

3.1 Validation Criteria

ERC System validation is the evaluation performed to determine that the System components (operator, plant, procedure, training) work together to manage an emergency condition. This evaluation can be

made by use of the criteria of "usability" and "operational correctness".

- Usability - that the EPs provide sufficient and understandable operator information that is compatible with training.

- Operational Correctness - that the EP's are compatible with plant responses, plant hardware and the operating shift.

3.2 Validation Methods

Three different validation methods may be used to ensure the above criteria are met for the ERC.

- Table Top - conducting a detailed step-by-step review of procedures via participatory discussion that includes training on the background information for each.

- Simulator Performance - using dynamic simulation of control room systems to provide realistic reproduction of control room actions and responses.

- Real Event Review - debriefing with plant operators following a real emergency event in the control room.

Specific guidance for implementing each method is given in the attachments to this document.

3.3 Validation Documentation

For the initial ERC validation, completed Attachment D for the table top and simulator methods will accompany all procedures for final approval and be retained with the procedure in Master File.

For subsequent revisions to any ERC component, the Operating Engineer over Procedure Development will determine the need for re-validation. Re-validation will not be required unless the revision consists of major changes which affect the usability or operational correctness. (Written technical verification may be required however, for procedures). When a re-validation is judged not to be required, it will be documented on Attachment D.

For any real event review validations, Attachment D will be completed as required and accompany any procedure changes for final approval.

4.0 RESPONSIBILITIES

4.1 Superintendent of Operations*

- Shall approve all Emergency Procedures and changes to them.

4.2 Operating Engineer over Document Development (OEDD) or his/her designee

- Shall determine if the validation is needed and its scope.
- Shall manage the ERC validation program and ensure it's smooth co-ordination with the training program
- Shall designate personnel to participate in the validation process
- Shall resolve discrepancies identified during the validation process.

* In his/her absence the Superintendent of Technical Services, Superintendent of Maintenance, Superintendent of Integrated Scheduling or Station Manager can fulfill this function.

5.0 REPORTING REQUIREMENTS

None

6.0 ATTACHMENTS

6.1 Attachment A Table Top Method of ERC Validation

6.2 Attachment B Simulator Method of ERC Validation

6.3 Attachment C Real Event Review Method of ERC Validation

6.4 Attachment D Discrepancy Resolution Form

6.5 Attachment E Observer Checklist and Debriefing Form

TABLE TOP METHOD OF ERC SYSTEM VALIDATION

1.0 PURPOSE

The purpose of this method is to ensure the operator/procedure/training components are compatible by verifying that the procedures contain sufficient and understandable information for the operators.

2.0 DESCRIPTION

2.1 Personnel

An operating shift will participate in this evaluation. The OEDD will designate personnel to assimilate and record comments and discrepancies during this evaluation.

2.2 Method

During operator training on the EP's, an operating shift will conduct a step-by-step review of each effected EP with the following criteria in mind:

- Each step, caution or note is written to the appropriate level of detail. There are not extra or missing substeps.
- Each step is located appropriately within the sequence of events.
- There is no uncertainty or confusion as to which step to go to next.

- The organization of the procedure is clear and understandable.

  a. Step numbering system

  b. Different step levels

  c. Contingency actions column

A discrepancy form (Attachment D) will be completed for each item that in the judgement of the operators does not met the above criteria or for any other constructive comments the operators may have. If no discrepancies are noted, then write NONE on Attachment D for that procedure.

2.3 Resolution of Discrepancies

Attachment D should be forwarded to the OEDD for resolution. The resolution of any discrepancy will be documented on Attachment D and if it requires a procedure change will be completed prior to final procedure approval.

SIMULATOR METHOD OF ERC VALIDATION

1.0 PURPOSE

The purpose of this method is to ensure the operational correctness and usability of the ERC by evaluating the operator's performance in order to determine that the System mitigates the consequences of emergency conditions.

2.0 DESCRIPTION

The simulator method of ERC validation can be a complex process due to the need to integrate hardware, software and personnel during relatively short periods of simulator time. This method consists of five phases:

- Planning
- Preparation
- Conducting the evaluation trial
- Analyzing results
- Resolving discrepancies

2.1 Planning

2.1.1 Personnel

A validation team will be appointed by the OEDD whose members are familiar with plant operations, procedures, training and test evaluation methods. The validation team shall be responsible for the following: 1) planning and preparing for the simulator session, and 2)

observing, recording and analyzing operator performance during the validation trail in Section 2.3.

Operators who are chosen to participate in the validation scenario runs should have a level of training, knowledge and skill which is typical of operators overall.

2.1.2 Simulator Selection

The McGuire Unit 1 plant specific simulator will be used for all validation trials.

2.2 Preparation

2.2.1 Select Simulator Scenarios

The validation team will select scenarios for implementation based on recommendations of WCAP 10204, ERG Validation Program, and on simulator software considerations.

2.2.2 Delineate Expected Operator Actions

After the scenarios have been selected, the validation team will identify the procedures which should be used by each one. Also, steps and operator actions will be identified within each procedure which the operator could follow in managing the emergency event. The delineation of a potential path through the procedures will aid the team in evaluating operator performance of EP's and in detection of discrepancies.

2.2.3 Validation Measurement Techniques

An observer checklist and debriefing form, Attachment E, and videotaping (if available) will be used to measure

and record operator performance such that all deviations can be identified. These techniques will permit the following analysis for each scenario:

- analysis of the operator's ability to control several plant parameters

- comparison of operator actions to the previously prepared list of expected actions

2.2.4 Plant-Simulator Characteristics

In the validation process, the evaluation of the System is being made for the actual plant setting and not for the simulator. The validation team will therefore perform a review contrasting the simulated and actual Control Room setting with respect to the actual Control Room's human factors design, operational design, work-space design and communicating system design. This review will aid the team in evaluating whether or not operator performance deviation, occurring in the simulator setting would also occur in the actual plant. Any differences that affect operator performance during the trial will be evaluated per Section 2.4.2.

2.2.5 Crew Familiarization

Prior to their session at the simulator, the operating crews will become familiar with the new procedures during plant training sessions. In addition, differences which exist between plant and simulator characteristics will be discussed.

2.3 Conducting the Evaluation Tri .

During the initial System trials, as many crews as practical should perform each scenario run. A scenario should be performed only once by any one crew. Each selected scenario will be run at least once during the evaluation trials.

For subsequent System trials due to modifications/changes, at least one operating crew will perform the required scenarios.

During the scenario runs, the validation team will observe the operator's actions and completed the observer's portion of Attachment E.

2.4 Analyzing Results

2.4.1 Immediately after the scenario trial is completed, an in-depth debriefing between the validation team and the operating crew will be conducted. The comments of the operators provide one of the most important sources of information for evaluating the System. Before the operators are questioned, they should be allowed to make any general comments concerning the scenario run in general or any component of the System in particular. These comments should be recorded on the debriefing section of Attachment E. After each operator concludes his remarks, the observers will ask questions based on those outlined in Attachment E and on the deviations which were recorded on their checklist.

2.4.2 Evaluate Findings

After the debriefing, data gathered from the validation and debriefing must be analysed and classified. The validation team will identify operator performance actions which deviated from the actions of the

hypothetical path determined in Section 2.2.2. Each of the deviations as well as other items noted on the Observer Checklist and Debriefing form would be considered to be a potential discrepancy. These items would be examined on a case-by-case basis to determine if it should be listed as a discrepancy or be deleted from consideration. Those items which are considered to be actual discrepancies will be documented on the Discrepancy Resolution form (Attachment D) and forwarded to the OEDD for resolution. If no discrepancies are noted, then write NONE on Attachment D for that procedure.

2.5 Resolving Discrepancies

The OEDD will review and resolve discrepancies forwarded to him by the validation team. Discrepancies may be due to the deficiencies in the procedures themselves or due to other causes such as deficiencies in the Control Room hardware, training or manpower. Discrepancies related to procedure deficiencies must be resolved prior to final approval and implementation.

REAL EVENT REVIEW METHOD OF ERC VALIDATION

1.0 PURPOSE

The purpose of this method is to review feedback from operators who have recently managed an unplanned real emergency event and to review other plant's event reports in order to determine that the System mitigates the consequences of emergency conditions.

2.0 DESCRIPTION

2.1 Personnel

The OEDD will appoint evaluations to conduct the real event review method of evaluation who are knowledgeable in plant operations, procedures and training.

2.2 Method

A real event review validation consists of a debriefing conducted by evaluators with plant operators to gather information on the effectiveness of the System during real conditions. This method of validation is the most effective means of validating the System. The feedback from operators provides valuable information with respect to the kinds of situations for which the System is designed to work.

The debriefing should occur as soon as possible after the emergency event in order to maximize it's effectiveness. The debriefing portion of Attachment E should be completed by the evaluators

during the interview. Before the operators are questioned, they should be allowed to make comments concerning any System problems they identified during the event. The evaluators will then ask questions as outlined in Attachment E.

2.3 Resolution

After the debriefing, the evaluators will review the data gathered and determine which items are to be listed as discrepancies and which are to be deleted from consideration. Those items which are considered to be actual System problems will be documented on the Discrepancy Resolution form (Attachment D) and forwarded to the OEDD for resolution.

Discrepancies which are found in the System as a result of the real event review validation will be reviewed and resolved by the OEDD. Any resolutions requiring changes to the EP's will be implemented in a timely manner after undergoing the EP verification process if applicable. Any resolutions requiring Control Room changes, training or operator staffing will be forwarded to the appropriate individual for completion.

Operations Management Procedure 4-3
Attachment D
Approval Bruce Travis
Revision 1 Date 8/25/88

DISCREPANCY RESOLUTION FORM

Procedure Number: _____

Evaluator, Date: _____

Validation Method: _____

Discrepancy: _____

Resolution: _____

Resolution Completion Signed _____

Date _____

OBSERVER CHECKLIST AND DEBRIEFING

I. Observer/Debriefing Checklist

A. The following checklist should be completed during the validation trial by the observers. Any negative answer should be explained after the step.

_____ 1. Was there sufficient information to perform the specified actions at each Step?

_____ 2. Were the EPs missing information needed to manage the emergency condition?

_____ 3. Was each EP step understood?

_____ 4. Were caution and note statements understood?

_____ 5. Could the operator exit from a given EP at the correct branch?

_____ 6. Could the operator enter the branched procedure at the correct point?

_____ 7. Were the procedure actions able to be performed in the designated sequence?

_____ 8. Did the operator have to use information or equipment not specified in the procedures to accomplish his task?

_____ 9. Did the operator find alternate paths not in the EPs?

____ 10. Were the EPs physically compatible with the work situation (too bulky, not bound well, no place to lay down, etc.)?

____ 11. Did the supervisor consistently direct the activities of the operators?

____ 12. Was there a designation of responsibilites among the operators?

____ 13. Did any verbal instruction have to be repeated or were some not carried out?

____ 14. Did any problems occur due to deficiencies in:
- manpower planning and staffing
- supervisory control and coordination

____ 15. Did any problems occur due to:
- failure to communicate information
- operator workload being too high

____ 16. Was equipment operated safely and correctly?

____ 17. Was any system operated incorrectly due to a lack of understanding of a modification to that system?

____ 18. Were erroneous conclusions drawn from controls and instrumentation?

____ 19. Was proper action taken in response to annunciators?

B. General Observer Comments

II. Debriefing

A. General Operator Comments (including potential solutions to problems)

B. The questions in Part I should be asked of the operating crew during the debriefing and any negative answers explained with potential solutions to any problems included.

C. Observers should ask questions, if required, to assist them in fully completing their checklist in Part I.