

PROCEDURES GENERATION PACKAGE

MONTICELLO NUCLEAR GENERATING PLANT

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I. INTRODUCTION

The purpose of this Procedures Generation Package (PGP) is to describe the emergency operating procedures (EOPs) development at Monticello Nuclear Generating Plant (MNP). This document was developed in response to Supplement 1 to NUREG-0737, Item 7.2b, page 15.

The following document describes the program for converting the General Electric (GE) Boiling Water Reactor Owner's Group (BWROG) Emergency Procedure Guidelines (EPGs) for GE-BWR 1 through 6 designs into EOPs for MNP.

II. PLANT-SPECIFIC TECHNICAL GUIDELINES

GENERAL

BWROG Emergency Procedure Guidelines, Revision 3 dated May 10, 1984 will be used for development of the initial MNP EOPs. When subsequent revisions to the EPGs are approved for implementation by the U.S. Nuclear Regulatory Commission, the revised information will be incorporated into the EOPs using the established revision, review, and approval process.

PROGRAM DESCRIPTION

The following plant-specific technical and source information is used in generation of MNP EOPs:

- o GE/BWROG EPG, Revision 3 with Appendices
- o USAR
- o Technical Specifications
- o Existing Plant Procedures
- o Plant Drawings
- o Equipment Manuals
- o Guidelines for the Preparation of Emergency Operating Procedures (NUREG-0899)
- o Emergency Operating Procedures Writing Guidelines, INPO 82-017
- o Emergency Operating Procedures Validation Guidelines, INPO 83-006
- o Emergency Operating Procedures Verification Guidelines, INPO 83-004

The EOPs are developed by following the EPGs step-by-step adding plant-specific information, details and nomenclature as required. The EPGs are generic to GE-BWR 1 through 6 designs in that they address all major systems which may be used to respond to an emergency. Because no specific plant includes all of the systems in these guidelines, the guidelines are applied to individual plants by deleting statements which are not applicable or by substituting equivalent systems where appropriate. For example, plants with no isolation condenser system will delete statements referring to IC and plants with Reactor Core Isolation Cooling Systems will substitute RCIC for IC. Since MNP does not have HPCS, IC or SPMS systems, these are deleted. Likewise, MNP has a Mark I primary containment design and all actions applicable to Mark II and III primary containment designs are deleted. In some cases, the EPGs contain a general category of systems which is bracketed, (i.e., [Other steam driven equipment]) or a bracketed list of systems, dependent on plant design, that potentially could be used for a given action. The EPG Appendices provide the direction necessary to apply the bracketed information to the plant-specific EOPs. Where a list of systems appropriate for a given action is identified, MNP systems are incorporated into the EOPs. In other cases, where the best choice of systems is suggested these are evaluated and the one or two most appropriate for MNP are used.

Brackets [] within the EPGs enclose plant unique setpoints, design limits, pump shutoff pressures, etc. Parentheses () within brackets indicate the source for the bracketed variable. The bracketed values are obtained for the MNP EOPs from the MNP technical and source information summarized previously such as the Technical Specifications and from calculated values based on EPG, Appendix C, "Calculational Procedures".

A walk-through of the EOPs is made in the MNP control room and/or plant specific simulator to confirm that:

- o Instrumentation is available to implement the actions in the EOPs
- o The action levels are within the range of the installed instrumentation
- o The action levels can be read on the installed instrumentation
- o The action level units are in agreement with the installed instrumentation
- o the nomenclature in the EOPs are in agreement with installed nomenclature on the control room panels

Discrepancies are documented and corrected as part of the EOP Verification Program.

III. GUIDELINES FOR PREPARATION OF EMERGENCY OPERATING PROCEDURES

GENERAL

The writer's guide, Guidelines for Preparation of EOPs, provides detailed instructions on how to prepare EOPs using sound writing principles. Its recommendations address all aspects of writing procedures from a human factors standpoint.

The writer's guide will be revised as necessary, based on training feedback, operating experience, and the results of the verification/validation programs.

The Guidelines for Preparation of Emergency Operating Procedures for the Monticello Nuclear Plant is presented in Attachment 1.

IV. EOP VERIFICATION PROGRAM

GENERAL

The EOP verification program confirms the correctness of the procedures and ensures that applicable generic and plant-specific technical information has been incorporated properly. It also checks that the human factors aspects presented in the Writer's Guide for EOPs have been applied. The verification program is based on the industry document Emergency Operating Procedures Verification Guideline (INPO 83-004), developed by the EOPIA Review Group and published by INPO.

PROGRAM DESCRIPTION

The following elements are included in the program:

- o Plant-specific calculations used in the upgraded EOPs are verified by an independent engineering organization.
- o A Human Factors Engineer conducts a review of the EOPs and the Guidelines for Preparation of EOPs.
- o A review will be performed to compare the MNP-EPG and the BWROG-EPG. Differences between the documents and justification for the differences will be documented.
- o A review will be performed to compare the EOPs and the MNP-EPG. Differences between the documents and justification for the differences will be documented.
- o A review will be performed to compare the requirements of the Guidelines for Preparation of EOPs and the EOPs. Differences between the documents and justification for the differences will be documented.

- o Control room walk-throughs of the EOPs are performed to confirm EOP nomenclature agrees with equipment nameplate, and action levels can be read on installed instrumentation

- o Each upgraded EOP is submitted for formal review in accordance with the established MNP procedures

Records will be established to document completion of all verification program activities. The records will document deviations discovered during the program and their resolutions.

V. EOP VALIDATION PROGRAM

GENERAL

The EOP Validation Program assures that the actions specified in the procedure can be performed by the operator to manage emergency conditions effectively. The methodology for EOP validation utilizes presently available methods at MNP while recognizing and allowing for future improvements. The program is based on the industry document Emergency Operating Procedures Validation Guideline (INPO 83-006), developed by the EOPIA Review Group and published by INPO.

PROGRAM DESCRIPTION

In developing the program, several methods of validation were considered:

- o Generic/specific simulator sessions
- o Control room walk-throughs
- o Desk top reviews
- o Seminars/workshops

Although each of the methods will yield useful information about the EOPs, it is believed that control room walk-throughs and sessions on a plant-specific simulator will best establish the accuracy of the EOPs and demonstrate that they will effectively mitigate transients and accidents.

The program will be implemented by a team comprised of:

- o Northern States Power Personnel
- o An advisor from General Electric
- o A Human Factors consultant

The team will select and develop scenarios which best exercise each EOP. In selecting the scenarios, emphasis will be placed on human engineering factors as well as technical adequacy. The scenarios will be developed to take the operator through anticipated procedure steps to provide for a complete evaluation of the performance of the procedure. The team will note expected versus actual responses to the scenarios to identify potential problems with the EOPs. They will evaluate operator feedback and provide disposition to procedural deviations. It is recognized that some problems may require revision to the EOPs. In such cases, the validating team will determine the extent to which the revised EOP must again be validated. Completion of all validation activities will be documented.

VI. EOP TRAINING PROGRAM

Reactor Operator (RO) and Senior Reactor Operator (SRO) training in the application of the Emergency Operating Procedures (EOP's) was developed to enable the RO's and SRO's to use the EOP's. The EOP training consists of on the job training, classroom activities and simulator exercises. Several issues were considered in formulating the course of instruction. The following items were major in curriculum development plans.

1. Identify new knowledge factors and skills needed for EOP use.
2. Define content and depth of learning required for RO and SRO.
3. Identify the best means of training (on-the-job training, classroom, simulator, etc.) for training goals.
4. Define the appropriate learning objectives.

EOP training is planned for Licensed Operators in the Licensed Operator Requalification Program and for candidates in the SRO/RO Licensed Operator Training Program. Instruction will consist of classroom lectures, seminars and practical exercise sessions on the rudiments of Accident Mitigation. Topical areas include causes, symptoms, surveys and recognition of degraded core conditions, as well as team work sessions in the classroom on analysis of potentially degraded core conditions. Further classroom instruction will provide the initial EOP readings and discussions on the bases for the EOP's. All Mitigation of Accident course work will be directed toward the structure of the EOP's with the logical emphasis on priorities and their bases. Learning objectives will serve the progression of knowledge factors and skills needed for competent use of the EOP's and reinforce the work shift interaction and communication skill areas. It is planned that the mitigation course will be cycled each four years as updated and revised refresher training. Simulator training will proceed from the objectives of the classroom activities toward specific operator performance goals. Practical and realistic scenarios will ensure safe, competent and reliable operator response to the impor-

tant aspects of the EOP's. The Monticello Plant Simulator is currently used for procedures training and will be extended where practical, for use in EOP training. The simulator will be utilized, as much as is within its capabilities to serve meaningful instruction. Routine EOP revision disclosures will be conducted during the working shift to keep the Licensed Operators current in the procedures as well as to provide feedback to plant staff on the workability of the procedures.

This description outlines the activities which are underway and partially completed. The conduct of shift on-the-job training, classroom instruction and simulator exercises are promulgated within existing curriculum structure, taking full advantage of other regularly scheduled training course work.

Any needed changes in the training will be implemented directly by plant management or by training request to the Training Department. As is customary, evaluations will be conducted to assess trainee performance and attitude toward the training, and the adequacy of the methods and means used to do the training.

ATTACHMENT 1

MONTICELLO NUCLEAR PLANT

GUIDELINE FOR PREPARATION OF EMERGENCY PROCEDURES

GUIDELINE FOR PREPARATION OF
EMERGENCY OPERATING PROCEDURES
FOR
MONTICELLO NUCLEAR GENERATING PLANT
NORTHERN STATES POWER COMPANY

REVISION A - JULY, 1984

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1.0 PURPOSE AND SCOPE

This document provides specific guidelines for preparing Monticello Nuclear Generating Plant (MNP) Emergency Operating Procedures. This Writer's Guide will enhance the understandability of the procedure and yet be sufficiently comprehensive to provide appropriate guidance to the operator during an operating emergency condition.

The Emergency Operating Procedures are contained in Operations Manual C.5. This document shall be used in the preparation and subsequent revisions of the procedures contained in that manual section.

2.0 GUIDELINES FOR PROCEDURE PREPARATION

The Emergency Operating Procedure (EOP) should be concise but, at the same time, adequately detailed to ensure a thorough understanding of each procedure.

2.1 PROCEDURE REVISIONS

- (1) Revisions to this Writer's Guide shall be reviewed and approved by the Northern States Power (NSP) EOP Project Manager and the General Electric (GE) EOP Project Manager.
- (2) Revisions to Emergency Operating Procedures shall be made in accordance with this EOP Writer's Guide and 4 ACD-3.11.

2.2 PROCEDURE CONTENT

Emergency Procedures shall adhere to the following format:

TABLE OF CONTENTS

PURPOSE
ENTRY CONDITIONS
OPERATOR ACTIONS

2.3 DESCRIPTION OF SECTION CONTENT

2.3.1 Title

The title shall be centered at the top of the first and second pages of the procedure. The title should be descriptive of the purpose of the procedure (see Appendix 5 and 6).

2.3.2 Purpose

The purpose is a brief statement describing the objective(s) of the procedure.

2.3.3 Entry Conditions

The entry conditions shall include only those alarms, indications, operating conditions, automatic system actions or other unique symptoms that the operator is to use in deciding to use the procedure.

2.3.4 Operator Actions

The operator action shall be short, concise, identifiable instructions. These instructions will give appropriate directions to the operator in order to mitigate further degradation of plant performance and restore plant operation to the point that normal operating procedures can be used.

2.4 CONTROL ROOM EOP BASIS DOCUMENT

For purposes of clarification and explanation of the Emergency Operating Procedures, an EOP Basis Document will be written to amplify and explain the technical aspects of the EOP steps. This document will reference BWROG EPG Appendix B and will be a controlled document. It will be available to the operators in the control room as a training aid.

2.5 GENERAL WRITING GUIDELINES

- (1) Procedure steps should deal with only one action.
- (2) Complex evolutions should be prescribed as simply as practical on a step-by-step basis.
- (3) Mandatory sequence of steps is assumed unless otherwise stated. When necessary, identify those steps which need not be followed in sequence or need to be performed in parallel with concurrent operations.
- (4) Short, simple sentences should be used in preference to long, compound, or complex sentences. As a rule, sentence length should not exceed 15 words.
- (5) User instructions should be written in the form of a command.

- (6) Complex instructions should be itemized in a series of steps, with each step made as simple as practicable.
- (7) Objects of operator actions should be specifically stated. This includes identification of exactly what is to be done and to what.
- (8) The basis or reason for an action should not be included in the instruction. If additional information is necessary to clarify an action, it shall be placed in the supplemental information column or on the facing page.
- (9) Limits should be expressed quantitatively whenever possible. Tolerances should be expressed by indicating the entire range (e.g. use 10-20" rather than $15" \pm 5"$).
- (10) Identification of components and parts should be complete enough to permit accurate identification by the operator.
- (11) When actions are required based upon receipt of an annunciated alarm, list the setpoint of the alarm to facilitate verification.
- (12) When resetting an alarm or trip, list the expected results immediately following the resetting action if beneficial to the operator.
- (13) A note should be provided to warn the operator prior to the performance of any operation which will activate an annunciator.
- (14) When additional confirmation of system response is considered necessary, prescribe the backup readings to be made.
- (15) When considered beneficial to the user for proper understanding and performance, describe the system response time associated with performance of the instruction.
- (16) Expected results of routine tasks or evolutions need not be stated.

- (17) For instructional steps requiring operator actions, space will be provided on the left margin of each column for operator checkoff as an aid in keeping track of his place in the procedure (see Appendix 6 and Subsection 3.9, Item 6).
- (18) When system response dictates a time frame within which the instruction must be accomplished, prescribe such time frame. If possible, however, avoid using time to initiate operator actions. Operator actions should be related to plant parameters.
- (19) If an operator will be required to perform actions in a specified manner or observe the specific indications, a note should precede the step in order to advise the operator of those actions or observations which he will be required to perform following the initial action.

2.6 LEVEL OF DETAIL

Too much detail in operating procedures, especially EOPs, should be avoided in the interest of being able to execute the instructions effectively. The level of detail required is the detail that a newly trained and licensed operator would desire, especially in an EOP, during an emergency condition. Instructions shall consist of a series of steps and, if desired, substeps. These steps shall be written in the form of a command (i.e. tell the operator to do something). The substeps should consist of a more detailed procedure for accomplishing a major step. Instructions should be to the degree of detail necessary for the performance of required operations without direct supervision and permit the plant to be operated safely and expeditiously with a minimum of reliance on memory.

2.7 PUNCTUATION

Punctuation should be used only as necessary to aid reading and prevent misunderstanding. Word order should be selected to minimize punctuation. If extensive punctuation is necessary for clarity, the sentence should be rewritten or made into several sentences. Punctuation should be in accordance with the following rules:

- (1) Use a colon to introduce a list of items.
- (2) Limit the number of commas to ensure that the instruction is not too complex or awkwardly constructed. Use a comma after conditional phrases for clarity and ease of reading. Example: WHEN level decreases to 60 inches, THEN start pump
- (3) Use a period at the end of a sentence and to indicate decimal places in numbers.
- (4) Use brackets to indicate alternative items in an Emergency Operating Procedure; e.g. open MSIV A0 2-80A [B, C, D].
- (5) Use parentheses to set off referenced figures, tables, appendices, attachments, etc.

2.8 VOCABULARY

Words used in procedures should convey precise meaning to the trained person. The following rules apply:

- (1) Use short, common words of few syllables.
- (2) Use common usage if it makes the procedure easier to understand.
- (3) Use words that are concrete rather than vague, specific rather than general, familiar rather than formal, precise rather than blanket. Avoid specialized or abstract words for which substitute words may be used.
- (4) Define key words that may be understood in more than one sense.
- (5) Minimize the use of articles (a, an, and the) unless they are needed for clarity.
- (6) Avoid specialized or abstract words for which substitute words may be used.

2.8.1 Action Verbs

Action verbs are placed in instructional steps to denote a particular action that the operator must perform. Common action verbs and their applications are provided in the Glossary (Appendix 1). Action verbs such as "Energize" or "Increase" will not be used in writing EOPs because they can cause oral communication problems.

2.8.2 Standard Terminology

To standardize those applications in which specific terminology should be used, the following guidelines apply:

- (1) For power-driven equipment, use Start and Stop.
- (2) For valves, use Open, Close, Throttled Open, Throttled Closed, Throttled, Locked Open, Locked Closed, and Locked Throttled.
- (3) For power distribution breakers and electrical supply switches, use Close and Open or On and Off, being consistent with the labeling used on the subject circuit breaker/switch.
- (4) For indicating lights, use On and Off.
- (5) For annunciators, use Activated and Reset.
- (6) For control switches with a positional placement that establishes a standby readiness condition, the verb "Place" should be used along with the engraved name of the desired position. Positional placements are typically associated with establishing readiness of automatic functions and are typically named AUTO or NORMAL: for example, "Place the Core Spray Pump Control Switch in AUTO."
- (7) For control circuitry that executes an entire function upon actuation of the control switch, the action verb appropriate to the component suffices without further amplification of how to manipulate the control device (e.g. Close M0- 1986 SUCTION VALVE on Panel C03).

- (8) For multiposition control switches that have more than one position for a similar function, placement to the desired position should be specified; for example, "Place DIESEL FIRE PUMP selector switch to TEST NO. 2."
- (9) Standard practices for observing abnormal results need not be prescribed within procedural steps. For example, observation of noise, vibration, erratic flow or discharge pressure need not be specified by steps that start pumps.

2.8.3 Logic Terms

The logic terms AND, OR, IF, IF NOT, WHEN, and THEN are often necessary to describe precisely a set of conditions or sequence of actions. Emphasis shall be achieved by using capitalization and underlining. All logic terms shall be underlined so that all the conditions are clear to the operator. When these words are not used as logic terms they will not be capitalized or underlined (i.e. HPCI or RCIC; 6 ft. and 10 ft.). The use of AND and OR within the same action shall be avoided. When AND and OR are used together, the logic can be very ambiguous.

Use other logic terms as follows:

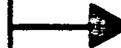
- (1) When attention should be called to combinations of conditions, the word AND shall be placed between the description of each condition. The word AND shall not be used to join more than two conditions. If three or more conditions need to be joined, a list format shall be used.
- (2) The word OR shall be used when calling attention to alternative combinations of conditions. The use of the word OR shall always be in the inclusive sense. To specify the exclusive "OR," the following shall be used: "either A OR B but not both." If three or more conditions need to be joined, a list format shall be used.
- (3) When action steps are contingent upon certain conditions or combinations, the step shall begin with the words IF or WHEN followed by a

description of the condition or conditions (the antecedent), a comma, the word THEN, followed by the action to be taken (the consequent) with the action verb underlined.

- (4) WHEN is used for an expected condition. It implies a "monitoring" or "wait" function.
- (5) IF is used for an unexpected but possible condition existing at the present time or at the time this step is reached. IF is not meant to include "at any time in the future."
- (6) The words "IF while executing the following steps:" shall be used to denote potential changes to the plant condition and the actions to be taken should these conditions occur while executing certain procedural steps. These conditions and actions shall be placed in a broad lined box at the first location it appears. The box shall be placed on the backside of the preceding page (facing page) opposite the steps for which the conditions apply. An arrow shall extend from the box to the first step the conditions apply. If the conditions apply to steps on more than one page, the conditions and actions should be repeated in a narrow lined box on the facing page opposite these steps along with the arrow from the box to the applicable first step on that page. Example:

Example of first location:

IF while executing the following steps:



Example of repeated condition or action:

IF while executing the following steps:



- (7) BEFORE is used when an action is to be taken before a parameter reaches a specified action level. For example, if the parameter is approaching the action level rapidly, the action may be taken sooner than if it were approaching the action level slowly.

- (8) Use of IF NOT should be limited to those cases in which the operator must respond to the second of two possible conditions. IF should be used to specify the first condition.
- (9) THEN shall not be used at the end of an action step to instruct the operator to perform the next step because it runs actions together.

2.9 NUMERICAL VALUES

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

- (1) Arabic numerals should be used.
- (2) For numbers between zero and one, the decimal point should be preceded by a zero; for example: 0.1.
- (3) Acceptance values should be specified in such a way that addition and subtraction by the user is avoided if possible. This can generally be done by stating acceptance values as limits. Examples: 510°F maximum, 300 psig minimum, 580°F to 600°F. For calibration points, statement of the midpoint and its lower and upper limits for each data cell would accomplish the same purpose; for example: 10 milliamperes (9.5 to 10.5). Avoid using \pm .
- (4) For numbers less than zero, a minus sign should precede the number (e.g. -1.2).
- (5) The number of significant digits should be equal to the number of significant digits available from the display. The operator should not be required to read an indicator to greater accuracy than is displayed by the indicator.
- (6) Engineering units should always be specified for numerical values of process variables. They should be the same as those used on the panel displays, for example: psig instead of psi.
- (7) Exponentials shall be identified as follows: 9.0E+5 μ Ci/sec.

2.10 COMPONENT IDENTIFICATION

For identification of components, the following rules apply:

- (1) Equipment identification should always match engraved names on panels, and will be complete.
- (2) Annunciators shall be identified by quoting the annunciator window verbatim followed by the panel number and grid coordinates of the window enclosed in parentheses [e.g. RHR HI RX PRESSURE (3B45)].
- (3) When referencing specific engraved names and numbers on panel placards and alarm windows, the engraving should be quoted verbatim and emphasized by using all capitals [e.g. verify that REACTOR LOW LEVEL (3A58) annunciator is reset].
- (4) The names of plant systems are emphasized by capitalizing the first letter of each word in the title. The word "system" should be deleted from the title in the interest of brevity and is understood because of the context.
- (5) If the component is seldom used or it is felt that the component would be difficult to find, location information should be given in parentheses following the identification.

2.11 CALCULATIONS

Mathematical calculations should be avoided, especially in Emergency Operating Procedures (EOPs). If a value has to be determined in order to perform a procedural step, a chart or graph should be used whenever possible (e.g. preparation of sodium pentaborate solution). The necessary space should be provided within the instruction or on attachments, along with the conversion factors to obtain the answer in correct units.

2.12 ABBREVIATIONS, LETTER SYMBOLS AND ACRONYMS

The use of abbreviations should be minimized because they may be confusing to those who are not thoroughly familiar with them. Abbreviations may be used where necessary to save time and space and when their meaning is unquestionably clear to the intended reader. Accepted abbreviations and acronyms are contained in 4 AWI-4.9.1. The full meaning of the abbreviation, other than the abbreviations listed in 4 AWI-4.9.1, should be written in before the first use of the abbreviation and whenever in doubt. Consistency should be maintained throughout the procedure.

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

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

An acronym is a type of symbol formed by the initial letter or letters of each of the successive parts or major parts of a compound term. Acronyms may be used if they are defined or approved for use. 4 AWI-4.9.1 lists those acronyms approved for use.

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

2.13 SPELLING

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

2.14 CAPITALIZATION

Capitalize the first letter of each word of specific systems or system components, logic terms (see Subsection 2.8.3), section headings (see Section 3.9.(1)), titles of figures and tables (see Subsection 2.23.1(2)). Capitalization may also be used when special emphasis is required. Accepted grammatical rules of capitalization will also be followed (i.e., capitalize first word in a sentence, proper nouns, etc.).

Capitalize all letters of each word any time an Emergency Operating Procedure or Contingency Title is used in a procedure as an entry condition. This includes steps in a procedure that refers the operator to a contingency procedure such as: EMERGENCY RPV DEPRESSURIZATION is required. Otherwise, capitalize the first letter of each word in specific procedure titles.

2.15 HYPHENATION

Hyphens are used between elements of a compound word whenever appropriate. When in doubt, restructure the compound word to avoid hyphenation. Hyphens should be used in the following circumstances:

- (1) In compound numerals from twenty-one to ninety-nine; example: one hundred thirty-four.
- (2) In fractions; examples: one-half, two-thirds.
- (3) In compounds with "self"; examples: self-contained, self-lubricated.
- (4) When the last letter of the first word is the same vowel as the first letter of the second word -- as an alternative, two words can be used; example: fire-escape or fire escape.
- (5) When misleading or awkward consonants would result by joining the words; example: non-nuclear.
- (6) To avoid confusion with another word; examples: re-cover to prevent confusion with recover, pre-position to avoid confusion with preposition.

- (7) When a letter is linked with a noun; examples: X-ray, O-ring, U-bolt, I-beam.
- (8) To separate chemical elements and their atomic weight; examples: Uranium-235, U-235.

2.16 USE OF UNDERLINING

Underlining will be used for emphasis of logic terms, CAUTION headings, NOTE headings and first level section headings. The following examples illustrate what shall be underlined.

- (1) Underline logic terms: IF WHEN THEN
 AND OR
 BUT IF NOT

- (2) Underline titles of first-level section headings.

RPV Level Control

- (3) Do not underline action which is all capitalized:

EMERGENCY RPV DEPRESSURIZATION is required

2.17 CONDITIONAL STATEMENTS

The following guidelines should be followed:

- (1) Write conditional statements so that the description of the condition appears first, followed by the action instruction.
- (2) If three or more conditions must be described before an action is directed, list the condition separately from the action instruction.
- (3) Emphasize the logic words by underlining, for example, IF . . . , THEN
 . . .

(4) See Subsection 3.13 for additional guidance.

2.18 REFERENCING AND BRANCHING TO OTHER PROCEDURES OR STEPS

Referencing implies that an additional procedure or additional steps should be used as a supplement to the procedure presently being used. Referencing other steps within the procedure being used, either future steps or completed steps, should be minimized. When a few steps are involved in the referencing, the steps should be stated in the procedure wherever they are needed.

To minimize potential operator confusion, branching shall be used when the operator is to leave one procedure or step and use another procedure or step. The words "exit" and "enter" will key the operator to leave the present step and not return until directed.

The words "proceed to" will be used to direct the operator to continue at the specified step within the same procedure. The words "Return to" will be used to direct the operator to return to a previous step in the same procedure.

Following the procedure number, the procedure title shall be enclosed in parentheses to emphasize the title of the referenced or branched procedure; example: Enter C.5-1100 (RPV LEVEL CONTROL) at Step 1.

When the actions to be taken are located in a specific section of the branched procedure, the section where the operator should enter shall be stated rather than just the procedure number and title: example: Enter B.3.4 (Residual Heat Removal) at Section VI.B.

When procedures are executed concurrently, a single tab for each procedure shall be used to assist the operator in locating the material. Each tab shall have the procedure title placed on it. Color coding shall also be used to properly identify each procedure.

2.19 SPECIAL OPERATOR INSTRUCTIONS

Special operator instructions are used to indicate changes in the expected flow of a procedure by indicating:

- o A requirement for concurrent execution of multiple steps
- o One or more contingent actions which remain applicable while executing a series of subsequent steps

Special operator instructions will be enclosed in a box formed using asterisks in order to differentiate them from Cautions. See Subsection 2.24 for an example.

2.20 PRIMARY ACTION COLUMN

The left-hand column of the dual column format will contain the operator instructional steps. The following rules are established in addition to the general rules in Subsection 2.5.

- o Expected indications should be presented in this column.
- o Operator actions in this column should be appropriate for the expected indications.

2.21 CONTINGENCY ACTIONS

Contingency steps will be placed in the right-hand column (see Appendix 7).

Contingency actions are operator actions that should be taken in the event a stated condition, event, or task does not represent or achieve the expected result. The need for contingency actions occurs in conjunction with tasks involving verification, observation, confirmation, and monitoring.

Contingency actions shall be specified for each circumstance in which the expected results or actions might not be achieved. The contingency actions

should identify, as appropriate, directions to override automatic controls and to initiate manually what is normally automatically initiated.

Once an operator is directed to take action in the contingency action column, an instruction will be placed at the end of the contingency action to direct the operator where to proceed in the EOP.

2.22 SUPPLEMENTAL INFORMATION

The right-hand column and the facing page shall be used to provide supplemental information such as setpoints, equipment and indicator locations, etc. not necessary to carry out the primary operator actions but may aid the operator. If the information is brief and there is room, the information should be placed in the right hand column.

The facing page shall be used when there is a lot of supplemental information (i.e. a list of items such as values that the operator must "check" or "verify").

A flow chart or logic diagram shall be provided at the beginning of each procedure, if needed to clarify operator actions.

2.23 PRINTED OPERATOR AIDS

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

Printed operator aids (graphs, etc.) applicable to a page of text should be presented on the back side of the preceding page (facing page) where it is available while reading the text. When this is not practical, printed operator aids should be presented as attachments; for example, when several graphs are applicable to a page and cannot be placed on the facing page. Reference to tables and figures should be by the figure or table number; for example: Maintain pump discharge flow in accordance with Figure 1000-1.

2.23.1 General Guidelines

- (1) Units of measure should be given numerical values that represent observed or measured data and calculated results. A virgule (/) should be used instead of "per" (e.g. ft/sec and lbs/hr).
- (2) Capitalization should be used when referencing figures and tables with text material; e.g. maintain pump discharge flow in accordance with NPSH Requirements for Core Spray Pump (Figure 1101-2).
- (3) Follow the guidelines stated in Section 3.11 when numbering figures, tables and attachments.
- (4) Figure and table identification shall include:
 - (a) Figure or table number
 - (b) Figure or table title

2.23.2 Figures

A figure is used to present data necessary to support operation of a specific system or systems. The data may be presented in the form of graphs, drawings and illustrations.

2.23.3 Tables

Tables consist of data or other information presented that is most easily presented in tabular form.

2.24 USE OF CAUTIONARY INFORMATION, NOTES AND SPECIAL OPERATOR INSTRUCTIONS

Cautionary information can be considered in two fundamental categories: those that apply to the entire procedure and those that apply to a portion or a specific step of the procedure. Those that apply to the entire procedure are called "PRECAUTIONS" and are covered in operator training and included in procedure C.5 - 1000 for ready reference. Those that apply to a portion of a

procedure are called "CAUTIONS" and are placed in a box immediately before the procedural steps to which they apply.

If a caution or note applies only to steps in the Primary Action column or only to steps in the Contingency Action column, the caution or note shall be placed in that column. Otherwise, a CAUTION shall extend across the entire page and shall be highlighted as shown in the Example of a CAUTION shown below. This placement of cautions helps ensure that the procedure user observes the caution before performing the step in either column. A caution shall not be used instead of an instructional step. It should be used to denote a potential hazard to equipment or personnel associated with a particular step. Each caution statement shall be wholly contained on a single page. A caution must appear on the same page as the step to which it applies. The caution shall be placed ahead of the step to which it applies and the step number shall be placed with the caution.

A NOTE is used to present or remind the operator of descriptive information that is intended to aid the operator to perform the instructional step. A note should present information only, not instructions, and should be located prior to the applicable action step.

It is permissible to separate the note from the applicable step to begin a new page as long as the note appears in sequence before the step.

In general, a note shall extend across the entire page and will be highlighted by indentation five spaces from the margins shown in the example of a NOTE shown below. Notes shall be further highlighted by centering three asterisks (with one space between asterisks) one-and-a-half line spaces above and below the note.

Caution and note statements should be short and concise.

Special operator instructions are described in Sections 2.19 and 3.12.

Example of a Special Operator Instruction:

----- (text) -----
* * * * *
* Execute procedures C.5 - 1301, 1302 and 1303 concurrently. *
* * * * *

----- (text) -----

Example of a CAUTION:

----- (text) -----

<p><u>CAUTION</u> DO NOT throttle HPCI or RCIC turbines below 2150 rpm.</p>

----- (text) -----

Example of a NOTE:

----- (text) -----

* * *
NOTE
Injection from RHR will not occur until Reactor
pressure is less than 195 psig.
* * *

----- (text) -----

3.0 TYPING FORMAT

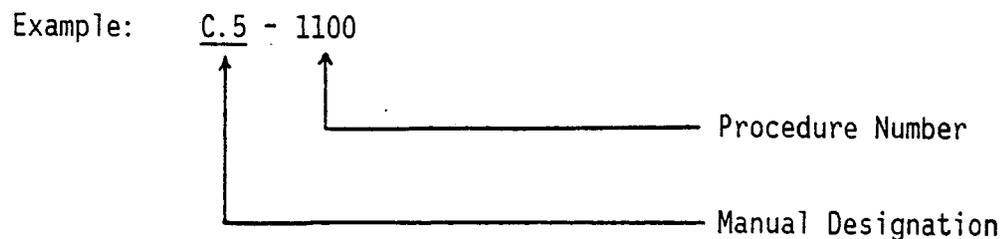
3.1 GENERAL REQUIREMENTS

The following general requirements shall apply:

- (1) Paper size should be 8½ x 11 inches.
- (2) Procedures are to be typed on an electric typewriter or word processor printer.
- (3) Gothic, pitch 12, type is to be used.
- (4) White bond paper.

3.2 EOP DESIGNATION AND NUMBERING

Operations Manual C.5 will contain the Emergency Operating Procedures. The EOPs shall be assigned a number following the prefix C.5. A complete listing of the Emergency Operating Procedures is provided in Appendices 2 and 3.



3.3 INSTRUCTION STEP NUMBERING

Instruction steps in a section or subsection shall be numbered and indented as follows:

1. Confirm
 - A. Check
 - 1) IF
 - a) WHEN

Due to the narrow width of the column for procedure steps in a dual column format, if possible avoid using the 1) and a) levels of indenting to eliminate wasted space.

Bullets shall be used to list steps or components not incorporated in a designated order as follows:

1. Confirm initiation of any of the following:
 - o Isolation
 - o ECCS
 - o Emergency Diesel Generator

3.4 REVIEW AND APPROVAL SHEET

Every MNP Emergency Operating Procedure shall have a Review and Approval Sheet (Appendix 5). The purpose of the Review and Approval Sheet is to identify the procedure and the authorized revision. It shall be the first page of each procedure. EOPs shall be reviewed and approved in accordance with 4 ACD-3.11.

3.5 REVISION SHEET

The Operations Manual shall have a List of Current Procedure Revisions. The purpose of the List of Current Procedure Revisions (Appendix 4) is to identify the effective revision of each procedure of the Emergency Operating Procedures. The List of Current Procedure Revisions shall be the first page of the manual.

3.6 REVISION NUMBERING AND DESIGNATION

- (1) A sequential number following the abbreviation "Rev." shall be used to designate the revision level of the procedure.

Example: Rev. 01

The diagram shows the text 'Rev.' and '01' underlined. A horizontal line is drawn below both. From the left end of this line, an arrow points up to the 'Rev.' text. From the right end of this line, an arrow points up to the '01' text. To the right of the '01' text, the label 'Revision Number' is written. Below the horizontal line, the label 'Abbreviation' is written.

- (2) Revisions to Emergency Operating Procedures shall be made in accordance with this EOP Writer's Guide and 4 ACD-3.11.
- (3) To identify revisions to the text of a procedure, a change bar shall be placed in the left margin for changes to the left column and in the right margin for all other changes (e.g. cautions, notes, or changes in the right column). Only changes to the last revision shall be noted. All previous revision notations in the margins shall be removed.
- (4) All pages in a specific procedure will be the same revision number. Procedures shall be revised and re-issued as a whole. Single pages cannot be individually revised.
- (5) Prior to implementation, the EOP drafts shall be revised using letter designations. Numbered revisions shall be incorporated at the conclusion of the implementation phase in accordance with subsection 3.6(1).

3.7 PAGE IDENTIFICATION AND NUMBERING

Each page of the procedure shall be identified by:

- (1) Emergency Operating Procedure designator and number (C.5___)
- (2) Procedure revision number
- (3) Page number

Each page of the Emergency Operating Procedure shall indicate the total number of pages in the procedure, specified as "Page __ of __." This information shall be located at the upper right hand corner of the page as shown in Appendix 6.

Sub-numbering of pages will not be used (e.g. Page 7A of 53). If required, all pages of the procedure will be re-numbered.

3.8 PAGE ARRANGEMENT/PARAGRAPH IDENTIFICATION

A dual-column format shall be used. The left hand column is designated for primary operator actions. The right hand column is designated for contingency actions (to be taken when the expected response is not obtained) and for supplemental information.

The following format is to be applied consistently for all MNP Emergency Operating Procedures.

- (1) Page margins are specified in Appendix 6 (refer to Subsection 3.6).
- (2) Page identification information is described in Section 3.7.
- (3) Start a new page to allow a Caution to appear on the same page as the step to which it applies.
- (4) The 8½ inch edges shall constitute top and bottom of pages and text. Tables and figures shall be readable with the page so arranged. Rotation of printed matter should be avoided for Emergency Operating Procedures. Refer to Subsection 3.14 if rotation is absolutely necessary.

3.9 HEADING AND TEXT ARRANGEMENT

- (1) First-level section headings (e.g. PURPOSE, ENTRY CONDITIONS) shall be flush to the left margin in all capitals with an underscore, second-level section headings shall be in full capitals and third-level headings (e.g., Primary Operator Action) shall have the first letter of each word capitalized with an underscore (refer to Subsection 3.3 for numbering).
- (2) Block style, as illustrated in Appendix 6, is to be used.
- (3) The title shall appear at the top margin, centered on the page, shall be in full capitals with an underscore. Three line spaces shall be allowed between the title and the first-level section heading (see Appendix 6 for example).

- (4) Procedures developed to support the EOPs (e.g. Alternate Methods for Injecting Boron into the RPV) shall be written in accordance with this document and incorporated as additional contingency procedures.
- (5) Start a page for the following conditions:
 - (a) So that an action step or sub-step is wholly contained on a single page;
 - (b) So that a caution is wholly contained on a single page.
- (6) A line three spaces long shall be placed in the left margin adjacent to the step or sub-step number in each column to allow the operator to check off completed steps. Two line spaces shall be allowed between the check-off line and the step number; for example, refer to Appendix 6.

3.10 SPACING

- (1) Three line spaces shall be allowed between paragraphs and steps.
- (2) Text will be typed using one-and-a-half line spacing.
- (3) Three line spaces shall be allowed between headings and the respective text.
- (4) Three line spaces shall be allowed between a paragraph and itemized lists.
- (5) One-and-a-half line spacing shall be allowed between items in a list.

3.11 FIGURES AND TABLES

The following guidelines should be adhered to when typing figures which consist of graphs, drawings, diagrams and illustrations:

- (1) The figure title and number should be placed three line spaces below the figure field.
- (2) The essential message should be clear; simple presentations are preferred.
- (3) Grid lines of graphs should be at least 1/8 inch apart; numbered grid lines should be bolder than unnumbered grid lines.
- (4) The figure field should be of sufficient size to offer good readability, but should not violate specified page margins (6-1/2' x 9").
- (5) Labeling of items within the figure should be accomplished by arrows pointing to the item.
- (6) The items within the figure should be oriented naturally insofar as possible; for example, height on a graph should be along the vertical axis.
- (7) In general, items within the figure should be labeled. Labels should be printed, using capitals, with letters and numbers at least 1/8 inch high or Gothic, pitch 12 type size.
- (8) The figure number, title and typed labels should be typed using the same typewriter element as is used for the text of the procedure (see 3.1.(3)).
- (9) All lines in figures should be reproducible.

The following guidelines should be adhered to when typing tables:

- (1) Type style and size should be the same as that for the rest of the procedure.
- (2) The table number and title should be typed in all capitals and located above the table field and three line spaces below the preceding text.
- (3) A heading should be entered for each column and centered within the column; the first letter of words in the column headings should be capitalized.
- (4) Horizontal lines should be placed above and below the column headings; vertical lines, while desirable, are not necessary or required.
- (5) Tabular headings should be aligned as follows:
 - (a) Horizontally by related entries.
 - (b) Vertically by decimal point for numerical entries.
 - (c) Vertically by first letter for word entries; however, run-over lines should be indented one space.
- (6) One-and-a-half spaces between horizontal entries suffices to segregate such entries, although horizontal lines may also be used if desired. If used, double horizontal lines should be used above and below the column headings.
- (7) There should not be a vacant cell in the table. If no entry is necessary, "N.A." should be entered to indicate "not applicable".

The following guidelines should be adhered to when numbering figures, tables and attachments.

- (1) Sequential Arabic numbers should be assigned to figures, tables and attachments in a separate series for each EOP. The sequence should correspond with the order in which they are first referenced in the

text. If the same figure is used again later in the same EOP, it will retain the original figure number. The four digit procedure number will precede the figure number. The symbol "#" and abbreviation "No." are unnecessary and should not be used. The number alone suffices. Attachments will be numbered sequentially as 1300-1, 1300-2, etc.

Examples: Figure 1100-1, Figure 1100-2, etc. (for C.5-1100)
Table 1200-1, Table 1201-2, etc. (for C.5-1200)
Attachment 1300-1, Attachment 1300-2, etc. (for C.5-1300)

- (2) Page identification for attachments should consist of information that identifies (1) attachment number, (2) procedure revision number and (3) procedure page number. Page numbering and revision of attachments shall meet the requirements of Subsection 3.6 and 3.7.
- (3) Section numbering for attachments should be in accordance with Subsection 3.3.

3.12 SPECIAL OPERATOR INSTRUCTIONS, CAUTIONS AND NOTES

All special operator instructions, cautions and notes should be distinguished from the rest of the text by the following format:

- (1) If applicable, the heading ("NOTE" or "CAUTION") should be capitalized, centered and placed three line spaces below the preceding text.
- (2) The text of the special operator instruction, caution or note should be block format, line-and-a-half spaced. The Caution text shall begin three spaces from the left-hand margin so that the vertical line of the box lines up with the step number and shall begin one-and-a-half line spaces below the heading. The text for Special Operator Instructions and Notes shall begin five spaces from the left-hand printed margin.

- (3) Notes shall be highlighted by three asterisks (*) with one space between asterisks and centered one-and-a-half line spaces above and below the note.
- (4) The right-hand margin of the text for a special operator instruction and a note should be five spaces to the left of the right-hand printed margin. Generally the right-hand margin of the text of the caution should be three spaces to the left of the right-hand printed margin so the vertical line of the box appears at the right-hand printed margin.
- (5) A special operator instruction and a caution shall be further highlighted by enclosing them in a box three spaces above the heading or text and one-and-a-half spaces below the last line of the text. Asterisks will be used to form the box for special operator instructions. Straight lines will be used to form the box for a caution.
- (6) A caution shall appear on the same page as the step to which it applies. Start a new page if necessary.
- (7) Refer to Section 2.24 for examples.
- (8) If a caution or note applies only to steps in the Primary Operator Action column or only to steps in the Contingency Action column, the caution or note shall be placed in that column. Refer to Appendix 6 for examples.

3.13 CONDITIONAL STATEMENTS

Conditional statements shall be in accordance with the following format guidelines to emphasize these statements:

- (1) The second and subsequent lines of the condition statement shall be indented two spaces.
- (2) The action shall start at the same left-hand margin as the first line of the conditional statement.

- (3) The second and subsequent lines of the action shall be indented two spaces.

An example of the foregoing format is provided below:

WHEN RPV pressure is below the Minimum
Alternate RPV Flooding Pressure,
THEN commence system initiation and slowly increase
injection into the RPV with the following
systems to restore and maintain RPV water
level above 0 in.

3.14 ROTATION OF PAGES

If pages need to be rotated, these rules shall be followed:

- (1) The top of the page with rotated print is the normal left-hand edge.
- (2) The page margins do not rotate.
- (3) Page identification and number will not be rotated.

3.15 USE OF FOLD-OUT PAGES

When used, a fold-out page is treated as a single page. It should follow the same format as a standard page except the width is different. The page should be folded so that a small margin exists between the fold and the right-hand edge of standard pages. This will reduce wear of the fold.

3.16 USE OF OVER-SIZED PAGES

Over-size pages should not be used. They should be re-organized or reduced to a standard page. If this cannot be done, a fold-out page should be used.

3.17 USE OF REDUCED PAGES

Reduced pages should be avoided whenever possible. Final size of reduced pages should be standard page size. Reduced pages shall be readable.

3.18 REPRODUCTION

Reproduction will be done on a standard copier, two-sided copy, especially when printed operator aids are presented on the back side of the preceding page (facing page).

3.19 BINDING

For control room use, the EOP's will be placed in a separate binder and conspicuously marked so that they are readily identifiable as emergency operating procedures. Sufficient copies will be provided in the control room since these procedures will be used concurrently. Each binder will have a ribbon book marker attached to use as an aid in marking the operator's place in the procedure.

3.20 PROCEDURE CONTROL

EOPs shall be controlled in accordance with 4 ACD-4.2 and 4 ACD-16.1.

4.0 REFERENCES

- (1) Monticello Nuclear Generating Plant Administrative Documents:
 - 4 ACD-3.11, Procedure Review and Approval
 - 4 ACD-4.2, Integrated Operating Procedures
 - 4 ACD-16.1, Document Control
- (2) Emergency Operating Procedures Writing Guidelines, INPO, July 1982
- (3) NUREG-0899, Guidelines for the Preparation of Emergency Operating Procedures, Rev. 5, June 4, 1982
- (4) BWROG Emergency Procedure Guideline, Revision 3L
- (5) BWROG EPG Appendix B, Revision 3A

APPENDIX 1

GLOSSARY

Word	Application
Activate	Formally institute special activity/function. To place into operation.
Align	Place systems or components (e.g. valves and breakers) in proper positions for accomplishing specified functions.
Allow	To permit a stated condition to be achieved prior to proceeding (e.g. "allow discharge pressure to stabilize").
Check	To determine the present status of a plant parameter or component.
Close	Mechanically: To change the physical position of a mechanical device so that it prevents physical access or fluid flow (e.g. "V-17-16"). Electrically: To change the physical position of an electrical circuit breaker to permit passage of electrical current (e.g. "close circuit breaker B-43-31").
Complete	To accomplish specified procedural requirements (e.g. "complete valve checklist A", "complete data report QA-", "complete Steps 7 through 9 of OI 51").
Comparison	A comparing or being compared.

APPENDIX 1
GLOSSARY
(Continued)

Word	Application
Confirm	To observe an expected condition or characteristic without being specific as to the method (e.g. "confirm . . . pump operation").
Decrease	<u>Do not</u> use because of oral communication problems. Use "lower" in lieu of "decrease".
Deenergize	Remove power supply. Should not be used; use Open.
Depress	Refers to pushbutton operation.
Discrepancy	Disagreement of inconsistency.
Energize	Supply power. Should not be used; use Close.
Ensure	Take necessary/appropriate actions to guarantee component, reading, etc., as specified.
Establish	To make arrangements for a stated condition (e.g. "established communication with control room").
Execute	To do or perform the instructed action or steps.
Implement	Commence a required program or series of procedures.
Increase	<u>Do not</u> use because of oral communication problems. Use "raise" in lieu of "increase".

APPENDIX 1
GLOSSARY
(Continued)

Word	Application
Inspect	To measure, observe or evaluate a feature or characteristic for comparison with specified limits; method of inspection should be included (e.g. "visually inspect for leaks").
Isolate	Remove from service by closing off the flow path.
Local	Take action outside the control room at equipment or local operating station.
Limitation	Specific parameter not to be exceeded (violated).
Maintain	Take appropriate actions to prevent fluctuation/changing.
Manual Initiation	Operation action which activates a function which is normally initiated automatically due to plant conditions.
Manual Trip	Operator action to activate a Reactor Trip or stop an operating piece of equipment such as a pump.
May	Possibility, permission or contingency.
Monitor	To observe a stated parameter or function for significant changes. This does not mean an operator continuously watches the parameter, but be aware of changes to keep the operation under control.
Notify	Inform specified personnel.

APPENDIX 1

GLOSSARY

(Continued)

Word	Application
Open	<p>Mechanically: To change the physical position of a mechanical device, such as a valve or door, to an unobstructed position that permits a fluid flow or access.</p> <p>Electrically: To change the physical position of an electric circuit breaker to prevent the passage of electrical current.</p>
Per	As specified in or by named procedure. Infers referencing the document is optional.
Place	Physically position a switch to the specified location.
Proceed	Go to specified area. In case of procedures, discontinue use of present procedure.
Rack In	Place an electrical circuit breaker in place by physically connecting it to its associated power source.
Rack Out	Disconnect an electrical breaker by physically removing it from its associated electrical cubicle.
Record	To document specified condition or characteristic (e.g. "record discharge pressure").
Refer	Use as a supplement. Perform applicable actions of cited procedure and return to the controlling procedure.

APPENDIX 1
GLOSSARY
(Continued)

Word	Application
Regulate	Control or restrict.
Restore and Maintain	To bring a specified parameter back under control or within specified limits and keep it within those limits.
Rotate	Turn a rotary multi-position switch to the required position. In reference to pumps, hand rotate before energizing.
Secure	Remove from service. Take appropriate action to prevent return to service.
Set	To physically adjust to a specified value an adjustable feature (e.g. "set diesel speed to . . . rpm").
Shall	Infers mandatory requirement.
Shift	Specifies changing mode of operation.
Should	Infers non-mandatory, preferred or desired method.
Shut	To move so as to close. Do not use.
Stabilize	To bring a specified parameter under control with any fluctuations controlled.
Start	To originate motion of an electrical or mechanical device directly or by remote control (e.g. "start . . . pump").

APPENDIX 1
GLOSSARY
(Continued)

Word	Application
Stop	To terminate operation (e.g. "stop . . . pump").
Terminate Injection	To stop flow to a specified location. This allows re-directing flow to another location without tripping the pump.
Throttle	To operate a valve in an intermediate position to obtain a certain flow rate (e.g. "throttle valve V-17-61 to . . .").
Trip	Do not use except when the circuit breaker opens automatically. Use "open" in lieu of "trip" when possible.
Vent	To permit a gas or liquid confined under pressure to escape at a vent (e.g. "vent . . . pump").
Verify	To determine if in proper condition/status and place in proper condition/status if not found in proper condition/status.

APPENDIX 2
EMERGENCY OPERATING PROCEDURES NUMBERING SCHEME - GENERAL

C.5 -1000 Series - Control Procedures

- 1100 Series - RPV Control Procedures
- 1200 Series - Primary Containment Control Procedures
- 1300 Series - Secondary Containment Control Procedures
- 1400 Series - Radioactivity Release Control Procedures
- 2000 Series - Contingency Procedures

APPENDIX 3
EMERGENCY OPERATING PROCEDURES NUMBERING SCHEME

C.5 Emergency Operating Procedures

- C.5-1000 General Operator Instructions and Precautions

- C.5-1100 RPV Control
 - C.5-1101 RPV Level Control
 - C.5-1102 RPV Pressure Control
 - C.5-1103 RPV Power Control

- C.5-1200 Primary Containment Control
 - C.5-1201 Suppression Pool Temperature Control
 - C.5-1202 Drywell Temperature Control
 - C.5-1203 Primary Containment Pressure Control
 - C.5-1204 Suppression Pool Water Level Control
 - C.5-1205 H₂/O₂ Concentration Control

- C.5-1300 Secondary Containment Control
 - C.5-1301 Secondary Containment Temperature Control
 - C.5-1302 Secondary Containment Radiation Control
 - C.5-1303 Secondary Containment Water Level Control

- C.5-1400 Radioactivity Release Control

- C.5-2001 Level Restoration
- C.5-2002 Emergency RPV Depressurization
- C.5-2003 Steam Cooling
- C.5-2004 Core Cooling Without Level Restoration
- C.5-2005 Alternate Shutdown Cooling
- C.5-2006 RPV Flooding
- C.5-2007 Level/Power Control

APPENDIX 4

Rev. _____

Date _____

C.5, Emergency Operating Procedures
List of Current Procedure Revisions

<u>Procedure</u>	<u>Procedure Title</u>	<u>Revision</u>
<u>1000 Series</u>	<u>Control Procedures</u>	
C.5 - 1000	General Operator Instructions and Precautions	0
<u>1100 Series</u>	<u>RPV Control Procedures</u>	
C.5 - 1100	RPV Control	0
C.5 - 1101	RPV Level Control	0
C.5 - 1102	RPV Pressure Control	0
C.5 - 1103	RPV Power Control	0
<u>1200 Series</u>	<u>Primary Containment Control Procedures</u>	
C.5 - 1200	Primary Containment Control	0
C.5 - 1201	Suppression Pool Temperature Control	0
C.5 - 1202	Drywell Temperature Control	0
C.5 - 1203	Primary Containment Pressure Control	0
C.5 - 1204	Suppression Pool Water Level Control	0
C.5 - 1205	H ₂ /O ₂ Concentration Control	0
<u>1300 Series</u>	<u>Secondary Containment Control Procedures</u>	
C.5 - 1300	Secondary Containment Control	0
C.5 - 1301	Secondary Containment Temperature Control	0
C.5 - 1302	Secondary Containment Radiation Control	0
C.5 - 1303	Secondary Containment Water Level Control	0
<u>1400 Series</u>	<u>Radioactivity Release Control Procedures</u>	
C.5 - 1400	Radioactivity Release Control	0

APPENDIX 4 (Cont'd.)

Rev. _____
Date _____

C.5, Emergency Operating Procedures
List of Current Procedure Revisions

<u>2000 Series</u>	<u>Contingency Control Procedures</u>	
C.5 - 2001	Level Restoration	0
C.5 - 2002	Emergency RPV Depressurization	0
C.5 - 2003	Steam Cooling	0
C.5 - 2004	Core Cooling Without Level Restoration	0
C.5 - 2005	Alternate Shutdown Cooling	0
C.5 - 2006	RPV Flooding	0
C.5 - 2007	Level/Power Control	0

APPENDIX 5
Review and Approval Sheet

Procedure C.5-____
Revision _____
Page 1 of _____

(TITLE _____)
(Procedure Number)

Prepared by: _____ Date _____

Reviewed by: _____ Date _____

QA Review: _____ Date _____

QA Revision Review Required: Yes _____ No _____

ALARA Review: _____ Date _____

ALARA Revision Review Required: Yes _____ No _____

Operations Committee Final Review: Meeting Number: _____ Date _____

Op. Com. Revision Review Required: Yes _____ No _____

Approved by: _____ Date _____

Op. Com. Results Review: _____ Mtg. No. _____ Date _____

REACTOR PRESSURE VESSEL CONTROL

PURPOSE

1-1/2 line spacing (typical)

This emergency procedure provides the direction necessary to maintain adequate core cooling, shut down the reactor and cool down the RPV to cold shutdown conditions in the event of symptoms indicative of a loss of inventory or ATWS incident.

← triple space (typical)

ENTRY CONDITIONS

The entry conditions for this procedure are any of the following:

- o RPV water level below +9 in., OR unknown
- o RPV pressure above 1056 psig
- o Drywell pressure above 2.0 psig
- o A condition which requires reactor scram, AND reactor power is either:
 - a. above 3%, OR
 - b. cannot be determined

1 space

OPERATOR ACTIONS

← 3 1/2" →	Contingency Action & Supplemental Information
<u>Primary Operator Action</u>	

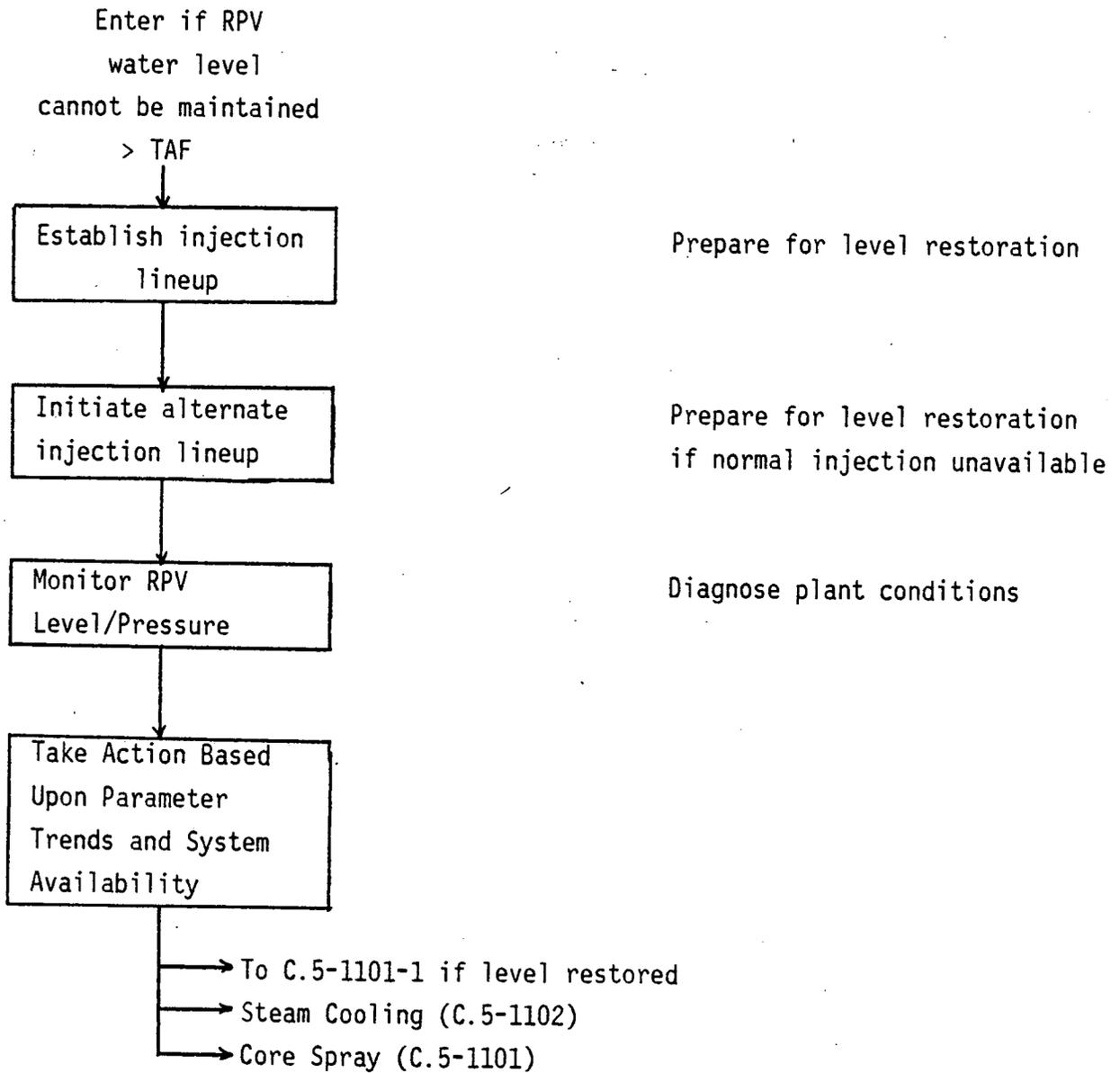
- | | | |
|-------|--|------|
| __ 1. | <u>IF</u> a reactor scram has not been initiated, <u>THEN</u> depress both of the <u>MANUAL SCRAM</u> pushbuttons. | None |
| __ 2. | Monitor RPV level, pressure <u>AND</u> power from multiple indications. | None |

1"

LEVEL RESTORATION

STEPS

OBJECTIVES



(Facing Page Lefthand side)

Primary Operator Action

Contingency Action & Supplemental Information

5. Monitor RPV water level.

None

6. Confirm automatic initiation of any of the following:

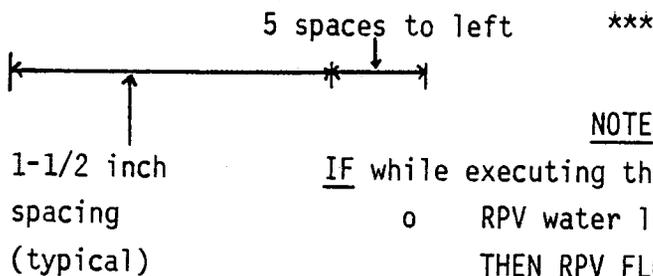
IF any of the following should have initiated but did not,

- MSIV isolation
- Group 2-7 isolation
- HPCI
- RCIC
- CS
- LPCI
- DGs

THEN initiate those systems which should be operating.

- MSIV isolation
- Group 2-7 isolations ← 1/2" mm
- HPCI
- RCIC
- Cs
- LPCI
- DGs

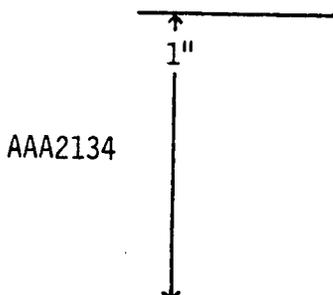
Proceed to step



NOTE

IF while executing this section (except where noted):

- o RPV water level becomes indeterminable.
THEN RPV FLOODING IS REQUIRED
- o RPV Flooding is required
THEN exit this section AND enter Attachment 1 (RPV Flooding) (TAB 3).
- o Boron Injection is required,
THEN exit this attachment AND enter Attachment 2 (Level/Power Control) (TAB 10).



AAA2134

Appendix 6
(Cont'd.)

C.5-1101
Revision 0
Page 4 of

<u>System</u>	<u>RPV Pressure Range (psig)</u>	<u>Capacity (gpm)*</u>
MC/RF	1160-0	12,800/pump
CRD	1650-0	160 max.
RCIC	1120-50	400
HPCI	1120-150	4,250
CS	265-0	4,500/pump
LPCI	217-0	7,700/pump

(Facing page left hand side)

Primary Operator Action

Contingency Action &
Supplemental Information

spaces

CAUTION

Do not secure OR place CS in MANUAL mode unless, by at least two independent indications:

- (1) misoperation in AUTOMATIC mode is confirmed, OR
- (2) adequate core cooling is assured.

IF a CS is placed in MANUAL, it will not initiate automatically. Make frequent checks of the initiating or controlling parameter. WHEN manual operation is no longer required, restore the system to AUTOMATIC/STANDBY mode if possible.

3. Restore AND maintain RPV water level between 9 in. and 48 in. using one OR more of the following systems:

- o MC/RF
- o CRD

← ½" →

(minimum)

IF RPV level cannot be determined,
THEN enter C.5-2006
(RPV Flooding)

IF RPV level cannot be maintained above +9.0 in.,
THEN proceed to step _____.

CAUTION

Do not throttle RCIC turbine below 2200 RPM or HPCI turbine below 2050 RPM.

- o RCIC
- o HPCI
- o CS
- o LPCI

A. WHEN RPV water level has stabilized in this range,
THEN proceed to step _____.