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EMERGENCY AND ABNORMAL OPERATING PROCEDURES WRITERS GUIDE

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A-502.1EMERGENCY AND ABNORMAL OPERATING PROCEDURES WRITERS GUIDE1.0 INTRODUCTION

1.1 PURPOSE - to provide technical and administrative guidance on the preparation of EOPs and APs.

1.2 SCOPE OF APPLICATIONS - this Writers Guide shall be applied to the writing and revision of all EOPs and APs.

1.3 Definitions

1.3.1 EMERGENCY OPERATING PROCEDURE (EOP) - a procedure which provides actions necessary to return the plant to a safe, stable condition following transient/accident conditions which have caused plant parameters to challenge reactor protection system set points, engineered safeguards system set points, challenge the ability to cool the reactor core, or a radiation release boundary.

1.3.2 ABNORMAL OPERATING PROCEDURE (AP) - APs govern the plant operations during abnormal conditions and specify operator actions that will prevent the condition from degrading into an emergency.

1.3.3 CRITICAL SAFETY FUNCTION (CSF) - CSFs are those functions necessary to protect the fuel/cladding, RCS pressure boundary and the containment vessel from degradation. A prioritized list of these six functions is as follows:

1.3.3.1 Maintenance of Subcriticality

1.3.3.2 Maintenance of Core Cooling

1.3.3.3 Maintenance of Heat Sink

1.3.3.4 Maintenance of RCS Integrity

1.3.3.5 Maintenance of Containment Integrity

1.3.3.6 Control of Reactor Coolant Inventory

1.3.4 SHALL - the word SHALL denotes a requirement.

1.3.5 SHOULD - the word SHOULD denotes a recommendation.



- 1.3.6 MAY - the word MAY denotes permission, it denotes neither a requirement nor a recommendation.
- 1.4 REFERENCES
 - 1.4.1 INPO 82-017, Emergency Operating Procedures Writing Guideline, July, 1982.
 - 1.4.2 NUREG-0899, Guidelines for the Preparation of Emergency Operating Procedures, August, 1982.
 - 1.4.3 WOG-ERG, Revision 1, LP Version, September, 1983.
 - 1.4.4 Battelle Document, Review Criteria for Evaluation of Procedure Generation Packages, Draft, November, 1983.
 - 1.4.5 QA Manual.
- 1.5 REVISIONS - revisions to any EOP/AP shall be made in accordance with A-601.6, Procedure Control Emergency and Abnormal Procedures.
- 2.0 EOP/AP ORGANIZATION AND CONTENT - each EOP/AP will normally contain the following:
 - 2.1 COVER PAGE - which will contain the following information;
 - 2.1.1 EOP alpha-numeric designation and title
 - 2.1.2 Revision number
 - 2.1.3 Effective date
 - 2.1.4 Total number of pages in the procedure
 - 2.1.5 Provision for review signature
 - 2.1.6 Provision for approval signature
 - 2.1.7 Facility identification
 - 2.1.8 PORC review date
 - 2.2 PURPOSE AND ENTRY CONDITIONS/SYMPTOMS PAGE - which contains;
 - 2.2.1 PURPOSE STATEMENT - brief statement which describes what it is intended the procedure will accomplish.



- 2.2.2 ENTRY CONDITIONS/SYMPTOMS section which will include those alarms, indications, operating conditions, automatic actions or other unique symptoms that the operator is to consider when deciding to use the procedure. Entry conditions may also include referencing or related procedures.
- 2.3 OPERATOR ACTION STEPS - general requirements are that action steps be structured so that they can be executed by minimum shift staffing as required by Technical Specifications, and be consistent with the responsibilities of the shift positions. In addition, the action steps should minimize the movement of personnel in the Control Room and enable the effective supervisory overview to monitor plant status.
- 2.3.1 OPERATOR ACTION STEPS are short, precise statements presenting, exactly the task to be performed and the expected response or result of that task. It is not necessary to state expected results of routine tasks. Steps are assumed to be performed in sequence unless otherwise denoted. Actions directed in a step should not be expected to be complete before the next step is begun. If a particular action must be completed before continuation, this must be stated in that step or substep. The action steps are presented in a dual column format and are identified as immediate or subsequent actions.
- 2.3.1.1 THE ACTION/EXPECTED RESPONSE column contains sequentially ordered steps and substeps with the initial operator task and its expected response. The user would normally move down this column as each expected response is obtained. When an expected response is not obtained, the user is expected to move to the right hand column for guidance.
- 2.3.1.2 THE RESPONSE NOT OBTAINED (RNO) column presents contingency actions to be taken when a stated action in the left hand column cannot be performed or does not satisfy the expected response. RNO column actions are specified for steps and substeps for which useful alternatives are available. The following should be applied to the format of RNO column entries:
- 2.3.1.2.1 Contingency actions should use directions to override automatic controls and to manually or locally initiate normally automatic actions.

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2.3.1.2.2 A contingency action should be numbered or lettered the same as the left-hand column substep to which it applies. A contingency entry for a high-level step is not numbered, but appears on the same line as its related step.

2.3.1.2.3 To describe a sequence of actions which are contingent upon plant or component conditions, a series of conditional statements should be used.

Example:

Check PRZR PORVs - CLOSED	<u>IF</u> PRZR pressure less than (1) psig, <u>THEN</u> manually close PORVs. <u>IF</u> any valve can <u>NOT</u> be closed, <u>THEN</u> manually close its block valve.
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2.3.1.2.4 If the RNO column contains multiple contingency actions for a single left-hand column action, the phrase "Perform the following:" may be used as the introductory statement.

2.3.1.2.5 If the RNO column action step contains multiple actions or substeps which do not correspond to multiple substeps in the left-hand column, then different designators should be used in each column.

Example:

Establish Letdown:	Establish excess letdown:
a.	1)
b.	2)
c.	3)

2.3.1.2.6 The user is expected to proceed to the next step or substep in the left-hand column after taking the RNO column action unless instructed otherwise.

2.3.1.2.7 If the RNO column action step or substep cannot be completed, the user is expected to proceed to the next left-hand column step or substep unless instructed otherwise.

2.3.1.2.8 As a general rule, contingent transitions occur from the RNO column. Deliberate transitions may be made from the left-hand column.



- 2.3.1.3 Immediate operator actions - actions which the operator is expected to perform from memory at the onset of an emergency condition. These should be actions for events in which urgency and consequence to reactor safety or core damage are important considerations. They should be limited to verification of automatic actions where possible. These steps should be included in the applicable EOP to ensure their execution is verified.
- 2.3.1.4 Subsequent operator actions - actions not defined as immediate.
- 2.3.2 CAUTION STATEMENTS - statements denote potential hazards to personnel or equipment. Cautions which apply to a particular action step should appear directly before that step. Cautions which apply throughout a procedure, or a portion of it, should appear at the start of the procedure or at the point where they become applicable. A caution statement will not contain a direct action. A passive action statement may be appropriate. An example would be the continuous monitoring of a parameter with an associated action if a prescribed value is reached.
- 2.3.3 NOTE STATEMENTS - statements contain advisory or administrative information for subsequent action steps or for caution statements. The directions in step 2.3.2 for placement and action content should be applied to notes. Where cautions and notes are included together all caution statements should be listed before any note statement.
- 2.4 The following may be used in an EOP or AP.
 - 2.4.1 AUTOMATIC ACTIONS PAGE - which provides information on systems or components which should activate automatically, without operator intervention. This is normally only contained in E-O reactor trip or safety injection.
 - 2.4.2 PRINTED OPERATOR AIDS - will be self explanatory, legible, and readable under the expected conditions of use and within the reading precision of the operator. These may consist of any of the following;
 - 5.4.2.1 FIGURES - which may include graphs, drawings, diagrams and illustrations.



- 5.4.2.2 TABLES - which should appear on or near the same page as the step from which they are identified, unless their length precludes this.
- 5.4.2.3 ATTACHMENT PAGES - may be used to provide additional information that the operator may need within the procedure.
- 2.4.3 FOLDOUT PAGE - which summarizes information an operator should have continuously available while using the procedure. It may contain important actions and transitions which are performed outside the normal flowpath of the procedure.
- 2.5 OVERSIZED PAGES - should not be used.
- 2.6 TEXT REVISIONS - should be identified by a change bar. The change bar consists of vertical bar located in the right hand margin to indicate the area of change to the text. The change bar for the current revision will not be carried forward to the next revision.
- 3.0 EOP/AP DESIGNATION, NUMBERING AND SECTION IDENTIFICATION
- 3.1 EOP DESIGNATORS - the EOPs use letter designations as follows:
 - 3.1.1 E - Emergency Procedures - for diagnosis and recovery from design basis events
 - 3.1.2 ES - Emergency Sub-procedures - which supplement the recovery actions of an E procedure
 - 3.1.3 ECA - Emergency Contingency Actions - supplement the E and ES procedures by providing recovery actions for low probability or unique events which may complicate or otherwise reduce the effectiveness of those procedures.
 - 3.1.4 F - Critical Safety Function Status Trees (CSFST) - for diagnosis of challenges to critical safety functions.
 - 3.1.5 FR - Functional Restoration - for restoration of a critical safety function to a satisfied condition.
 - 3.1.6 The FR procedures also utilize an alpha-numeric designation denoting to which critical safety function they apply (ex., FR - S.1). The second letter designators used are:
 - 3.1.6.1 S - for Subcriticality

- 3.1.6.2 C - for Core Cooling
- 3.1.6.3 H - for Heat Sink
- 3.1.6.4 P - for RCS Integrity
- 3.1.6.5 Z - for Containment Integrity
- 3.1.6.6 I - for RCS Inventory
- 3.2 EOP NUMBERING - each EOP shall be numbered in the same manner as used in the WOG-ERGs, Revision 1, LP version where applicable.
- 3.3 AP DESIGNATION AND NUMBERING - each Abnormal Procedure shall be identified by the designator AP followed by an alpha-numeric designation.
- 3.4 REVISION DESIGNATION AND NUMBERING - each EOP/AP revision will be identified on the cover page by the designator revision number followed by a sequential number. The first effective (PORC approved) EOP/AP shall be identified as revision number 0.
- 3.5 EOP/AP SECTION ORGANIZATION - in order to facilitate rapid location of specific sections and subsections of the EOP/AP, the Control Room Copy is arranged per Figure 8 as follows:
 - 3.5.1 COVER SHEET - which is used for administrative purposes and does not provide any active function in the EOP/AP to be used. The Cover Sheet of the Control Room copy is the first page seen in the binder.
 - 3.5.2 PURPOSE and ENTRY CONDITIONS/SYMPTOMS PAGE - in the Control Room copy is immediately following the cover sheet.
 - 3.5.3 OPERATOR ACTION STEP PAGES - which may be subdivided into Immediate Operator Action pages, followed by Subsequent Operator Action pages.
 - 3.5.4 FOLDOUT PAGES - provided on right-hand side of binder, for visibility and easy access.
 - 3.5.5 AUTOMATIC ACTION AND ATTACHMENT PAGES - provided on the left-hand side of the binder for visibility and easy access.



4.0 EOP/AP FORMAT

- 4.1 GENERAL FORMAT - all pages of the EOP/AP (except Cover Page) shall follow the general format as shown in Figure 1 in addition to the following specific rules;
- 4.1.1 PAPER - shall be white, 8-1/2" by 11", bond.
- 4.1.2 TYPING - shall be performed on a consistent, legible typing or word processing system.
- 4.1.3 PAGE MARGINS - a suitable margin is to be maintained between text and the page edges.
- 4.1.4 PAGE ORIENTATION - the 8-1/2" edges should constitute the top and bottom of all procedure and attachment pages.
- 4.1.5 PAGE IDENTIFICATION - each page of the EOP/AP shall contain the following information;
- 4.1.5.1 EOP/AP designator and number.
- 4.1.5.2 EOP/AP title.
- 4.1.5.3 Current revision number.
- 4.1.5.4 Page number and total number of pages in EOP/AP.
- 4.1.6 LINE SPACING - the following rules apply to all EOPs/APs;
- 4.1.6.1 Two lines between headings and text and between paragraphs.
- 4.1.6.2 One line between text lines.
- 4.1.7 TEXT ARRANGEMENT - block style is to be used.
- 4.1.8 TEXT CONTINUITY - the text of operator action steps; with applicable substeps, cautions, notes; should be wholly contained on the same page. Where physical constraints preclude this the following guidelines apply:
- 4.1.8.1 Cautions and/or notes may be placed alone on the immediately preceding page.
- 4.1.8.2 If a step must be continued on to another page, then:
- 4.1.8.2.1 The initial page shall be annotated at the bottom of the action step field portion of the page to indicate that the step continues. (ie, THIS STEP CONTINUED ON FOLLOWING PAGE.)

- 4.1.8.2.2 The following page shall have the initial action step heading repeated and be annotated to indicate that the step is being continued from a previous page.

ex: Establish letdown -
THIS STEP CONTINUED FROM PREVIOUS PAGE

- 4.1.9 PAGE ROTATION - should be minimized but when it is necessary to rotate a page for the sake of clarity and readability (i.e., proper graph construction), the following rules are applicable;

- 4.1.9.1 The left hand edge of the normal page shall become the top of the rotated page.

- 4.1.9.2 Page margins, identification and numbering shall not rotate.

- 4.2 COVER PAGE FORMAT - each cover page shall contain, as a minimum, the information specified in Section 2.1 and will follow the format similar to Figure 3 of procedure A-601.

- 4.3 PAGE HEADINGS FORMAT - each page of the EOP/AP (except the cover page) shall be identified with a header as shown in Figure 2 which contains the following information:

- 4.3.1 Procedure designator and number which are located in the upper left-hand corner.

- 4.3.2 Procedure title which is centered.

- 4.3.3 Page # of # located in upper right-hand corner.

- 4.3.4 Revision designator (REV:) and number located in the upper right-hand corner.

- 4.4 PURPOSE AND ENTRY CONDITIONS/SYMPTOMS PAGE FORMAT - shall contain the information specified in Sections 2.2.1, 2.2.2 and 4.1.5 and follow the modified block format as shown in Figure 2.

- 4.5 OPERATOR ACTION STEP PAGE FORMAT - the operator action step page consists of operator instruction steps, caution statements and note statements which are formatted as follows and as shown in FIGURE 3:



- 4.5.1 OPERATOR ACTION STEPS - shall be of a dual column format. The left-hand column is designated ACTION/EXPECTED RESPONSE and the right-hand column is designated RESPONSE NOT OBTAINED.
- 4.5.1.1 Both columns contain operator action steps which may be designated IMMEDIATE or SUBSEQUENT.
- 4.5.1.2 All operator action steps should be numbered and sequenced as stated in section 5.1, Sequencing of operator action steps.
- 4.5.1.3 All IMMEDIATE operator action steps shall be identified by a circle surrounding the step number.
- 4.5.1.4 Operator action steps should begin with an action verb defined in TABLE 1.
- 4.5.2 CAUTION STATEMENTS - text should be in a block format, as shown in Figure 3, in addition to the following formatting requirements:
 - 4.5.2.1 Caution statements should be enclosed at the top and bottom by a continuous line of asterisks which should begin three lines below the preceding text. This differentiates the CAUTION and NOTE.
 - 4.5.2.2 The statement header CAUTION should be centered and placed two lines below the preceding line of asterisks.
 - 4.5.2.3 Caution statement text should begin two lines below the caution header and extend from margin to margin.
 - 4.5.2.4 Caution statements should be emphasized as described in section 5.2, Emphasis Techniques, by using all upper case capitalization.
 - 4.5.2.5 Caution statements which apply to the whole procedure shall be stated prior to any operator action step and be shown on the foldout page if applicable.
 - 4.5.2.6 Caution statements which apply to a particular step shall be stated prior to that step.
 - 4.5.2.7 Caution statements should be written to preclude confusion as to which step or evolution they refer.
- 4.5.3 NOTE STATEMENTS - text should be in a block format as shown in Figure 3, in addition to the following formatting requirements:



- 4.5.3.1 The statement header NOTE should be on the same line as the text but separated from the text by a colon.
- 4.5.3.2 Note statement text should begin two lines below the preceding text and extend from margin to margin.
- 4.5.3.3 Note statements should be preceded with a bullet (o) to also differentiate them from a CAUTION.
- 4.5.3.4 Note statements which apply to a particular step shall be stated prior to that step.
- 4.6 AUTOMATIC ACTIONS PAGE FORMAT - automatic actions should be listed in a single column format.
- 4.7 PRINTED OPERATOR AIDS PAGES FORMAT - printed operator aids may consist of figures, tables, foldout pages or attachment pages.
 - 4.7.1 FIGURE FORMAT - figures should be formatted as follows:
 - 4.7.1.1 Figure number and title are all capitals and are centered on figure field just above the lower margin.
 - 4.7.1.2 Figure field should fill but not violate page margins.
 - 4.7.1.3 All lines and gridlines shall be readable and reproducible.
 - 4.7.1.4 Orientation shall be as natural as possible or in the same direction as the instrumentation which it represents.
 - 4.7.1.5 All items within a figure should be labeled incorporating arrows to identify specifics where possible. Labels should be typed in all capital letters.
 - 4.7.2 TABLE FORMAT - tables should be formatted as follows:
 - 4.7.2.1 A capitalized table name and number should be located above the table field.
 - 4.7.2.2 A capitalized heading shall be entered for each table column.
 - 4.7.2.3 Horizontal lines should be placed above and below the table heading and below the last line on the table. Vertical column lines should be placed within the table for readability.



- 4.7.2.4 The table should appear on the same page as the step from which it was identified where physically possible.
- 4.7.2.5 Table columns should be aligned by first letters for word entries and by decimal points for numerical values.
- 4.7.2.6 All rows and columns shall be filled. Where no entry is necessary or appropriate, the abbreviation N.A. should be used.
- 4.7.3 FOLDOUT PAGE FORMAT - the foldout page shall be formatted as shown in FIGURE 5.
- 4.7.4 ATTACHMENT PAGE FORMAT - an attachment page shall be formatted as shown in FIGURE 4. The word ATTACHMENT capitalized and followed by an alphabetic or alphanumeric designation should be centered on the page as a heading.
- 5.0 WRITING STYLE - the following writing style should be applied to the writing and revision of all EOPs and APs.
- 5.1 SEQUENCING OF OPERATOR ACTION STEPS
 - 5.1.1 OPERATOR ACTION STEPS should be numbered sequentially in order of expected performance.
 - 5.1.2 OPERATOR ACTION SUBSTEPS should be lettered or numbered sequentially in order of expected performance.
 - 5.1.3 OPERATOR ACTION SUBSTEPS should be designated by "bullets" (o) if no order of performance is expected or required.
- 5.2 EMPHASIS TECHNIQUES - the following techniques will be used for emphasizing certain information in the EOPs and APs:
 - 5.2.1 CAPITALIZATION - in addition to standard American English usage, the following should be capitalized:
 - 5.2.1.1 The word NOTE in note statements - all capitals.
 - 5.2.1.2 The word CAUTION and all words contained in caution statements - all capitals.
 - 5.2.1.3 The logic terms identified in section 5.11 - all capitals.



- 5.2.1.4 The majority of all abbreviations and acronyms as defined in section 5.4 - all capitals.
- 5.2.1.5 The expected response portion of an operator action step - all capitals.
- 5.2.1.6 Procedure designators, titles and other identifying information - all capitals.
- 5.2.1.7 Table headings and figure titles - all capitals.
- 5.2.1.8 The words GO TO, RETURN TO and REFER TO - all capitals.
- 5.2.1.9 Operator action steps - first letter of each word should be capitalized.
- 5.2.1.10 Operator action substeps - the first letter of the first word of each substep should be capitalized.
- 5.2.2 UNDERLINING - the following shall be underlined;
 - 5.2.2.1 The word NOTE in note statements.
 - 5.2.2.2 The word CAUTION in caution statements.
 - 5.2.2.3 All logic terms defined in section 5.11.
- 5.2.3 ASTERISKS - a continuous line of asterisks shall enclose all caution statement at the top and bottom.
- 5.2.4 BULLETS - (o) proceeding a specific operator action substep or NOTE:
- 5.3 VOCABULARY - the following rules apply to all words used in EOPs and APs;
 - 5.3.1 Only words which have the following characteristics should be used:
 - 5.3.1.1 Simple, short words of few syllables.
 - 5.3.1.2 Words commonly used in training material, control room labels and reference material utilized by the operators. Control Room label wording is preferred.
 - 5.3.1.3 Precise, specific, familiar and definite.
 - 5.3.2 Operator Action Steps should begin with an action verb as listed and defined in TABLE 1.



- 5.3.3 Spelling should be consistent with modern usage and when a choice is offered by a dictionary, the first choice should be used.
- 5.4 ABBREVIATIONS AND ACRONYMS - are subject to the following limitations;
- 5.4.1 Abbreviations may be used where necessary to save time and space in the interest of clarity and brevity.
- 5.4.2 Use of an abbreviation which causes any ambiguity or confusion shall not be permitted.
- 5.4.3 Only those abbreviations listed in the QA Manual (Reference 1.4.5) should be used in an EOP or AP unless the abbreviation is part of an approved procedure title or Control Room label.
- 5.4.4 Abbreviations used from a source designated in step 5.4.3 should be used verbatim, in terms of upper and lower case letters, numerals, periods and decimals.
- 5.4.5 Acronyms which are not commonly used or previously defined should not be used.
- 5.5 NARRATIVE STYLE - steps may be written as complete sentences, short phrases, or some combination of the two. Notes and cautions should be written as complete sentences. Sentences, clauses and phrases should be short and precise utilizing normal American English word order where practical. Operator action steps should:
- 5.5.1 Be short, imperative statements which state the exact task that the operator is expected to perform.
- 5.5.2 Deal with only one idea. Complex evolutions should be broken down into a series of steps and substeps.
- 5.5.3 Be clear as to the objectives of operator actions.
- 5.5.4 Be written in sentence form in the right-hand column.
- 5.6 PUNCTUATION - the rules of punctuation for standard American English should be used where practical. Word order should be selected to minimize the amount of required punctuation. Punctuation should be minimized to that necessary to aid reading and promote understanding. Individual punctuation characters should be used under the following guidances.



- 5.6.1 PERIOD - a period shall be used at the end of all complete sentences, to indicate a decimal place in numbers, and may be used at the end of each phrase used in an action step where a distinct separation from a following phrase or sentence is desired.
- 5.6.2 COMMA - commas are used to indicate natural divisions or slight pauses in sentences. Use of too many commas is an indication that a sentence or instruction is too complex and should be rewritten. Commas shall be used in conditional phrases.
- 5.6.3 COLON - a colon is normally used to indicate a list is to follow. In the EOP/AP sets it is also used after the initial action step when substeps are used.
- 5.6.4 HYPHEN - a hyphen is used to form an adjective from two not-normally hyphenated words and when a word must be broken for continuation on another line. The use of hyphenated words should be minimized.
- 5.6.5 DASH - a dash is used in operator action steps to provide a separation between the action portion and the expected response portion of the step or substep.
- 5.6.6 PARENTHESES - are used to provide the adverse containment values for instrumentation readings in applicable steps. They are used to provide valve number designations and instrument designators when these are noted in addition to a word descriptor. Parentheses may also be used to provide amplifying or useful information such as locations, breaker cubicle designations, and information which cannot be placed in a note prior to a step as it only applies to a specific substep condition.
- 5.6.7 APOSTROPHE - apostrophes are generally used to indicate the plural form of abbreviations or symbols. Apostrophes should not be used. The plural form of any word used in the writing of EOPs and AP will be shown simply by the addition of an s or es as necessary.
- 5.6.8 QUOTATION MARKS, EXCLAMATION POINTS, QUESTION MARKS, ITALICS and BRACKETS (except as needed in calculations) should not be used.
- 5.7 UNITS OF MEASURE - should be stated in terms used by Control Room indication for the parameter being addressed.
- 5.8 NUMERALS - numerical values should be consistent with the following rules:



- 5.8.1 Arabic numerals should be used.
- 5.8.2 A decimal point should be preceded by a zero for numbers less than unity.
- 5.8.3 The number of significant digits should be no greater than the number of significant digits on available instrumentation or the reading precision of the operator. No less than one-half of one meter division should be used.
- 5.8.4 Control values and limits should be stated quantitatively where necessary and may be followed by the tolerance in parentheses.
- 5.9 TOLERANCES - tolerances should be stated in terms of upper and lower limits where possible such that addition and subtraction by the user is avoided. Tolerances shall have the same units as the instrumentation to which they refer.
- 5.10 FORMULAS AND CALCULATIONS - should be avoided. Values which must be determined to perform a procedural step should utilize graphs or figures. If a calculation has to be performed, the needed formulas, conversion factors and space to perform the calculation shall be provided.
- 5.11 LOGIC TERMS AND CONDITIONAL STATEMENTS (See Appendix A for specific examples) - the logic terms AND, OR, IF, IF NOT, THEN, and WHEN are often used to precisely define a set of conditions or sequence of actions. The use of these logic terms shall follow the guidelines listed below:
 - 5.11.1 All letters of logic terms shall be emphasized by capitalization and underlining when used in logic statements.
 - 5.11.2 The use of AND and OR within the same action step should be avoided.
 - 5.11.3 When combinations of conditions are used the word AND should be placed between a description of each condition for no more than a combination of three conditions. A list format shall be used for four or more conditions. The AND condition is assumed in a list unless otherwise specified.



- 5.11.4 The word OR shall be used between alternative conditions. Use of the word OR in this manner implies the inclusive sense. The exclusive sense of the word OR is denoted by using the form; either A OR B but not both.
- 5.11.5 Should action steps be contingent upon certain conditions or combinations of conditions, the step shall begin with the logic terms IF or WHEN followed by a description of the condition(s), a comma, the logic term THEN and the action to be taken. IF is used for unexpected or possible conditions and WHEN is used for expected or probable conditions.
- 5.11.6 The use of the logic term IF NOT should be limited to cases in which the operator must respond to the second of any two possible conditions. The term IF should be used to specify operator response to the first of any two possible conditions.
- 5.11.7 THEN should only be used in conditional statements. THEN should not be used at the end of action steps because it tends to run operator action steps together.
- 5.12 BRANCHING - branching encompasses transitioning, either to another step in the same procedure or to another EOP/AP; and referencing another procedure for supplemental information or direction. Transitioning is a series operation while referencing is a parallel operation.
- 5.12.1 TRANSITION TO A LATER STEP WITHIN CURRENT EOP/AP - shall be performed by using the words GO TO as shown by; GO TO Step 20.
- 5.12.2 TRANSITION TO A PREVIOUS STEP WITHIN CURRENT EOP/AP - shall be performed by using the words RETURN TO as shown by; RETURN TO Step 20.
- 5.12.3 TRANSITION TO ANOTHER EOP (or AP) - should be performed by using the words GO TO, followed by the procedure designator, number, title, and the specific procedure step as shown by; GO TO ES-0.1, REACTOR TRIP RESPONSE, Step 20.
- 5.12.3.1 If a specific step is not shown it is to be assumed that transition is to the beginning of the designated procedure.
- 5.12.3.2 Transition from an EOP to an AP should not be used.



- 5.12.3.3 Procedures entered for supplemental guidance or from CSFST direction may use a RETURN TO statement. This statement should contain the appropriate procedure designator, title and step number where applicable. A procedure with multiple entry conditions may use an open return statement as shown by; RETURN TO PROCEDURE AND STEP IN EFFECT. This denotes a transition to the last previous EOP in use.
- 5.12.4 REFERENCING - referencing is used to denote a procedure which may provide useful or necessary information to the operator during the execution of an EOP/AP. In general, those procedures referenced cover low probability occurrences or normal plant operations whose inclusion within an EOP/AP would cause excessive complication and reduced effectiveness of the procedure in effect. Referencing is denoted by the term REFER followed by the procedure designator and title as shown by; REFER TO ER-AFW.1, ALTERNATE WATER SUPPLY TO AFW PUMPS.
- 5.12.4.1 Referencing a procedure does not constitute leaving the procedure in effect as it is providing only additional information.
- 5.12.4.2 Referencing should be minimized for procedure continuity.
- 5.12.5 The referencing terms GO TO, RETURN TO and REFER TO and the procedure designator and title shall be all capitalized and the word Step shall be initially capitalized for emphasis.
- 5.13 LOCATION INFORMATION - location information should be provided in parentheses following the identification of any components equipment, instruments or controls which are not normally used or which may be difficult to find.
- 5.14 COMPONENT IDENTIFICATION - equipment, controls and displays should be identified in a manner consistent with control panel placards. System and component abbreviations may be used. If abbreviations are used, their use should be in accordance with section 5.4.
- 5.15 LEVEL OF DETAIL - too much detail should be avoided but the operator must be able to effectively execute the instructions in an efficient and timely manner. The following rules should be applied towards the level of detail included in an EOP/AP:
- 5.15.1 For each control with a number engraved on a placard, the number should be included within parentheses following the control name.

- 5.15.2 For control circuitry that executes a function upon actuation of the control switch, the action verb is sufficient without further amplification of how to manipulate the control device.
- 5.15.3 For control switches with positional placement that establishes a standby readiness condition, the action verb PLACE should be used along with the name of the desired position.
- 5.15.4 For multiposition switches that have more than one position for a similar function, placement to the desired position should be specified.
- 5.15.5 Standard practices for observing abnormal results need not be prescribed within procedure steps.
- 6.0 FORMAT OF CRITICAL SAFETY FUNCTION STATUS TREES
- 6.1 Critical Safety Function Status Trees (CSFSTs) are block format devices used in the evaluation of predefined safety concerns designated as Critical Safety Functions. (FIGURE 6 - CSFST).
- 6.1.1 The blocks are aligned so that the user will enter each tree on the left-hand side of its page and move towards the right-hand side.
- 6.1.2 Each block contains a question concerning current plant conditions. The question in each block may be dependent on previous blocks.
- 6.1.3 Each question is written to obtain a YES or NO response. The response dictates which branch of the status tree will be taken.
- 6.1.4 Questions should be written so that a YES response branch will move the user down the page.
- 6.1.5 Each possible complete path through the tree ends in its own end point, or terminus. The last path segment and the associated terminus circle use a color-code and/or pattern-code as shown in FIGURE 7.
- 6.1.6 Termini should be ordered so that the highest priority condition terminus is at the top of the page and the priority levels descend down the page. The priority order for color-coding, in descending order, is RED-ORANGE-YELLOW-GREEN.

6.1.7

All termini color-coded other than GREEN will provide an applicable Functional Restoration procedure designator.

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TABLE 1
ACTION VERB LIST

<u>VERB</u>	<u>APPLICATION</u>
ACTUATE	To put into action or motion; commonly use to refer to automated, multi-faceted operations.
ALIGN	To arrange components into a desired configuration.
ALLOW	To permit a stated condition to be achieved prior to proceeding.
BLOCK	To inhibit an automatic actuation. EXAMPLE: block SI actuation.
CHECK	To perform a comparison with a procedural requirement. EXAMPLE: check if SI can be terminated.
CLOSE	To change the physical position of a mechanical device so that access or flow is prevented or so that passage of electrical current is permitted. EXAMPLE: close valve 4309.
COMPLETE	To accomplish specified requirements. EXAMPLE: complete steps 1 through 9 first.
CONSULT	To confer with or seek advice from someone. EXAMPLE: consult plant engineering staff.
CONTINUE	To go on with a particular process. EXAMPLE: continue with this guideline.



TABLE 1
ACTION VERB LIST
(continued)

- CONTROL To manually operate equipment necessary to satisfy guideline requirements on process parameters: pressure, temperature, level, flow, etc.
EXAMPLE: control PRZR level.
- DECREASE To reduce a given parameter within certain bounds.
EXAMPLE: decrease level to 18-24 inches.
- DETERMINE To calculate or evaluate using formulas or graphs.
EXAMPLE: determine maximum venting time.
- DISPATCH Send personnel to locally operate equipment.
EXAMPLE: Dispatch personnel to initiate makeup to the spent fuel pit.
- ENERGIZE To supply electrical energy to (something); commonly used to describe an electrical bus or other dedicated electrical path.
- ESTABLISH To make arrangements for a stated condition.
EXAMPLE: establish communications with the control room
- EVALUATE To examine and decide; commonly use in reference to plant conditions and operations.
EXAMPLE: evaluate plant conditions.
- EQUALIZE To make the value of a given parameter equal to the value of another parameter.
EXAMPLE: equalize charging and letdown flow.



TABLE 1

ACTION VERB LIST
(continued)

IDENTIFY	Perform an evaluation to decide where an abnormal condition exists. EXAMPLE: identify faulted S/G(s).
INCREASE	To make progressively greater within certain bounds. EXAMPLE: increase level to 18-24 inches.
INITIATE	To begin a process. EXAMPLE: initiate flow to all S/Gs.
ISOLATE	Align system components to stop flow into and out of a specified portion of a system. EXAMPLE: isolate faulted S/G(s).
LOAD	To connect an electrical component or unit to a source of electrical energy, may involve a "start" in certain cases. EXAMPLE: load the high-head SI pump on the AC emergency bus.
LOCALLY	Action performed by an operator outside the control room. EXAMPLE: locally close valve.
MANUALLY	Action performed by an operator in the control room. EXAMPLE: manually dump steam from intact S/G with ARV.
MAINTAIN	To control a given plant parameter to some guideline requirement continuously.



TABLE 1
ACTION VERB LIST
(continued)

MINIMIZE	To make as small as possible. EXAMPLE: minimize secondary system contamination.
MONITOR	Similar to "check", except implies a continuous activity.
OPEN	To change the physical position of a mechanical device so that access or flow is permitted or so that passage of electrical current is blocked. EXAMPLE: open breaker 14B.
OPERATE	To turn on or turn off as necessary to achieve the stated objective. EXAMPLE: operate PRZR heaters to increase.
PERFORM	Carry out a set of operator actions. EXAMPLE: perform the following:
PLACE	To put a multipositioned device in a specific position, or when establishing the readiness condition of a particular item of equipment or control. EXAMPLE: place controls in MANUAL.
PLACE IN STANDBY	Return a piece of equipment to an inactive status but ready to start on demand; commonly used to refer to a mid-position on a switch labeled AUTO. EXAMPLE: Stop the SI pumps and place in standby.
RECORD	Document a specified condition or characteristic. EXAMPLE: record discharge pressure.

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TABLE 1
ACTION VERB LIST
(continued)

RESET	To remove an active output signal from a retentive logic device even with the input signal still present: commonly used in reference to protection/safeguards logics in which the actuating signal is "locked-in". The reset allows equipment by the initial signal to be deenergized. EXAMPLE: reset SI.
RESTORE	Re-establish an original condition. EXAMPLE: restore offsite power.
SEARCH	Perform a systematic evaluation to find the cause of an abnormal condition. EXAMPLE: Search for initiating break.
SET	To put an adjustable feature to a specified value. EXAMPLE: set the D/G speed to 1800 rpm.
SHUT DOWN	To deenergize equipment and place in standby. EXAMPLE: shut down unnecessary equipment.
START	To originate motion of an electrical or mechanical device. EXAMPLE: start charging pump 1B.
STOP	To terminate motion of an electrical or mechanical device. EXAMPLE: stop charging pump 1B.



TABLE 1

ACTION VERB LIST
(continued)

SWITCH	Re-align a system or component. EXAMPLE: switch to alternate AFW water supply.
SYNCHRONIZE	To align the electrical characteristics of two different electrical sources. EXAMPLE: synchronize the diesel generators.
THROTTLE	To operate a valve in an intermediate position to obtain a certain flow rate. EXAMPLE: throttle flow via MOV 429 to establish a 100°F/hr cooldown rate.
TRANSFER	Shift or move a control to the desired position. EXAMPLE: transfer condenser steam dump to pressure control mode.
TRIP	To manually activate a semi-automatic feature which terminates a current function. EXAMPLE: trip RCP 1A.
TRY	To make a continued effort when success may not be immediately obtainable. EXAMPLE: try to restore offsite power.
TURN ON	To supply electrical energy to a non-mechanical component. EXAMPLE: turn on PRZR heaters.



TABLE 1
ACTION VERB LIST
(continued)

VENT To permit the ingress or egress of a gas or fluid
 through a boundary.

EXAMPLE: vent CCW pump.

VERIFY To observe that a condition or characteristic is
 occurring as expected.

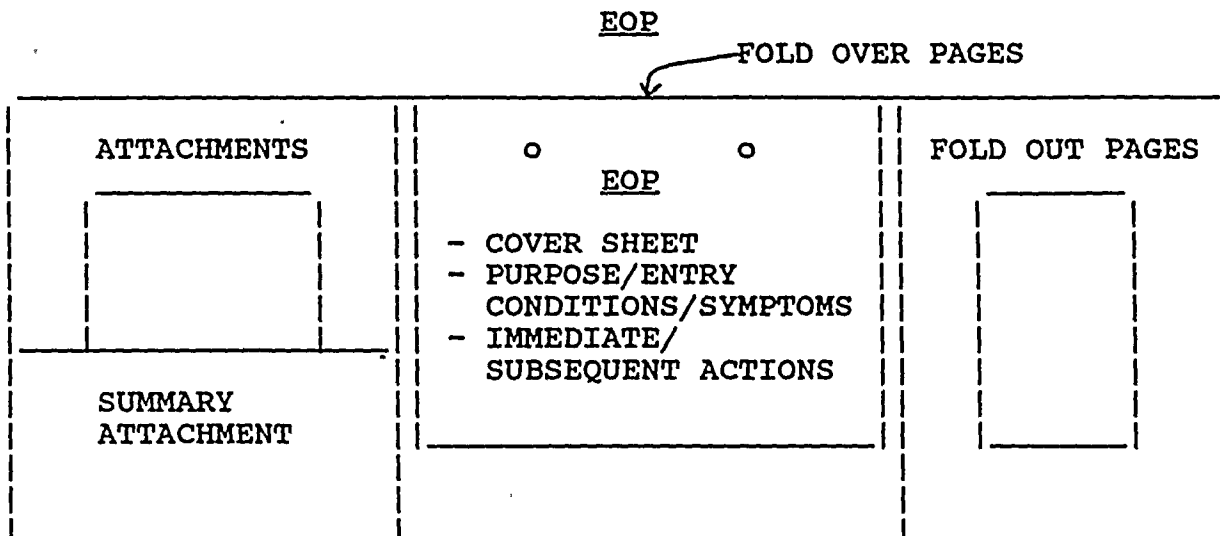
EXAMPLE: verify MSIVs are closed.

11-11-11

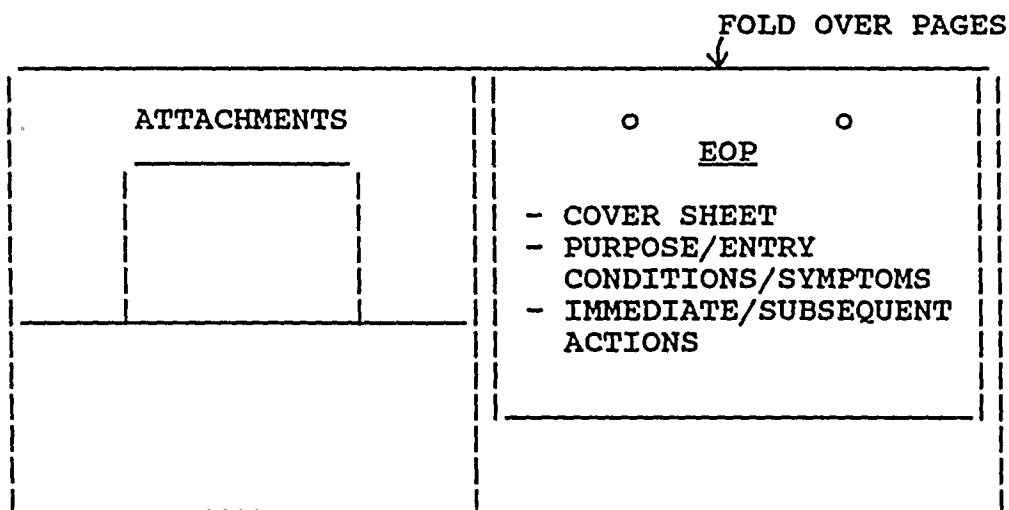


FIGURE 8

CONTROL ROOM EOP/AP BINDER ARRANGEMENT
(TRI-FOLD BINDER)



BI-FOLD BINDER

AP



APPENDIX A

Logic Terms and Conditional Statements

The EOP and AP sets are designed to provide guidance for actions contingent upon plant conditions. Since the procedures provide actions for a variety of conditions it is necessary to use consistent logic terminology and logic statement structure to ensure correct user interpretation. This appendix delineates the logic terms used in the procedure sets and addresses the specific functions of each device. Each logic term should be used in its standard form in a procedure to avoid user confusion.

Use of the IF ..., THEN Statement

Where an action is contingent upon a definite condition or set of conditions existing when the step is entered an IF-THEN format should be used. This statement consists of the emphasized IF followed by a description of the required condition or conditions, and the emphasized THEN followed by the action or actions to be performed.

ex. IF letdown is in service, THEN use auxiliary spray

Use of the IF NOT, THEN Statement

This statement may provide a contingency action to be used in the event the required conditions of an IF...THEN statement are not satisfied, a desired system/component status does not exist or an RNO action does not obtain the desired result and other action should be taken. The normal structure of this statement is IF NOT, THEN followed by the desired action. The emphasized IF and NOT may be separated to allow the insertion of other words for statement clarity.

- ex. 1) IF letdown is in service, THEN use auxiliary spray. IF NOT, THEN use on PRZR PORV.
- 2) Verify faulted S/Gs isolated unless needed for RCS cooldown.
IF NOT, THEN GO TO E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.
- 3) IF PRZR pressure less than 2335 psig, THEN manually close PORVs.
IF any valve can NOT be closed, THEN manually close its block valve.



Use of the WHEN...,THEN Statement

The use of this statement provides guidance for the performance of actions which are contingent upon a certain condition occurring. The specified condition is one which is expected to occur, but need not have occurred to allow continued procedure flow. The operator is expected to continue on in the procedure and perform the designated action whenever the specified condition is met unless otherwise directed. This statement is structured with the emphasized WHEN followed by the specified condition, and the emphasized THEN followed by the action to be performed.

ex. WHEN ruptured S/G pressure less than 1050 psig, THEN,
verify S/G ARV closed.

Use of the Emphasized THEN

The emphasized THEN should only be used within the previously addressed combinations, it should not be emphasized when used for any other purpose in the procedures.

Use of the Emphasized AND

Action steps and conditional statements are normally broken up into individual substeps through the alpha-numeric system used in the procedures. When combinations of conditions are used which necessitate linking more than one condition within a step or substep the emphasized AND should be placed between the conditions.

ex. Trip Criteria-
BOTH CONDITIONS MET:

SI pumps
AT LEAST ONE RUNNING

AND

RCS PRESS minus highest
S/G PRESS-
LESS THAN 165 PSI

This technique should not be utilized to combine more than three conditions. For more than three conditions a list format should be used.

ex. Place Following Equipment Switches
in PULL STOP Position:

Charging pumps
SI pumps
RHR pumps
CS pumps



Use of the Emphasized OR

The OR is used to combine equally acceptable conditions within a step or substep to provide for action direction. This technique should be used in the inclusive sense such that any one condition satisfies the step, and if more than one of the listed conditions exists the step is till satisfied.

ex. Depressurize RCS until EITHER of the following conditions satisfied:

PRZR level-
GRATER THAN 70%

OR

RCS subcooling based on core exit TCs-
LESS THAN REQUIREMENTS OF FIGURE 1

When directing actions to be taken the use of OR should be minimized in the procedure sets. Priorities should be established wherever possible and the procedure written to reflect the prioritization. Where this is not feasible it may be necessary to use the exclusive sense of the word or and this must be specified in the step.

ex. Start A charging pump OR C charging pump, but not both

Combination of Logic Terms

Combining any of the previously listed logic devices within individual steps should be minimized to limit the possibilities of confusion and ambiguity. Where it becomes necessary to combine them, great care must be exercised to maintain procedure clarity and definitive direction to the user.

