CLINTON POWER STATION

EMERGENCY OFFNORMAL PROCEDURES

VERIFICATION AND VALIDATION PROGRAM

Recommend Approval _____ 4/26/84
Power Plant Manager Date

Recommend Approval _____ 4/29/84
Manager Nuclear Station Engineering Dept. Date

Approval _____ 4/26/84
Vice President Date

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

I. Introduction

This document shall be included as an element of the Procedures Generation Package, required by section 7.2b of Supplement 1 of NUREG-0737, "Requirements for Emergency Response Capability".

The Clinton Power Station (CPS) Plant Specific Emergency Procedure Guidelines (EPGs) and Emergency Offnormal Procedures (EOPs) are written to revision 3J of the generic Boiling Water Reactor Owners' Group (BWROG) guidelines. It is the intent of this plan to critically review how effectively the guidelines have been implemented through a verification and validation process. This process shall identify procedural/human factors deficiencies, initiate resolution of those deficiencies, and provide auditable documentation of this review.

Verification of the EOPs shall provide due evidence that they are correctly written and are technically accurate, while validation shall prove them useable and operationally correct.

NOTE

All CPS EOPs shall be verified/validated by this program plan.

II. Document Approval

All revisions of the Emergency Offnormal Procedures (EOP) Verification and Validation (V&V) Program shall be a complete reissue bearing a new title page. Each revision shall be reviewed by the Power Plant Manager and the Manager - Nuclear Station Engineering Department and approved by the Vice President.

III. Personnel Designation

The V&V shall be performed by a consultant which has experience in performing EOP V&V.

As many Plant Operations personnel as possible shall be involved in both verification and validation. Their participation shall be coordinated by the Supervisor - Plant Operations.

NOTE

The EOP V&V shall be performed by people not involved in writing the CPS EOPs.

IV. Verification

A. Introduction

EOP verification evaluates the written correctness of the procedure and ensures that applicable generic and plant-specific technical information has been incorporated. The EOP Writer's Guide should be reviewed to ensure that human factors are considered in writing the EOPs.

The verification program is based on the INPO document, Emergency Operating Procedures Verification Guideline (INPO 83-044), developed by the Emergency Operating Procedures Implementation Assistance (EOPIA) Review Group.

B. Preparation

1. Personnel Designation

The consultant shall provide the necessary personnel as evaluators to conduct the comparative evaluation.

2. EOP Source Documents

The listing of EOP source documents is provided on Form #1 of the EOP verification forms and shall be reviewed by personnel conducting the assessment phase. These documents shall be reviewed to ensure they are complete, current, and applicable. (See VI. A. - Review of Source Documents Revisions.) Any additional source documents used shall be listed.

C. Assessment

1. Table-Top Review

In the table-top review, the evaluator(s) shall:

a. Make a general review of the EOP using the procedure-specific portion of the evaluation criteria (Attachment 2) and source documents.

b. Indicate on Form #1 of the EOP Verification Forms (Attachment 1) that the evaluation was performed, either by checking the acceptable column or by designating the appropriate discrepancy sheet for any discrepancies identified.

c. Make a step-by-step review of the EOP using the step, caution, note-specific portion of the evaluation criteria (Attachment 2) and source documents.

d. Indicate for each step on Form #2 of the EOP Verification Forms (Attachment 1) that the comparative evaluation was performed either by checking the acceptable column or by designating the appropriate discrepancy sheet for any discrepancies identified.

e. Upon completion of Form #3 of the EOP verification forms (Attachment 1), all verification forms including discrepancy sheets should be collected by the consultant.

2. Control Room Walkthrough

In the walkthrough phase, the evaluator(s) shall:

a. Verify that the instrumentation required by postulated plant accidents is identified in the EOPs and is available in the main control room.

b. Check to ensure that the instrumentation in the main control room meets the range and accuracy of the instrumentation required to carry out the EOPs.

3. Plant-Specific Calculations

Evaluators shall review calculations of plant-specific parameters.

D. Resolution

Independent of the type of verification performed, the evaluators shall:

1. Review all other evaluators' comments and resolve any conflicts between the EOP writer's and evaluators' comments. In the event of a disagreement, forward the identified concern to the Supervisor - Technical for review and comment.

2. Forward recommended solutions to Supervisor - Technical, Supervisor - Plant Operations, Assistant Power Plant Manager - Operations, and the Power Plant Manager for review and comment.

3. Have responsible department revise applicable documents and procedures with approved resolutions as directed by the Supervisor - Technical or justify why no revision is required.

E. Documentation

1. Documentation of the table-top review shall consist of Forms 1-3 (Attachment 1) and all discrepancy sheets (Attachment 3).

2. Documentation of the control room walkthrough shall consist of the completed EOP/EPG Correspondence to Control Room/Plant Equipment Sheets (Attachment 9).

3. Documentation of the review of plant-specific calculations shall consist of completed CPS Plant Specific Parameter Calculation Worksheets (Attachment 6).

V. Validation

A. Introduction

EOP validation is the evaluation performed to determine that the actions specified in the procedure can be performed by the operator to effectively manage the emergency conditions. The EOP validation will evaluate the operational correctness and useability provided by each EOP.

The validation program is based on the INPO document, Emergency Operating Procedures Validation Guidelines (INPO 83-006), developed by the EOPIA Review Group.

B. Preparation

1. Personnel Designation

The consultant shall provide the personnel necessary to conduct the comparative evaluation.

2. Source Documents

The following shall constitute a minimum list of source documents:

a. Generic EPGs, Rev. 3J
b. CPS FSAR
c. SERs, SOERs
d. INPO Guidance Documents (see section VIII - References)

C. Validation Methods

Some combination of the following methods shall be employed by Illinois Power Company to validate all CPS EOPs.

1. Table-Top Review

a. Preparation

Arrangements shall be made prior to the review to have the required EOPs, specifications, related technical documentation, SERs and SOERs available along with a room equipped with adequate surface area to lay out EOPs and related documentation. A blackboard, an overhead, transparencies, and pens should also be available.

b. Assessment/Resolution*

1. Assessment

In this method, personnel explain and/or discuss procedure action steps in response to a proposed scenario or as part of an actual industry operating experience review. Evaluators should use the observation guide (Attachment 4) for evaluation criteria.

2. Resolution

*Recommended resolutions shall be produced in the same session and forwarded to Supervisor - Technical for review and approval. Upon approval, cognizant department(s) shall revise applicable source documents and procedures, as directed by the Supervisor - Technical.

c. Documentation

Documentation of the table-top validation effort shall be achieved by a summary memo or letter from the consultant to all cognizant departments.

2. Control Room Walkthrough

a. Preparation

Arrangements shall be made to have access to the main control room for the walkthrough. To minimize impact on normal operations and to more easily involve all rotating shifts, it is recommended that the walkthrough be accomplished in stages. To help maintain continuity in the overall validation, each stage should include one scenario.

b. Assessment

In this method, control room operators shall conduct a step-by-step enactment of their actions during a proposed scenario for the evaluators without carrying out actual control functions. Evaluators should use the observation guide (Attachment 4) for evaluation criteria during the review. Evaluators shall note operator errors on the Control Room Walkthrough Checkiist (Attachment 7).

c. Resolution

The evaluators shall:

1. Review all other evaluators' checklists/comments and resolve any conflicts between the writer's and evaluators' comments. In the event of a disagreement, forward identified concern to Supervisor - Technical for review and comment.

2. Forward recommended solutions to the Supervisor - Technical for review and comment.

3. Have responsible department revise applicable source documents and procedures with approved resolutions as directed by the Supervisor - Technical or justify why no revision is necessary.

d. Documentation

Evaluators shall use the debriefing guide (Attachment 5) in interviewing the operators following each scenario. All problems or concerns identified during assessment should be documented on CPS Control Room Walkthrough Checklist (Attachment 7).

3. Simulator

a. Preparation

Arrangements shall be made to have access to the CPS simulator and sufficient classroom space for support purposes.

Selection of appropriate transients and subsequent scenario development shall be completed by the consultant prior to commencement of this phase of the validation. Multiple failures, both simultaneous and sequential, shall be addressed.

b. Assessment

In this method, control room operators shall perform actual control functions on simulated equipment, during a proposed scenario for evaluators.

Evaluators shall note operator errors on the CPS Simulator Checklist (Attachment 8).

c. Resolution

Evaluators shall:

1. Review all other evaluators' checklists/comments and resolve any conflicts between the writer's and evaluators' comments. In the event of a disagreement, forward identified concern to Supervisor - Technical for review and comment.

2. Forward the recommended solutions to the Supervisor - Technical for review and comment.

3. Have responsible department revise applicable source documents and procedures with approved resolutions as directed by the Supervisor - Technical.

d. Documentation

Evaluators shall use the debriefing guide (Attachment 5) to interview operators following each scenario. All problems/concerns identified shall be documented on CPS Simulator Checklists (Attachment 8).

VI. Verification/Validation of Subsequent EOP Revisions

A. Review of Source Document Revisions

All revisions to EOP source documents shall be reviewed for impact on the EOPs.

B. Verification/Validation

All revisions to EOPs shall be verified and validated according to this plan. The scope of the V&V performed shall be contingent upon the type of changes.

C. EOP Control

All EOPs shall be distributed in accordance with CPS Procedure 1005.04, Distribution and Control of Station Procedures and Revisions.

VII. Summary

Upon completion of the V&V effort, Illinois Power Company shall have a high level of assurance that the content of the EOPs is sufficient, (i.e., that the EOPs are technically accurate, correctly written, useable, and operationally correct.).

VIII. References

A. EOP Writing Guideline, INPO 82-017, dated July 1982
B. EOP Verification Guideline, INPO 83-004, dated March 1983
C. EOP Validation Guideline, INPO 83-006, dated April 5, 1983
D. EOP Implementation Guideline, INPO 82-016, Rev. 1, dated July 1983
E. EOP Procedures Generation Package Guideline, INPO 83-007, dated February 1983

ATTACHMENT 1

EOP VERIFICATION

FORM #1
Page ___ of ___

EOP TITLE: _____

CPS NUMBER: _____ REVISION: _____

SCOPE OF VERIFICATION: _____

_____

EOP SOURCE DOCUMENTS USED:

1. EPGs, Rev. 3J
2. CPS FSAR
3.
4.
5.
6.
6.

EVALUATOR(S): _____

PROCEDURE-GENERAL VERIFICATION

1. WRITTEN CORRECTNESS

AREAS	ACCEPTABLE	DISCREPANCY SHEET #(s)
LEGIBILITY		
EOP FORMAT CONSISTENCY		
IDENTIFICATION INFORMATION		

2. TECHNICAL ACCURACY -

AREAS	ACCEPTABLE	DISCREPANCY SHEET #(s)

ADDRESSED IN FORM #2 AS PART OF STEP, CAUTION, NOTE-SPECIFIC VERIFICATION.

ATTACHMENT 1

EOP VERIFICATION

FORM #2
Page ___ of ___

STEP, CAUTION, NOTE-SPECIFIC VERIFICATION

STEP NUMBER, CAUTION, OR NOTE	WRITTEN CORRECTNESS		TECHNICAL ACCURACY	
	ACCEPTABLE	DISCREPANCY SHEET #	ACCEPTABLE	DISCREPANCY SHEET #

ATTACHMENT 1

EOP VERIFICATION

FORM #3
EOP ___ Rev. ___
Page ___ of ___

Verification Completion Date: _____

Performed by: _____

_____

_____

_____

Reviewed by: _____

All actions required by the verification have been completed and approved.

_____ Date _____
Consultant

ATTACHMENT 2

I. PROCEDURE-GENERAL

A. Written Correctness

1. Legibility

Are the text, tables, graphs, and figures legible to the evaluator?

2. EOP Format Consistency

a. Do the following sections exist in each EOP:

Section 1.0 - SYMPTOMS
Section 2.0 - AUTOMATIC ACTIONS
Section 3.0 - OPERATOR ACTIONS
Section 4.0 - CONTINGENCIES
Section 5.0 - FINAL CONDITIONS
Section 6.0 - DISCUSSION

b. Is the page layout consistent with the sample page format given in FSAR Table 13.5-7 Emergency Offnormal Procedure Format?

3. Identification Information

a. Is the procedure title descriptive of the purpose of the procedure?

b. Does the cover sheet correctly provide the following:

1. procedure title
2. procedure number
3. revision number
4. number of pages

c. Does each page correctly provide the following:

1. procedure designator
2. revision number
3. Page ___ of ___ numbers

d. Does the procedure have all its pages in the correct order?

II. STEP, CAUTION, NOTE-SPECIFIC

A. Written Correctness

1. Information Presentation

a. Are instruction steps numbered correctly?

b. Are instruction steps constructed to comply with the following:

1. Steps deal with only one idea.
2. Sentences are short and simple.
3. Operator actions are specifically stated.
4. Objects of operator actions are specifically stated.
5. Objects of operator actions are adequately stated.
6. If there are three or more objects, they are listed (and space is provided for operator check-off).
7. Punctuation and capitalization are proper.
8. Abbreviations are correct and understandable to the operator.

c. Do instruction steps make proper use of logic structure?

d. When an action instruction is based on receipt of an annunciator alarm, is the setpoint of the alarm identified?

e. Are cautions used appropriately?

f. Are cautions placed properly?

g. Are cautions constructed to comply with the following:

1. They do not contain operator actions.
2. They do not use extensive punctuation for clarification.
3. They make proper use of emphasis.

h. Are notes properly used?

i. Are notes properly placed?

j. Are notes worded so that they do not contain operator actions?

k. Are numerical values properly written?

l. Are values specified in such a way that mathematical operations are not required of the user?

m. Is a table or graph provided in the procedure for necessary operator calculations?

n. Are units of measurement in the EOP the same as those used on equipment.

2. Procedure Referencing and Branching

a. Do the referenced and branched procedures identified in the EOPs exist for operator use?

b. Is the use of referencing minimized?

c. Are referencing and branching instructions correctly worded?

1. "go to" (branching)
2. "refer to" (referencing)

d. Do the instructions avoid routing users past important information such as cautions preceding steps?

e. Are the exit conditions compatible with the entry conditions of the referenced or branched procedure?

B. Technical Accuracy

1. Entry Conditions or Symptoms Information

a. Are the entry conditions of the EPG listed correctly?

b. If additional entry conditions have been added, do they comply with the following:

1. appropriate entry conditions for which the EOP should be used
2. not excessive

2. Instructional Step, Caution, and Note Information

a. Are EOP/EPG differences:

1. documented
2. explained

b. Is the EPG technical foundation (strategy) changed by the following changes in EOP steps, cautions, or notes:

1. elimination
2. addition
3. sequence
4. alteration

c. Are correct, plant-specific adaptations incorporated per EPG:

1. systems
2. instrumentation
3. limits
5. controls
5. indications

d. Have licensing commitments applicable to EOPs been addressed?

e. Are differences between the licensing commitments and the EOPs or EPGs documented?

3. Quantitative Information

a. Do the quantitative values, including tolerance bands, used in the EOP comply with applicable EOP source document?

b. Where EPG values are not used in the EOP, are the EOP values computed accurately?

c. When calculations are required by the EOP, are equations presented with sufficient information for operator use?

4. Plant Hardware Information

a. Is the following plant hardware specified in the EOP available for operator use:

1. equipment
2. controls
3. indicators
4. instrumentation

ATTACHMENT 3

EOP DISCREPANCY FORM

EOP: _____ REV.: _____ STEP NUMBER: _____

DISCREPANCY: _____

_____

_____

_____

_____

_____

_____

EVALUATOR: _____ DATE: _____

RESOLUTION: _____

_____

_____

_____

_____

_____

SUPERVISOR - TECHNICAL: _____ DATE: _____

APPROVED: YES NO (circle one)

RESOLUTION INCORPORATED BY: _____ DATE: _____

ATTACHMENT 4

OBSERVATION GUIDE

I. USEABILITY

A. LEVEL OF DETAIL

1. Did the operator appear to have sufficient information to perform the specified actions at each step?

2. Did the operator seem uncertain at any decision point?

3. Was the operator able to find needed equipment with the labels, abbreviations, symbols, and location information provided him in the EOPs?

4. Was the operator able to manage the emergency condition with the information provided him?

5. Were the operator's contingency actions sufficient to address the symptoms?

6. Was the operator able to find referenced and branched procedures?

B. UNDERSTANDABILITY

1. Did the operator appear to have problems with any of the following?

a. reading the EOP
b. reading figures and tables
c. determining values on figures and graphs
d. complying with EOP step
e. complying with caution and note statements
f. understanding the organization of the EOPs

II. OPERATIONAL CORRECTNESS

A. PLANT COMPATIBILITY

1. Were the actions specified in the EOPs able to be performed in the designated sequence?

2. Were alternate success paths found which were not included in the EOPs?

3. Was the operator able to obtain the necessary information from plant instrumentation as specified in the procedure?

4. Did the plant symptoms provide adequate information for the operator to select the applicable EOP?

5. Were the EOP entry conditions appropriate for the plant symptoms seen by the operator?

6. Did the operator have to use information or equipment not specified in the EOPs to accomplish his task?

7. Did the plant responses agree with the EOP basis?

8. Were the instrument readings and tolerances consistent with the instrument values stated in the EOP?

9. Were the EOPs physically compatible with the work situation (too bulky to hold, binding wouldn't allow them to lay flat on the work space, no place to lay the EOPs down to use)?

B. OPERATOR COMPATIBILITY

1. If time intervals were specified, were the procedure action steps able to be performed on the plant within or at the designated time intervals?

2. Could the procedure action steps be performed by the operating shift?

3. If specific actions were assigned to individual shift personnel, did the EOPs appear to help coordinate the actions where necessary?

4. Was the operating shift able to follow the designated action step sequences?

5. Was the operator able to do the following?

   a. find the particular step or set of steps when required
   b. return to the procedure exit point without omitting steps when required
   c. enter the branched procedure at the correct point
   d. exit from the given EOP at the correct branch

ATTACHMENT 5

DEBRIEFING GUIDE

I. USEABILITY

A. LEVEL OF DETAIL

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

2. Were the alternatives adequately described at each decision point?

3. Could the operator use labeling, abbreviations, and location information as provided in the EOPs to find the needed equipment?

4. Were the EOPs missing information needed to manage the emergency condition?

5. Were the contingency actions sufficient to address the symptoms?

6. Could the operator use the titles and numbers to find referenced and branched procedures?

B. UNDERSTANDABILITY

1. Was the EOP easy to read?

2. Were the figures and tables easily and accurately read?

3. Were the values on figures and graphs easily determined?

4. Were caution and note statements complied with?

5. Were the EOP steps complied with?

II. OPERATIONAL CORRECTNESS

A. PLANT COMPATIBILITY

1. Were the actions specified in the procedure able to be performed in the designated sequence?

2. Did the operator find alternate success paths not included in the EOPs?

3. As specified in the EOPs, could the operator obtain the necessary information from the plant instrumentation that is provided?

4. Did the plant symptoms provide adequate information from the operator select the applicable EOP?

5. Were the EOP entry conditions appropriate for the plant symptoms seen by the operator?

6. Did the operator have to use information or equipment not specified in the EOPs to accomplish his task?

7. Did the plant responses agree with the EOP basis?

8. Were the instrument readings and tolerances consistent with the instrument values stated in the EOP?

9. Were the EOPs physically compatible with the work situation (too bulky to hold, binding wouldn't allow them to lay flat in work space, no place to lay the EOPs down to use)?

B. OPERATOR COMPATIBILITY

1. If time intervals were specified, were the procedure action steps able to be performed on the plant within or at the designated time intervals?

2. Could the procedure action steps be performed by the operating shift?

3. If specific actions were assigned to individual shift personnel, did the EOPs appear to help coordinate the actions where necessary?

4. Was the operating shift able to follow the designated action step sequences?

5. Could the operator find the particular step or set of steps when required?

6. Could the operator return to the procedure exit point without omitting steps when required?

7. Could the operator enter the branched procedure at the correct point?

8. Could the operator exit from a given EOP at the correct branch?

ATTACHMENT 6

CPS PLANT-SPECIFIC PARAMETER VERIFICATION

Parameter Name: _____

EOP Title: _____

Calculated Value: _____

Attached calculations have been reviewed.

_____

Evaluator Date

ATTACHMENT 7

CPS CONTROL ROOM WALKTHROUGH CHECKLIST

EOP Title: _____

CPS Number: _____

Date: _____

List any step for which:

1. Level of detail inadequate or instruction unclear _____
2. Equipment label/ identification ambiguous or nonexistent _____
3. Required motion/travel is awkward or impossible in reasonable/required time. _____
4. Required action has no monitoring device. _____

Comments: _____

_____

_____

_____

_____ _____

Evaluator Shift Supervisor

ATTACHMENT 8

CPS SIMULATOR CHECKLIST

Transient(s)_____ _____

Procedure(s) Used_____

Date_____

1. List any step(s) resulting in immediate unexpected simulator response _____
_____

   Describe unexpected response _____
_____
_____

2. List any step(s) difficult to performed in required time interval. _____
_____

   Why? _____
_____
_____

3. List any step(s) being performed when management of the emergency was judged a failure. _____
_____

   How did failure(s) transpire? _____
_____
_____

Recommendations_____
_____
_____
_____

_____ _____
Evaluator Shift Supervisor

ATTACHMENT 9

EOP/EPG CORRESPONDENCE TO CONTROL ROOM/PLANT EQUIPMENT

Subject Panel/Equipment_____

Briefly explain discrepancy below:

_____

_____

_____

_____

_____

_____

_____

_____
Evaluator