AFW

corrective

actions

Book 2

A|16

STATE CHANGE HISTORY

Initiate	Assign Work	Assign	Conduct Work	Work Complete	Review & Approval	Approved	Quality Check
by RICHARD FLESSNER	2/5/2002 3.35.35 PM Owner DUANE SCHOON	by TOM SHELEY	2/6/2002 1.32 47 PM Owner TERRY VANDENBOSCH	by TERRY VANDENBOSCH	9/18/2002 7.02.19 AM Owner DUANE SCHOON	by DUANE SCHOON	9/20/2002 9.49 37 AM Owner PBNP CAP Admin

SECTION 1

Activity Request Id: CA003697

Activity Type: Corrective Action **Submit Date:** 2/5/2002 3:35:35 PM

Site/Unit: Point Beach - Common

Activity Requested: Review EOPs and AOPs containing high-risk human error events against human error reduction methods used in the PRA model and revise where appropriate to achieve significant CDF risk reduction.

****
See UPDATE section TPS
****

CATPR: N **Initiator:** FLESSNER, RICHARD

Initiator Department: EX Engineering Processes PB **Responsible Group Code:** PO PB Operations PB

Responsible Department: Plant **Activity Supervisor:** DUANE SCHOON

Activity Performer: TERRY VANDENBOSCH

SECTION 2

Priority:	3	**Due Date:**	10/4/2002
Mode Change Restraint:	(None)	**Management Exception From PI?:**	Y
QA/Nuclear Oversight?:	N	**Licensing Review?:**	N
NRC Commitment?:	N	**NRC Commitment Date:**	

SECTION 3

Activity Completed:

1/18/2002 12:52PM - LARRY PETERSON:
Due date extended as requested and approved by F. Cayia in prior update. Retruned to R flessner for completion.

1/18/2002 12.54PM - LARRY PETERSON:
Reassigned to R. Flessner for completion following extension

2/22/2002 12.14PM - MARK RINZEL:
This item has been exempted from performance indicators by the Plant Manager via e-mail dated 2/21/2002. The item has been updated to reflect this exemption in section two.

8/21/2002 9.22.43 AM - TERRY VANDENBOSCH:

Two groups of 1 SRO and 2 COs are scheduled to meet with the PRA group on the simulator to perform a review of the EOPs. This is scheduled for the week of 8/19/02.

9/18/2002 7:02:19 AM - TERRY VANDENBOSCH:
Comments from 8/21/02 simulator observations

1. Step 15 of EOP-0, The Simulator and actual Control Room have different operator aids (rad monitor index). The difference extents the time in the Simulator to perform this step. The extended time blurs the training in this step and the steps that follow. There is a negligible impact on PRA HRA assumptions

2. The reading of the foldout to the operators after the immediate actions extends the time by about 4 minutes Most of the actions are covered later in the procedure This was repeated at the start of each procedure which starts to adds up over several procedures. Thesecould be addressed differently.

3 EOP-1.4, step 1 provides condition to stop RHR pumps, which are the same conditions for the kick-out from EOP-1.3 to EOP-1.4. Step 3 b directs operator to check RHR flow, a condition that should not exist. The RNO provides the same conditions again without clear direction on what to do or go if the condition does not exist. In general, if you answer yes to step 3.b, you are in the wrong procedure. If you are in the right procedure, you can never answer yes to 3.b because if you entered at >200 psig RCS pressure, you stop the RHR pumps. If you enter at <200 psig and < 450 gpm, you most likely will still be <450 gpm. This is confusing to the operator. There is a negligible impact on PRA HRA assumptions.

4. EOP-1.4, attachment A performance and actions of step 14.b overlap in time. Attachment A takes 10-15 minutes to complete. Step 14.b is performed by the same operator and is requested about 5 minutes after attachment A is complete.

5 EOP-1.4, step 19 Note and step 19 are confusing to the operators. The note provides guidance to maintain maximum RHR flow, but <2200 gpm. Substep b directs throttling RHR flow to < 2200 gpm. RCS pressure is not addressed and is a major factor with RHR flow. Operators speculated that if the RCS pressure eventually dropped that they could reach runout conditions In order to achieve a throttled condition that would not runout the RHR pumps, the operators placed the valves in the 20% throttled position. There is a negligible impact on PRA HRA assumptions.

6. EOP-1.4, step 1 note and step 28 note caused operator confusion. If you are monitoring for information only, you don't implement CSPs. Note for step 1 directs operators to monitor for information only in this procedure and then not to implement before step 27. Note for step 28 says to implement if >34% RWST level. The intent is that CSPs are not implemented if steps 1-27 are not complete or if RWST is <34%. The intent needs to be clearer in the first note. There is a negligible impact on PRA HRA assumptions.

7. CSP-H.1, step 11, Operators became confused when SI occurred after 11.a but before 11.c. The actuation after the reset prevented the reset of the feedwater isolation. This may have some impact on the Human Error Probability.

8 The stroke time for the Containment Air Isolation Valve is 4 minutes. The time to open this valve delayed initiation of feed and bleed in CSP H.1. The re-establishment of Containment Instrument Air needs to be started earlier in the procedure. The timing of the valve allows for the operator to keep aware of the valve status The procedure should recommend this practice. There is a minor impact on PRA HRA assumptions

9. AOP-5B, step 27 directs the operator to perform several checklists, very few of these required any real action. The required actions need to be identified and prioritized to aid the operator. HEP-IA--AOP5B-74 may be slightly improved by simplifying the procedure.

10. AOP-9A needs to provide a wider scope of actions to address the effect on other system, such as Instrument Air. The procedure really only addresses a service water leak and/or rupture. A blockage could lead to flooding concern arose and a loss of Instrument Air occurred. The operators were left with little effective guidance to deal with the event. Operators considered opening heat exchanger drains to increase cooling flow, but this is not contained in the procedure. Flooding of the RHR pumps is expected to occur when relief valves for the SW system open in the Aux Building if both SW discharge valves are closed or blockage occurs in the system. The effect on plant risk is not quantified, but it is greater than negligible. This item is the most important of the items listed

Actions completed/recommendations·

Item 1: Simulator operator aid has been changed to match the control room.

Item 2: The foldout page items apply throughout the applicable procedure The operators need to be aware of these items when entering the applicable procedure. The guidance contained in OM 3.7 is consistent to the ERG users guide. No action required.

Item 3. The procedure steps are correct as written. It is possible that between the time the operator transitioned from EOP 1.3 to EOP 1.4 RCS pressure could have lowered to less than 200 psi. The transition out of EOP 1.3 has two criteria to be met, RCS pressure greater than 200 psi and RHR flow less than 450 gpm. Once the transition is made to EOP 1.4 the operator is to remain in this procedure and is not dependent on RCS pressure. When the operator gets to step 3 b. it could be possible the RHR pumps are still running In this case he would stop the "B" train and align the "A" train for recirc. No further action is required.

Item 4: The sequence is correct. If the operator while performing Attachment A would extend past the time of request to perform step 14 b., the operator is to stop Attachment A perform Step 14 b then continue with Attachment A. No further action is required.

Item 5: Based on calculations the RHR pumps will not runout when in this alignment. 2200 gpm limitation was chosen because it is the last point on the RHR pump operating curve and ensures the pump is operating well within its design. When pressure drops in the RCS the operators should be adjusting flow to maintain less than 2200 gpm No further action is required.

Item 6: The intent is to perform steps 1-27 without delay and if RWST level is > 34% the CSPs should be implemented until RWST level is < 34% A procedure feedback has been issued to evaluate the wording of the notes. This is an enhancement to the procedure. Feedback numbers OPS 2002-01340 and 2002-01341.

Item 7: The scenario given was a reactor trip without SI with a loss of all feed. The timing of the operators was such that they just performed step 11 a. and 11 b. when an SI occurred. The operators took appropriate actions to reset SI by repeating steps 11 a.. A procedure feedback has been issued to evaluate whether or not we need to enhance the step as in EOP-3. This is an enhancement to the procedure. Feedback numbers OPS 2002-01342 and 2002-01343.

Item 8: Reestablishing air cannot be done until after SI is reset This occurs at step 32 however there is a foldout page item directing the operators to step 27 when the feed and bleed is to occur. When talking to the operators they waited for the step to be complete. This should not be the case. Once the action is commences there is not a need to wait for full opening of the valve. No further action should be required.

Item 9: AOP-5B is designed for any plant condition. The operator will have to reed the table and determine the applicability for plant conditions. No further action required.

Item 10: AOP-9B was not designed to address return blockage Engineering will need to evaluate plant response since this failure is beyond plant design. This will be a long term project to develop the applicable AOP. CAP029344 was written to track this issue No further action required.

This CAP should be closed since the procedure feedbacks are enhancements to the procedures. A CAP has been issued to track the service water concerns.

9/19/2002 6:04:42 AM - TERRY VANDENBOSCH:
The wrong CAP was referenced for the AOP-9A, service water concerns The CAP referenced should be CAP029404.

9/20/2002 9 49.37 AM - DUANE SCHOON·
Closed.

SECTION 4

QA Supervisor:	(None)	**Licensing Supervisor:**	(None)

SECTION 5

Project:	CAP Activities & Actions		
State:	Quality Check	**Active/Inactive:**	Active
Owner:	PBNP CAP Admin	**AR Type:**	Daughter
Submitter:	RICHARD FLESSNER	**Assigned Date:**	2/6/2002
Last Modified Date:	9/20/2002 9.49.37 AM	**Last Modifier:**	DUANE SCHOON
Last State Change Date:	9/20/2002 9.49.37 AM	**Last State Changer:**	DUANE SCHOON
Close Date:			
One Line Description:	Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW		
NUTRK ID:	CR 01-3595		
Child Number:	1		
References:	CR 01-2278ÈRCE 01-069ÈGOOD CATCH		
Update:	Action out a ACE that is being classified as a ROOT CAUSE. Due dates and priority set out ACE 314. Contact the author of ACE 314 for any clarification. TPS ACTIVITY COMPLETED is old information from the ACE that was cloned into this action by responsible ACE individual --- Disregard.		
Import Memo Field:			
CAP Admin:	PBNP CAP Admin	**Site:**	Point Beach
OLD_ACTION_NUM:			
Cartridge and Frame:			

NOTES/COMMENTS

Management exception from performance indicators by DENNIS HETTICK (2/28/2002 8.04:32 AM)
This excetion was granted by plant manager. e mail attached.

ATTACHMENTS AND PARENT/CHILD LINKS

ACE000314: Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW

CAP001415: Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW

FW Request for Performance Indicator Exception for tTRACK actions.rtf (6255 bytes)

STATE CHANGE HISTORY

Initiate
⇨ AR Pre-Screen
9/18/2002 5 28 56 PM
Owner (None)
by RICK WOOD

SECTION 1

Activity Request Id:	CAP029404		
Activity Type:	CAP	**Submit Date:**	9/18/2002 5.28 56 PM
One Line Description:	AOP-9A has little guidance for sytem blockage		
Detailed Description:	9/18/2002 5:28:56 PM - RICK WOOD: Operations and PRA evaluated a number of scenarios in the simulator to look for improvement in the area of human error probability in response to CA003697*. One scenario involved a full blockage of service water discharge. AOP-9A Service Water System Malfunction was referenced, but the complete blockage of Service Water discharge was not fully considered for this procedure. The procedure really only addresses a service water leak and/or rupture. Internal Flood or Loss of Instrument Air are potential consequences of Service Water System blockage. The operators were left with little effective guidance to deal with the simulated scenario. Operators considered opening heat exchanger drains to increase cooling flow, but this is not contained in the procedure. *CA003697 Review EOPs and AOPs containing high-risk human error events against human error reduction methods used in the PRA model and revise where appropriate to achieve significant CDF risk reduction.		
Initiator:	WOOD, RICK	**Initiator Department:**	EPP Engineering Programs PRA PB
Date/Time of Discovery:	9/18/2002 4:48:35 PM	**Date/Time of Occurrence:**	9/18/2002 4:48.35 PM
Identified By:	Site-identified	**Site/Unit:**	Point Beach - Common
Equipment # (1st):	(None)	**Equipment Type (1st):**	(None)
Equipment # (2nd):	(None)	**Equipment Type (2nd) :**	(None)
Equipment # (3rd):	(None)	**Equipment Type (3rd) :**	(None)
Why did this occur?:	9/18/2002 5:28:56 PM - RICK WOOD: Procedure considered pump failure and pipe rupture, but other failure modes are not included.		
Immediate Action Taken:			
Recommendations:	9/18/2002 5:28:56 PM - RICK WOOD: 1. The effect of full SW flow blockage on plant systems needs to be understood and factored into the PRA model. 2. If vulnerabilities are identified, then procedure changes or design changes should be considered.		
Notify Me During Eval?:	N	**SRO Review Required?:**	Y
System:	(None)		

SECTION 2

Operability Status:	(None)	**Compensatory Actions:**	N
Basis for Operability:			
OPR Completed?:	N	**Unplanned TSAC Entry:**	N
External Notification:	N		

SECTION 3

Screened?:	N	Significance Level:	(None)
INPO OE Reqd?:	N	Potential MRFF?:	N
QA/Nuclear Oversight?:	N	Licensing Review?:	N
Good Catch/Well Doc'd?:	NA		

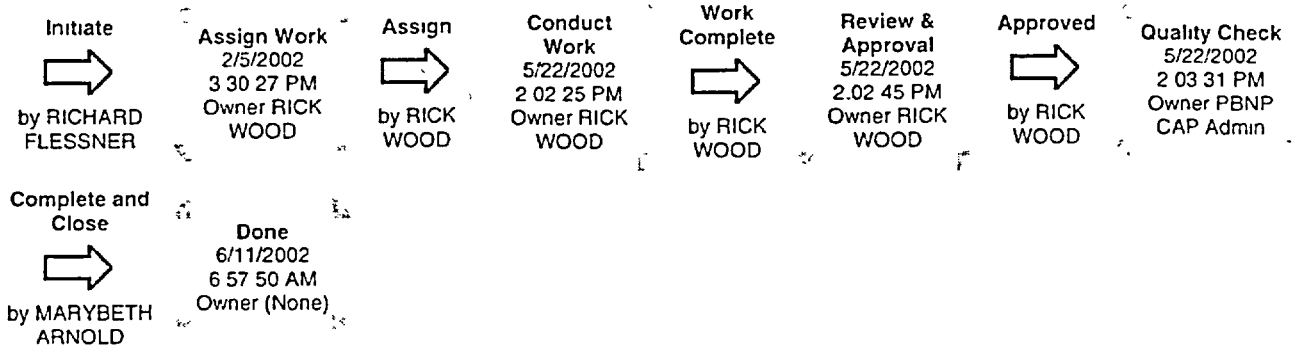
SECTION 4

Inappropriate Action:			
Process:	(None)	Activity:	(None)
Human Error Type:	(None)	Human Perf Fail Mode:	(None)
Equip Failure Mode:	(None)	Process Fail Mode:	(None)
Org/Mgt Failure Mode:	(None)	Group Causing Prob:	(None)
Hot Buttons:	(None)		

SECTION 5

CAP Admin:	PBNP CAP Admin	Prescreener:	(None)
Project:	Corrective Action Process (CAP)		
State:	AR Pre-Screen	Active/Inactive:	Active
Submitter:	RICK WOOD	Owner:	(None)
AR Type:	Parent	Last Modified Date:	9/18/2002 5:28:56 PM
Last Modifier:	RICK WOOD	Last State Change Date:	9/18/2002 5:28:56 PM
Last State Changer:	RICK WOOD	Close Date:	
NUTRK ID:			
# of Children:	0		
References:			
Update:			
Prescreen Comments:			
Import Memo Field:			
OLD_ACTION_NUM:			
Cartridge and Frame:			

STATE CHANGE HISTORY



SECTION 1

Activity Request Id:	CA003696		
Activity Type:	Corrective Action	**Submit Date:**	2/5/2002 3:30.27 PM
Site/Unit:	Point Beach - Common		
Activity Requested:	Formally provide Operations and Training with a description of the human error reduction methods used in evaluating operator actions in the PRA model.		
CATPR:	N	**Initiator:**	FLESSNER, RICHARD
Initiator Department:	EX Engineering Processes PB	**Responsible Group Code:**	EPP Engineering Programs PRA PB
Responsible Department:	Engineering	**Activity Supervisor:**	RICK WOOD
Activity Performer:	RICK WOOD		

SECTION 2

Priority:	3	**Due Date:**	6/5/2002
Mode Change Restraint:	(None)	**Management Exception From PI?:**	N
QA/Nuclear Oversight?:	N	**Licensing Review?:**	N
NRC Commitment?:	N	**NRC Commitment Date:**	

SECTION 3

Activity Completed:

1/18/2002 12:52PM - LARRY PETERSON:
Due date extended as requested and approved by F. Cayia in prior update. Retruned to R. flessner for completion.

1/18/2002 12.54PM - LARRY PETERSON:
Reassigned to R. Flessner for completion following extension.

5/22/2002 2 01.52 PM - RICK WOOD.
Memo NPM 2002-0267 was sent to T. Vandenbosch and J. Fouse documenting those items which contribute to the success and failure of Human Interactions in the PRA model. These factors are spelled out in this memo and can be looked at with respect to the way the procedures are written and trained on.

6/11/2002 6:57.50 AM - MARYBETH ARNOLD:

Memo NPM 2002-0267 dated 05/21/02 was verified in EDMS and issued to Operations and Training personnel CLOSED.

SECTION 4

QA Supervisor:	(None)	Licensing Supervisor:	(None)

SECTION 5

Project:	CAP Activities & Actions		
State:	Done	Active/Inactive:	Inactive
Owner:	(None)	AR Type:	Daughter
Submitter:	RICHARD FLESSNER	Assigned Date:	5/22/2002
Last Modified Date:	6/11/2002 6:57.50 AM	Last Modifier:	MARYBETH ARNOLD
Last State Change Date:	6/11/2002 6:57:50 AM	Last State Changer:	MARYBETH ARNOLD
Close Date:	6/11/2002 6:57:50 AM		
One Line Description:	Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW		
NUTRK ID:	CR 01-3595		
Child Number:	1		
References:	CR 01-2278 RCE 01-069 GOOD CATCH NPM 2002-0267		
Update:			
Import Memo Field:			
CAP Admin:	PBNP CAP Admin	Site:	Point Beach
OLD_ACTION_NUM:			
Cartridge and Frame:			

ATTACHMENTS AND PARENT/CHILD LINKS

ACE000314 Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW

CAP001415 Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW

NMC
Committed to Nuclear Excellence

INTERNAL CORRESPONDENCE

NPM 2002-0267

To: Terry Vandenbosch, Jimmy Fouse

From: R. P. Wood

Date: May 21, 2002

Subject: CA003696 AFW PRA Root Cause Corrective Action

Copy To: File

Root cause evaluation RCE 01-069 *Increased CDF in AFW PRA Model Due to Procedural Inadequacies Related to Loss of Instrument Air* identified that human error factors used in assessing error probabilities have not been compared to Abnormal or Emergency Operating procedures, the writers' guide for these procedures, and training materials. CA003696 from this root cause evaluation requires the PRA group to formally provide Operations and Training with a description of the human error reduction methods used in evaluating operator actions in the PRA model

A little history on human factors in Emergency Response Guidelines: A Supplemental SER on the Revision 1 ERGS was issued by the NRC on July 7, 1986 which stated for the first time that the NRC review of the ERGS was one of technical adequacy and not human factors adequacy. Subsequently, several utilities reported that NRC audits of their EOP programs resulted in many human factors comments with several having generic implications. The subcommittee evaluated this situation and recommended that the WOG interact with the NRC to clarify and resolve the generic concerns.

In June 1989, the WOG participated in NUMARC workshops in Washington, D.C., and Denver, Colorado that discussed the industry-wide EOP implementation concerns of the NRC. At the NUMARC workshop, members of the NRC Human Factors Branch approached the WOG representatives concerning the ERG human factors issue tabled since early 1987 by the WOG.
On November 16, 1989, members of the Operations Subcommittee met with the NRC to scope out a program for human factoring ERGS, which would result in the issuance of Revision 2 at the end of 1991. This separate program (which was not part of the 1990 ERG Maintenance Program) was not funded by the WOG at the February, 1990 General Session. In other words, the WOG and NRC identified this as a concern, but a review of Emergency Response Guideline with a focus on generic human factors concerns has not been performed by these organizations.

The Kewaunee and Point Beach PRA group uses a computer program developed by EPRI called the HRA Calculator version 1 to determine human error probabilities for specific operator action. The HRA Calculator is designed to step PRA analysts through the tasks needed to develop and document Human Failure Events and Human Error Probabilities in a Human Reliability Analysis. The HRA Calculator operates on a Basic Event basis and uses EPRI's SHARP framework (Systematic Human Action Reliability Procedure (SHARP), 1984, NP-3583) The current version of the HRA Calculator employs EPRI's CBDTM (An Approach to the Analysis of Operator Actions in Probabilistic Risk Assessment, 1992, EPRI-TR-100259) for cognitive modeling and THERP (Handbook of Human Reliability Analysis With Emphasis on Nuclear Power Plant Applications, A.D. Swain and H E. Guttman, 1983, NUREG/CR-1278) for the execution modeling

For the most recent PRA update, the PRA group at Point Beach has developed and documented probabilities for 5 different human actions. There are 116 different HEPs that exist in the PRA model. The list of these actions is appended to this memo. Quantification of the Human Error Probability (HEP) is accomplished using this tool. The method is described in a course on human reliability analysis presented by Scientech. The material from this course is available from the PRA group if Operations or Training is interested in the details of this analysis. The essential elements of the analysis involve determining the errors due to cognitively mistaking the action and those due to improperly executing the action

The cognitive errors are divided into eight factors, four focused on a failure of the plant information-Operator interface, and four focused on a failure of the procedure–crew interface. The cognitive part of the human error probability (HEP) is denoted as pc. Specific elements to be reviewed by Operations and Training are as follows:

1. Availability of Information
   1.1. Warning in Procedure – If the normally displayed information is expected to be unreliable, is a warning or a note directing alternate information sources provided in the procedure?
   1.2. Training on Indicators – Has the crew received training in interpreting or obtaining the required information under conditions similar to those prevailing in this scenario?
2 Data not attended to
   2.1. Alarmed vs Not Alarmed – Is the critical value of the cue signaled by an annunciator?
3. Data Misread or Miscommunicated
   3.1. Formal Communications – Is a communications protocol used where the person transmitting a value always identifies with what parameter the value is associated?
4. Information Misleading
   4.1. All cues as stated – Are cue states or parameter values as stated in the procedure?
   4.2. Warning of differences – Does the procedure itself warn that a cue may not be as expected or provide instructions if the cue is not as stated?
   4.3. Specific Training – Has simulator training provided a similar cue configuration and emphasized the correct interpretation of the procedure in the face of the degraded cue state?
   4.4 General Training – Have the operators received training that should allow them to recognize that the cue information is not correct for the given circumstances?
5. Relevant Step in Procedure Missed
   5.1. Obvious vs. Hidden – Is the relevant instruction a separate stand alone step or is it "hidden" in a note or caution, on the back of a page, or buried in one of several statement in a paragraph?
   5.2. Single vs. Multiple – Is the procedure reader using more than one procedure?
   5.3. Graphically distinct – Is the step more conspicuous than other steps?
   5.4. Placekeeping aids – Are placekeeping aids used by all crews.
6. Misinterpret Instruction
   6.1. Standard Unambiguous wording – Does the step include unfamiliar nomenclature?
   6.2. Training on Step – Has the crew received training on the correct interpretation of this step?
7. Error in interpreting Logic
   7.1. NOT statement – Does the step contain the word "not?"
   7.2. AND or OR statement – Does the step contain diagnostic logic where more than one condition is combined to determine the outcome?
   7.3. Both AND and OR – Does the step contain a complex logic involving a combination of ANDed and ORed terms?
   7.4. Practiced Scenarios – Has the crew practiced this step in the simulator?
8. Deliberate Violation
   8.1. Belief in Adequacy of Instruction – Does the crew have confidence in the effectiveness of the procedure for dealing with the current situation? If the crew does, then there is no reason for believeing the step would be deliberately violated.
   8.2. Adverse Consequences if Comply – A crew must have a strong motivation for violating a procedure.

The approach is applied to major decision steps such as transfers to another procedure, or the decision to initiate some process It is not applied to steps that are purely directions to perform a specific task; these are considered as part of the execution.

Errors in execution are determined using the THERP tables The execution part of the human error probability (HEP) is denoted as pe. It is estimated by applying THERP to each Operator Action modeled in the Plant Response Trees. The approach is essentially to review each procedure to identify the critical steps (i.e., those essential to completion of the task(s)) and whether any potential recovery mechanisms (such as verification of flow or valve position, alternative steps accomplishing the same action, revisitation of the step due to a procedure 'loop', etc.) are present in the procedure and would be read in accordance with the procedure usage guidelines. Such recovery mechanisms

account for the fact that failure to perform a procedure step may preclude success in a subsequent step, which results in a search for the cause of the previous failure. The methodology has 27 different tables, but we use four. Tables 7 and 8 list the values for errors of omission and should be of particular interest to the procedure writers. Table 7 is the estimated probabilities of errors of omission per item of instruction when use of written procedures is specified. The table is divided into procedures with and without check offs and with long or short lists. Using procedures with check off steps that have fewer than 10 items in a list has the best probability of success. Table 8 is less frequently needed and is the estimated probabilities of errors in recalling oral instruction items not written down. Table 12 is the estimated probabilities of errors of commission in operating manual controls. Table 13 is the estimated probabilities for selection errors for locally operated valve. I've included both of these tables so that Operations and Training can be sensitive to those areas that have a higher potential for error.

Appendix A
Quantified and Documented Human Error Probabilities for Point Beach

1. AF--HEP-STARTXXX

Brief Description - This HEP calculates the probability to fail to manually start an AFW pump after its associated auto-start fails
Associated Basic Events - AF--HEP-START1TD, AF--HEP-START2TD, AF--HEP-START-MD, AF--HEP-START12T

2. AF--HEP-TDAFISOL

Brief Description - This HEP calculates the probability to fail to isolate a faulted steam generator, which would allow the TDAFW pump to inject into the intact steam generator.
Associated Basic Event - AF--HEP-TDAFISOL

3. AF--HEP-RECIRCXX

Brief Description - This HEP calculates the probability to manually control the AFW pump mini-flow valve with a loss of IA to the valve.
Associated Basic Events - AF--HEP-RECIRC-1, AF--HEP-RECIRC-2, AF--HEP-RECIRC-A, AF--HEP-RECIRC-B

4. AF--HEP-MDP-FLOW

Brief Description - This HEP calculates the probability to manually control the MDAFW pump discharge flow control valve with a loss of IA to the valve.
Associated Basic Events - AF--HEP-MDP-FLOW

5. AF--HEP-CST-LOW-

Brief Description - This HEP calculates the probability to supply back-up to the AFW pumps on CST low level. This HEP is broken into multiple parts to take into account the various dependencies that may exist.
Associated Basic Events - AF--HEP-CST-LOW-, AF--HEP-CST-SWTD, AF--HEP-CST-SWMD, AF--HEP-CST-FW--, AF--HEP-CST-SW--

HEPs in the Point Beach PRA Model

PARM ID: 125-HEP--D04-D28
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM D-04 TO D-28
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY TUE JUN 12 17:45:44 2001
WHY: JPM

PARM ID: 125-HEP--D04-D40
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM D-04 TO D-40
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 09:27:34 2001
WHY: CSG

PARM ID: 125-HEP--D40-D28
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM D-40 TO D-28
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP--D49-D51
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM D-49 TO D-51
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP--D49-D52
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM D-49 TO D-52
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP--D49-D53
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM D-49 TO D-53
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP--D50-D51
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM D-50 TO D-51
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP--D50-D52
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM D-50 TO D-52
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP--D50-D53
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM D-50 TO D-53
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-1B32D302
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS 1B-32 TO D-302
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-1B49D301
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS 1B-49 TO D-301
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-2B39D301
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS 2B-39 TO D-301
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-2B42D302
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS 2B-42 TO D-302
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-B81-D302
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS B-81 TO D-302
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-D05--D01
DESCRIPTION: OPERATOR FAILS TO ALIGN BATTERY D-05 TO BUS D-01
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Thu Sep 20 13:27:04 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-D06--D02
DESCRIPTION: OPERATOR FAILS TO ALIGN BATTERY D-06 TO BUS D-02
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Thu Sep 20 13:27:15 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-D105-D03
DESCRIPTION: OPERATOR FAILS TO ALIGN BATTERY D-105TO BUS D-03
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-D106-D04
DESCRIPTION: OPERATOR FAILS TO ALIGN BATTERY D-106TO BUS D-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 20:38:45 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-D14-D40
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS D-14 TO BUS D-40

DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-D28-D40
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS D-28 TO BUS D-40
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-D305-D01
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS D-305 TO BUS D-01
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Mon Jun 18 16:19:32 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-D305-D02
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS D-305 TO BUS D-02
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Mon Jun 18 16:19:36 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-D305-D03
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS D-305 TO BUS D-03
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Mon Jun 18 16:19:41 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-D305-D04
DESCRIPTION: OPERATOR FAILS TO ALIGN BUS D-305 TO BUS D-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Mon Jun 18 16:19:45 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 125-HEP-EOP10-08
DESCRIPTION: NO BATTERY CHARGER AFTER UV + POWER RECOVERY
DISTRIBUTION: Lognormal Mean Failure Prob.: 4.200E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 138-HEP-H21-CLSE
DESCRIPTION: FAILURE OF OPERATORTO CLOSE BKR H52-21ONTO BUS H-02
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.500E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 138-HEP-H31-CLSE
DESCRIPTION: FAILURE OF OPERATORTO CLOSE BKR H52-31ONTO BUS H-03
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.300E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 138-HEP-STARTG05
DESCRIPTION: OPERATOR FAILS TO START GAS TURBINE G-05
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.300E-001
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001

WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-1A032A03
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 1A-03 TO 2A-03
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-1A042A04
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 1A-04 TO 2A-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-1X041A03
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 1A-04 TO 2A-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-1X041A04
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 1X-04 TO 1A-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-2A031A03
DESCRIPTION:.OPERATOR FAILS TO TRANSFER PWR FROM 2A-03 TO 1A-03
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-2A041A04
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2A-04 TO 1A-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-2X042A03
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2X-04 TO 2A-03
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-2X042A04
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2X-04 TO 2A-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-G01-1A05
DESCRIPTION: OPERATOR FAILS TO ALIGN G-01 TO 1A-05U1 ECA-0.0 STEP 9
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.900E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-G02-1A05
DESCRIPTION: OPERATOR FAILS TO ALIGN G-02 TO 1A-05U1 ECA-0.0 STEP 10
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.900E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-G03-1A06
DESCRIPTION: OPERATOR FAILS TO ALIGN G-03 TO 1A-06U1 ECA-0.0 STEP 12
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.900E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 416-HEP-G04-1A06
DESCRIPTION: OPERATOR FAILS TO ALIGN G-04 TO 1A-06U1 ECA-0.0 STEP 13
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.900E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-1A051B03
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 1A-05 TO 1B-03
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-1A061B04
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 1A-06 TO 1B-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-1B031B04
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 1B-03 TO 1B-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-1B041B03
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 1B-04 TO 1B-03
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-2A012B01
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2A-01 TO 2B-01
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-2A022B02
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2A-02 TO 2B-02
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-2A052B03
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2A-05 TO 2B-03

DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-2A062B04
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2A-06 TO 2B-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-2B012B43
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2B-01 TO 2B-43
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-2B022B43
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2B-02 TO 2B-43
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-2B032B01
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2B-03 TO 2B-01
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-2B032B04
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2B-03 TO 2B-04
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-2B042B02
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2B-04 TO 2B-02
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: 480-HEP-2B042B03
DESCRIPTION: OPERATOR FAILS TO TRANSFER PWR FROM 2B-04 TO 2B-03
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-CST-FW--
DESCRIPTION: FIRE WATER TO CST
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.100E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:12 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-CST-LOW-
DESCRIPTION: FAILURE OF OPERATORTO RESPOND TO LOW CST LEVEL ALARM
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.900E-004
MODFD: Fri Aug 17 16:23:55 2001 BY SUN JUN 10 11:31:12 2001

WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-CST-SWMD
DESCRIPTION: SERVICE WATER TO THE MOTOR-DRIVEN PUMP
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.500E-002
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-CST-SWTD
DESCRIPTION: SERVICE WATER TO THE TURBINE-DRIVEN PUMP
DISTRIBUTION: Lognormal Mean Failure Prob.: 9.200E-003
MODFD: Wed Jun 13 19:10:40 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-MDP-FLOW
DESCRIPTION: FAIL TO MANUALLY CONTROL MDAFW AFTER A LOSS OF IA
DISTRIBUTION: Lognormal Mean Failure Prob.: 4.400E-002
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-MINI-GAG
DESCRIPTION: FAILURE TO GAG MINI RECIRC VALVE >1HR INTO EVENT
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.400E-003
MODFD: Tue May 07 09:22:31 2002 BY JPM
WHY:

PARM ID: AF--HEP-RECIRC-1
DESCRIPTION: FAIL TO MANUALLY CONTROL RECIRC ON TDP 1P-29
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.500E-002
MODFD: Tue May 07 10:24:38 2002 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-RECIRC-2
DESCRIPTION: FAIL TO MANUALLY CONTROL RECIRC ON TDP 2P-29
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.500E-002
MODFD: Tue May 07 10:24:42 2002 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-RECIRC-A
DESCRIPTION: FAIL TO MANUALLY CONTROL RECIRC ON MDP P-38A
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.500E-002
MODFD: Tue May 07 10:24:46 2002 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-RECIRC-B
DESCRIPTION: FAIL TO MANUALLY CONTROL RECIRC ON MDP P-38B
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.500E-002
MODFD: Tue May 07 10:24:51 2002 BY JPM
WHY: REV 5/7/2002

PARM ID: AF--HEP-RECIRC4F
DESCRIPTION: MEX EVENT FAIL TO MANUALLY CONTROL 4 AFW PUMPS
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.060E-003
Median: 0.000E+000 Error Factor: 5.000E+000
MODFD: Tue May 07 09:21:53 2002 BY JPM
WHY:

PARM ID: AF--HEP-START-MD
DESCRIPTION: FAIL TO MANUALLY START MDP AFTER AUTO FAILS
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.640E-003
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-START1TD
DESCRIPTION: FAIL TO MANUALLY START TDP 1P-29
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.640E-003
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-START2TD
DESCRIPTION: FAIL TO MANUALLY START TDP 2P-29
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.640E-003
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: AF--HEP-TDAFISOL
DESCRIPTION: FAILURE TO ISOLATE TDAFW PUMP FROM RUPTURED SG
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.750E-003
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP--SI--SD--DRN
DESCRIPTION: FAIL TO RESTORE SI FROM SHUTDOWN OOS FOR FEED
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E+000
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-120-INVBACKU
DESCRIPTION: OPERATOR FAILS TO MANUALLY ALIGN 1-43/Y-01 TO DY-0A
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.200E-002
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-416-ECA00--5
DESCRIPTION: OPERATOR FAILS TO START DG MANUALLY
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.800E-003
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-480-AOP10C-5
DESCRIPTION: FAIL TO WIRE 1P11A TO B08 PER AOP10C-6
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.000E-001
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-480-AOP10C-6
DESCRIPTION: FAIL TO ALIGN TO B08 / B09 PER AOP 0.0 STEP 6.1
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-001
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-CCI-AOP9B-73

DESCRIPTION: OPERATOR FAILS TO ALIGN UNIT 2 CCW PUMPS TO UNIT
DISTRIBUTION: Lognormal Mean Failure Prob.: 6.500E-002
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-CCW-AOP9B-74
DESCRIPTION: OPERATOR FAILS TO ISOLATE CCW RUPTURE
DISTRIBUTION: Lognormal Mean Failure Prob.: 7.000E-002
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-CCW-EOP13-03
DESCRIPTION: OPERATOR FAILS TO START CCW PUMPS
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.200E-004
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:13 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-CCW-OI-71-42
DESCRIPTION: OPERATOR FAILS TO ALIGN STANDBY HEAT EXCHANGER
DISTRIBUTION: Lognormal Mean Failure Prob.: 4.000E-002
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-CV--AOP6E-62
DESCRIPTION: OPERATOR FAILS TO EMERG BORATE FROM CHRG.
DISTRIBUTION: Lognormal Mean Failure Prob.: 4.100E-002
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-CV--ECA01-4B
DESCRIPTION: OPERATPR FAILS TO START CHARGING PUMPS
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.300E-003
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-CV--EOP-0-49
DESCRIPTION: HEP - CHG PUMP OPER. FOR SEALING FLOW #NAME?
DISTRIBUTION: Lognormal Mean Failure Prob.: 4.100E-003
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-ECA-EOP31-32
DESCRIPTION: OPERATPR FAILS TO COOL DOWN AND DEPRESSURIZE
DISTRIBUTION: Lognormal Mean Failure Prob.: 7.700E-003
MODFD: Wed Jun 13 19:10:41 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-ECA00-U2-09-
DESCRIPTION: OPERATOR FAILS TO ALIGN G-02 TO 2A-05U2 ECA-0.0 STEP 9
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.900E-003
MODFD: Wed Feb 20 07:33:50 2002 BY JPM
WHY:

PARM ID: HEP-ECA00-U2-10-
DESCRIPTION: OPERATOR FAILS TO ALIGN G-01 TO 2A-05U2 ECA-0.0 STEP 10
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.900E-003

MODFD: Wed Feb 20 07:34:07 2002 BY JPM
WHY:

PARM ID: HEP-ECA00-U2-12-
DESCRIPTION: OPERATOR FAILS TO ALIGN G-04 TO 2A-06U2 ECA-0.0 STEP 12
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.900E-003
MODFD: Wed Feb 20 07:34:16 2002 BY JPM
WHY:

PARM ID: HEP-ECA00-U2-13-
DESCRIPTION: OPERATOR FAILS TO ALIGN G-03 TO 2A-06U2 ECA-0.0 STEP 13
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.900E-003
MODFD: Wed Feb 20 07:34:32 2002 BY JPM
WHY:

PARM ID: HEP-ECC-ECA00-21
DESCRIPTION: OPERATOR FAILS TO DEPRESSURIZE SGS TO 250 PSI
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.000E-001
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-ESF-EOP-0-04
DESCRIPTION: OPERATOR FAILS TO MANUALLY INITIATE SI
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.250E-003
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-FP--FUEL-OIL
DESCRIPTION: OPERATOR FAILS TO SUPPLY FUEL OIL TO FIREPUMP
DISTRIBUTION: Lognormal Mean Failure Prob.: 3.500E-002
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-HHR-EOP13-23
DESCRIPTION: OPERATOR FAILS TO ALIGN FOR HHR
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.250E-002
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-IA--AOP5B-74
DESCRIPTION: OPERATOR FAILS TO ISOLATE IA HEADER RUPTURE
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.000E-002
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-IA--FO-04748
DESCRIPTION: OPERATOR FAILS TO REOPEN 3047 OR 3048
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-003
MODFD: Thu Jun 14 10:18:03 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-IA--FO-START
DESCRIPTION: OPERATOR FAILS TO RESTART IA OR SA
DISTRIBUTION: Lognormal Mean Failure Prob.: 6.900E-004
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-IA--RE-01207
DESCRIPTION: OPERATOR FAILS TO RESTORE IA-1207 AFTER T/M
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.000E-003
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-IA--RE-01210
DESCRIPTION: OPERATOR FAILS TO RESTORE IA-1210 AFTER T/M
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.000E-003
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-MFW-CSPH1-06
DESCRIPTION: OPERATOR FAILS TO ALIGN MFW AFTER SI SIGNAL
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.000E-002
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-MFW-CSPH1-XX
DESCRIPTION: OPERATOR FAILS TO OPEN MOV SW-2880 AFTER SI
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E-001
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-MFW-EOP01-06
DESCRIPTION: OPERATOR FAILS TO ALIGN MAIN FEED WATER TO SGS
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.300E-003
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-MS--EOP-3-02
DESCRIPTION: OPERATOR FAILS TO DIAGNOSE SGTR EVENT
DISTRIBUTION: Lognormal Mean Failure Prob.: 4.750E-003
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:14 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-OCC-EOP01-04
DESCRIPTION: OPERATOR FAILS TO CONTROL CHARGING / LETDOWN
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.500E-002
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-ODA-EOP12-05
DESCRIPTION: FAILURE TO COOLDOWNAND DEPRESSURIZE AFTER SLOCA
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.700E-003
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-ODB-CSPC1-14
DESCRIPTION: OPERATOR FAILS TO DEPRESS. TO USE LPSI AFTER SLOCA
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.050E-002
MODFD. Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-ODC-EOP-3-21

DESCRIPTION: OPERATOR FAILS TO DEPRESS. INTACT SG AFTER SGTR
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.000E-002
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-ODD-CSPC1-14
DESCRIPTION: OPERATOR FAILS TO DEPRESS. TO USE LPSI AFTER MLOCA
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.200E-002
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-RC--EOP-1-05
DESCRIPTION: FAILURE TO ISOLATE PORV WITH BLOCK VALVE
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.600E-003
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-RCS-CSPH1-12
DESCRIPTION: OPERATOR FAILS TO ESTABLISH FEED AND BLEED (NO SI)
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.360E-002
MODFD: Wed Jun 13 19:10:42 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-RCS-CSPH1-13
DESCRIPTION: OPERATOR FAILS TO ESTABLISH FEED AND BLEED (WITH SI)
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.050E-002
MODFD: Wed Jun 13 19:10:43 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-RHR-EOP13-23
DESCRIPTION: OPERATOR FAILS TO ALIGN FOR LHR
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.450E-002
MODFD: Wed Jun 13 19:10:43 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-RP--AOP9B-63
DESCRIPTION: OPERATOR FAILS TO MANUALLY TRIP RX (TCC/TSW)
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.100E-004
MODFD: Wed Jun 13 19:10:43 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-RP--CSPS1-01
DESCRIPTION: FAILURE TO SCRAM RXVIA OPENING MG SET BKR
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.700E-003
MODFD: Wed Jun 13 19:10:43 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-RP--EOP-0-01
DESCRIPTION: OPERATOR FAILS TO MANUALLY TRIP REACTOR
DISTRIBUTION: Lognormal Mean Failure Prob.: 8.300E-004
MODFD: Wed Jun 13 19:10:43 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-SI-ACC-AISOL
DESCRIPTION: OPERATOR FAILS TO ISOLATE ACCUMULATOR
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.700E-001

MODFD: Wed Jun 13 19:10:43 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-SW--AOP9A-63
DESCRIPTION: OPERATOR FAILS TO ISOLATE SW HEADER RUPTURE
DISTRIBUTION: Lognormal Mean Failure Prob.: 5.200E-002
MODFD: Wed Jun 13 19:10:43 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-SW--EOP-0-9A
DESCRIPTION: OPERATOR FAILS TO ISOLATE NON-ESSEN SW LOADS
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.800E-002
MODFD: Wed Jun 13 19:10:43 2001 BY SUN JUN 10 11:31:15 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: HEP-SWI-AOP9A-61
DESCRIPTION: OPERATOR FAILS TO START STANDBY SW PUMPS
DISTRIBUTION: Lognormal Mean Failure Prob.: 2.370E-005
MODFD: Wed Jun 13 19:10:43 2001 BY SUN JUN 10 11:31:16 2001
WHY: SUN JUN 10 09:27:34 2001

PARM ID: OP--HEP--DGFOXFR
DESCRIPTION: OPERATORS FAIL TO ALIGN VLVES FOR FUEL OIL X-TIES
DISTRIBUTION: Lognormal Mean Failure Prob.: 1.000E+000
MODFD: Thu Jun 14 11:32:09 2001 BY JPM
WHY:

THERP Tables

ATTACHED

T20-7 is one of the most frequently used tables in the HRA Handbook because so many routine tasks involve the use of written procedures. If the procedures are poorly written (which is often the case), and especially if there are several action items per numbered step or paragraph, EOMs will be relatively frequent. EOMs must be evaluated separately, using other tables.

In the table, "items of instruction" refers to statements that include (usually) some type of information presented to an operator (the S in the S-O-R paradigm, i.e., Box A in the basic human performance model on p 1-21), some degree (often minimal) of operator processing of the information (the O in S-O-R, or Box C in the figure on p 1-21), and some type of required response (The R in S-O-R, or Box E in the figure on p 1-21). The least error-likely instructions have only one S-O-R per numbered step.

Table 20-7 Estimated probabilities of errors of omission per item of instruction when use of written procedures is specified[1] (from Table 15-3)

Item[2]	Omission of item:	HEP	EF	
When procedures with checkoff provisions are correctly used[3]:				
(1)	Short list, ≤10 items	.001	3	1.3E-03
(2)	Long list, >10 items	.003	3	3.8E-03
When procedures without checkoff provisions are used, or when available checkoff provisions are incorrectly used[4]:				
(3)	Short list, ≤10 items	.003	3	3.8E-03
(4)	Long list, >10 items	.01	3	1.3E-02
(5)	When written procedures are available and should be used but are not used[4]	.05[5]	5	8.0E-02

[1]The estimates for each item (or perceptual unit) presume zero dependence among the items (or units) and must be modified by using the dependence model when a non-zero level of dependence is assumed.
[2]The term "item" for this column is the usual designator for tabled entries and does not refer to an item of instruction in a procedure.
[3]Correct use of checkoff provisions is assumed for items in which written entries such as numerical values are required of the user.
[4]Table 20-6 lists the estimated probabilities of incorrect use of checkoff provisions and of non-use of available written procedures.
[5]If the task is judged to be "second nature" or "skill-of-the-craft," use the lower uncertainty bound for .05, i.e., use .01 (EF = 5).

The written instruction model in T20-7 makes an artificial division of procedures into short and long lists. Obviously, there is nothing magical about the 10 items that serve as the dividing line between a short and a long list. As more data are obtained, this model can be revised to allow more than two points to represent the length of a list of items.

remembered increases. In the table, "detailed which each task or activity is mentioned by AF7757, AF7758, and AF7759." "General oral level of detail, e.g., "Open the blocking valv the concept of a perceptual unit is importan oral instructions, the analyst may judge that the general oral instruction is equivalent important to note the last footnote in the t

THE NOTATION BY TABLE 20-8 IS BY THE INSTRUCTOR WHO TAUGHT HRA. PBNP DOES USE THIS TABLE IN THEIR HRA MODEL - SEE THERP TABLES.

was never used this for nuclear

Table 20-8 Estimated probabilities of instruction items not wri

HEPs as a function of number of

Item[3]	Number of Oral Instruction Items or Perceptual Units	Pr[F] to recall item "N," order of recall not important			F order not important			(c) HEP	EF
Oral instructions are detailed:									
(1)	1[4]	.001		3	.001		3	.001	3
(2)	2	.003		3	.004		3	.006	3
(3)	3	.01		3	.02		5	.03	5
(4)	4	.03		5	.04		5	.1	5
(5)	5	.1		5	.2		5	.4	5
Oral instructions are general:									
(6)	1[4]	.001		3	.001		3	.001	3
(7)	2	.006		3	.007		3	.01	3
(8)	3	.02		5	.03		5	.6	5
(9)	4	.06		5	.09		5	.2	5
(10)	5	.2		5	.3		5	.7	5

Don't need table

[1]It is assumed that if more than five oral instruction items or perceptual units are to be remembered, the recipient will write them down. If oral instructions are written down, use Table 20-5 for errors in preparation of written instructions and Table 20-7 for errors in their use.

[2]The first column of HEPs (a) is for individual oral instruction items, e.g., the second entry, .003 (item 2a), is the Pr[F] to recall the second of two items, given that one item was recalled, and order is not important. The HEPs is the other columns for two or more oral instruction items are joint HEPs, e.g., the .004 in the second column of HEPs is the Pr[F] to recall both of two items to be remembered, when order is not important. The .006 in the third column of HEPs is the Pr[F] to recall both of two items to be remembered in the order of performance specified. For all columns, the EFs are taken from Table 20-20, as explained in Ch 15.

[3]The term "item' for this column is the usual designator for tabled entries and does not refer to an oral instruction item.

[4]The Pr[F]s in rows 1 and 6 are the same as the Pr[F] to initiate the task.

T20-12 applies to all kinds of manual controls, including switches in a control room that are used to govern the position of motor-operated valves (MOVs), air-operated valves (AOVs), and pneumatic-operated valves that are located elsewhere in a plant. As stated in the discussion of T20-9 (selection HEPs for displays), it is speculative to predict which particular incorrect control will be selected, given that the correct one was not selected. For some operations, initial incorrect movement of a switch or other control is not important. The importance of this error is obviously situation-specific.

Item 1A was mistakenly left out of the HRA Handbook. Original item 8 in the HRA Handbook version of this table was cumbersome to apply, and in the present table, items 8A-C replace it. No changes were made to the HEPs or EFs.

12 Table 20-12 Estimated probabilities of errors of commission in operating manual controls[1] (from Table 13-3)

Item	Potential Errors	HEP	EF	
(1)	Inadvertent activation of a control	See text, Ch. 13		
(1A)[2]	Select wrong control when it is dissimilar to adjacent controls	Negligible		
Select wrong control on a panel from an array of similar-appearing controls[3]:				
(2)	identified by labels only	.003	3	3.8E-03
(3)	arranged in well-delineated functional groups (all one type together)	.001	3	1.3E-03
(4)	which are part of a well-defined mimic layout	.0005	10	1.4E-03
Turn multi-position rotary control in wrong direction (for rotary switches with only two positions, see items 8A-C):				
(5)	when there is no violation of populational stereotype	.0005	10	1.4E-03
(6)	when design violates a strong populational stereotype and operating conditions are normal	.05	5	8.0E-02
(7)	when design violates a strong populational stereotype and operation is under high stress	.5	5	8.0E-01
Turn a two-position switch in wrong direction or leave it in the wrong setting[4]:				
(8A)	when there is no violation of populational stereotype	.0001	10	2.7E-04
(8B)	when design violates a strong populational stereotype and operating conditions are normal	.01	5	1.6E-02
(8C)	when design violates a strong populational stereotype and operation is under high stress	.1	5	1.6E-01
(9)	Set a multi-position rotary control to an incorrect setting (for rotary switches with only two positions, see item 8A-C)	.001	10[5]	2.7E-03
(10)	Failure to complete change of state of a component if switch must be held until change is completed	.003	3	3.8E-03
Select wrong circuit breaker in a group of circuit breakers[3]:				
(11)	densely grouped and identified by labels only	.005	3	6.3E-03
(12)	in which the PSFs are more favorable (see Ch. 13 in HRA Handbook)	.003	3	3.8E-03
(13)	Improperly mate a connector (this includes failures to seat connectors completely and failure to test locking features of connectors for proper engagement)	~~.003~~ .01	3	1.3E-02

Proposed to use .003 since we have data for. CC:

[1] These ECOM HEPs do not include errors in deciding which controls to activate.
[2] Item 1A is a new addition to this table; it is not in NUREG/CR-1278.
[3] If controls or circuit breakers are to be restored and tagged, adjust the tabled HEPs according to Table 20-15.
[4] Items 8A-C replace item 8 in this table in NUREG/CR-1278; no change in HEPs or EFs.
[5] This EF is a function of the clarity with which indicator position can be determined: designs of control knobs and their position indications vary greatly. For plant-specific analyses, an EF of 3 may be used.

Valve restoration errors occur frequently in all kinds of plants. T20-7 and T20-8 are used for estimating probabilities of EOMs. T20-13 below is used for selection errors, and T20-14, which follows, is used for other types of ECOMs.

T20-13 lists some HEPs in increasing value according to some important PSFs. Note that there is a factor of 10 difference between the smallest HEP and the largest. For any given application, choose the descriptive statement that most closely fits.

Table 20-13 Estimated HEPs for selection errors for locally-operated valves[1] (from Table 14-1) 13

Item	Potential Errors	HEP	EF	MEAN
Making an error of selection in changing or restoring a locally-operated valve when the valve to be manipulated is:				
(1)	Clearly and unambiguously labeled, set apart from valves that are similar in all of the following: size and shape, state, and presence of tags (sticks out like sore thumb)	.001	3	1.3E-03
(2)	Clearly and unambiguously labeled, part of a group of two or more valves that are similar in one of the following: size and shape, state, or presence of tags	.003	3	3.8E-03
(3)	Unclearly or ambiguously labeled, set apart from valves that are similar in all of the following: size and shape, state, and presence of tags	.005	3	6.3E-03
(4)	Unclearly or ambiguously labeled, part of a group of two or more valves that are similar in one of the following: size and shape, state, or presence of tags	.008	3	1.0E-02
(5)	Unclearly or ambiguously labeled, part of a group of two or more valves that are similar in all of the following: size and shape, state, and presence of tags	.01	3	1.3E-02

[1]Unless otherwise specified, Level 2 tagging is presumed. If other levels of tagging are assessed, adjust the tabled HEPs according to Table 20-15.

Identifying stuck-open valves, see 08.11-22 (T20-14)

Table No	.m	Text	Mean	EF	Median	Notes
20-7		**Estimated probabilities of errors of omission per item of instruction when use of written procedure is specified (from Table 15-3)**				1
	1	Omission of item when procedures with checkoff provisions are correctly used. Short list, <= 10 items.	1.3E-3	3	0.0010	2,5
	2	Omission of item when procedures with checkoff provisions are correctly used. Long list, > 10 items.	3.8E-3	3	0 0030	2,5
	3	Omission of item when procedures without checkoff provisions are used, or when available checkoff provisions are incorrectly used. Short list, <= 10 items.	3.8E-3	3	0.0030	3,5
	4	Omission of item when procedures without checkoff provisions are used, or when available checkoff provisions are incorrectly used. Long list, > 10 items.	1.3E-2	3	0.0100	3,5
	5	Omission of item when written procedures are available and should be used but are not used.	8.0E-2	5	0.0500	3,4,5
20-8		**Estimated probabilities of errors of omission - Added for Wisconsin Electric**				
	1a		1.3E-3			
	2a		3.8E-3			
	2b		5.0E-3			
	2c		7.5E-3			
	3b		3.2E-2			
	4		1.3E-3			
20-9		**Estimated probabilities of errors in selecting unannunciated displays (or annunciated displays no longer annunciating) for quantitative or qualitative readings (from Table 11-2)**				
	1	Selection of wrong display when it is dissimilar to adjacent displays.	neg.	neg.	neg.	6,7
	2	Selection of wrong display from similar-appearing displays when they are on a panel with clearly drawn mimic lines that include the displays.	1.4E-3	10	0.0005	6
	3	Selection of wrong display from similar-appearing displays that are part of well-delineated functional groups on a panel.	1.3E-3	3	0.0010	6

Table No	m	Text THERP TABLES	Mean	EF	Median	Notes
	4	Selection of wrong display from an array of similar-appearing displays identified by labels only.	3.8E-3	3	0.0030	6
20-10		**Estimated HEPs for errors of commission in reading and recording quantitative information from unannunciated displays (from Table 11-3)**				
	1	Display or task - Analog meter	3.8E-3	3	0.0030	8
	2	Display or task - Digital readout (<=4 digits)	1.3E-3	3	0.0010	8
	3	Display or task - Chart recorder	7.5E-3	3	0.0060	8
	4	Display or task - Printing recorder with large number of parameters	8.0E-2	5	0.0500	8
	5	Display or task - Graphs	1.3E-2	3	0.0100	8
	6	Display or task - Values from indicator lamps that are used as quantitative displays	1.3E-3	3	0.0010	8
	7	Display or task - Recognize that an instrument being read is jammed, if there are no indicators to alert the user	1.6E-1	5	0.1000	8
	8	Display or task - Recording task: Number of digits or letters to be recorded <=3	neg.	neg.	neg.	8,9
	9	Display or task - Recording task: Number of digits or letters to be recorded >3	1.3E-3	3	0.001/ symbol	8,9
	10	Display or task - Simple arithmetic calculations with or without the use of a calculator	1.3E-2	3	0.0100	8
	11	Display or task - Detect out-of-range arithmetic calculations	8.0E-2	5	0.0500	8

Table No	Item	Text	Mean	EF	Median	Notes
20-11		**Estimated HEPs for errors of commission in check-reading displays (from Table 11-4)**				10
	1	Display or task: Digital indicators (these must be read - there is no true check-reading function for digital display)	1.3E-3	3	0.0010	

Table No.	.m	Text	Mean	EF	Median	Notes	
	2	Display or task: Analog meters with easily seen limit marks	1.3E-3	3	0.0010		
	3	Display or task: Analog meters with difficult-to-see limit marks, e.g., scribe lines	2.5E-3	3	0.0020		
	4	Display or task: Analog meters without limit marks	3.8E-3	3	0.0030		
	5	Display or task: Analog-type chart recorders with limit marks	2.5E-3	3	0.0020		
	6	Display or task: Analog-type chart recorders without limit marks	7.5E-3	3	0.0060		
	7	Display or task: Confirming a status change on a status lamp	neg.	neg.	neg.	11,12	
	8	Display or task: Misinterpreting the indication on the indicator lamp	neg.	neg.	neg.	12	
20-12		**Estimated probabilities of errors of commission in operating manual controls (from Table 13-3)**				13	
	1	Inadvertent activation of a control	1.3E-3	for	Ch. 13		See Text
	1a	Select wrong control when it is dissimilar to adjacent controls	0.0E+0	neg	neg.	14	neg.
	2	Select wrong control on a panel from an array of similar-appearing controls identified by labels only	3.8E-3	3	0.0030	15	
	3	Select wrong control on a panel from an array of similar-appearing controls arranged in well-delineated functional groups	1.3E-3	3	0.0010	15	

Table No.	.m	Text THERE ABLES	Mean	EF	Median	Notes
	4	Select wrong control on a panel from an array of similar-appearing controls which are part of a well-defined mimic layout	1.4E-3	10	0.0005	15
	5	Turn multi-position rotary control in wrong direction when there is no violation of populational stereotype (for rotary switches with only two positions, see items 8A-8C)	1.4E-3	10	0.0005	
	6	Turn multi-position rotary control in wrong direction when design violates a strong populational stereotype and operating conditions are normal (for rotary switches with only two positions, see items 8A-8C)	8.0E-2	5	0.0500	
	7	Turn multi-position rotary control in wrong direction when design violates a strong populational stereotype and operation is under high stress (for rotary switches with only two positions, see items 8A-8C)	8.0E-1	5	0.5000	
	8a	Turn a two-position switch in wrong direction or leave it in the wrong setting when there is no violation of populational stereotype	2.7E-4	10	0.0001	16
	8b	Turn a two-position switch in wrong direction or leave it in the wrong setting when design violates a strong populational stereotype and operating conditions are normal	1.6E-2	5	0.0100	16
	8c	Turn a two-position switch in wrong direction or leave it in the wrong setting when design violates a strong populational stereotype and operation is under high stress	1.6E-1	5	0.1000	16
	9	Set a multi-position rotary control to an incorrect setting (for rotary switches with only two positions, see items 8A-C)	2.7E-3	10	0.0010	17
	10	Failure to complete change of state of a component if switch must be held until change is completed	3.8E-3	3	0 0030	
	11	Select wrong circuit breaker in a group of circuit breakers densely grouped and identified by labels only	6.3E-3	3	0.0050	15
	12	Select wrong circuit breaker in a group of circuit breakers in which the PSFs are more favorable (see Ch. 13 in HRA Handbook)	3.8E-3	3	0.0030	15
	13	Improperly mate a connector (this includes failures to seat connectors completely and failure to test locking features of connectors for proper engagement)	1.3E-2	3	0.0100	
20-13		**Estimated HEPs for selection errors for locally-operated valves (from Table 14-1)**				18
	1	Making an error of selection in changing or restoring a locally-operated valve when the valve to be manipulated is clearly and unambiguously labeled, set apart from valves that are similar in all of the following; size, shape, state, and presence of tags.	1.3E-3	3	0.0010	

Table No	Num	Text THERE ABLES	Mean	EF	Median	Notes
	2	Making an error of selection in changing or restoring a locally-operated valve when the valve to be manipulated is clearly and unambiguously labeled, part of a group of two or more valves that are similar in one of the following: size and shape, state, or presence of tags.	3.8E-3	3	0.0030	
	3	Making an error of selection in changing or restoring a locally-operated valve when the valve to be manipulated is unclearly or ambiguously labeled, set apart from valves that are similar in all of the following; size, shape, state, and presence of tags.	6.3E-3	3	0.0050	
	4	Making an error of selection in changing or restoring a locally-operated valve when the valve to be manipulated is unclearly or ambiguously labeled, part of a group of two or more valves that are similar in one of the following: size and shape, state, or presence of tags.	1.0E-2	3	0.0080	
	5	Making an error of selection in changing or restoring a locally-operated valve when the valve to be manipulated is unclearly or ambiguously labeled, part of a group of two or more valves that are similar in all of the following: size and shape, state, and presence of tags.	1.3E-2	3	0 0100	
20-16		**Modifications of estimated HEPs for the effects of stress and experience levels (from Table 18-1)**				
			Modifiers for Nominal HEPs			19
		Stress Level (Task Load)	**Skilled (a)**		**Novice (b)**	20
	1	Very low stress (very low task load)	2		2	
	2	Optimum stress (optimum task load): Step-by-step	1		1	21
	3	Optimum stress (optimum task load): Dynamic	1		2	21
	4	Moderately high stress (heavy task load): Step-by-step	2		4	21
	5	Moderately high stress (heavy task load): Dynamic	5		10	21
	6	Extremely high stress (threat stress): Step-by-step	5		10	21
	7	Extremely high stress (threat stress): Dynamic or diagnosis	0.25	5	0.50	21,22
		Note for item 7: These are actual HEPs to use with dynamic tasks or diagnosis; they are NOT modifiers.				
20-17		**Equations for conditional probabilities of success and failure on Task "N", given success or failure on previous Task "N-1", for different levels of dependence (from Table 10-2)**				
		Failure Equations:				
		Level of Dependence: ZD $Pr[F_{"N"}\|F_{"N-1"}\|ZD] = N$ Eqn #: (10-14)				
		Level of Dependence: LD $Pr[F_{"N"}\|F_{"N-1"}\|LD] = (1 + 19N)/20$ Eqn #: (10-15)				
		Level of Dependence: MD $Pr[F_{"N"}\|F_{"N-1"}\|MD] = (1 + 6N)/7$ Eqn #: (10-16)				

Table No	ɜm	Text THERE ABLES	Mean	EF	Median	Notes
		Level of Dependence: HD $Pr[F_{-N-}\|F_{-N-1-}\|HD] = (1 + N)/2$ Eqn #: (10-17)				
		Level of Dependence: CD $Pr[F_{-N-}\|F_{-N-1-}\|CD] = 1.0$ Eqn #: (10-18)				
20-20		**General guidelines for estimating uncertainty bounds for estimated HEPs (from Table 7-2)**				23
		Task consists of performance of step-by-step procedure conducted under routine circumstances (e g., a test, maintenance, or calibration task); stress level is optimal:				24,26
	1	Estimated HEP < 0.001		10		25
	2	Estimated HEP 0.001 to 0.01		3		25
	3	Estimated HEP > 0.01		5		25
		Task consists of performance of step-by-step procedure but carried out in nonroutine circumstances such as those involving a potential turbine/reactor trip; stress level is moderately high:				24,26
	4	Estimated HEP < 0.001		10		25
	5	Estimated HEP > 0.001		5		25
		Task consists of relatively dynamic interplay between operator and system indications, under routine conditions, e.g., increasing or reducing power; stress level is optimal				24,26
	6	Estimated HEP < 0.001		10		25
	7	Estimated HEP > 0.001		5		25
	8	Task consists of relatively dynamic interplay between operator and system indications, but carried out in nonroutine circumstances; stress level is moderately high		10		24,25,26
	9	Any task performed under extremely high stress conditions, e.g., large LOCA; conditions with status of ESFs not perfectly clear; or conditions where initial operator responses proven inadquate so severe time pressure felt (see Ch 7 for EF=5 rationale).		5		24,25,27
20-22		**Estimated probabilities that a checker will fail to detect errors made by others (from Table 19-11)**				28
	1	Checking routine tasks, checker using written materials (includes over-the-shoulder inspections, verifying position of locally-operated valves, switches, circuit breakers, connectors, etc , and checking written lists, tags, or procedures for accuracy)	1.6E-1	5	0.1000	
	2	Same as above, but without written materials	3.2E-1	5	0.2000	
	3	Special short-term, one-of-a-kind checking with alerting factors	8.0E-2	5	0.0500	
	4	Checking that involves active participation, such as making special measurements	1.6E-2	5	0.0100	

Table No.	Item	Text THERP TABLES	Mean	EF	Median	Notes
		Given that the position of a locally-operated valve is checked (item 1 or 2 above), noticing that it is not completely opened or closed (for "hands-on verification" of valve position, use lower bounds for the percentage of people estimated to carry out this administrative control procedure):				
	5	Position indicator only	1.6E-1	5	0.1000	29
	6	Rising stem with or without a position indicator	8.0E-1	5	0.5000	29,30
	7	Neither of position indicator nor a rising stem	1.0E+0	5	0.9000	29
	8	Checking by reader/checker of the task performer in a two-person team, or checking by a second checker, routine task (no credit for more than 2 checkers)	8.0E-1	5	0.5000	
	9	Checking the status of equipment if that status affects ones safety when performing the checking task	1.6E-3	5	0.0010	
20-23		**The Annunciator Response Model: estimated HEPs for multiple annunciators alarming closely in time (from Table 11-13)**				31, 32
		Number $Pr[F_i]$ for each annunciator (ANN) for completely dependent set of ANNs, successively addressed by the operator				
		ANNs 1 (a) 2 (b) 3 (c) 4 (d) 5 (e) 6 (f) 7 (g) 8 (h) 9 (l) 10 (j)	$Pr[F_i]$ (k)			33
	1	1 .0001	1.0E-4			
	2	2 .0001 .001	6.0E-4			
	3	3 .0001 .001 .002	1.0E-3			
	4	4 .0001 .001 .002 .004	2.0E-3			
	5	5 .0001 .001 .002 .004 .008	3.0E-3			
	6	6 .0001 .001 .002 .004 .008 .016	5.0E-3			
	7	7 .0001 .001 .002 .004 .008 .016 .032	9.0E-3			
	8	8 .0001 .001 .002 .004 .008 .016 .032 .064	2.0E-2			
	9	9 .0001 .001 .002 .004 .008 .016 .032 .064 .13	3.0E-2			
	10	10 .0001 .001 .002 .004 .008 .016 .032 .064 .13 .25	5.0E-2			
	11	11-15 $Pr[F_i]$ for each additional ANN beyond 10 = 0.25	1.0E-1			
	12	16-20 $Pr[F_i]$ for each additional ANN beyond 10 = 0.25	1.5E-1			
	13	21-40 $Pr[F_i]$ for each additional ANN beyond 10 = 0.25	2.0E-1			
	14	>40 $Pr[F_i]$ for each additional ANN beyond 10 = 0 25	2.5E-1			

..ote No.	Note THERP TABLES
1	The estimates for each item (or perceptual unit) presume zero dependence among the items (or units) and must be modified by using the dependence model when a non-zero level of dependence is assumed.
2	Correct use of checkoff provisions is assumed for items in which written entries such as numerical values are required of the user.
3	Table 20-6 lists the estimated probabilities of incorrect use of checkoff provisions and of non-use of available written procedures.
4	If the task is judged to be "second nature" or "skill-of-the-craft," use the lower uncertainty bound for 0.05, i.e., use 0.01 (EF=5).
5	Divide by 3 based on Swan's (pg. 15-3 to 15-15) adjustments to HEPs at nuclear power plants with response/non-response procedure type.
6	The listed HEPs are independent of recovery factors. In some cases, the content of the quantitative or qualitative indication from an incorrect display may provide immediate feedback of the selection error and the total error can be assessed as neg.
7	This assumes the operator knows the characteristics of the display for which he or she is searching.
8	Multiply HEPs by 10 for reading quantitative values under a high level of stress if the design violates a strong populational stereotype, e.g., a horizontal analog meter in which values increase from right to left, or in which the scale is non-linear.
9	In this case, "letters" refer to those that convey no meaning. Groups of letters such as MOV (Motor-Operated Valve) do convey meaning to NPP operators, and the recording HEP is considered to be negligible.
10	"Check-reading" means reference to a display merely to see if the indication is within allowable limits, no quantitative reading is taken. The check-reading may be done from memory or a written checklist may be used.

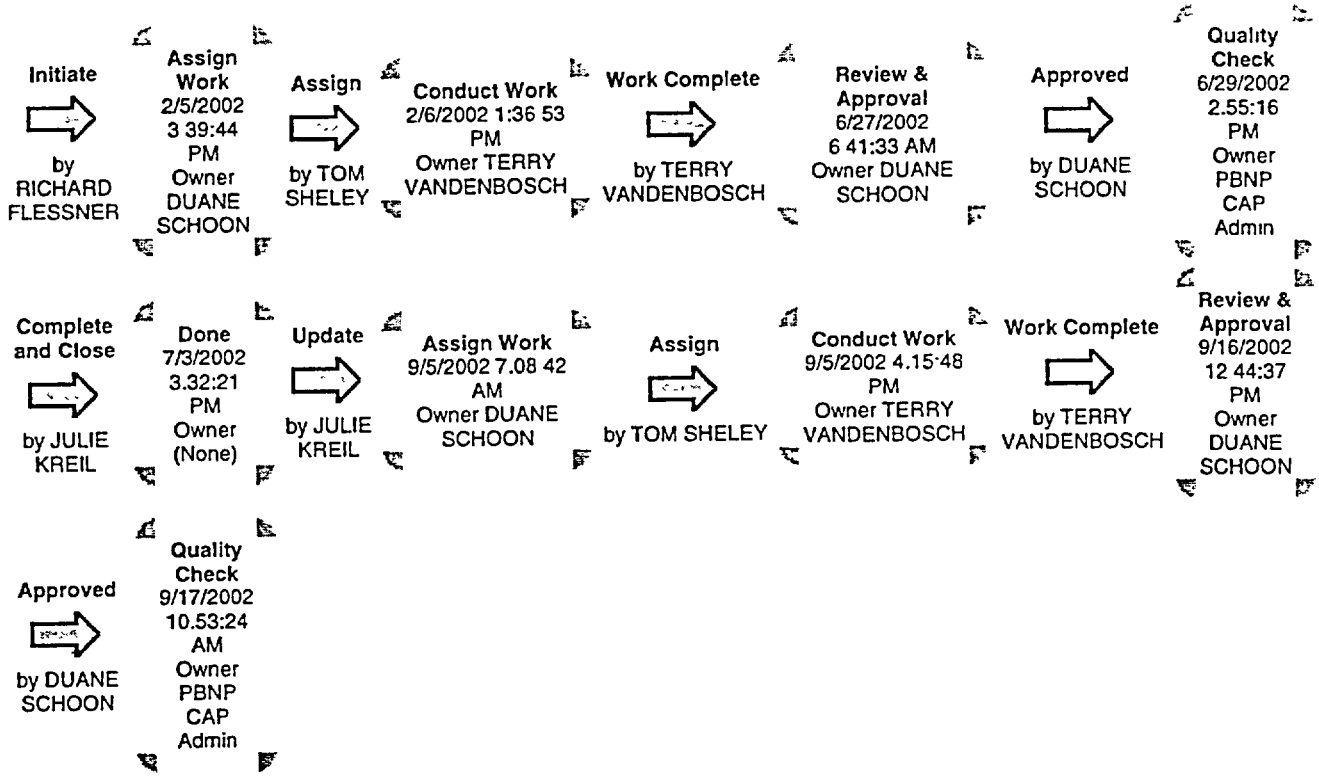
.ote No.	Note THERP TABLES
	The HEPs apply to displays that are checked individually for some specific purpose, such as a scheduled requirement, or in response to some developing situation involving that display.
11	If the operator must hold a switch in a spring-loaded position until a status lamp lights, use HEP - .003 (EF=3), from Table 20-12, item 10.
12	For levels of stress higher than optimal, use 0.001 (EF=3).
13	These ECOM HEPs do not include errors in deciding which controls to activate.
14	Item 1A is a new addition to this table; it is not in NUREG/CR-1278.
15	If controls or circuit breakers are to be restored and tagged, adjust the tabled HEPs according to Table 20-15.
16	Items 8A-C replace item 8 in this table in NUREG/CR-1278; no change in HEPs or EFs.
17	This EF is a function of the clarity with which indicator position can be determined; designs of control knobs and their position indications vary greatly. For plant-specific analyses, an EF of 3 may be used.
18	Unless otherwise specified, Level 2 tagging is presumed. If other levels of tagging are assessed, adjust the tabled HEPs according to Table 20-15.
19	The nominal HEPs are those in the data tables in Part III and in Ch. 20 of the HRA Handbook. Error factors (EFs) are listed in Table 20-20.
20	A skilled person in one with at least 6 months' experience in the tasks being assessed. A novice is one with less than 6 months' experience. In NPPs both levels have the required licensing or certificates.
21	Step-by-step tasks are routine, procedurally guided tasks, such as carrying out written calibration procedures. Dynamic tasks require a higher degree of man-machine interaction, such as decision-making, keeping track of several functions, controlling several functions, or any combination of these. These requirements are the basis of the distinction between step-by-step and dynamic tasks, which are often involved in responding to an abnormal event.

..ote No.	Note THERP TABLES
22	Diagnosis may be carried out under varying degrees of stress, ranging from optimum to extremely high (threat stress). For threat stress, the HEP of 0.25 is used to estimate ones performance. Ordinarily, more than one person will be involved in such tasks. Tables 20-1 and 20-3 list joint HEPs based on the number of control room personnel presumed to be involved in the initial diagnosis of an abnormal event. For subsequent diagnosis tasks, use the dependence models.

Note No.	Note THERP TABLES
23	The estimates in this table apply to experienced personnel. The performance of novices is discussed in Chapter 18. See Appendix A to calculate the UCBs for Pr[FT], the total-failure term of an HRA event tree.
24	For UCBs for HEPs based on the dependence model, see Table 20-21.
25	The highest upper bound is 1.0.
26	See Table 20-16 for definitions of step-by-step and dynamic procedures.
27	An error factor (EF) of 5 is assigned for the extremely high stress conditions because the upper uncertainty bound is truncated at 1.0, and it is considered desirable to have a more conservative (i.e., higher) lower UCB for such tasks.
28	This table applies to cases during normal operating conditions in which a person is directed to check the work performed by others either as the work is being performed or after its completion.
29	A position indicator incorporates a scale that indicates the position of the valve relative to a fully opened or fully closed position. A rising stem qualifies as a position indicator if there is a scale associated with it.
30	This change is based on the conservative assumption that the checker will just look at the rising stem even when there is a position indicator.
31	The HEPs are for the failure to initiate some kind of intended corrective action as required. The action carried out may be correct or incorrect and is analyzed using other tables. The HEPs already include the effects of stress and should not be increased in consideration of stress effects. An EF of 10 is assigned to each $Pr[F_i]$ or the mean of $Pr[F_i]$ in column k. Based on computer simulation, use of an EF of 10 for the mean yields approximately correct upper bounds for the 95th percentile. The corresponding lower bounds are too high; they are roughly equivalent to 20th-percentile rather than the usual 5th-percentile bounds on a log-normal distribution. Thus, use of an EF of 10 for the mean $Pr[F_i]$ values provides a conservative estimate since the lower bounds are high.

Note No.	Note THERP TABLES
32	"Closely in time" refers to cases in which two or more annunciators alarm within several seconds or with a time period such that the operator perceives them as a group of signals to which he must selectively respond.
33	The values in column k represent the expected Pr[F]s to initiate action in response to a randomly selected ANN (or completely dependent set of ANNs) in a group of ANNs competing for the operator's attention. It is the arithmetic mean of the $Pr[F_i]$s in a row, with an upper limit of 0.25. The mean $Pr[F_j]$ values assume that all of the ANNs (or completely dependent sets of ANNs) are equal in terms of the probability of being noticed. See page 11-52, paragraph 2, in the HRA Handbook if this assumption does not hold.

STATE CHANGE HISTORY



SECTION 1

Activity Request Id:	CA003698		
Activity Type:	Corrective Action	**Submit Date:**	2/5/2002 3:39:44 PM
Site/Unit:	Point Beach - Common		
Activity Requested:	Revise OM 4.3.1, AOP and EOP Writers' Guide, to incorporate human error reduction methods used in the PRA model that can significantly reduce CDF risk. **** SEE UPDATE TPS ****		
CATPR:	N	**Initiator:**	FLESSNER, RICHARD
Initiator Department:	EX Engineering Processes PB	**Responsible Group Code:**	PO PB Operations PB
Responsible Department:	Plant	**Activity Supervisor:**	DUANE SCHOON
Activity Performer:	TERRY VANDENBOSCH		

SECTION 2

Priority:	3	**Due Date:**	10/4/2002
Mode Change Restraint:	(None)	**Management Exception From PI?:**	Y

QA/Nuclear Oversight?:	N	Licensing Review?:	N
NRC Commitment?:	N	NRC Commitment Date:	

SECTION 3

Activity Completed:

1/18/2002 12:52PM - LARRY PETERSON:
Due date extended as requested and approved by F. Cayia in prior update. Retruned to R. flessner for completion.

1/18/2002 12:54PM - LARRY PETERSON:
Reassigned to R. Flessner for completion following extension.

2/22/2002 12:15PM - MARK RINZEL:
This item has been exempted from performance indicators by the Plant Manager via e-mail dated 2/21/2002. The item has been updated in section two to reflect this exemption

6/27/2002 6:41:33 AM - TERRY VANDENBOSCH:
OM 4.3.1 revision 4 was revised and issued on 6/6/02 incorporating the guidance for PRA.

6/29/2002 2.55:16 PM - DUANE SCHOON:
Closed.

7/3/2002 3:32:21 PM - JULIE KREIL:
OM 4.3.1 Rev 4 was issued 62/6/02. CA003697 is assigned to PO group to review/revise EOPs and AOPs. CLOSED CA003698.

9/5/2002 7:08:42 AM - JULIE KREIL:
This item is being re-opened per discussion of R. Flessner and T. Vandenbosch. Determination is that the OM issuance of 6/6/02 did not fully include human error reduction methods used in the PRA model that can significantly reduce CDF risk.

9/16/2002 12:44:37 PM - TERRY VANDENBOSCH:
Revision 5 to OM 4.3.1 was issued on 9/16/02 which included discussion step 2.6 and attachment I, PRA CONSIDERATIONS, which discusses guidelines or techniques that are known to increase the chance of success in performing a procedure.

This item can be closed.

9/17/2002 10:53.24 AM - DUANE SCHOON:
Closed.

SECTION 4

QA Supervisor:	(None)	Licensing Supervisor:	(None)

SECTION 5

Project:	CAP Activities & Actions		
State:	Quality Check	Active/Inactive:	Active
Owner:	PBNP CAP Admin	AR Type:	Daughter
Submitter:	RICHARD FLESSNER	Assigned Date:	9/5/2002
Last Modified Date:	9/17/2002 10.53.24 AM	Last Modifier:	DUANE SCHOON
Last State Change Date:	9/17/2002 10:53:24 AM	Last State Changer:	DUANE SCHOON

Close Date:	
One Line Description:	Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW
NUTRK ID:	CR 01-3595
Child Number:	1
References:	CR 01-2278 RCE 01-069 GOOD CATCH OM 4.3 1
Update:	Action out a ACE that is being classified as a ROOT CAUSE. Due dates and priority set out ACE 314. Contact the author of ACE 314 for any clarification. TPS ACTIVITY COMPLETED is old information from the ACE that was cloned into this action by responsible ACE individual --- Disregard. ****
Import Memo Field:	
CAP Admin:	PBNP CAP Admin **Site:** Point Beach
OLD_ACTION_NUM:	
Cartridge and Frame:	

NOTES/COMMENTS

Management exception from performance indicators by **DENNIS HETTICK** (2/28/2002 8:06:43 AM)
approved by the plant manager. email is attached

ATTACHMENTS AND PARENT/CHILD LINKS

ACE000314: Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW

CAP001415: Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW

FW Request for Performance Indicator Exception for tTRACK actions.rtf (6255 bytes)

OM 4.3.1

AOP AND EOP WRITERS' GUIDE

DOCUMENT TYPE:	Administrative
REVISION:	5
EFFECTIVE DATE:	September 16, 2002
APPROVAL AUTHORITY:	Department Manager
PROCEDURE OWNER (title):	Group Head
OWNER GROUP:	Operations

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure establishes the administrative and technical guidance used in the development and maintenance of Abnormal Operating Procedures (AOPs) and Emergency Operating Procedures (EOPs).

1.2 This procedure is used to develop the EOP set that is derived from the Westinghouse Owner's Group Emergency Response Guideline Program.

1.3 The requirements of this procedure shall be implemented as follows:

1.3.1 New procedures initiated on, or after, the effective date of this procedure shall comply with these requirements. New procedures that have **NOT** completed technical review on, or before, the effective date of this procedure shall comply with these requirements.

1.3.2 Total rewrite revisions initiated on, or after, the effective date of this procedure shall comply with these requirements. Total rewrite revisions that have **NOT** completed technical review before the effective date of this procedure shall comply with these requirements.

1.3.3 Existing procedures in effect on the effective date of this procedure are exempt from these requirements until a total rewrite revision is initiated.

1.3.4 Exceptions to the format and content requirements of this document shall be approved in writing by the Operations Manager.

2.0 DISCUSSION

2.1 The following guidance is to be applied consistently for the emergency operating procedure set. The emergency operating procedure set includes those procedures identified with the designators EOP, ECA, CSP, and SEP.

2.2 Point Beach Nuclear Plant Procedures Writers' Guide should be followed whenever possible to provide plant consistency for procedures, however, explicit exceptions will be listed in this document. Differences are generally caused by the special application of the procedures requiring quick responses. Other differences are due to differences in word processing software.

2.3 Some AOPs will be written in a Single Column format due to the nature of the procedure. Refer to ATTACHMENT G, Single Column AOP Format, for these requirements.

2.4 This writers' guide should be used in conjunction with the EOP procedure change checklist PBF-2004. A checklist should be completed for each permanent EOP revision. The checklist is structured to follow this writers' guide. It also checks items which have been identified as problems during previous EOP issues.

2.5 The matrix in H, PRA CORE DAMAGE RISK MATRIX, was developed based on initiating events with a frequency of core damage greater than 1E-6 and an initiating event frequency of greater that 1E-3. The selected scenarios were then compared to the procedures that the operator would most likely use to prevent core damage. Procedure validation should consider those scenarios where an X is marked. This matrix is risk based only and should not be used as the sole consideration for determining scenarios for procedural validation.

2.6 When revising or developing a new emergency procedure the writer should refer to ATTACHMENT I, PRA CONSIDERATIONS. The way a procedure is written can play an important role in the probability of successfully implementing human actions that are required to mitigate plant transients and accidents. Human Reliability Analysis (HRA) is the method that Probabilistic Risk Assessment used to evaluate the chances of success or failure to correctly perform a human action. There are two primary types of human errors that can be made that could lead to failure to successfully perform an action. Errors of Commission errors involve performing the wrong action even though the correct information is understood. These types of errors include selection of wrong unit / wrong train valves or putting a control in the incorrect position. These types of errors are typically reduced through good labeling and training. Another type of error is the error of Omission. These types of errors typically involve misinterpreting or completely missing procedure steps. Well written procedures can reduce the chance of these types of errors.

3.0 RESPONSIBILITIES

3.1 Operations Manager

3.1.1 Ensures that a technical basis is maintained for the EOPs using background documents and setpoint databases.

3.1.2 Determines when to incorporate subsequent revisions to generic technical guidelines into appropriate plant-specific procedures.

3.2 EOP Coordinator

3.2.1 Ensures the procedures are technically accurate and written to the standards established in this writers' guide.

3.2.2 Determines when the procedures will be upgraded to the requirements of this writers' guide.

3.2.3 Determines when to incorporate subsequent revisions to plant-specific technical information into appropriate procedures.

3.3 Procedure Writer

3.3.1 Researches reference sources.

3.3.2 Verifies the accuracy of information.

3.3.3 Revises any applicable procedure background documentation which supports the procedure development.

3.3.4 Confirms the usability of new or revised program descriptions, procedures, and instructions.

3.3.5 Ensures procedures and instructions comply with the requirements of this procedure when developing or revising these documents.

4.0 CONTENT OF MAJOR SECTIONS

4.1 Emergency Operating Procedure Identification

Each plant procedure shall be uniquely identified. This identification permits easy administration of the procedure preparation, review, revision and distribution process.

4.1.1 Each emergency operating procedure that is derived from the Westinghouse Owners Group Optimal Recovery Guidelines will be identified with the designator EOP followed by a sequential number.

Example: EOP-0, EOP-1.1

4.1.2 Each emergency operating procedure that is derived from the Westinghouse Owners Group Emergency Contingency Action will be identified with the designator ECA consistent with the generic procedures.

Example: ECA-0.0

4.1.3 Each related emergency operating procedure that is derived from the Westinghouse Owners Group Functional Restoration Guideline shall be identified with the designator CSP to represent Critical Safety Procedure followed by an alphanumeric symbol that is consistent with the generic numbering scheme for function restoration guidelines.

Example: CSP-P.1, CSP-H.4

4.1.4 Each procedure is identified using its designator and number and a descriptive title that is consistent with the respective generic guidance ERG. It is acceptable to change the generic title in the plant specific procedure to incorporate plant terminology or to better describe the scope of the procedure. Such a change will be justified in the deviation document for that procedure.

4.1.5 Each status tree is derived from the Westinghouse Owners Group Status Trees and will be identified with the designator ST followed by a sequential number.

4.2 Revision Identification

4.2.1 The word **DRAFT** shall be used in the title block to designate a procedure that has not received Manager's Supervisory Staff approval.

4.2.2 The descriptor **REVISION 0** shall be used in the title block to designate the original issuance of each procedure.

4.2.3 The **REVISION** followed by the next sequential number shall be used in the title block to identify revisions to each procedure for changes made subsequent to the implementation of the original plant procedures.

4.2.4 To identify revision to the text of a procedure, a change bar located in the left side of the changed text will be used. Total rewrite revisions will not utilize revision change bars.

4.3 Page Identification and Numbering

4.3.1 The header printed on every page will be in accordance with Point Beach Nuclear Plant Procedures Writers' Guide. In addition, CSPs will have the color designators within the title block on every page to represent the priority of the critical safety procedure status tree paths that are entry conditions to the CSP.

4.3.2 The page number will appear in the header of the page along with the total number of pages in the procedure. The last page of each procedure will additionally be identified by the word **END** following the last instruction step. In addition to the procedure page count, attachments and figures will also provide a section page number and total section page count under the section number. The section number is located under the heading block.

4.4 Cover Page

4.4.1 The cover page will be in single column format. Each cover sheet will contain three sections in addition to the procedure title and title block. The first will be titled PURPOSE and will briefly describe what the procedure is intended to do for the operator. It will include the applicability of the procedure.

4.4.2 The second section is a summary of those symptoms which require entry into the procedure. This section will be titled SYMPTOMS OR ENTRY CONDITIONS. Certain procedures can be entered primarily based on symptoms; for these procedures a symptom summary is sufficient. Some other procedures can only be entered by transitions from previous procedures and a summary of the entry conditions (and EOP procedure step) should be provided. Due to the complexity of the EOP set, the step number referenced by the SYMPTOMS OR ENTRY CONDITIONS may not be correct, however, the referenced procedure is current. For critical safety procedures, the conditions that were present to satisfy the path on the status tree should be included in the SYMPTOMS OR ENTRY CONDITIONS. This is done to provide the operator with a quick reference to verify the correct procedure is being used. This description is not meant to duplicate the monitoring function of the status trees. Because of this, every branch of the status tree does not need to be described in this section. This information should be presented in a manner that is most useful for the procedure user.

4.4.3 The third section is a list of REFERENCES for that procedure.

4.5 Procedure Section

This section will contain the operator actions and contingency desired. A step-by-step procedure directs the operator to perform necessary actions required by the intent of the procedure. The left-hand column is for action/expected response and the right-hand column is for response not obtained. Attachment F provides a sample of this two-column format.

4.6 Attachments

Attachments, figures, and tables may be attached to the procedure to provide additional information. Attachments may be used to simplify transitioning within a procedure if a series of actions may be required in more than one place within the same procedure.

4.6.1 Attachment Pages

a. Attachments shall be designated by sequential capital letters.

b. Attachments are identified with the following header centered immediately below the page header block:

EXAMPLE

ATTACHMENT A
(Page 1 of 2)
TITLE

c. The last page of each attachment should have the word -END- centered on the page, below the last line of text to indicate the end of the attachment.

4.6.2 Figure Pages

a. Figures shall be designated by sequential Arabic numbers.

b. Figure pages located at the end of the document are identified with the following header centered immediately below the page header block:

EXAMPLE

FIGURE 1
TITLE

c. Related figures may be shown on the same page under a single title. Figures identified with a separate title should be shown on a separate page.

d. Graphical information or pictures may also be presented as figures at the end of the document as a figure page.

e. The independent variable on all graphs should be plotted on the horizontal axis.

f. Figure numbers or titles may be used within the text of a document but are not required. If they are used, all figures within the document should be numbered.

4.6.3 Tables

a. Tables may be used within the text or attachments of a document to clearly present information.

b. Table numbers or titles may be used but are not required. If they are used, all tables within the document should be numbered.

c. There should not be a vacant cell in the table. If no entry is necessary, "NA" or "- -" should be entered to indicate not applicable.

4.7 Foldout Pages

4.7.1 Each foldout page, when provided, shall be identified by the heading FOLDOUT PAGE FOR followed by the applicable procedure and unit number, centered at the top of the page within the page border.

4.7.2 Starting with the procedure page where the first step of the procedure is located, foldout pages shall be printed on the back of each procedure page.

4.8 Status Trees

4.8.1 Refer to Attachment E for status tree priority identification symbols.

4.8.2 The descriptive title for each Critical Safety Function Status Tree shall consist of the term "ST-X" followed by the noun name for the applicable critical safety function. The letter X shall be replaced with the numerical order of priority for that particular safety function where one is the highest priority.

4.8.3 Critical safety function status trees will be presented in the block version. The trees are represented horizontally along the page. Color coding and line pattern coding shall be used from each branch point to its terminus. All text should be at least as legible (type size and spacing) as the instruction steps in the procedures.

4.8.4 Changes to status trees shall be upgraded on the PPCS screens.

5.0 FORMAT AND STYLE REQUIREMENTS

5.1 Step Length and Content

5.1.1 Steps should be written in short and precise language.

5.1.2 The writer should consider that persons using the procedure may have a different background or skill level than the writer. Generally procedures should be written so that a fully qualified person can perform the procedure.

5.1.3 Each step should begin with an action verb except when location information is provided.

5.1.4 If multiple tasks are required to perform a step, the high level step should describe the purpose of the entire step and the multiple tasks should be presented as individual substeps.

5.1.5 Individual steps should be limited to a single action or no more than three closely related actions.

5.1.6 Limits should be expressed quantitatively whenever possible. An example of limits which cannot be expressed quantitatively are the cooldown limits specified by a curve.

5.1.7 Each action step shall be wholly contained on a page when step content allows.

For large steps it may be necessary to continue a step from one page to the next. When a step must be continued to the next page, include the following words centered at the bottom of the initial page and left justified at the top of the subsequent page to clearly show that the step is continued:

Example:

(Step 27. continued on next page)

Step 27. (continued from previous page)

5.1.8 The following guidelines should be followed when applying to sequencing of steps within the document:

a. Technical necessity should be the overriding consideration for step sequencing.

b. Physical layout and organization of equipment should be considered so that optimal movement and monitoring are achieved.

c. Steps should be structured to minimize the movement of personnel around the Control Room or the plant during performance of the procedure.

d. Steps should be structured to avoid unintentional duplication of tasks.

e. All numbered steps should be assumed to be performed in sequence unless stated otherwise in a preceding note.

5.1.9 Expected results of routine tasks need not be stated.

5.1.10 When considered beneficial for proper understanding and performance, provide the system response time associated with performance of the instruction.

5.1.11 When system response dictates a time frame within which the instruction must be accomplished, prescribe such time frame. Avoid using time to initiate operator actions. Operator actions should be related to plant parameters.

5.1.12 When additional confirmation of system response is considered necessary, prescribe the backup readings to be taken.

5.1.13 Definitions of key words and phrases used in procedures are listed in Attachment A, Definitions of Key Words and Phrases.

5.1.14 Items that are unique to the procedures are listed in Attachment B, Abbreviations, Acronyms, and Symbols. These items are used to help in keeping procedures concise.

5.1.15 When used in statements other than logic statements, "not" shall stand for the negative of the proceeding group of words.

5.1.16 All procedures shall end with a transition to another procedure, or with direction to consult with appropriate plant management for guidance.

5.1.17 Procedures shall be structured so that they can be executed by the minimum shift staffing and Control Room staffing required by Technical Specifications.

5.2 Dual Column Format

5.2.1 Steps and substeps may be written as imperative sentences in the following format: (Refer to Attachment D for examples of step construction and Attachment F for a sample format)

a. Action verb, procedure user action, or plant parameter; a hyphen and expected response in all capital letters.

b. The action verb used in a step should apply to all subsequent substeps and may be deleted from those steps.

5.2.2 The left-hand column, titled Action/Expected Response, contains directions for the operator and the expected plant response. The following rules apply to the left-hand column:

a. Each step shall begin with a high level action step which presents primary, sequential tasks to be performed in response to the specific emergency or off-normal operating condition.

b. Each high level action step should be written in all initial capital letters and bold font.

c. Periods should not be placed at the end of left-hand column steps, however, a colon should be placed at the end of any step which has substeps.

d. Left-hand column tasks shall be presented in the desired sequence unless otherwise specified.

e. If the left-hand column action cannot be performed, or the expected response is not obtained, the right-hand column contains contingency guidance.

5.2.3 The right-hand column, titled Response Not Obtained, provides contingency actions which are to be taken in the event a stated condition or task in the left-hand column does not represent or achieve the expected response. The following rules apply to the right-hand column:

a. Right-hand column contingency actions are designated consistent with the left-hand column substeps to which they apply.

b. A contingency action which applies to a high level step is not numbered and starts on the same line as the related high level step.

c. Contingency actions provided for any high level step or substep which has subordinate substeps shall apply to all of the subordinate substeps.

d. If the right-hand column contains multiple contingency actions which cannot be described by a simple sentence, the phrase "Perform the following:" should be used as the introductory statement, and the required tasks shall be presented as substeps.

e. If a right-hand column action must be completed prior to continuing, that requirement shall appear explicitly stated in the procedure using the words "DO NOT CONTINUE" followed by the condition(s) which must be satisfied prior to continuing.

f. After completing applicable contingency actions in the right-hand column, the procedure user proceeds to the next high level step or substep in the left-hand column unless directed otherwise.

g. If a contingency action is not provided in the right-hand column or the contingency action cannot be performed, the procedure user proceeds to the next high level step or substep in the left-hand column.

5.3 Use of Logic Terms

5.3.1 The logic terms AND, OR, IF, IF...NOT, WHEN...THEN, and IF...THEN are often necessary to precisely describe a set of conditions or sequence of actions.

5.3.2 When logic terms are used, they should be in all capital letters and underlined so that all conditions are clear to the document user.

5.3.3 Procedures written in dual column format equate to the logic "IF the expected conditions in the left-hand column are NOT satisfied, THEN perform the contingency action in the right-hand column" The logic terms should not be repeated in the right-hand column. However, logic terms may be used to introduce a secondary contingency in the right-hand column.

So that contingencies are only contained in the right-hand column, the use of logic terms IF and IF...NOT should not be used in the left-hand column.

5.3.4 When steps are contingent upon certain conditions or combinations of conditions, the step should be formatted in accordance with one of the following examples:

EXAMPLES

- IF condition A, THEN perform action.
- IF condition A is NOT satisfied, THEN perform different action.
- WHEN condition A, THEN perform action.

5.3.5 Use of the logic term IF...NOT should be limited to those cases where the document user must respond to the second of two possible conditions. The logic term IF should be used to specify the first condition, as shown in the above example.

5.3.6 The logic term THEN should always follow a condition, not an action. This ensures only one action exists for each step.

EXAMPLES

- Ensure spray addition tank level has been lowered by at least 12%, THEN stop containment spray (Unacceptable)
- WHEN spray addition tank level has been lowered by at least 12%, THEN stop containment spray. (Acceptable)

5.3.7 Action steps should be performed in sequence so that a conjunction such as "and" is not required between steps. However, in the case of combinations of conditions within a single step, the logic term AND should be placed between the description of each condition.

EXAMPLE

IF condition A AND condition B AND condition C, THEN perform action.

5.3.8 In order to simplify a long sequence of conditions, the logic term AND should not be used to join more than three conditions. If more than three conditions need to be joined, a list format should be used.

EXAMPLES

IF all of the following conditions are met, THEN perform action.
- Condition A
- Condition B
- Condition C
- Condition D
- Condition E

5.3.9 When used for connecting actions in a step, the word "and" need not be emphasized.

EXAMPLE

Stop SI pumps and place in standby.

5.3.10 The logic term OR should be used between alternative conditions. It should be used in the inclusive sense, meaning that any one or all of the conditions may be present.

EXAMPLE

IF condition A OR condition B, THEN perform action.

5.3.11 The word "or" (not a logic term) should be used between alternative actions. It should be used in the exclusive sense, meaning that only one action is to be performed.

EXAMPLE

IF condition A, THEN perform action A or action B, but not both.

5.3.12 Presenting alternative actions without stating priorities should be minimized. Priorities should be established for each action where possible.

5.3.13 The use of logic terms AND and OR within the same step should be worded so as to avoid confusion or ambiguity, as shown in the following example.

EXAMPLE

IF condition A AND condition B OR condition C occurs, THEN go to Step X.

This example can have two possible meanings and should be worded instead as either one of the following:

Meaning Number 1:

- IF both condition A AND condition B occur, THEN go to Step X.

  OR

- IF condition C occurs, THEN go to Step X.

Meaning Number 2:

- IF both condition A AND condition B occur, THEN go to Step X.

  OR

- IF both condition A AND condition C occur, THEN go to Step X.

5.3.14 Conditional statements in notes and cautions should follow all requirements for logic terms with the following exceptions:

a. They should be written in lower case with no underline.

b. The logic term THEN should not be used.

EXAMPLES

- IF condition A AND condition B, THEN result. (Unacceptable in notes and cautions)
- If condition A and condition B, result. (Acceptable in notes and cautions)

5.4 Use of Cautions and Notes

5.4.1 Non-action information should be presented as either a note or caution.

5.4.2 A caution is used to present information regarding potential hazards to personnel or equipment associated with the subsequent step(s).

5.4.3 A note is used to present advisory or administrative information necessary to support performance of the subsequent step(s).

5.4.4 Notes or cautions shall appear immediately before the step to which they apply.

5.4.5 Notes and cautions should appear within the page border, extending across the entire page, inside distinct boxes in bold font. The word NOTE or CAUTION, in all capital letters, bolded and underlined, should be centered at the top of the box.

CAUTION

This is a caution.

NOTE

This is a note.

5.4.6 Notes may be grouped together with each individual note identified with a closed bullet (•).

5.4.7 Cautions may be grouped together with each individual caution identified with a closed bullet (•).

5.4.8 Cautions shall precede notes when they appear together unless the note contains information which clarifies the caution.

5.4.9 Notes and cautions and the first applicable step shall not be split between pages.

5.4.10 Notes and cautions themselves shall not be split between pages.

5.4.11 The following guidelines apply to the wording in notes and cautions:

a. Each document should provide enough information to accomplish the purpose of the document without relying on information contained in notes or cautions.

b. Notes and cautions should be declarative statements of fact and not commands or action statements unless they are advising on actions to be taken in the event of changing plant conditions.

c. Notes and cautions which are repeated in different documents should have standardized wording whenever possible.

5.5 Calculations

5.5.1 Mathematical calculations should be avoided in procedures. If a value has to be determined in order to perform a procedural step, a chart or graph should be used whenever possible.

5.5.2 Actions which require calculations should have space provided within the document for recording all steps of the calculation.

5.6 Use of Underlining

Underlining will be used for emphasis of logic terms and to designate transitions.

5.7 Transitions to Other Procedures or Steps

5.7.1 Examples of transition from several procedures for the same or different reasons are listed in Attachment C, Symptom or Entry Condition Examples.

5.7.2 Transitioning is defined as leaving the procedure at the current step and resuming actions in another procedure or step within the current procedure.

5.7.3 Since transitioning is likely to lead to errors in implementation by interrupting the flow of guidance, documents should be written to minimize the use of transitions. For example, if short sections of other procedures are required, those sections may be copied into the procedure instead of transitioning to the other procedure.

5.7.4 Transitions to other procedures do not contain an automatic return feature. If it is desired to return to the procedure which caused the transition, words such as "return to procedure and step in effect" must appear in the procedure being transitioned from.

5.7.5 A transition is identified by underlining the transition.

5.7.6 Steps which create a transition to another document should be formatted in accordance with the following example:

EXAMPLE

Transitions to another document:

o Go to EOP-0.1, REACTOR TRIP RESPONSE.

5.7.7 Transitions to an earlier or a later step in the current document or to an attachment in the current document should be formatted in accordance with the following example:

EXAMPLE

Transitions within the current document:

- Go to Step 10.
- Return to Step 2
- Go to ATTACHMENT A.

5.7.8 Transitions to steps within the current document which are preceded by a caution or note should be formatted in accordance with the following example:

EXAMPLE

Transitions to steps in the current document with preceding notes or cautions:

- IF conditions are NOT satisfied, THEN OBSERVE NOTE PRIOR TO STEP 1 and return to Step 1.
- IF conditions are NOT satisfied, THEN OBSERVE CAUTION PRIOR TO STEP 10 and go to Step 10.

5.8 Branching to Other Documents

5.8.1 Branching is defined as the concurrent performance of two or more documents. Branching can also apply to the use of attachments to the main document.

5.8.2 Each document should contain all the guidance necessary to perform the course of action. Therefore, the writer should limit the use of branching whenever possible.

5.8.3 Branching should be used for the following situations:

a. When a complex or time consuming operation is required which could delay performance of the main document.

b. When more than three local operator actions are necessary which do not require close supervision by the performer of the main document.

c. When it is desired to delegate supervision of a particular task sequence to another individual.

5.8.4 Steps which create a branch should contain the following information in the order shown:

a. A brief description of the actions to be accomplished in the document being branched to.

b. The term "per."

c. The document number and title in all capital letters. When branching to an attachment within the current document, it is only necessary to specify the attachment designator in all capital letters.

d. When branching to an attachment in another document, the appropriate attachment designator at which to enter the other document should be included following the document title.

e. The words "while continuing with this procedure (instruction)" should be placed at the end of the sentence to emphasize the need for concurrent performance.

EXAMPLES

1. Check Emergency Diesels -
ANY RUNNING UNLOADED

a. Stop any unloaded diesel per
OP 11A, EMERGENCY DIESEL GENERATOR

5.9 Referencing

5.9.1 Referencing is defined as the use of other documents or sources of information to perform the current step. Referencing also applies to obtaining guidance from plant management or plant engineering staff.

5.9.2 Referencing is usually made to figures or other sources of information that are too lengthy to be provided in the step.

5.9.3 Referencing to a document is designated by the term "refer to" followed by the document designator.

5.9.4 Referencing to a person for guidance is designated by the terms "as determined by" or "as directed by" followed by the title.

EXAMPLES

- o Refer to ATTACHMENT A for list of valves receiving containment isolation signal.
- o Adjust RMS high alarm setpoint to clear alarm as directed by TSC.

5.10 Component Identification

5.10.1 The preferred method for identifying equipment in procedures is to use the name and number of the equipment (Word Paraphrasing Method).

EXAMPLES

- o Emergency Diesel Generator G01
- o Letdown Containment Isolation Valve CV-371

5.10.2 When two or more equipment numbers can be associated with the same equipment name, the equipment numbers should be listed below the equipment name.

EXAMPLE

1. Shut Letdown Orifice Isolation Valves
   - CV-200A
   - CV-200B
   - CV-200C

5.10.3 When a list of equipment is included in a procedure, the equipment number followed by a comma and the equipment name should be listed.

EXAMPLE

1. Locally ensure the following valves open:

- 2SF-820B, RWST to P-33 refueling water circulating pump valve
- 1SF-820, RWST to P-33 refueling water circulating pump valve

5.10.4 In some cases it may be desired to identify the component exactly as it appears on the component label (Verbatim Method).

a. This method should be used when Control Room annunciator legends are provided in documents.

b. This method should be used when component nameplate identification is provided as part of an equipment lineup checklist which is intended to be read by the document user performing the equipment manipulation.

c. This method should be used when other identification methods have resulted in confusion.

EXAMPLE

- EDG G01

5.10.5 When only a generic reference to a component is being made, the equipment number is not needed (Common Usage Method).

EXAMPLES

- Start one emergency diesel generator
- Identify all open containment isolation valves

5.11 Standard Steps, Cautions, and Notes

Standard steps, cautions, and notes are blocks of text that are the same in more than one place in the emergency operating procedures. When a standard text block is changed, then it shall be reviewed for change in all other locations. This ensures a consistent method for completing actions steps and helps prevent operator error. When making a change to a standard text block, care must be taken to ensure the new text is applicable for all locations and does not conflict with the basis for each location.

5.12 Level of Detail

Too much detail in emergency operating procedures should be avoided in the interest of being able to effectively execute the instructions in a timely manner. The level of detail required is the detail that a newly trained and licensed operator would desire during an emergency condition.

To assist in determining the level of detail for emergency operating procedures, the following general rules apply.

5.12.1 Actions may unintentionally be performed incorrectly or omitted if a procedure lacks needed information. On the other hand, excessive detail can result in the procedure being time consuming or in steps being missed due to the user scanning over the procedure. To determine the appropriate level of detail the following factors should be considered:

a. User knowledge and skills (skill of the craft)

b. Complexity of task

c. Task frequency

d. Past experience in implementing the procedure

5.12.2 Recommended action verbs are as follows:

a. Use "start/stop/pullout" for power-driven rotating equipment.

b. Use "open/shut/throttle" for valves.

c. Use "trip/close/lockout/pullout" for electrical breakers.

5.12.3 Standard practices for observing abnormal results need not be prescribed within procedural steps. For example, observations of noise, vibration, erratic flow, or discharge pressure need not be specified by steps that start pumps.

5.13 High Level Steps

Procedure steps will be numbered and substeps indented as follows:

1 High Level Step
a. First Level Substep
1) Second Level Substep
a) Third Level Substep

High level steps are printed in bold print with each word capitalized. These are the numbered steps.

5.13.1 Continuous Action Step

a. Continuous Action steps are used to provide guidance which applies throughout the remainder of the procedure.

b. Continuous action steps are steps which are identified by an asterisk "*" box around the step text.

c. WHEN, THEN continuous action logic statements do not need to be enclosed in an asterisk box. When the condition is met, the action is performed. Until the condition is met, the operator is expected to continue with procedure.

5.13.2 Immediate Action Steps

a. Immediate actions steps are high level steps which can be identified by a circle around the sequential step number.

b. Immediate action steps shall be identified by a note prior to the first action step which states "Steps X through Y are immediate action steps."

c. Immediate action steps shall be used for operation of controls or confirmation of automatic actions that are required to stop the degradation of conditions and mitigate their consequences.

5.14 Substeps

Substeps are usually lettered sequentially accordingly to desired order of performance. If the order of importance is not important, then the substeps will not be designated by a letter, but will be preceded by an open or closed bullet. Use of the third level of indentation should be minimized.

5.14.1 Sequential

Sequential substeps are preceded by a small letter or number. These items are expected to be followed in the order presented.

5.14.2 Equally Acceptable Substeps

a. Equally acceptable substeps are those for which any of several alternative steps or sequence of steps may be equally correct.

b. Equally acceptable substeps should be separated by the logical term OR.

c. Equally acceptable substeps should be indexed with open bullets instead of numbers and letters to indicate that not all substeps need to be performed.

5.14.3 Closed Bullet Substeps

Closed bullet substeps do not require any specific order. A closed bullet further indicates that all of the items must be used to satisfy the high level step.

5.14.4 Equipment Lists

a. Equipment lists provide the equipment designation. Each item is preceded by a closed or open bullet.

b. Closed bullet equipment lists indicate all the listed items must be used.

c. Open bullet equipment lists indicate any or all of the items is used.

5.14.5 Continuous Action Substeps

Continuous action substeps are designated with the asterisk "*" box.

6.0 MECHANICS OF STYLE

6.1 Spelling

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

6.2 Punctuation

Punctuation should be used only as necessary to aid reading and prevent misunderstanding. Word order should be selected to require a minimum of punctuation. When extensive punctuation is necessary for clarity, the sentence should be rewritten and possibly made into several sentences. Punctuation should be in accordance with the following rules.

6.2.1 BRACKETS, [ ], should only be used to indicate adverse containment setpoints.

6.2.2 COLON should be used to indicate that a series of related substeps or a list is to follow.

6.2.3 COMMA should be used:

a. Prior to the logical term THEN

b. To separate items in a series

c. Prior to the conjunction in a series

d. To separate five or more digits in a numeral

EXAMPLES

- IF conditions satisfied, THEN take action.
- Unlock, rack in, and close the following breakers:

6.2.4 HYPHENATION of words should be minimized while meeting the following guidelines:

a. Hyphenated component identifiers and document numbers should be kept on the same line of text.

b. Written compound numbers from twenty-one to ninety-nine should be hyphenated.

c. Written fractions, such as one-half, should be hyphenated.

d. Compound words with "self," such as self-contained, should be hyphenated.

e. Compound words which would result in misleading or awkward combinations of consonants, such as bell-like, should be hyphenated.

f. Compound words which could be confused with another word, such as re-cover versus recover or pre-position versus preposition, should be hyphenated.

g. A letter which is linked to a noun, such as x-ray or O-ring, should be hyphenated.

h. Chemical elements and their atomic weights, such as Boron-10 or U-232, should be hyphenated.

6.2.5 PARENTHESES, ( ), may be used to set off explanatory or supplementary information.

a. Action steps should not be included within parentheses.

b. May be used to denote the plurality of a noun name or equipment.

c. Documents should be written to avoid the use of parentheses.

6.2.6 PERIOD is used at the end of complete sentences in the RNO column and for indicating the decimal place in numbers.

6.2.7 QUOTATION MARK may be used to set off unique titles or examples contained within the text of a document.

Quotation marks should not be used for program description, procedure, or instruction titles.

6.2.8 SEMICOLON should not be used because they encourage long sentences.

6.2.9 SLANT may be used to:

a. Form fractions

b. Indicate alternate positions on a single switch

c. Form acronyms such as S/G for steam generator

6.3 Capitalization

6.3.1 Capitalization should be used consistently in documents to avoid confusion.

If used too often or inappropriately, capitalization can hamper reading speed and comprehension.

6.3.2 The following words normally have an initial capital letter:

a. The first word in a sentence

b. The first word in steps and substeps

c. The first word in a list

d. Words such as Step, Section, and Number when followed by a designating numeral or letter.

6.3.3 Capitalization of only the important words should be used for the following:

a. Proper nouns such as an organization's name

b. Official personnel or staff titles

6.4 Vocabulary

6.4.1 Certain terms have unique meanings as listed below:

a. Manual or manually - an action performed by the document user at the location of document performance .

b. Local or locally - an action performed by a document user at a location other than the Control Room.

EXAMPLES

- "Manually shut valve" means to operate Control Room switch(s) to close the valve. If the valve cannot be closed from the Control Room, then dispatch an operator to locally close the valve.
- "Locally shut valve" means to directly manipulate the hand wheel, air supply, or other equipment to close the valve.

c. Operable - indicates that a system, subsystem, train, component, or device is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power, cooling water, seal water, lubrication, or other auxiliary equipment are also capable of performing their related support function(s).

d. Operating - indicates that a system, subsystem, train, component, or device is in operation and is performing its specified function(s). Auxiliary equipment required to perform its specified function(s) may or may not be capable of performing their related support function(s).

e. Available - indicates that a system, subsystem, train, component, or device is capable of performing its specified function(s) even though required auxiliary equipment may or may not be capable of performing their related support function(s).

6.4.2 Words such as "approximately," "rapidly," and "slowly" should not be used unless clarification is provided.

6.4.3 The terms "increase," "decrease," "increasing," and "decreasing" shall not be used. In order to avoid possible confusion, these terms should be replaced with other terms that convey the same intent, such as "rising," "lowering," "trending higher," or "trending lower."

6.4.4 The following rules apply to inequalities:

a. Inequalities should be expressed as words rather than symbols.

b. The terms "greater than" and "less than" should be used instead of "above" or "below," unless they could cause confusion. Then the terms "higher than" and "lower than" should be used.

EXAMPLES

- The phrase "maintain level greater than three feet below the reactor vessel flange" could mean to keep level at least three feet below the flange or it could mean that level should not be lower than three feet below the flange. (Unacceptable)
- The phrase "maintain level higher than three feet below the reactor vessel flange" means keep level above the negative three foot setpoint. (Acceptable)
- The phrase "maintain level lower than three feet below the reactor vessel flange" means keep level below the negative three foot setpoint. (Acceptable)

6.4.5 Although excessive use of symbols can be confusing, certain symbols are widely recognized and can be effective in increasing reading speed.

a. The terms differential pressure and delta P may be written as ΔP.

b. The terms differential temperature and delta T may be written as ΔT.

c. The terms degrees Fahrenheit and degrees Centigrade may be written as °F and °C respectively.

d. The word percent may be written as % when used following a number.

e. Mathematical symbols in equations may be used.

f. Greek letters and other symbols used to express engineering units may be used.

6.5 Numerical Values

6.5.1 Use of Roman Numerals should be avoided whenever possible.

6.5.2 All numerical values should be consistent with scale and range that can be read on the instrumentation to be used. This is typically one-half the smallest division on the instrumentation being used.

6.5.3 The number of significant digits presented should be equal to the reading precision of the document user.

6.5.4 Decimal functions should be written with at least one digit to the left of the decimal point.

6.5.5 Numbers written in exponential form should be written as shown in the following example.

EXAMPLES

- o 6.4×10^{-6} (preferred)
- o 6.4 E-6 (acceptable)

6.5.6 Acceptance values should be stated in such a way that any addition and subtraction operations are avoided. This is done by stating acceptance values as limits.

EXAMPLES

ACCEPTABLE	UNACCEPTABLE
maintain pressure between 238 psig and 262 psig	maintain pressure at 250 + 5%
torque to between 22 ft-lbs and 26 ft-lbs	torque to 24 + 2 ft-lbs

6.5.7 Engineering units should always be specified when presenting numerical values for process parameters. They shall be the same as those used on the instrumentation displays.

6.5.8 Numerical values and associated engineering units should be kept on the same line of text.

6.6 Abbreviations, Letter Symbols and Acronyms

6.6.1 When using abbreviations and acronyms, it is important to determine who the user of the procedure is. In some cases it may be acceptable to use abbreviations and acronyms without definition. In other cases it may need to be defined to ensure the user knows its meaning.

6.6.2 When an abbreviation or acronym needs to be defined, it should be done by writing out the term and placing the abbreviation or acronym in parentheses after the term. Refer to Attachment B for a listing of abbreviations.

EXAMPLE

Calculate fuel usage in Effective Full Power Days (EFPD).

6.7 End

To designate the end of each procedure or multiple page attachment, the word -END- will be placed below the last line of text centered on the page.

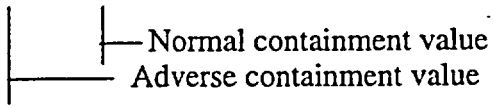
6.8 Normal and Adverse Containment Setpoints

6.8.1 Procedures which address severe accident conditions are written such that, in many steps, the procedure user determines an appropriate action to be taken based upon process parameter values. In order to minimize the instrument uncertainty required when normal containment conditions exist, two separate set points may be provided in the step.

6.8.2 In those instances where both the normal and adverse values are given, the first process value is the abnormal containment value and shall be enclosed in brackets. The normal value shall be listed second.

EXAMPLE

a. Check PZR Level - GREATER THAN [34%] 10%



6.8.3 When only one process parameter value is given, brackets are not required and the value presented shall apply for both normal and adverse containment conditions.

6.9 Supporting Documentation

6.9.1 Setpoint Documentation for EOPs

a. Procedures based on the Westinghouse Owner's Group Emergency Response Guidelines (ERGs) shall have a description of the conversion of ERG footnotes into plant specific set points contained within a Setpoint Document.

b. A clear description of how each setpoint within EOP procedures is derived shall also be contained in a Setpoint Document.

c. The format of Setpoint Document(s) should be established and approved by the Operations Manager.

d. Setpoint Document(s) may be maintained either electronically in a database or as a hard copy document.

6.9.2 Background Document Requirements for EOPs and Selected AOPs

a. A Background Document shall be written and maintained for all EOPs and selected AOPs. Background Documents for other documents may be produced on an as-needed basis as determined by the Responsible Manger.

b. Background Documents provide explanatory and other background information regarding the content of its associated document.

c. The purpose of the Background Document is to serve as a reference source for document users, training personnel, and personnel initiating document changes.

d. Each Background Document shall be numbered with the background document designator "BG-" followed by the same alpha-numeric designator as its associated document.

EXAMPLE

Document Number/Title	Background Document Number/Title
EOP E-0, REACTOR TRIP OR SAFETY INJECTION	BG-EOP E-0, REACTOR TRIP OR SAFETY INJECTION

e. When a revision to a document is made, appropriate modifications to the Background Document shall also be made.

f. The revision number of the Background Document need not match the revision number of the associated document.

g. Revisions to a Background Document which do not involve changes to the associated document may be made.

- Such changes shall be approved by the Responsible Manager of the associated document.

- In this situation the revision number of the associated document is not changed.

h. The step, caution, or note text is provided word for word as found in the issued PBNP procedure for easy cross reference to the procedure.

6.9.3 Deviation Document Requirements (EOP Network)

a. Deviation Documents for procedures based on Westinghouse Owner's Group generic guidelines are intended to serve as a reference source and technical justification for all deviations in wording, content, and step sequence between the generic guideline and the plant specific procedure.

b. Step Deviations shall be provided which describe the differences between the generic guideline steps and the plant specific steps including justification for these differences.

- Step deviations shall be explained for all wording changes, step sequence changes, and any additions or deletions of steps, substeps, notes, or cautions.

- A deviation consists of two parts; the deviation portion which describes the difference between the PBNP step and the WOG step, and justification which provides the reason for the deviation.

- When the difference in an abbreviation or acronym used in the plant specific procedure versus that used in the generic guideline is slight and easily understood, a deviation description is not required.

c. When a revision to a document is made, appropriate modifications to the Deviation Document shall also be made.

d. The revision number of the Deviation Document need not match the revision number of the associated document.

e. Revisions to a Deviation Document which do not involve changes to the associated document may be made.

- Such changes shall be approved by the Responsible Manager of the associated document.

- In this situation the revision number of the associated document is not changed.

6.9.4 Background Document Content for EOPs and Selected AOPs

a. The format of Background Document(s) should be established and approved by the Responsible Manager of the associated document.

b. Each Background Document shall contain a Cover Page which identifies the associated document, document title, revision number, and approval date.

c. Each Background Document shall contain a brief basis for performing the document actions.

- This may be done in a section or step-by-step manner.
- Additional explanatory and background information, as deemed necessary and appropriate by the document writer, may also be included.
- This information may provide explanation of symptoms or entry conditions or document steps that are not readily apparent.
- This information should also include explanations of critical step sequences that are not readily apparent and/or consequences of changing or not following the sequence.

d. Explanatory information may be provided, but is not required in Background Documents, for the Purpose and Symptoms Or Entry Conditions sections.

e. Background information for any document figures or attachments may be documented as if the figure or attachment were a single step. A more detailed discussion of these document elements may be provided if desired.

f. Each Background Document for procedures which contain a Foldout Page shall provide step documentation for each Foldout Page item.

g. Each Background Document for procedures based on Westinghouse Owner's Group generic guidelines shall contain the following additional information:

- Source document identification shall be provided which indicates the generic guideline(s) used as the basis for the associated procedure including any appropriate revision number.
- Step Documentation shall be provided which provides a cross-reference between the generic guideline steps and the plant specific procedure steps.

6.10 Use of Oversized Pages

Oversized pages should be avoided whenever possible.

6.11 Use of Reduced Pages

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

6.12 Reproduction

Reproduction of procedures, including figures and tables, shall be of a quality equal to that of the originals.

7.0 REFERENCES

7.1 Westinghouse Owners Group Low Pressure ERGs, Volume I to II.

7.2 NUREG/CR-2005, Checklists for Evaluating Emergency Procures used in Nuclear Power Plants.

7.3 FSAR Section 12.4, Written Procedures.

7.4 Westinghouse Owners Group, Writer's Guide for Emergency Response Guidelines, Revision 1, up through and including Revision 1C.

7.5 Point Beach Nuclear Plant Procedures Writers' Guide.

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

7.7 NUREG-1358, Lessons Learned from the Special Inspection Program for Emergency Operating Procedures.

7.8 NUREG-1358, Supplement 1, Lessons Learned from the Special Inspection Program for Emergency Operating Procedures.

7.9 WCAP 10204, Emergency Response Guidelines Validation Program.

7.10 WCAP 10599, Emergency Response Guidelines Validation Program Final Report.

7.11 Westinghouse Owners Group (WOG) Emergency Response Guidelines.

7.12 Westinghouse Owners Group Emergency Response Guidelines, Executive Volume.

8.0 BASES

NONE

ATTACHMENT A
(Page 1 of 3)
DEFINITIONS OF KEY WORDS AND PHRASES

AVAILABLE

Indicates that a system, subsystem, train, component, or device is capable of performing its specified function(s) even though required auxiliary equipment may or may not be capable of performing their related support function(s).

CHECK

Observe a system or parameter to determine its present condition. When "Check" is used there will always be criteria included (possible in a subsequent substep) to be used in the evaluation. The word "Check" alone does not imply that any action is to be taken beyond observing the condition.

Example: **Check if SI is Actuated**

DO NOT CONTINUE

The procedure user should not continue in this procedure until the desired condition that follows is obtained. If another procedure is being done concurrently, it does not have to be halted but the operator should be cautious to avoid taking any actions that this statement is attempting to avoid.

Example: Do not proceed to next step until RCS pressure is reduced to 1200 psig.

ENSURE

The word "Ensure" is used to confirm that an expected desirable condition exists. If the condition does NOT exist, the appropriate contingency, either stated or implied, is to establish the expected condition.

FAULTED (NON-FAULTED)

"Faulted" refers to a steam generator with an uncontrolled secondary system release.

Example: **Identify Faulted Steam Generator**

ATTACHMENT A
(Page 2 of 3)
DEFINITIONS OF KEY WORDS AND PHRASES

GO TO (RETURN TO)

This phrase tells the procedure user to leave the procedure at this point and continue executing procedure steps beginning with the step number in this statement. The user will sometimes be instructed to go to an earlier step in the procedure (i.e., "Return to") or a later step in the procedure (i.e., "Go to") or another procedure altogether. Whenever the user leaves a procedure, prior to the end, a shoe lace should be inserted as a page marker. Often the procedure that the user is transferred to will have an instruction to "return to the procedure in effect." This page marker will allow the user to continue the original procedure where it was left off.

INTACT

"Intact" specifically refers to a steam generator that is neither faulted nor ruptured. This means the steam generator does not have a secondary depressurization or tube rupture. Often if neither steam generator is intact, one of them will have to be considered intact to complete necessary actions in the procedure. This is also described in the appropriate procedure.

Example: **Depressurize Intact Steam Generator to 250 psig**

Intact can also be used more generally to describe a pressure boundary that is not relieving.

LOCALLY

This word is used to remind the procedure user that the action that follows cannot be executed from the Control Room.

MANUALLY

This word is used to remind the procedure user that the action that follows can be done from the control room.

OPERATE

This word is used to allow the operator to manipulate a particular control or cycle equipment in order to establish or maintain a definite criteria.

RUPTURED (NON-RUPTURED)

"Ruptured" refers to a steam generator with a ruptured tube.

ATTACHMENT A
(Page 3 of 3)
DEFINITIONS OF KEY WORDS AND PHRASES

PER

This word is used to present a reference procedure identifier that is to be used in satisfying the step. This is used when there are additional concerns that have to be addressed beyond the information that can be put in the procedure. The user is expected to obtain the referenced procedure and satisfy the directives of this procedure while performing the procedure step.

VERIFY

"Verify" is used to confirm that an expected desirable condition exists. The desirable condition shall be defined in succeeding substeps. If the condition does NOT exist, the contingency stated in the RNO column shall be followed.

Example:

9	Verify SI Flow Not Required:			
	a.	Check RCS subcooling based on core exit thermocouples - GREATER THAN [80°F] 35°F	a.	Manually start SI pumps as necessary to restore RCS subcooling and go to EOP-1 UNIT 1, LOSS OF REACTOR OR SECONDARY COOLANT o 1P-15A, train A o 1P-15B, train B
	b.	Check PZR level – GREATER THAN [34%] 10%	b.	Perform the following: 1) Control charging flow as necessary maintain PZR level. 2) IF PZR level can NOT be maintained, THEN manually start SI pumps as necessary to restore PZR level and go to EOP-1, LOSS OF REACTOR OR SECONDARY COOLANT o 1P-15A, train A o 1P-15B, train B

ATTACHMENT B
(Page 1 of 1)
ABBREVIATIONS, ACRONYMS, AND SYMBOLS

AC	Alternating Current
AFW	Auxiliary feedwater
AOV	Air Operated Valve
BAST	Boric Acid Storage Tank
CC	Component Cooling
CST	Condensate storage tank
CVCS	Chemical & volume control system
DC	Direct Current
El.	Elevation
EDG	Emergency Diesel Generator
EH	Electrohydraulic
FCV	Flow Control Valve
HCV	Hand-control valve (used as a valve identifier)
HP	High Pressure
I&C	Instrumentation & Control
LP	Low Pressure
MCC	Motor Control Center
MOV	Motor Operated Valve
MSIV	Main Steam Isolation Valve
PORV	Power Operated Relief Valve
PPCS	Plant process computer system
PRT	Pressurizer Relief Tank
PZR	Pressurizer
RCP	Reactor Coolant Pump
RCS	Reactor coolant system
reg	Regulating
RHR	Residual heat removal system
RMS	Radiation monitoring system
RTD	Resistant Temperature Device
RVLIS	Reactor Vessel Level Indication System
RWST	Refueling water storage tank
SFP	Spent Fuel Pool
S/G	Steam Generator
SGTR	Steam generator tube rupture
SI	Safety injection
SL	Turbine Stop Valve Left
SR	Turbine Stop Valve Right
SUR	Startup rate
SW	Service water
ΔT	Delta temperature
TSC	Technical Support Center
VCT	Volume control tank

ATTACHMENT C
(Page 1 of 1)
SYMPTOM OR ENTRY CONDITION EXAMPLES

TRANSITION FROM SEVERAL PROCEDURES FOR DIFFERENT REASONS

B. SYMPTOMS OR ENTRY CONDITIONS

1. This procedure is entered from the following procedure when it has been determined that a natural circulation cooldown is required:

   - EOP-0.1, UNIT 1, REACTOR TRIP RESPONSE, Step 33

2. This procedure is entered from the following procedure after plant conditions have been stabilized following restoration of AC emergency power:

   - ECA-0.1, UNIT 1, LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED, Step 25

3. This procedure is entered from the following procedure if a natural circulation cooldown is in progress:

   - CSP-I.3 UNIT 1, RESPONSE TO VOIDS IN REACTOR VESSEL, Step 2

TRANSITION FROM SEVERAL PROCEDURES FOR THE SAME REASON

B. SYMPTOMS OR ENTRY CONDITIONS

1. This procedure is entered from the following procedures if SI actuates:

   - EOP-0.2 UNIT 1, NATURAL CIRCULATION COOLDOWN, Step 1
   - EOP-0.3 UNIT 1, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITH RVLIS), Step 1
   - EOP-0.4 UNIT 1, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS), Step 1

ATTACHMENT D
(Page 1 of 4)
EXAMPLES OF STEP CONSTRUCTION, DUAL COLUMN PROCEDURES

ACTION STEP

13. **Energize PZR Heaters As Necessary To Saturate PZR Water At Ruptured S/G Pressure**

- o1T-1A
- o1T-1B
- o1T-1C
- o1T-1D
- o1T-1E

CONCURRENT STEPS

NOTE

Steps 10 and 11 should be performed at the same time.

10. **Dispatch Operator To Locally Close Breaker 1A52-02**

11. **Dispatch Operator To Locally Close Breaker 1A52-15**

ATTACHMENT D
(Page 2 of 4)
EXAMPLES OF STEP CONSTRUCTION, DUAL COLUMN

CONTINUOUS ACTION STEP

7	**Stabilize S/G Levels:**			
	a.	Check S/G levels – GREATER THAN [51%] 29%	a.	Perform the following: 1) Maintain total feed flow greater than 200 gpm until S/G level greater than [51%] 29% in at least one S/G. 2) IF total feed flow NOT greater than 200 gpm, THEN verify valve alignment and start pumps as necessary to establish total feed flow greater than 200 gpm.
	b.	Control feed flow to maintain S/G levels between [51%] 29% and 65%	b.	IF level in intact S/G continues to rise, THEN stop feed flow to that S/G.

DIAGNOSTIC STEP

17 **Check If Diesels Should Be Stopped:**

a. Check 4160 Vac safeguards buses ENERGIZED BY OFFSITE POWER

- 1A-05, train A
- 1A-06, train B

a. Restore offsite power to 4160 Vac safeguards buses

b. Stop all unloaded EDGs:

- For G-01 OR G-02 use OP-11A, EMERGENCY DIESEL GENERATOR
- For G-03 OR G-04 use OP-11B, EMERGENCY DIESEL GENERATOR

ATTACHMENT D
(Page 3 of 4)
EXAMPLES OF STEP CONSTRUCTION, DUAL COLUMN

EQUALLY ACCEPTABLE SUBSTEPS

55 **Go To Appropriate Post-Steam Generator Tube Rupture Cooldown Procedure:**

- Go to EOP-3.1 UNIT 1, POST-STEAM GENERATOR TUBE RUPTURE COOLDOWN USING BACKFILL

OR

- Go to EOP-3.2 UNIT 1, POST-STEAM GENERATOR TUBE RUPTURE COOLDOWN USING BLOWDOWN

OR

- Go to EOP-3.3 UNIT 1, POST-STEAM GENERATOR TUBE RUPTURE COOLDOWN USING STEAM DUMP

RECURRENT STEP

17.	**Check Surge Tank Level STABLE**	Repeat Steps 13 through 16 every 5 to 10 minutes until surge tank level is stable. Continue with Step 18.

ATTACHMENT D
(Page 4 of 4)
EXAMPLES OF STEP CONSTRUCTION, DUAL COLUMN

TIME-DEPENDENT STEP

d) WHEN containment spray has has been actuated for greater than two minutes, THEN ensure at least one spray additive eductor suction valve open

- 2SI-836A, train A
- 2SI-836B, train B

VERIFICATION STEP

25. **Verify Service Water System**

a.	Ensure service water header pressure - GREATER THAN OR EQUAL TO 40 PSIG	a.	Manually start pump(s) and align valves as necessary to establish service water header pressure greater than or equal to 40 psig.

ATTACHMENT E
(Page 1 of 1)
STATUS TREE PRIORITY IDENTIFICATION SYMBOLS

COLOR	LINE PATTERN CODE	TERMINUS CODE	STATUS/RESPONSE
Red			The critical safety function is under extreme challenge and immediate operator action is required.
Orange			The critical safety function is under severe challenge and prompt operator action is required.
Yellow			The critical safety function condition is off-normal and operator action may be taken but is not required.
Green			The critical safety function is satisfied and no operator action is required.

ATTACHMENT F
(Page 1 of 1)
SAMPLE FORMAT

POINT BEACH NUCLEAR PLANT
EMERGENCY OPERATING PROCEDURES

RESPONSE TO LOSS OF CORE SHUTDOWN

CSP-S.2 UNIT 1 YELLOW
MAJOR
Revision DRAFT 4/8/99
Page 2 of 3

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	NOTE Foldout page shall be monitored throughout this procedure.	
1	Check Intermediate Range Flux - LESS THAN $1.5x10^{-10}$ AMPS • 1N-35, train A • 1N-36, train B	Perform the following: a. IF flux trending lower, THEN perform the following: 1) Monitor flux. 2) WHEN flux less than $1.5x10^{-10}$ amps, THEN go to Step 2. Continue with procedure and step in effect. b. IF flux NOT trending lower AND undercompensation is suspected, THEN go to Step 2. c. IF flux NOT trending lower AND intermediate range channels are NOT undercompensated, THEN borate RCS until flux is less than $1.5x10^{-10}$ amps.
2	Verify Source Range Channels Operating: a. Check source range detectors - BOTH ENERGIZED • 1N-31, train A • 1N-32, train B b. Transfer both pens of NR-45 recorder to source range scale	a. Depress both intermediate range permissive defeat push-buttons.
3	Check Source Range Channels Startup Rate - ZERO OR NEGATIVE • 1N-31, train A • 1N-32, train B	Borate RCS until source range startup rate is negative or zero.

CONTINUOUS USE

ATTACHMENT G
(Page 1 of 26)
SINGLE COLUMN AOP FORMAT

1.0 SINGLE COLUMN AOP FORMAT

1.1 Required Sections For Single Column AOPs

1.0 PURPOSE

2.0 DISCUSSION

3.0 SYMPTOMS

4.0 INITIAL RESPONSE – AUTOMATIC

5.0 INITIAL RESPONSE – MANUAL

6.0 SUBSEQUENT ACTIONS

FIGURES

ATTACHMENTS

1.2 Page Header format

1.2.1 The header printed on every page will be in accordance with Point Beach Nuclear Plant Procedures Writers' Guide. The following information shall appear within the header.

a. POINT BEACH NUCLEAR PLANT.

b. Manual type.

c. Leave one empty row between the manual and the title. The title should be on the bottom line of the header.
(see example below)

d. Title.

e. Unit number (if applicable).

f. Document number.

g. Classification.

ATTACHMENT G
(Page 2 of 26)
SINGLE COLUMN AOP FORMAT

h. Revision number.

i. The word DRAFT shall be used in the title block to designate a procedure that has not received Manager's Supervisory Staff approval.

j. Current date (do NOT use a date code).

1.2.2 The descriptor REVISION 0 shall be used in the title block to designate the original issuance of each procedure.

1.2.3 The following are examples of how some headers appear in documents:

POINT BEACH NUCLEAR PLANT ABNORMAL OPERATING PROCEDURE TITLE UNIT X	AOP X.XX CLASSIFICATION Revision XX DRAFT Month, Day, Year TOTAL REWRITE

POINT BEACH NUCLEAR PLANT ABNORMAL OPERATING PROCEDURE TITLE	AOP XX CLASSIFICATION Revision XX DRAFT Month, Day, Year

1.3 Page Footer format

NOTE: All footers are in Times New Roman 12PT.

1.3.1 The footer printed on every page will be in accordance with Point Beach Nuclear Plant Procedures Writers' Guide. The following information shall appear within the footer.

a. Page number.

b. Total number of pages in the procedure.

ATTACHMENT G
(Page 3 of 26)
SINGLE COLUMN AOP FORMAT

1.3.2 In addition to the procedure page count, attachments will also provide a section page number and total attachment page count under the attachment title. The attachment title is located under the header block.

1.4 Revision Identification

1.4.1 To identify revision to the text of a procedure, a change bar located in the left side of the changed text will be used.

1.4.2 Total rewrite revisions will not utilize revision change bars.

1.5 Attachments

1.5.1 Attachments, figures, and tables may be attached to the procedure to provide additional information. Attachments may be used to simplify transitioning within a procedure if a series of actions may be required in more than one place within the same procedure.

1.5.2 Attachment Pages

a. Attachments shall be designated by sequential capital letters.

b. Attachments are identified with the following header centered immediately below the page header block.

EXAMPLE

ATTACHMENT A
(Page 1 of 2)
TITLE

ATTACHMENT G
(Page 4 of 26)
SINGLE COLUMN AOP FORMAT

1.5.3 Figure Pages

a. Figures shall be designated by sequential Arabic numbers.

b. Figure pages located at the end of the document are identified with the following header centered immediately below the page header block.

EXAMPLE

FIGURE 1
TITLE

c. Related figures may be shown on the same page under a single title. Figures identified with a separate title should be shown on a separate page.

d. Graphical information or pictures may also be presented as figures at the end of the document as a figure page.

e. The independent variable on all graphs should be plotted on the horizontal axis.

f. Figure numbers or titles may be used within the text of a document but are not required. If they are used, all figures within the document should be numbered.

1.5.4 Tables

a. Tables may be used within the text or attachments of a document to clearly present information.

b. Table numbers or titles may be used but are not required. If they are used, all tables within the document should be numbered.

c. There should not be a vacant cell in the table. If no entry is necessary, "NA" or "- -" should be entered to indicate not applicable.

ATTACHMENT G
(Page 5 of 26)
SINGLE COLUMN AOP FORMAT

2.0 FORMAT AND STYLE REQUIREMENTS

2.1 Step Length and Content

2.1.1 Steps should be written in short and precise language.

2.1.2 The writer should consider that persons using the procedure may have a different background or skill level than the writer. Generally procedures should be written so that a fully qualified person can perform the procedure.

2.1.3 Individual steps should be limited to a single action or no more than three closely related actions.

2.1.4 Limits should be expressed quantitatively whenever possible. An example of limits which cannot be expressed quantitatively are the cooldown limits specified by a curve.

2.1.5 The following guidelines should be followed when applying to sequencing of steps within the document:

2.1.6 Technical necessity should be the overriding consideration for step sequencing.

2.1.7 Physical layout and organization of equipment should be considered so that optimal movement and monitoring are achieved.

2.1.8 Steps should be structured to minimize the movement of personnel around the Control Room or the plant during performance of the procedure.

2.1.9 Steps should be structured to avoid unintentional duplication of tasks.

2.1.10 All numbered steps should be assumed to be performed in sequence unless stated otherwise in a preceding note.

2.1.11 Expected results of routine tasks need not be stated.

2.1.12 When considered beneficial for proper understanding and performance, provide the system response time associated with performance of the instruction.

ATTACHMENT G
(Page 6 of 26)
SINGLE COLUMN AOP FORMAT

2.1.13 When system response dictates a time frame within which the instruction must be accomplished, prescribe such time frame. Avoid using time to initiate operator actions. Operator actions should be related to plant parameters.

2.1.14 When additional confirmation of system response is considered necessary, prescribe the backup readings to be taken.

2.1.15 Definitions of key words and phrases used in procedures are listed in Attachment A, Definitions of Key Words and Phrases.

2.1.16 Items that are unique to the procedures are listed in Attachment B, Abbreviations, Acronyms, and Symbols. These items are used to help in keeping procedures concise.

2.1.17 When used in statements other than logic statements, "not" shall stand for the negative of the proceeding group of words.

2.1.18 Procedures shall be structured so that they can be executed by the minimum shift staffing and Control Room staffing required by Technical Specifications.

2.2 Use of Logic Terms

2.2.1 The logic terms AND, OR, IF, IF...NOT, WHEN...THEN, and IF...THEN are often necessary to precisely describe a set of conditions or sequence of actions.

2.2.2 When logic terms are used, they should be in all capital letters and underlined so that all conditions are clear to the document user.

2.2.3 When steps are contingent upon certain conditions or combinations of conditions, the step should be formatted in accordance with one of the following examples:

EXAMPLES

- IF condition A, THEN perform action.
- IF condition A is NOT satisfied, THEN perform different action.
- WHEN condition A, THEN perform action.

ATTACHMENT G
(Page 7 of 26)
SINGLE COLUMN AOP FORMAT

2.2.4 Use of the logic term IF...NOT should be limited to those cases where the document user must respond to the second of two possible conditions. The logic term IF should be used to specify the first condition, as shown in the above example.

2.2.5 The logic term THEN should always follow a condition, not an action. This ensures only one action exists for each step.

EXAMPLES

- Ensure spray addition tank level has been lowered by at least 12%, THEN stop containment spray (Unacceptable)
- WHEN spray addition tank level has been lowered by at least 12%, THEN stop containment spray. (Acceptable)

2.2.6 Action steps should be performed in sequence so that a conjunction such as "and" is not required between steps. However, in the case of combinations of conditions within a single step, the logic term AND should be placed between the description of each condition.

EXAMPLE

IF condition A AND condition B AND condition C, THEN perform action.

2.2.7 In order to simplify a long sequence of conditions, the logic term AND should not be used to join more than three conditions. If more than three conditions need to be joined, a list format should be used.

EXAMPLES

IF all of the following conditions are met, THEN perform action.
- Condition A
- Condition B
- Condition C
- Condition D
- Condition E

ATTACHMENT G
(Page 8 of 26)
SINGLE COLUMN AOP FORMAT

2.2.8 When used for connecting actions in a step, the word "and" need not be emphasized.

EXAMPLE

Stop SI pumps and place in standby.

2.2.9 The logic term OR should be used between alternative conditions. It should be used in the inclusive sense, meaning that any one or all of the conditions may be present.

EXAMPLE

IF condition A OR condition B, THEN perform action.

2.2.10 The word "or" (not a logic term) should be used between alternative actions. It should be used in the exclusive sense, meaning that only one action is to be performed.

EXAMPLE

IF condition A, THEN perform action A or action B, but not both.

2.2.11 Presenting alternative actions without stating priorities should be minimized. Priorities should be established for each action where possible.

ATTACHMENT G
(Page 9 of 26)
SINGLE COLUMN AOP FORMAT

2.2.12 The use of logic terms AND and OR within the same step should be worded so as to avoid confusion or ambiguity, as shown in the following example.

EXAMPLE

IF condition A AND condition B OR condition C occurs, THEN go to Step X.

This example can have two possible meanings and should be worded instead as either one of the following:

Meaning Number 1:

- IF both condition A AND condition B occur, THEN go to Step X.

  OR

- IF condition C occurs, THEN go to Step X.

Meaning Number 2:

- IF both condition A AND condition B occur, THEN go to Step X.

  OR

- IF both condition A AND condition C occur, THEN go to Step X.

ATTACHMENT G
(Page 10 of 26)
SINGLE COLUMN AOP FORMAT

2.2.13 Conditional statements in notes and cautions should follow all requirements for logic terms with the following exceptions:

a. They should be written in lower case with no underline.

b. The logic term THEN should not be used.

EXAMPLES

- IF condition A AND condition B, THEN result. (Unacceptable in notes and cautions)
- If condition A and condition B, result. (Acceptable in notes and cautions)

2.3 Use of Cautions and Notes

2.3.1 Non-action information should be presented as either a note or caution.

2.3.2 A caution is used to present information regarding potential hazards to personnel or equipment associated with the subsequent step(s).

2.3.3 A note is used to present advisory or administrative information necessary to support performance of the subsequent step(s).

2.3.4 Notes or cautions shall appear immediately before the step to which they apply.

ATTACHMENT G
(Page 11 of 26)
SINGLE COLUMN AOP FORMAT

2.3.5 Cautions should appear within the page border, extending across the appropriate page width, inside a distinct box and in bold font. The word CAUTION in all capital letters, bolded and underlined, should be centered at the top of the box.

CAUTION

This is the CAUTION format.

2.3.6 The appropriate page width is defined as the same width as the step to which the CAUTION applies.

2.3.7 Notes should appear within the page border, extending across the appropriate page width and in bold font. The word NOTE in all capital letters and bolded should be at the beginning of the line.

NOTE: This is the NOTE format.

2.3.8 The appropriate page width is defined as the same width as the step to which the NOTE applies.

2.3.9 Notes may be grouped together with each individual note identified with a closed bullet (•).

2.3.10 Cautions may be grouped together with each individual caution identified with a closed bullet (•).

2.3.11 Cautions shall precede notes when they appear together unless the note contains information which clarifies the caution.

2.3.12 Notes and cautions and the first applicable step shall not be split between pages.

2.3.13 Notes and cautions themselves shall not be split between pages.

ATTACHMENT G
(Page 12 of 26)
SINGLE COLUMN AOP FORMAT

2.3.14 The following guidelines apply to the wording in notes and cautions:

a. Each document should provide enough information to accomplish the purpose of the document without relying on information contained in notes or cautions.

b. Notes and cautions should be declarative statements of fact and not commands or action statements unless they are advising on actions to be taken in the event of changing plant conditions.

c. Notes and cautions which are repeated in different documents should have standardized wording whenever possible.

2.4 Use of Underlining

2.4.1 Underlining will be used for emphasis of logic terms and to designate transitions.

2.5 Transitions to Other Procedures or Steps

2.5.1 Examples of transition from several procedures for the same or different reasons are listed in Attachment C, Symptom or Entry Condition Examples.

2.5.2 Transitioning is defined as leaving the procedure at the current step and resuming actions in another procedure or step within the current procedure.

2.5.3 Since transitioning is likely to lead to errors in implementation by interrupting the flow of guidance, documents should be written to minimize the use of transitions. For example, if short sections of other procedures are required, those sections may be copied into the procedure instead of transitioning to the other procedure.

2.5.4 Transitions to other procedures do not contain an automatic return feature. If it is desired to return to the procedure which caused the transition, words such as "return to procedure and step in effect" must appear in the procedure being transitioned from.

2.5.5 A transition is identified by underlining the transition.

ATTACHMENT G
(Page 13 of 26)
SINGLE COLUMN AOP FORMAT

2.5.6 Steps which create a transition to another document should be formatted in accordance with the following example:

EXAMPLE

Transitions to another document:

o Go to EOP-0.1, REACTOR TRIP RESPONSE.

2.5.7 Transitions to an earlier or a later step in the current document or to an attachment in the current document should be formatted in accordance with the following example:

EXAMPLE

Transitions within the current document:

- Go to Step 10.
- Return to Step 2
- Go to ATTACHMENT A.

2.5.8 Transitions to steps within the current document which are preceded by a caution or note should be formatted in accordance with the following example:

EXAMPLE

Transitions to steps in the current document with preceding notes or cautions:

- IF conditions are NOT satisfied, THEN OBSERVE NOTE PRIOR TO STEP 1 and return to Step 1.
- IF conditions are NOT satisfied, THEN OBSERVE CAUTION PRIOR TO STEP 10 and go to Step 10.

ATTACHMENT G
(Page 14 of 26)
SINGLE COLUMN AOP FORMAT

2.6 Branching to Other Documents

2.6.1 Branching is defined as the concurrent performance of two or more documents. Branching can also apply to the use of attachments to the main document.

2.6.2 Each document should contain all the guidance necessary to perform the course of action. Therefore, the writer should limit the use of branching whenever possible.

2.6.3 Branching should be used for the following situations:

a. When a complex or time consuming operation is required which could delay performance of the main document.

b. When more than three local operator actions are necessary which do not require close supervision by the performer of the main document.

c. When it is desired to delegate supervision of a particular task sequence to another individual.

2.6.4 Steps which create a branch should contain the following information in the order shown:

a. A brief description of the actions to be accomplished in the document being branched to.

b. The term "per."

c. The document number and title in all capital letters. When branching to an attachment within the current document, it is only necessary to specify the attachment designator in all capital letters.

d. When branching to an attachment in another document, the appropriate attachment designator at which to enter the other document should be included following the document title.

ATTACHMENT G
(Page 15 of 26)
SINGLE COLUMN AOP FORMAT

e. The words "while continuing with this procedure (instruction)" should be placed at the end of the sentence to emphasize the need for concurrent performance.

EXAMPLES

1. Check Emergency Diesels -
ANY RUNNING UNLOADED

a. Stop any unloaded diesel per
OP 11A, EMERGENCY DIESEL GENERATOR

2.7 Referencing

2.7.1 Referencing is defined as the use of other documents or sources of information to perform the current step. Referencing also applies to obtaining guidance from plant management or plant engineering staff.

2.7.2 Referencing is usually made to figures or other sources of information that are too lengthy to be provided in the step.

2.7.3 Referencing to a document is designated by the term "refer to" followed by the document designator.

2.7.4 Referencing to a person for guidance is designated by the terms "as determined by" or "as directed by" followed by the title.

EXAMPLES

- Refer to ATTACHMENT A for list of valves receiving containment isolation signal.
- Adjust RMS high alarm setpoint to clear alarm as directed by TSC.

ATTACHMENT G
(Page 16 of 26)
SINGLE COLUMN AOP FORMAT

2.8 Component Identification

2.8.1 The preferred method for identifying equipment in procedures is to use the name and number of the equipment.
(Word Paraphrasing Method)

EXAMPLES

o Emergency Diesel Generator G01

o Letdown Containment Isolation Valve CV-371

2.8.2 When two or more equipment numbers can be associated with the same equipment name, the equipment numbers should be listed below the equipment name.

EXAMPLE

1. Shut Letdown Orifice Isolation Valves

   - CV-200A
   - CV-200B
   - CV-200C

2.8.3 When a list of equipment is included in a procedure, the equipment number followed by a comma and the equipment name should be listed.

EXAMPLE

1. Locally ensure the following valves open:

- 2SF-820B, RWST to P-33 refueling water circulating pump valve
- 1SF-820, RWST to P-33 refueling water circulating pump valve

ATTACHMENT G
(Page 17 of 26)
SINGLE COLUMN AOP FORMAT

2.8.4 In some cases it may be desired to identify the component exactly as it appears on the component label.
(Verbatim Method)

a. This method should be used when Control Room annunciator legends are provided in documents.

b. This method should be used when component nameplate identification is provided as part of an equipment lineup checklist which is intended to be read by the document user performing the equipment manipulation.

c. This method should be used when other identification methods have resulted in confusion.

EXAMPLE

- EDG G01

2.8.5 When only a generic reference to a component is being made, the equipment number is not needed.
(Common Usage Method)

EXAMPLES

- Start one emergency diesel generator
- Identify all open containment isolation valves

ATTACHMENT G
(Page 18 of 26)
SINGLE COLUMN AOP FORMAT

2.9 Level of Detail

Too much detail in abnormal operating procedures should be avoided in the interest of being able to effectively execute the instructions in a timely manner. The level of detail required is the detail that a newly trained and licensed operator would desire during an abnormal condition.

To assist in determining the level of detail for abnormal operating procedures, the following general rules apply.

2.9.1 Actions may unintentionally be performed incorrectly or omitted if a procedure lacks needed information. On the other hand, excessive detail can result in the procedure being time consuming or in steps being missed due to the user scanning over the procedure. To determine the appropriate level of detail the following factors should be considered:

a. User knowledge and skills (skill of the craft).

b. Complexity of task.

c. Task frequency.

d. Past experience in implementing the procedure.

2.9.2 Recommended action verbs are as follows:

a. Use "start/stop/pullout" for power-driven rotating equipment.

b. Use "open/shut/throttle" for valves.

c. Use "trip/close/lockout/pullout" for electrical breakers.

2.9.3 Standard practices for observing abnormal results need not be prescribed within procedural steps. For example, observations of noise, vibration, erratic flow, or discharge pressure need not be specified by steps that start pumps.

2.9.4 Procedure steps will be numbered and substeps indented as follows:

1.0 Section Title
1.1 High Level Step
1.1.1 First Level Substep
a. Second Level Substep

ATTACHMENT G
(Page 19 of 26)
SINGLE COLUMN AOP FORMAT

3.0 MECHANICS OF STYLE

3.1 Spelling

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

3.2 Punctuation

Punctuation should be used only as necessary to aid reading and prevent misunderstanding. Word order should be selected to require a minimum of punctuation. When extensive punctuation is necessary for clarity, the sentence should be rewritten and possibly made into several sentences. Punctuation should be in accordance with the following rules.

3.2.1 COLON should be used to indicate that a series of related substeps or a list is to follow.

3.2.2 COMMA should be used:

a. Prior to the logical term THEN.

b. To separate items in a series.

c. Prior to the conjunction in a series.

d. To separate five or more digits in a numeral.

EXAMPLES

- IF conditions satisfied, THEN take action.
- Unlock, rack in, and close the following breakers:

ATTACHMENT G
(Page 20 of 26)
SINGLE COLUMN AOP FORMAT

3.2.3 HYPHENATION of words should be minimized while meeting the following guidelines:

a. Hyphenated component identifiers and document numbers should be kept on the same line of text.

b. Written compound numbers from twenty-one to ninety-nine should be hyphenated.

c. Written fractions, such as one-half, should be hyphenated.

d. Compound words with "self," such as self-contained, should be hyphenated.

e. Compound words which would result in misleading or awkward combinations of consonants, such as bell-like, should be hyphenated.

f. Compound words which could be confused with another word, such as re-cover versus recover or pre-position versus preposition, should be hyphenated.

g. A letter which is linked to a noun, such as x-ray or O-ring, should be hyphenated.

h. Chemical elements and their atomic weights, such as Boron-10 or U-232, should be hyphenated.

3.2.4 PARENTHESES, ( ), may be used to set off explanatory or supplementary information.

a. Action steps should not be included within parentheses.

b. May be used to denote the plurality of a noun name or equipment.

c. Documents should be written to avoid the use of parentheses.

ATTACHMENT G
(Page 21 of 26)
SINGLE COLUMN AOP FORMAT

3.2.5 PERIOD is used at the end of complete sentences and for indicating the decimal place in numbers.

3.2.6 QUOTATION MARK may be used to set off unique titles or examples contained within the text of a document.

Quotation marks should not be used for program description, procedure, or instruction titles.

3.2.7 SEMICOLON should not be used because they encourage long sentences.

3.2.8 SLANT may be used to:

a. Form fractions.

b. Indicate alternate positions on a single switch.

c. Form acronyms such as S/G for steam generator.

3.3 Capitalization

3.3.1 Capitalization should be used consistently in documents to avoid confusion.

If used too often or inappropriately, capitalization can hamper reading speed and comprehension.

3.3.2 The following words normally have an initial capital letter:

a. The first word in a sentence.

b. The first word in steps and substeps.

c. The first word in a list.

d. Words such as Step, Section, and Number when followed by a designating numeral or letter.

ATTACHMENT G
(Page 22 of 26)
SINGLE COLUMN AOP FORMAT

3.3.3 Capitalization of only the important words should be used for the following:

a. Proper nouns such as an organization's name.

b. Official personnel or staff titles.

3.4 Vocabulary

3.4.1 Certain terms have unique meanings as listed below:

a. Manual or manually - an action performed by the document user at the location of document performance.

b. Local or locally - an action performed by a document user at a location other than the Control Room.

EXAMPLES

- "Manually shut valve" means to operate Control Room switch(s) to close the valve. If the valve cannot be closed from the Control Room, then dispatch an operator to locally close the valve.
- "Locally shut valve" means to directly manipulate the hand wheel, air supply, or other equipment to close the valve.

c. Operable - A system, subsystem, train, component, or devices operable when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power, cooling water, seal water, lubrication, or other auxiliary equipment are also capable of performing their related support function(s).

d. Operating - indicates that a system, subsystem, train, component, or device is in operation and is performing its specified function(s). Auxiliary equipment required to perform its specified function(s) may or may not be capable of performing their related support function(s).

ATTACHMENT G
(Page 23 of 26)
SINGLE COLUMN AOP FORMAT

e. Available - indicates that a system, subsystem, train, component, or device is capable of performing its specified function(s) even though required auxiliary equipment may or may not be capable of performing their related support function(s).

3.4.2 Words such as "approximately," "rapidly," and "slowly" should not be used unless clarification is provided.

3.4.3 The terms "increase," "decrease," "increasing," and "decreasing" shall not be used. In order to avoid possible confusion, these terms should be replaced with other terms that convey the same intent, such as "rising," "lowering," "trending higher," or "trending lower."

3.4.4 The following rules apply to inequalities:

a. Inequalities should be expressed as words rather than symbols.

b. The terms "greater than" and "less than" should be used instead of "above" or "below," unless they could cause confusion. Then the terms "higher than" and "lower than" should be used.

EXAMPLES

- The phrase "maintain level greater than three feet below the reactor vessel flange" could mean to keep level at least three feet below the flange or it could mean that level should not be lower than three feet below the flange. (Unacceptable)
- The phrase "maintain level higher than three feet below the reactor vessel flange" means keep level above the negative three foot setpoint. (Acceptable)
- The phrase "maintain level lower than three feet below the reactor vessel flange" means keep level below the negative three foot setpoint. (Acceptable)

ATTACHMENT G
(Page 24 of 26)
SINGLE COLUMN AOP FORMAT

3.4.5 Although excessive use of symbols can be confusing, certain symbols are widely recognized and can be effective in increasing reading speed.

a. The terms differential pressure and delta P may be written as ΔP.

b. The terms differential temperature and delta T may be written as ΔT.

c. The terms degrees Fahrenheit and degrees Centigrade may be written as °F and °C respectively.

d. The word percent may be written as % when used following a number.

e. Mathematical symbols in equations may be used.

f. Greek letters and other symbols used to express engineering units may be used.

3.5 Numerical Values

3.5.1 Use of Roman Numerals should be avoided whenever possible.

3.5.2 All numerical values should be consistent with scale and range that can be read on the instrumentation to be used. This is typically one-half the smallest division on the instrumentation being used.

3.5.3 The number of significant digits presented should be equal to the reading precision of the document user.

3.5.4 Decimal functions should be written with at least one digit to the left of the decimal point.

ATTACHMENT G
(Page 25 of 26)
SINGLE COLUMN AOP FORMAT

3.5.5 Numbers written in exponential form should be written as shown in the following example.

EXAMPLES	
o 6.4×10^{-6}	(preferred)
o 6.4 E-6	(acceptable)

3.5.6 Acceptance values should be stated in such a way that any addition and subtraction operations are avoided. This is done by stating acceptance values as limits.

EXAMPLES

ACCEPTABLE	UNACCEPTABLE
maintain pressure between 238 psig and 262 psig	maintain pressure at 250 + 5%
torque to between 22 ft-lbs and 26 ft-lbs	torque to 24 ± 2 ft-lbs

3.5.7 Engineering units should always be specified when presenting numerical values for process parameters. They shall be the same as those used on the instrumentation displays.

3.5.8 Numerical values and associated engineering units should be kept on the same line of text.

ATTACHMENT G
(Page 26 of 26)
SINGLE COLUMN AOP FORMAT

3.6 Abbreviations, Letter Symbols and Acronyms

3.6.1 When using abbreviations and acronyms, it is important to determine who the user of the procedure is. In some cases it may be acceptable to use abbreviations and acronyms without definition. In other cases it may need to be defined to ensure the user knows its meaning.

3.6.2 When an abbreviation or acronym needs to be defined, it should be done by writing out the term and placing the abbreviation or acronym in parentheses after the term. Refer to Attachment B for a listing of abbreviations.

EXAMPLE

Calculate fuel usage in Effective Full Power Days (EFPD).

ATTACHMENT H
(Page 1 of 1)
PRA CORE DAMAGE RISK MATRIX

Procedure	EVENT				
	SGTR	Turbine Trip without the Condenser	LOOP	Loss of CCW	Steam Line Break
EOP 0	X	X	X	X	X
EOP 0.0	--	--	--	--	--
EOP 0.1	--	X	X	X	--
EOP 0.2	--	--	X	X	--
EOP 0.3	--	--	X	X	--
EOP 0.4	--	--	X	X	--
EOP 1	X	--	X	--	X
EOP 1.1	--	--	--	--	--
EOP 1.2	X	--	--	X	--
EOP 1.3	--	--	X	--	--
EOP 1.4	--	--	X	--	--
EOP 2	--	--	--	--	X
EOP 3	X	--	--	--	X
EOP 3.1	X	--	--	--	--
EOP 3.2	X	--	--	--	--
EOP 3.3	X	--	--	--	--
ECA 0.0	--	--	X	--	--
ECA 0.1	--	--	X	--	--
ECA 0.2	--	--	--	--	--
ECA 1.1	--	--	--	--	--
ECA 1.2	--	--	--	--	--
ECA 2.1	X	--	--	--	X
ECA 3.1	X	--	--	--	--
ECA 3.2	X	--	--	--	--
ECA 3.3	X	--	--	--	--
CSP C.1	X	--	X	X	X
CSP H.1	X	--	X	--	X

ATTACHMENT I
(Page 1 of 2)
PRA CONSIDERATIONS

The following are some procedure writing guidelines or techniques that are known to increase the chance of success in performing procedure:

Unreliable information:

For some transients and accidents information may come through alarms or indicators that is different than what is actually present in the field. In these cases, the procedure should cue the operator as to the difference. The primary example currently used in the EOP's is the use of bracketed value for severe containment conditions. Conditions in the plant or personal actions that can cause unreliable information are rare. However, if clear instructions to the operator are not included in the procedure, failure rates can be increase as much as 30 times.

EXAMPLE

a. Check PZR Level - GREATER THAN [34%] 10%

Check vs. Monitor:

Check refers to a step that directs an operator to perform a specific action. Monitor involves steps that direct an operator to perform an action in the future if a specified indication is reached (such as a continuous action step). Monitor steps have a higher probability of failure due to the distractions that can cause the operator to forget to monitor the indication. When possible it is preferable to write Check Steps (take action now steps) vs. Monitor steps. There is a 2 times high probability of missing a monitor step than a check step.

All Cues as Stated:

Alarms may not be indicative of what is actually stated on the alarm, but actually a cue for other problems. These cues should be included in appropriate AOP entry criteria or notes and cautions should be used to inform the reader of potentially misleading information. Examples may include annuiniciators for failed equipment that are due to a larger problem such as a loss if Instrument Air.

ATTACHMENT I
(Page 2 of 2)
PRA CONSIDERATIONS

See section 4.42 of OM 4.3.1 for entry conditions and section 5.4 of OM 4.3.1 for information about notes and cautions. These types of warnings contained within the procedure can reduce the chance of taking inappropriate action by 3 times.

Obvious vs. Hidden Procedure Steps:

Notes and cautions should not contain action steps to perform. **OM 4.3.1 step 5.4.11 does allow for action steps in notes and cautions,** however, these should not be used unless absolutely necessary. The chance of missing a step imbedded in a note or caution is 30 times more likely than a individual numbered step.

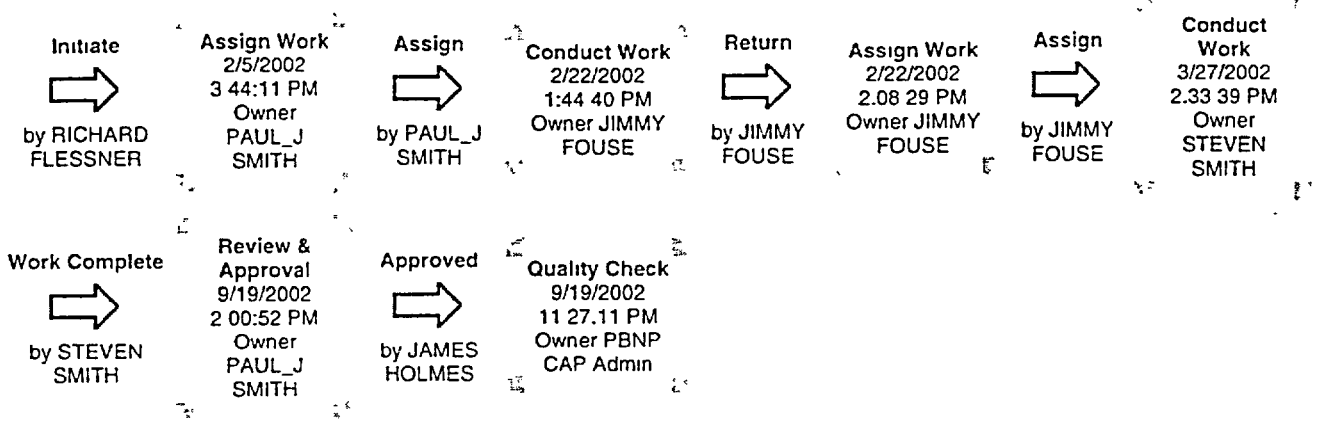
Standard Unambiguous wording:

Steps should include standard nomenclature with usual grammatical construction. Explanation or interpretation should not be required for the reader to understand the instruction. In addition, proper interpretation of the step should not require inference about the future state of the plant. **Section 6.0 or OM 4.3.1 describes the mechanics of style which should be used to avoid ambiguous wording.** Misleading wording can double the probability of performing an error.

Error in Logic:

Use of OR, AND, or NOT can cause a misinterpretation of the logic contained within a step. Generally, the use of a NOT statement can increases the probability of misinterpretation by a factor of 20. The use of an AND or OR could cause an increase in misinterpretation by a factor of 3. The use of an AND and OR step together could cause an increase in misinterpretation by a factor of 5. In summary, the use of the NOT statement or a combination of an AND/OR statement should be avoided if possible. Note that the use of closed and open bullets are assumed AND and OR statements for determining these probabilities. **See OM 4.3.1 section 5.3 for more information about use of NOT, AND and OR.**

STATE CHANGE HISTORY



SECTION 1

Activity Request Id:	CA003699		
Activity Type:	Corrective Action	**Submit Date:**	2/5/2002 3 44.11 PM
Site/Unit:	Point Beach - Common		
Activity Requested:	Review initial operator training materials and methods associated with high-risk human error-events against human error reduction methods used in the PRA model and revise where appropriate to achieve significant CDF risk reduction.		
CATPR:	N	**Initiator:**	FLESSNER, RICHARD
Initiator Department:	EX Engineering Processes PB	**Responsible Group Code:**	TPI Training PB Operations Initial PB
Responsible Department:	Training	**Activity Supervisor:**	PAUL_J SMITH
Activity Performer:	STEVEN SMITH		

SECTION 2

Priority:	3	**Due Date:**	10/4/2002
Mode Change Restraint:	(None)	**Management Exception From PI?:**	N
QA/Nuclear Oversight?:	N	**Licensing Review?:**	N
NRC Commitment?:	N	**NRC Commitment Date:**	

SECTION 3

Activity Completed:

1/18/2002 12:52PM - LARRY PETERSON:
Due date extended as requested and approved by F. Cayia in prior update. Retruned to R. flessner for completion

1/18/2002 12:54PM - LARRY PETERSON:
Reassigned to R. Flessner for completion following extension

3/27/2002 2.33PM - JIMMY FOUSE:

Assigned to S. Smith to conduct work, assigned P. Smith as activity supervisor

8/19/2002 5:13:14 PM - STEVEN SMITH:
Operations Training Group Lead and myself met with PSA personnel and agreed upon a course of action to use the current PSA model to compare against Initial License training materials. PSA group will provide complete listing of HEPs to myself.

9/6/2002 2.41:25 PM - STEVEN SMITH.
After discussion with PRA personnel on 9/5/2002 the attributes applicable to training were defined and summarized as follows:

1. Availability of information (pca) - do we train on the event/HEP
2. Information misleading (pcd) - are cues provided
3 Misinterpreted Instruction (pcf) - do we train on the procedure, step or task
4 Error in interpreting (pcg) - do we train on the procedure to a sufficient detail to discuss difficult logic steps.

The list of HEPs was received on 9/5/2002.

A matrix is being developed which will display the top 10 HEPs and indicate the results of benchmarking Initial License Training materials to the attributes.

At this time, five HEPs have been benchmarked to the ILT materials. However, several problems have been encountered with the relatively dated age of the PRA model and its associated HEPs. All HEPs below are listed by there place on the to 10 list derived by a priority sort by FV X FP.

1. The first rated HEP, HEP-ECC-ECA 0.0-21, OPER Fails To Depressurize SGS to 250 PSI to maintain RCS inventory is now at step 39 and the SG is depressurized to 230 PSI.

2 The 2nd and 6th HEPs (HEP-RHR-EOP13-23 Low head recirc and HEP-HHR-EOP 13-23, high head recirc respectively) are now divided into two EOPs. Low head recalculation procedure steps are contained in EOP 1.3 and high head recalculation steps are contained in EOP 1.4

3. The 7th rated HEP (HEP-MFWCSPH1-XX, OPER Fails to Open MOV SW 2880 After SI) is being considered for deletion. It is not contained in CSP H1, Response to Loss of Secondary Heat Sink. Apparently, SW-2880 was considered at one time to be shut on a Safety Injection Signal, which would have required opening to provide service water-cooling to the main feed pumps in the effort to restore inventory to the SGs on the loss of heat sink. SW – 2880 last appeared in CSP H1 in a 1999 revision as an RNO to close if the required number of service water pumps were not established. This information is being feed back to the PRA group.

4. The 10th rated HEP (HEP-480-AOP10C-6, Fail to align to B08/B09 PER AOP 0.0, Step 6.1) At this time it is unclear on how this HEP is defined. AOP 0.0 is the abnormal procedure to address a Vital DC Malfunction. AOP 10A, Safe Shutdown – Local Control has reference to aligning charging and service water pumps to B08 and B09 and could contain this task. This is being feed back to the PRA group for resolution

In general, training has been conducted on the five HEPs benchmarked with a combination of classroom, simulator and specific task training Details will be attached in matrix form to this corrective action.

9/6/2002 3:18:48 PM - STEVEN SMITH:
EOP 1.3 and EOP 1.4 are Transfer to Containment Sump Recirculation (vs recalculation)- Low and High Head Injection respectively

9/9/2002 5:06 40 PM - STEVEN SMITH:
The scope of the HEPs was expanded to include the top five Auxiliary Feed Water HEPs as well. The matrix is complete with the exception of three HEPs needing definition from the PRA group.

9/19/2002 1:45:49 PM - STEVEN SMITH:
HEP-480-AOP10C, Fail To Align To B08/B09 Per AOP 0.0 Step 6 1 This HEP has been interpreted as referring to OI-112, Aligning Equipment to Appendix R Power Supply.

9/19/2002 2:00.52 PM - STEVEN SMITH:

The matrix of HEPs is complete. All HEP definition/clarification issues are documented in the update section of this CA and/or on the attached matrix No changes to initial operations training materials are required to optimize core damage reduction (bounded by the scope of this CA). However, TWR 02-250 has been created to incorporate reference to HEPs within ILT training materials in the commitment section and body of the applicable lesson plans NP 7.7.20, Probabilistic Risk Assessment, requires that the PRA group inform operations training of PRA model HEP updates and changes.

9/19/2002 11:27:11 PM - JAMES HOLMES.
This item has been reviewed and accepted for closure by Paul J Smith as per our conversation on 9/19/02. While Paul was providing his approval information the system gave him a gateway error and his approval was not captured. This item can be considered closed.

SECTION 4

QA Supervisor:	(None)	**Licensing Supervisor:**	(None)

SECTION 5

Project:	CAP Activities & Actions		
State:	Quality Check	**Active/Inactive:**	Active
Owner:	PBNP CAP Admin	**AR Type:**	Daughter
Submitter:	RICHARD FLESSNER	**Assigned Date:**	3/27/2002
Last Modified Date:	9/19/2002 11:27:11 PM	**Last Modifier:**	JAMES HOLMES
Last State Change Date:	9/19/2002 11:27:11 PM	**Last State Changer:**	JAMES HOLMES
Close Date:			
One Line Description:	Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW		
NUTRK ID:	CR 01-3595		
Child Number:	1		
References:	CR 01-2278ÈRCE 01-069ÈGOOD CATCH		
Update:	PRA and Training personnel met with the RCE author to discuss scope of this corrective action. The high-risk human error events covered by this action are the top 10 HEPs based on the F-V value times the probability of failure. These HEPs will be reviewed against the attributes from EPRI TR-100249 related to training aspects of cognitive failure probabilities Any HEP identified as not receiving full credit for CDF reduction will be further evaluated and tracked via a separate corrective action item The remaining HEPs (beyond the top 10) will be evaluated as part of the ongoing PRA update process (CA003693).		
Import Memo Field:			
CAP Admin:	PBNP CAP Admin	**Site:**	Point Beach
OLD_ACTION_NUM:			
Cartridge and Frame:			

NOTES/COMMENTS

Note created during 'Return' transition by JIMMY FOUSE (2/22/2002 2:08.29 PM)
changed activity supervisor to Jimmy Fouse

Update to CA003699 by ANDREW ZOMMERS (9/16/2002 8.29.34 AM)
Attached file of top 10 HEP events/tasks with the current places those HEP's are trained on Still waiting on feedback from PRA group for the 10th rated HEP dealing with AOP 10 series

ATTACHMENTS AND PARENT/CHILD LINKS

ACE000314: Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW

CAP001415: Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW

CA3699HEPMatrix.doc (47104 bytes)

C ,99 Evaluate Initial License Training Materials for HEl :lusion
Matrix Displays Top 10 HEPs + Aux Feed Water System HEPs

HEPs	Description	F-v X FP	Train On?	Training Setting	Lesson Plan and/or Task	Training on Cues (Entry conditions/symptoms/notes/cautions)
HEP-ECC-ECA 0.0-21	OPER Fails To Depressurize SGS To 250 PSI	4.1E-03	Yes	Classroom Simulator (Procedure ECA 0.0, Loss of all AC Power) Simulator (Task)	LP0462 Loss of All AC Power Task: P000.010.COT Respond to Loss of All AC Power	Entry conditions are discussed in classroom and cues are provided in the simulator.
HEP-RHR-EOP13-23	Operator Fails To Align For LHR	3.65E-03	Yes	Classroom Simulator (Procedure EOP 1.3, Transfer to Containment Sump Recirculation – Low Head Injection Simulator (Task) Field (Task)	LP0435 Loss Of Coolant Accident Task: P000.055.COT Transfer to CTMT Sump Recirc P.000.023.COT Respond To Loss Of CTMT Sump Recirc Capability LP1091 EOP Package: P000.042.AOT Line up transfer to containment sump recirculation post-accident conditions.	Entry conditions are discussed in classroom and multiple cues and scenarios are provided in the simulator.
138-HEP-STARTG05	Operator Fails To Start Gas Turbine-G05	3.6E-03	Yes	Simulator (Task)	Task: P065.002.COT Start the Gas Turbine Remotely P065.003.COT Fast Start the Gas Turbine	Simulator scenarios are conducted during the course of the Initial License Training program that will allow trainees to start G05 based on procedure cues.

C 599 Evaluate Initial License Training Materials for HEA clusion
Matrix Displays Top 10 HEPs + Aux Feed Water System HEPs

HEP-ODC-EOP-3-21	OPER Fails To Depress Intact SG After SGTR	3.18E-03	Yes	Classroom Simulator (Procedure EOP-3, Steam Generator Tube Rupture. Simulator (Task)	LP0441 Faulted S/Gs and SGTRs Task: P000.004.COT Respond to SGTRs	Entry conditions are discussed in classroom and multiple cues and scenarios are provided in the simulator.
HEP-RCS-CSPH1-12	OPER Fails To Establish Bleed + Feed (NO SI)	2.97E-03	Yes	Classroom Simulator (Procedure CSP H.1, Respond to Loss Of Secondary Heat Sink Simulator (Task)	LP1998 Heat Sink Task: P000.028.COT Respond To Loss Of Secondary Heat Sink	Entry conditions are discussed in classroom and multiple cues and scenarios are provided in the simulator.
HEP-HHR-EOP13-23	Operator Fails To Align For HHR	2.14E-03	Yes	Classroom Simulator (Procedure EOP 1.4, Transfer to Containment Sump Recirculation – High Head Injection Simulator (Task) Field (Task)	LP0435 Loss Of Coolant Accident Task: P000.055.COT Transfer to CTMT Sump Recirc P.000.023.COT Respond To Loss Of CTMT Sump Recirc Capability LP1091 EOP Package: P000.042.AOT Line up transfer to containment sump recirculation post-accident conditions.	Entry conditions are discussed in classroom and multiple cues and scenarios are provided in the simulator.

C 699 Evaluate Initial License Training Materials for HE. clusion
Matrix Displays Top 10 HEPs + Aux Feed Water System HEPs

HEP-MFW CSPH1-XX	OPER Fails To Open MOV SW-2880 After SI	1.7E-03		***This HEP is no longer be valid per PRA group decision. See CA3699 Update***		
AF-HEP-MDP-Flow	Failure to Manually Control MDAFW After Loss Of IA	1.28E-03	Yes	Classroom Simulator (Procedure AOP-5A is listed as an option to run in the simulator with the scenario of an instrument air leak in containment, time permitting) Simulator (Task) Field (Task)	LP2439 Secondary Coolant System Malfunctions Task: simulator – P000.036.COT Respond to Loss of Instrument Air Task: Field – P000.004.AOT Respond to loss of IA in the Turbine Hall P115.003.AOT Manually Position an Air Operated Valve	Entry conditions are discussed in classroom and a scenario is provided in the simulator for a general loss of IA to fulfill task requirements.
HEP-SW-AOP9A-63	Operator Fails to Isolate SW Header Rupture	9.41E-04	Yes	Classroom Simulator (Procedure AOP-9A, Service Water System Malfunctions. Includes SW system leak) Simulator (Task)	LP2444 Service Water System Malfunctions Task: P000.014.COT Respond to Service Water System Malfunctions	Entry conditions are discussed in classroom and multiple cues and scenarios are provided in the simulator.

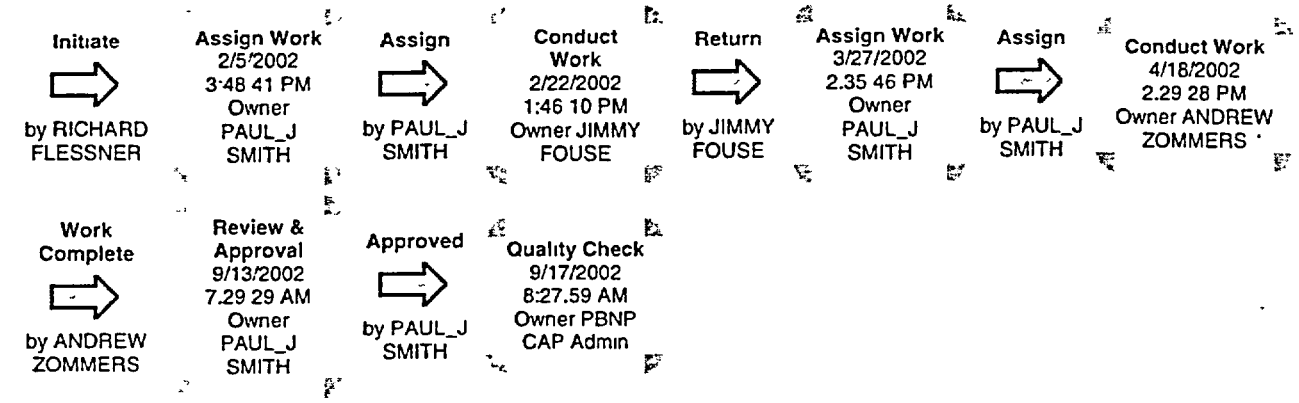
HEP-RCS-CSPH1-13	OPER Fails To Establish Bleed + Feed (W/SI)	6.54E-04	Yes	Classroom Simulator (Procedure CSP H.1, Respond to Loss Of Secondary Heat Sink Simulator (Task)	LP1998 Heat Sink Task: P000.028.COT Respond To Loss Of Secondary Heat Sink	Entry conditions are discussed in classroom and multiple cues and scenarios are provided in the simulator.
HEP-480-AOP10C	Fail To Align To B08/B09 Per AOP 0.0 Step 6.1 This HEP has been interpreted as referring to OI-112, Aligning Equipment to Appendix R Power Supply.	4.8E-04	Yes	Classroom Field (Task)	LP0316 AOP-10A through AOP-29, Specifically AOP 10B, Safe to Cold Shutdown Local. P000.027.AOT Align equipment to alternate power supply. (This is a required task for AOTs and Direct SRO candidates)	Cues are provided in the context of OJT/TPE in which the trainee will be given conditions to perform actions to align equipment in accordance with OI-112.
AF-HEP-CST-FW	Fire Water To CST	4.04E-04	Yes	Classroom Field (Task)	LP0158, EOP Procedure Format and Usage. LP0316 AOP-10A through AOP-29, AOP-23, Establish Alternate Source of AFW Suction Supply is part of this. Task: P000.033.AOT Line Up Alternate	The entry condition of AOP-23 is an EOP foldout page criteria that is standard in the EOP set. The foldout page criteria are stressed through out the ILT training program in all simulator scenarios involving EOP use.

					Sources Of AFW (This is a required task for AOTs and Direct SRO candidates)	
AF-HEP-CST-SWMD	Service Water To The Motor Driven Pump	3.26E-04	Yes	Classroom Field (Task)	LP0158, EOP Procedure Format and Usage. LP0316 AOP-10A through AOP-29, AOP-23, Establish Alternate Source of AFW Suction Supply is part of this. Task: P000.033.AOT Line Up Alternate Sources Of AFW (This is a required task for AOTs and Direct SRO candidates)	The entry condition of AOP-23 is an EOP foldout page criteria that is standard in the EOP set. The foldout page criteria are stressed through out the ILT training program in all simulator scenarios involving EOP use.
AF-HEP-CST-SW	MEX Event Zero	1.48E-04	*Yes*	Per PRA Group this HEP is redundant to AF-HEP-CST-SWMD.		

C 599 Evaluate Initial License Training Materials for HE. clusion
Matrix Displays Top 10 HEPs + Aux Feed Water System HEPs

AF-HEP-CST-Low	Failure Of Operator To Respond To Low CST Level Alarm	4.6E-05	Yes	Classroom Field (Task)	LP0158, EOP Procedure Format and Usage. LP0316 AOP-10A through AOP-29, AOP-23, Establish Alternate Source of AFW Suction Supply is part of this. Task: P000.033.AOT Line Up Alternate Sources Of AFW (This is a required task for AOTs and Direct SRO candidates)	The entry condition of AOP-23 is an EOP foldout page criteria that is standard in the EOP set. The foldout page criteria are stressed through out the ILT training program in all simulator scenarios involving EOP use.

STATE CHANGE HISTORY



SECTION 1

Activity Request Id:	CA003700		
Activity Type:	Corrective Action	**Submit Date:**	2/5/2002 3:48:41 PM
Site/Unit:	Point Beach - Common		
Activity Requested:	Revise operator training procedures to incorporate human error reduction methods used in the PRA model that can significantly reduce CDF risk.		
CATPR:	N	**Initiator:**	FLESSNER, RICHARD
Initiator Department:	EX Engineering Processes PB	**Responsible Group Code:**	TPI Training PB Operations Initial PB
Responsible Department:	Training	**Activity Supervisor:**	PAUL_J SMITH
Activity Performer:	ANDREW ZOMMERS		

SECTION 2

Priority:	3	**Due Date:**	10/4/2002
Mode Change Restraint:	(None)	**Management Exception From PI?:**	N
QA/Nuclear Oversight?:	N	**Licensing Review?:**	N
NRC Commitment?:	N	**NRC Commitment Date:**	

SECTION 3

Activity Completed:

1/18/2002 12:52PM - LARRY PETERSON:
Due date extended as requested and approved by F. Cayia in prior update. Retruned to R. flessner for completion.

1/18/2002 12:54PM - LARRY PETERSON:
Reassigned to R. Flessner for completion following extension.

9/13/2002 7:29:29 AM - ANDREW ZOMMERS:
Operations Training Standard (OTS) 12 was developed to give Operations Training additional guidance when changes to training materials are needed for PRA related items. This OTS was

given to Paul Smith for approval and issuance. When this OTS is issued a copy will be sent to all Operations Training personnel

9/17/2002 8:27:59 AM - PAUL_J SMITH:
OTS 12 issued on 9/16/2002. Copy provided to all operations training personnel. Action is complete. (OTS 12 is linked to this CA)

SECTION 4

QA Supervisor:	(None)	**Licensing Supervisor:**	(None)

SECTION 5

Project:	CAP Activities & Actions		
State:	Quality Check	**Active/Inactive:**	Active
Owner:	PBNP CAP Admin	**AR Type:**	Daughter
Submitter:	RICHARD FLESSNER	**Assigned Date:**	4/18/2002
Last Modified Date:	9/17/2002 8:27:59 AM	**Last Modifier:**	PAUL_J SMITH
Last State Change Date:	9/17/2002 8:27:59 AM	**Last State Changer:**	PAUL_J SMITH
Close Date:			
One Line Description:	Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW		
NUTRK ID:	CR 01-3595		
Child Number:	1		
References:	CR 01-2278ÈRCE 01-069ÈGOOD CATCH		
Update:			
Import Memo Field:			
CAP Admin:	PBNP CAP Admin	**Site:**	Point Beach
OLD_ACTION_NUM:			
Cartridge and Frame:			

NOTES/COMMENTS

Note created during 'Return' transition by **JIMMY FOUSE** (3/27/2002 2.35:46 PM)
Returned to supervisor to assign a new responsible person and supervisor

ATTACHMENTS AND PARENT/CHILD LINKS

ACE000314: Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW

CAP001415: Probabilistic Risk Assessment PRA For Auxiliary Feedwater System AFW

OTS 12 Rev 0 (31744 bytes)

Operations Training Standards

OTS-12 Revision 0

Issue:

Guidance is required concerning the control of training materials in which credit is taken, or can be taken, regarding the PRA model.

Expectations:

Training has a part in lowering the risk of core damage frequency by minimizing operator error Human Error Probability (HEP) focuses on plant information to operator interface and/or procedure to crew interface failures

When training materials are being developed, revised or deleted (LP's, TRQM's, SG's, etc.) specific attention shall be devoted to the HEP events/tasks. The appropriate Program Lead shall be contacted for HEP input prior to the change being made

As a guide, specific elements to consider when developing PRA significant materials are as follows:

1. Availability of Information
   1.1. Training on Indicators - Will the crew receive training under conditions similar to those prevailing in the HEP event/task?
2. Information Misleading
   2.1. Specific Training - Will simulator training provide a similar cue configuration and emphasize the correct interpretation of the procedure in the face of the degraded cue state?
   2.2. General Training - Will the operators receive training that should allow them to recognize when the cue information is not correct for the given circumstances?
3. Misinterpret Instructions
   3.1. Training on Step - Will the operators receive training on the correct interpretation of this step or task?
4. Error in Interpreting Logic (do we train on difficult logic steps)
   4.1 NOT statement - Does the step contain the word "not?"
   4.2 AND or OR statement - Does the step contain diagnostic logic where more than one condition is combined to determine the outcome?
   4.3 Both AND and OR - Does the step contain a complex logic involving a combination of ANDed and ORed terms?
   4.4 Practiced Scenarios - Will the crew practice this step in the simulator?

If materials will be linked to an HEP event/task, the following shall occur:

- The HEP task shall be linked in the Task-To-Training matrix.
- The HEP task shall be documented in the commitments section of the lesson plan or Simulator guide.
- The PRA group shall be informed to update their materials.

The PRA group shall be contacted prior to deleting training materials that are linked to an HEP event/task.

Approved: _____ 9/6/02
Operations Training Supervisor Date