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Log # TXNB-09082

Ref. # 10 CFR 52

December 21, 2009

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555
ATTN: David B. Matthews, Director
Division of New Reactor Licensing

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 3 AND 4
DOCKET NUMBERS 52-034 AND 52-035
EMERGENCY ACTION LEVELS

REFERENCE: Letter, R. Flores to D. B. Matthews, "Responses to Requests for Additional Information No. 2864, 3295, and 3327," dated November 18, 2009 (TXNB-09072)

Dear Sir:

In the referenced letter, Luminant Generation Company LLC (Luminant) stated that the Emergency Action Limits (EALs) provided in Appendix 1 of the Emergency Plan would be updated to include current US-APWR design information, and to indicate the differences and deviations from NEI 99-01, Revision 5. This letter fulfils that commitment.

Our response to Question 13.03-1 in the referenced letter stated that we would follow NRC Option 2 for submittal of the Emergency Plan EALs. Option 2 requires the submittal of four critical elements:

1) propose an overview of the EAL scheme
2) develop the remainder of the EAL scheme using a specific NRC-endorsed guidance document
3) propose a License Condition to create a fully-developed set of EALs
4) keep the EALs in a document controlled by 10 CFR 50.54(q).

The referenced letter included the information requested in Critical Elements 1, 3, and 4, and identified the templates that would be used for Critical Element 2. The attachment to this letter incorporates all of the known design information (setpoints) and where the information is not yet available, a methodology is provided that will be used to establish the setpoints. This complements the original response and addresses all of the Critical Elements.

Should you have any questions regarding this submittal, please contact Don Woodlan (254-897-6887, Donald.Woodlan@luminant.com) or me.

There are no commitments in this letter.

DO9D
NRO

I state under penalty of perjury that the foregoing is true and correct.

Executed on December 21, 2009.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachment: COL Application Part 5, Emergency Plan Revision 1, Update Tracking Report Revision 0

Email distribution w/attachment

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Attachment

COL Application Part 5, Emergency Plan Revision 1, Update Tracking Report Revision 0

December 18 2009

Comanche Peak Nuclear Power Plant, Units 3 & 4
COL Application

Part 5

Emergency Plan Revision 1

Update Tracking Report

Revision 0

Revision History

Revision	Date	Update Description
-	11/20/2009	COLA Revision 1 Transmittal See Luminant Letter no. TXNB-09074 Date 11/20/2009
-	11/12/2009	Updated Section: II, Appendix 4, Appendix 5, Appendix 7, See Luminant Letter no. TXNB-09066 Date 11/12/2009 Incorporated responses to following RAIs: No. 70, 78
-	11/16/2009	Updated Section: II, Appendix 4, Appendix 5, Appendix 7, See Luminant Letter no. TXNB-09066 Date 11/16/2009 Incorporated responses to following RAIs: No. 88
0	12/18/2009	Update Section Appendix1

Tracking Report Revision List

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RCOL2_13.03-2	Figure II-1	II-13	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Change "Texas Department of Health" to "Texas Department of State Health Services"	-
RCOL2_13.03-03	II.B.1	II-14	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Rearrange 1st and 2nd Paragraph	-
RCOL2_13.03-03	II.B.1	II-14	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Add bullet: • Approve release of public information from Luminant	-
RCOL2_13.03-03	II.B.5	II-18	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Add statement indicating further information regarding the duties and responsibilities of ERO positions are contained in EPPs addressing "Activation and Operation" of the various ERFs.	-
RCOL2_13.03-03	II.B.5	II-19	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Add new section discussing responsibilities of the Emergency Planning Advisor	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RCOL2_13.03-03	Figure II-2	II-24	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Add "Security Shift Supervisor" to top row of diagram	-
RCOL2_13.03-03	Figure II-4	II-26	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Add "ERDC Teams" above "Team Communicator"	-
RCOL2_13.03-03	Table II-2	II-29	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Change 40 and 70 minutes to 30 and 60 minutes Change "Plant Equipment Operators" to "Nuclear Equipment Operators" Change Footnote on "Chemistry Technician," "Mechanic," "Electrician," and "I&C Technician" from "f" to "a"	-
RCOL2_13.03-1	II.D.1	II-33 II-34	Response to RAI No. 70 Luminant Letter no.TXNB-09072 Date 11/18/2009	Revise definitions of emergency classes to include a general list of licensee actions at each emergency	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RCOL2_13.03-14	II.E.1	II-36	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Add footnote indicating that in the event of a security-related attack on the site by a hostile force, a brief notification is provided to the NRC following notification of the designated State and local authorities and within approximately fifteen minutes of the discovery of the event.	-
RCOL2_13.03-5 F-1	II.F.1	II-40	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Added discussion of backup power capability of the microwave hut at Comanche Peak.	-
RCOL2_13.03-5 F-1	II.F.1.b	II-41	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Added discussion of dedicated circuit and private telephone lines using the public telephone system and backup power is provided to meet the requirements of 47 CFR 12.2.	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RCOL2_13.03-5 F-2	II.F.1.c	II-42	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Added discussion describing the ENS, HPN, RSCL, PMCL, LAN; known collectively as the Emergency Telecommunication System (ETS). The ETS uses the Federal Telecommunications System.	-
RCOL2_13.03-6	II.G.2	II-45	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Added statement indicating publically posted information will be reviewed and, if necessary, updated annually in coordination with Hood and Somervell Counties.	-
RCOL2_13.03-7	II.H.2	II-49	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Add discussion stating the EOF is a well engineered building meeting the Uniformed Building Code. Characteristics of the EOF's walls, ceilings, shielding and ventilation were also added. Add sentence indicating details regarding EOF habitability are described in the EPP that addresses "Activation and Operation of the EOF."	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RCOL2_13.03-7	II.H.	II-50	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Add statement indicating the documents maintained in the EOF are kept current and are maintained as described in document control procedures. Add bullet indicating that the EOF reference materials include the US-APWR DCD.	-
RCOL2_13.03-9	II.J.1	II-59	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Added statement indicating visible measures, such as rotating blue warning beacons, may be used in high noise areas.	-
RCOL2_13.03-9	II.J.10.a	II-65	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Revised section indicating maps, rather than "a map." Revised section indicating locations of pre-selected radiological sampling and monitoring points would be included in Appendix 4 rather than in an EPP.	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RCOL2_13.03-10	II.K.2	II-68	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Change title of "EOF Radiological Protection Coordinator" to "EOF Radiation Protection Coordinator"	-
RCOL2_13.03-10	II.K.2	II-68	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Add statement indicating the EPP addressing "Emergency Exposure Guidelines and Personnel Dosimetry" provides guidance for authorizing and documenting emergency exposures.	-
RCOL2_13.03-11	II.M.2	II-76	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Add statement indicating the structure of the Recovery Organization is discussed in the EPP addressing "Reentry,Recovery, and Closeout."	-
RCOL2_13.03-11	II.M.2	II-76	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Add statement indicating information is provided in the EPP addressing "Duties of the Emergency Coordinator/Recovery Manager."	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RCOL2_13.03-12	II.N.1.c	II-80	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Add subsection discussing Remedial Exercises.	-
RCOL2_13.03-7	II.N.2.a	II-80	Response to RAI No. 78 Luminant Letter no.TXNB-09072 Date 11/18/2009	Add statement indicating that ERDS is tested quarterly in accordance with Generic Letter GL-93-01 and additional information regarding the quarterly test is contained in the EPP addressing "Maintaining Emergency Preparedness."	-
RCOL2_13.03-12	II.N.2.d	II-81	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Add "annually" to indicate that Luminant conducts radiological monitoring drills are conducted annually.	-
RCOL2_13.03-13	II.O.3	II-85	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Revise to indicate that training is provided in accordance with the EPP addressing "Emergency Preparedness Training."	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RCOL2_13.03-13	II.O.4	II-85	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Add statement indicating that initial and continuing training for ERO personnel is provided in accordance with the EPP addressing "Emergency Preparedness Training."	-
RCOL2_13.03-9	Appendix 4 ETE List of Figures	A4-10	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Revise list to include Figure A4-6, Pre-selected radiological sampling and monitoring points	-
RCOL2_13.03-9	Appendix 4 ETE	A4-16	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Insert Figure A4-6, Pre-selected Radiological Sampling and Monitoring Points	-
RCOL2_13.03-14	Appendix 5 Emergency Plan Procedures	A5-1	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Add EPP topic "Security Events" and corresponding Section II.E.5 to list	-
RCOL2_13.03-9	Appendix 7 Certification Letters and Letters of Agreement	A7-25	Response to RAI No. 78 Luminant Letter no.TXNB-09066 Date 11/12/2009	Insert City of Benbrook Certification Letter	-

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RAI_13.03-20	ETE Executive Summary, Computation of ETE	ES-3	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise 1st paragraph to "819 ETE" and "13 Evacuation Scenarios (63 x 13 = 819)" to reflect new Scenario for the 4th of July Celebration in Granbury	-
RAI_13.03-20	ETE Executive Summary, Selected Results	ES-4	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise 4th bullet to read "13 Evacuation Scenarios" to reflect new Scenario for the 4th of July Celebration in Granbury	-
RAI_13.03-20	ETE Table 6-2	ES-9	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add Scenario 13 to table to reflect new Scenario for the 4th of July Celebration in Granbury	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-22	ETE Table 8-5A	ES-14	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise the "Dist. To EPZ Bndry", "Travel Time to EPZ Bndry", "ETE", "Dist. EPZ Bndry to H.S.", "Travel Time EPZ Bndry to H.S." and "ETE to H.S." entries for Brawner Intermediate School, Emma Roberson Elementary School, and Mambrino Elementary School to reflect impact of new evacuation routes. Change Average ETE from 1:55 to 1:40.	-
RAI_13.03-22	ETE Table 8-7A	ES-15	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise the "Mobilization" and "ETE" for the second wave.	-
RAI_13.03-18	ETE Subsection 1.3, Analytical Tools	1-6	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add bulleted list referencing NUREG/CR-4873 and NUREG/CR-4874	-
RAI_13.03-23	ETE Subsection 1.3, Analytical Tools	1-6	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Under "Developing the Evacuation Time Estimate" delete the last sentence of 1st paragraph and replace with discussion of Figure 1-2.	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-20	ETE Table 1-1	1-11	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Change right column for "Evacuation Cases" to include 13 Scenarios and 819 unique cases to reflect new Scenario for the 4th of July Celebration in Granbury	-
RAI_13.03-20	ETE Subsection 2.2, Study Methodological Assumptions	2-3	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise Assumption 7 to include 13 Scenarios and 3 special events to reflect new Scenario for the 4th of July Celebration in Granbury Revise Table to include Scenario 13 to reflect new Scenario for the 4th of July Celebration in Granbury	-
RAI_13.03-18	ETE Subsection 2.3, Study Assumptions	2-5	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Remove Assumption #6 and replace with discussion of Traffic Control Points; objectives of TCPs; and explanation that use of TCPs is not considered in the inputs to the ETE.	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-24	ETE Subsection 2.3, Study Assumptions	2-5	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add discussion to Assumption 4 describing the effect of heavy truck traffic considered during the ETE analysis.	-
RAI_13.03-19	ETE Subsection 3.1, Permanent Residents	3-2	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Remove 2nd sentence in 1st paragraph and replace with a discussion of how the 2007 population was estimated using regression analysis. Insert sentence deleted above as a new paragraph prior to last paragraph in the section.	-
RAI_13.03-19	ETE Subsection 3.2, Construction	3-2	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add discussion regarding procedure used to extrapolate resident and shadow vehicles to 2015.	-
RAI_13.03-20	ETE Subsection 3.3.3, Fourth of July Celebration (New Subsection)	3-11	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add new Subsection describing the 4th of July Celebration in Granbury and its inclusion as a Special event (Scenario 13).	-

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RAI_13.03-19	ETE Subsection 3.5, Medical Facilities	3-18	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Replace last sentence with new sentence indicating Buses can transport up to 30 people; wheelchair buses, up to 15 people; wheelchair vans, up to 4 people; and ambulances, up to 2 people.	-
RAI_13.03-25	ETE Section 5, Estimation of Trip Generation Time	5-3 through 5-4	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Under Fundamental Considerations, remove 5th paragraph (beginning with "An employee who lives outside...") and replace with revised text describing the sequence (c) in Figure 5-1.	-
RAI_13.03-25	ETE Figure 5-1	5-5	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Replace with revised Figure 5-1	-
RAI_13.03-25	ETE Estimation of Trip Generation Time	5-11	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Under "Calculation of Trip Generation Time Distribution" delete last paragraph and replace with discussion describing treatment of outliers in response to survey questions.	-

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RAI_13.03-20	ETE Section 6, Demand Estimation for Evacuation Scenarios	6-1	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise 3rd paragraph to indicate 13 Scenarios and 13 x 63 = 819 evacuation cases to reflect new Scenario for the 4th of July Celebration in Granbury	-
RAI_13.03-22	ETE Figure 6-1	6-4	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Replace Figure	-
RAI_13.03-20	ETE Table 6-2	6-5	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add Scenario 13 to table to reflect new Scenario for the 4th of July Celebration in Granbury	-
RAI_13.03-20	ETE Table 6-3	6-6	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add Scenario 13 to table to reflect new Scenario for the 4th of July Celebration in Granbury Change "Special Events" discussion to indicate 3 special events to reflect the 4th of July Celebration in Granbury.	-

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RAI_13.03-19	ETE Table 6.4	6-7	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Correct numbers inserted into "Residents with Commuters," Residents without Commuters," and "Shadow" columns for Scenario 12. An error was discovered during preparation of the RAI response	-
RAI_13.03-20	ETE Table 6-4	6-7	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add Scenario 13 to table to reflect new Scenario for the 4th of July Celebration in Granbury	-
RAI_13.03-20	ETE Section 7, General Population Evacuation Time Estimates (ETE)	7-1	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise 1st paragraph to indicate 13 Evacuation Scenarios	-
RAI_13.03-20	ETE Section 7.4, Guidance on Using ETE Tables	7-4	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise 1st paragraph to indicate 13 Evacuation Scenarios	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-19	ETE Subsection 8.1, Transit-Dependent People – Demand Estimate	8-2	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	First Paragraph deleted. Added sentence to 2nd paragraph indicating estimate includes those people who may be transit dependent because a commuter in the household is using the only available vehicle to travel to work outside the EPZ.	-
RAI_13.03-20	ETE Section 8.4, Summer Camps and Retreats – Transit Demand	8-5	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revised to include the number of buses and drivers needed to evacuate each facility base on bus capacity estimates.	-
RAI_13.03-21	ETE Subsection 8.3, Special Facility Demand	8-4	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Remove sentence stating that some facilities share buses. Change estimated needs for buses to 20 and for wheelchair vans to 7.	-
RAI_13.03-22	ETE Subsection 8-5, Evacuation Time Estimates for Transit-Dependent People	8-7	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Under the heading "School Evacuation" revise 2nd paragraph to reflect new times due to revised evacuation routes.	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-21	ETE Subsection 8-5, Evacuation Time Estimates for Transit-Dependent People	8-9	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Under "Evacuation of Ambulatory Persons from Special Facilities" remove 1st bullet and add sentence to last bullet indicating that buses load concurrently at facilities with 30 or more ambulatory patients with a loading time of 30 minutes for entire facility. Remove paragraph describing buses that pick up at multiple facilities and replace with discussion of Courtyards at Lake Granbury. In last paragraph on page, revise "5 wheelchair van runs" to "7 wheelchair van runs"	-
RAI_13.03-22	ETE Subsection 8-5, Evacuation Time Estimates for Transit-Dependent People	8-9	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Under the heading "Evacuation of Ambulatory Persons from Special Facilities," revise the 2nd paragraph to reflect new evacuation times.	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-27	ETE Subsection 8-5, Evacuation Time Estimates for Transit-Dependent People	8-10	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Under the heading Emergency Medical Services (EMS) Vehicles, revise the 2nd Paragraph to refer to Table 8-9 and indicate that an average of 30 minutes is needed to mobilize 30 ambulances.	-
RAI_13.03-19	ETE Subsection 8.6 (New Section)	8-11	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	New section added discussing ETE for special needs persons based on special needs registration provided by representatives from the offices of emergency management for the EPZ counties.	-
RAI_13.03-22	ETE Subsection 8.5, Evacuation Time Estimates for Transit-Dependent People	8-11	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Under the heading "Somervell County Jail," revise the 2nd and 4th paragraphs to reflect new evacuation times	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-22	ETE Table 8-3	8-16	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise Brawner Intermediate School, Emma Roberson Elementary School, and Mambrino Elementary School to reflect correct Host Schools. Revise Happy Hills Farm to indicate correct Zone "2D" rather than "Granbury."	-

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RAI_13.03-21	ETE Table 8-4	8-17	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Change "Max Bus Runs" header to "Bus Runs" Delete "Bus Assignment" column For Zone 1D Acorn Run Manor, merge 4 right-most columns and replace with "Facility owned vehicle" For Zone 1D Southern Concepts, merge 4 right-most columns and replace with "Facility owned van" For Zone Granbury Southern Concepts, merge 4 right-most columns and replace with "Facility owned van" For Granbury Care Center change "Wheelchair Van Runs" from 0 to 2 and "Bus Runs" from 6 to 4 Change Total Wheelchair Bus Runs from 7 to 5 Delete "Total 15 buses" Delete ** Footnote	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-22	ETE Table 8-5A	8-18	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise the "Dist. To EPZ Bndry", "Travel Time to EPZ Bndry", "ETE", "Dist. EPZ Bndry to H.S.", "Travel Time EPZ Bndry to H.S." and "ETE to H.S." entries for Brawner Intermediate School, Emma Roberson Elementary School, and Mambrino Elementary School to reflect impact of new evacuation routes. Change Average ETE from 1:55 to 1:40.	-
RAI_13.03-22	ETE Table 8-5B	8-19	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise the "Dist. To EPZ Bndry", "Travel Time to EPZ Bndry", "ETE", "Dist. EPZ Bndry to H.S.", "Travel Time EPZ Bndry to H.S." and "ETE to H.S." entries for Brawner Intermediate School, Emma Roberson Elementary School, and Mambrino Elementary School to reflect impact of new evacuation routes. Change Average ETE from 2:10 to 2:00.ETE from 2:10 to 2:00.	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-22	ETE Table 8-7A	8-21	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise the "Mobilization" and "ETE" for the second wave.	-
RAI_13.03-22	ETE Table 8-7B	8-22	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Revise the "Mobilization" and "ETE" for the second wave.	-
RAI_13.03-27	ETE Table 8-9 (New)	8-23	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Insert new Table 8-9 describing the Ambulance Resources and estimated mobilization times.	-
RAI_13.03-18	ETE Section 9, Traffic Management Strategy	9-2	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add discussion indicating that TCPs are not credited in calculating the ETE with reference to Study Assumptions 5 and 6. Discussion of Access Control Points also added. ACPs divert "through trips" and assumptions reflect these trips are restricted after 90 minutes after Advisory to Evacuate.	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-26	ETE Section 9, Traffic Management Strategy	9-2	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	At the end of the section, insert the following: All transit trips and other responders entering the EPZ to support the evacuation are assumed to be unhindered by personnel manning ACPs.	-
RAI_13.03-26	ETE Section 10, Evacuation Routes	10-1	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Delete 3rd Paragraph and associated bullets.	-
RAI_13.03-22	ETE Appendix E, Figures E-1 through E-3	E-7	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Remove Figures E-1 through E-3 and replace with Revised Figures E-1 through E-7	-
RAI_13.03-18	ETE Appendix G: Traffic Management	G-1	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Added reference to Assumptions indicating that TCP serve many useful functions, but are not considered in the inputs to the model used to calculate the ETE.	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-26	ETE Appendix G: Traffic Management	G-1	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	At the end of the section, insert the following: All transit trips and other responders entering the EPZ to support the evacuation are assumed to be unhindered by personnel manning ACPs.	-
RAI_13.03-20	ETE Appendix I: Evacuation Sensitivity Studies	I-3	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Remove discussion of Fourth of July Celebration. This event is now considered an Evacuation Scenario rather than a Sensitivity Study	-
RAI_13.03-20	ETE Appendix J:	J-1	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Change all instances of "12 Scenarios" to "13 Scenarios" to reflect new Scenario for the 4th of July Celebration in Granbury.	-
RAI_13.03-20	ETE Appendix J	J-2	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add Fourth of July Celebration in Granbury to list of Special Events	-

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
RAI_13.03-20	ETE Appendix J: Figure J-13 (New Figure)	J-26 (New Page)	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add "Figure 13: Evacuation Time Estimates Scenario 13, Region R03 (Entire EPZ)" to reflect new Scenario for the 4th of July Celebration in Granbury	-
RAI_13.03-23	ETE Appendix K	Cover Page	Response to RAI No. 88 Luminant Letter no.TXNB-09069	Delete "Characteristics" from title of Appendix K	-
RAI_13.03-23	ETE Appendix K	K-1	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add discussion of the link-node analysis network to the beginning of Appendix K.	-
RAI_13.03-23	ETE Appendix K	K-2 through K-17 (New Pages)	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add Figures K-1 through K-16 as pages K-2 through K-17.	-
RAI_13.03-23	ETE Appendix K	K-18	Response to RAI No. 88 Luminant Letter no.TXNB-09069 Date 11/16/2009	Add "Table K-1: Evacuation Roadway Network Characteristics" to table in Appendix K.	-
CTS-00923	Appendix1 Foreword	A1-ii	Update reference to NEI 07-01	Add "(July 2009)"	0
CTS-00924	Appendix1 Foreword	A1-ii	Clarification of method used for adding new design information when it is available	Replace text with current method	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00925	Appendix1 Acronyms & Abbreviations	A1-v	Correction of MHI company name	Added "Ltd."	0
CTS-00926	Appendix1 Acronyms & Abbreviations	A1-vi	Update acronym list	Add RPS, SCBA & US-APWR	0
CTS-00927	Appendix1 2.0	A1-3	Describe EAL and IC changes	Discusses changes in Rev. 2. Provides summary of reason for changes.	0
CTS-00928	Appendix1 3.5	A1-6	Update reference number sequence due to the addition of references	Changed reference number	0
CTS-00929	Appendix1 3.7	A1-11	Update values and notation to be consistent with USAPWR EAL	Updated CET temperature values and deleted TBD notation	0
CTS-00930	Appendix1 3.7	A1-11	Updated to be consistent with MHI Standard EALs	New note added for F Recognition Category.	0
CTS-00931	Appendix1 3.7	A1-11	Updated note regarding how digital control systems are handled for the US-APWR	Incorporated language to document deviation from NEI 99-01 to address digital I&C.	0
CTS-00932	Appendix1 3.8	A1-11	Update reference number sequence due to the addition of references	Changed reference number	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00933	Appendix1 3.9	A1-12	Update reference number sequence due to the addition of references	Changed reference number	0
CTS-00934	Appendix1 5.0	A1-13	Clarification of methodology used for adding new design information when it is available	Described methodology for providing information not currently available.	0
CTS-00935	Appendix1 5.4	A1-16	Deleted Anticipated Operational Occurrence since it is not used in USAPWR (or NEI template)	Deleted the term Anticipated Operational Occurrence	0
CTS-00936	Appendix1 AU1	A1-21	Updated EAL threshold #1 to be consistent with USAPWR EAL	Added setpoint information. Removed Main Steam Line Monitor.	0
CTS-00937	Appendix1 AU1	A1-21	Updated EAL threshold #2 to be consistent with USAPWR EAL	Added setpoint information. Capitalized radiation monitor names	0
CTS-00938	Appendix1 AU1	A1-21	Updated EAL #3 to be consistent with USAPWR EAL	Changed nomenclature to "site-specific."	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00939	Appendix1 AU1	A1-21	Editorial	Delete "[ ]" and change the font from Italic to Arial	0
CTS-00940	Appendix1 AU1	A1-22	Updated EAL #1 Basis and EAL #3 Note to be consistent with USAPWR EAL	Add EAL#1 Basis and EAL#3 Note to describe how to complete missing Threshold information	0
CTS-00941	Appendix1 AU2	A1-23	Updated with actual values consistent with USAPWR EAL	Replace threshold TBD values with actual values. Deleted "setpoint-TBD."	0
CTS-00942	Appendix1 AU2	A1-23	Editorial	Fixed punctuation and grammar on EAL#2	0
CTS-00943	Appendix1 AU2	A1-23	Updated EAL#1 Basis to be consistent with USAPWR EAL	Added EAL#1 Basis	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00944	Appendix1 AA1	A1-25	Updated EAL threshold #1 to be consistent with USAPWR EAL	Replaced threshold TBD values with actual values and removed Main Steam Line Monitor.	0
CTS-00945	Appendix1 AA1	A1-25	Updated EAL threshold #2 to be consistent with USAPWR EAL	Added setpoint information. Capitalized radiation monitor names	0
CTS-00946	Appendix1 AA1	A1-25	Updated EAL #3 to be consistent with USAPWR EAL	Changed nomenclature to "site-specific."	0
CTS-00947	Appendix1 AA1	A1-25	Editorial	Delete "["and "]" and change the font from Italic to Arial	0
CTS-00948	Appendix1 AA1	A1-26	Editorial	Delete "["and "]" and change the font from Italic to Arial	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00949	Appendix1 AA1	A1-26	Updated EAL #1 Basis and EAL #3 Note to be consistent with USAPWR EAL	Added EAL#1 Basis and EAL#3 Note	0
CTS-00950	Appendix1 AA2	A1-27	Updated threshold 1 to be consistent with USAPWR EAL	Added 3 instruments for Threshold 1	0
CTS-00951	Appendix1 AA2	A1-27	Deletion of unnecessary place holders	Deleted unneeded setpoint TBDs in Threshold 2	0
CTS-00952	Appendix1 AA2	A1-27	Deletion of redundant text in Basis of AA2	Removed unneeded text in Basis	0
CTS-00953	Appendix1 AA2	A1-27	Clarification of EAL#1 Basis to be consistent with USAPWR EALs	Added detail to EAL#1 Basis	0
CTS-00954	Appendix1 AA2	A1-28	Editorial	Delete a blank before “A monitor could” and unnecessary commas.	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00955	Appendix1 AA2	A1-28	Deletion in EAL#2 Basis to remove developer information not required to be included in CPNPP EALs	Deleted unneeded text in EAL#2 Basis	0
CTS-00956	Appendix1 AA3	A1-29	Deletion of TSC and SAS because they do not require continuous occupancy to maintain plant safety functions	Deleted two areas from Threshold 1	0
CTS-00957	Appendix1 AA3	A1-29	Editorial	Font change "Italic" to "Arial" and "[" and "]" are deleted	0
CTS-00958	Appendix1 AA3	A1-29	Clarification of basis to be consistent with Threshold 1	Added and deleted text to match areas listed in Threshold 1	0
CTS-00959	Appendix1 AS1	A1-31	Clarification of methodology used for adding new information when it is available	Changed nomenclature to "site-specific."	0
CTS-00960	Appendix1 AS1	A1-31	Editorial	Capitalized radiation monitor names	0
CTS-00961	Appendix1 AS1	A1-31 A1-32	Editorial	Removed brackets and unneeded text in IC Basis, and font change from Italic to Arial	0
CTS-00962	Appendix1 AS1	A1-32	Editorial	Removed brackets and unneeded text in EAL#1 Basis	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00963	Appendix1 AS1	A1-32	Clarification of methodology used for adding new information when it is available	Added detail to EAL#1 Basis	0
CTS-01099	Appendix1 AS1	A1-32	Editorial	Added EAL#2 Basis title	0
CTS-00964	Appendix1 AG1	A1-33	Updated to be consistent with USAPWR EAL	Replaced TBD value with "site-specific"	0
CTS-00965	Appendix1 AG1	A1-33	Editorial	Capitalized radiation monitor name	0
CTS-00966	Appendix1 AG1	A1-33 A1-34	Editorial	Remove bracket "[" and "]" and change font italic to Arial	0
CTS-00967	Appendix1 AG1	A1-33	Editorial	Remove a blank	0
CTS-00969	Appendix1 AG1	A1-34	Clarification of section title	Added EAL#2 Basis title	0
CTS-00970	Appendix1 AG1	A1-34	Clarification of methodology used for adding new information when it is available	Added detail to EAL #1 Basis	0
CTS-00971	Appendix1 Table 5-C-1	A1-36	Updated ICS to be consistent with NEI 07-01	Added ICs CU9 and CA9	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00972	Appendix1 CU1	A1-37	Updated to be consistent with USAPWR EAL	Replaced TBD value with "site-specific"	0
CTS-00973	Appendix1 CU1	A1-37	Revision to add needed information	Description for Threshold value added to Basis	0
CTS-00974	Appendix1 CU2	A1-38	Updated to be consistent with USAPWR template	Replace TBD and brackets with "site specific" in Threshold 1	0
CTS-00975	Appendix1 CU2	A1-38	Editorial	Changed I-402 to L-402 in Threshold 1	0
CTS-00976	Appendix1 CU2	A1-38	Updated to be consistent with USAPWR EALs. No threshold value is required.	Deleted threshold TBD values for all listed radiation monitors	0
CTS-01091	Appendix1 CU2	A1-39	Editorial	Delete a blank before "If RVlevel".	0
CTS-00977	Appendix1 CU2	A1-39	Revised to add needed information	EAL#1 Basis statement added to address "site specific" text in Threshold 1	0
CTS-00978	Appendix1 CU6	A1-42	Corrected acronym to have consistent meaning	Corrected acronym for "PABX"	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00979	Appendix1 CU7	A1-44	Editorial	Made editorial changes for "volts" and "dc"	0
CTS-00980	Appendix1 CU9	A1-46	Update: added CU9 to be consistent with NEI 07-01	Added IC CU9 and associated Threshold and Basis	0
CTS-00981	Appendix1 CA1	A1-46	Updated to be consistent with USAPWR EAL	Replaced TBD value with "site specific" for RCS Level monitor L-402 in Threshold 1	0
CTS-00982	Appendix1 CA1	A1-46	Updated to be consistent with USAPWR EAL	Added monitors L-404 and L-405 for RCS Level to Threshold 1	0
CTS-00983	Appendix1 CA1	A1-46	Updated to be consistent with USAPWR EAL	Removed unneeded TBD values for RVWL in Threshold 1	0
CTS-00984	Appendix1 CA1	A1-46	Editorial	Made editorial change to "L-572" to remove brackets	0
CTS-00985	Appendix1 CA1	A1-46	Updated to be consistent with USAPWR EAL. No threshold values are required.	Removed "Threshold Value TBD" and brackets for each monitor listed in Threshold 2	0
CTS-00986	Appendix1 CA1	A1-47	Updated to be consistent with USAPWR EAL	Added text to address L-404 and L-405 in EAL#1 Basis	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00987	Appendix1 CA1	A1-47	Clarification that information will be provided when it becomes available.	Added statement regarding "site specific" for L-402 in EAL#1 Basis	0
CTS-00988	Appendix1 CA1	A1-47	Editorial	Removed brackets in EAL#2 Basis and font change Italic to Arial	0
CTS-00989	Appendix1 CA4	A1-50	Editorial	Removed brackets from Basis text and font change Italic to Arial	0
CTS-00990	Appendix1 CA9	A1-51	Update: added IC CA9 to be consistent with NEI 07-01	Added IC CA9 and associated Basis	0
CTS-00991	Appendix1 CS1	A1-51	Updated to be consistent with USAPWR EAL	Replaced Threshold 1 TBD value for RVWL with actual value	0
CTS-00992	Appendix1 CS1	A1-51	Updated to be consistent with USAPWR EAL	Replaced Threshold 1 TBD value for RCS Level with "site specific" and changed value description	0
CTS-00993	Appendix1 CS1	A1-51	Updated to be consistent with USAPWR EAL.	Added monitor L-402 to Threshold 1	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-00994	Appendix1 CS1	A1-51	Updated to be consistent with USAPWR EAL	Updated to be consistent with USAPWR EAL	0
CTS-00995	Appendix1 CS1	A1-51	Updated to be consistent with USAPWR EAL	Replaced Threshold 2 TBD value for RCS Level with "site specific" and changed value description	0
CTS-00996	Appendix1 CS1	A1-51	Updated to be consistent with USAPWR EAL	Changed monitor from L-402 to L-401 for RCS level in Threshold 2	0
CTS-00997	Appendix1 CS1	A1-51	Updated to be consistent with USAPWR EAL	Replaced "TBD radiation monitor" with actual monitors and values in Threshold 3	0
CTS-00998	Appendix1 CS1	A1-51	Editorial	Editorial change to "L-1401" in Threshold 3	0
CTS-00999	Appendix1 CS1	A1-52	Updated to be consistent with USAPWR EAL	Added Basis information for EAL#1	0
CTS-01000	Appendix1 CS1	A1-52	Updated to be consistent with USAPWR EAL	Added Basis information for EAL#2	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01001	Appendix1 CS1	A1-52	Updated to be consistent with USAPWR EALs	Added EAL#3 basis description for high range monitors	0
CTS-01002	Appendix1 CG1	A1-53	Updated to be consistent with USAPWR EALs	Replaced Threshold 1 RVWL TBD value with actual value and changed the value description	0
CTS-01003	Appendix1 CG1	A1-53	Updated to be consistent with USAPWR EALs	Replaced Threshold 1 RCS loop level with "site specific" and changed value description	0
CTS-01004	Appendix1 CG1	A1-53	Updated to be consistent with USAPWR EAL	Changed RCS level monitor from L-402 to L-401in Threshold 1	0
CTS-01005	Appendix1 CG1	A1-53	Updated to be consistent with USAPWR EALs	Change TBD radiation monitor to the actual monitors and a value of 2000 R/hr in Threshold 2	0
CTS-01006	Appendix1 CG1	A1-53	Updated to be consistent with USAPWR EALs	Changed CET TBD values to actual values in Threshold 2	0
CTS-01007	Appendix1 CG1	A1-53	Editorial	Made editorial changes to "L-1400" and "L-1403"	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01008	Appendix1 CG1	A1-54	Updated to be consistent with USAPWR EALs	Changed description to "explosive mixture" in Threshold 2b, Table 5-C-3	0
CTS-01009	Appendix1 CG1	A1-54	Editorial and clarification of GE declaration	Removed brackets, removed text regarding containment closure and added text for GE declaration	0
CTS-01010	Appendix1 CG1	A1-55	Updated to be consistent with USAPWR EALs	Added RVWL description and L-401 indication to EAL#1 Basis	0
CTS-01011	Appendix1 CG1	A1-55	Clarification that value will be added when information becomes available.	Added statement in EAL#1 Basis for filling in value for L-401	0
CTS-01012	Appendix1 CG1	A1-55	Updated to be consistent with USAPWR EALs	Added containment high radiation ARM discussion to EAL#2 Basis	0
CTS-01013	Appendix 1 Table 5-F-2 Fuel Clad Barrier Threshold 2-LOSS	A1-58	Updated to be consistent with USAPWR EALs	Changed Primary Reactor Coolant Activity Level for Xe-133 from TDB to actual value	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01014	Appendix 1 Table 5-F-2 Fuel Clad Barrier Threshold 3-LOSS and POTENTIAL LOSS	A1-59	Updated to be consistent with USAPWR EALs	Changed Core Exit Thermocouple Readings from TBD to actual values	0
CTS-01015	Appendix 1 Table 5-F-2 Fuel Clad Barrier Threshold 4-POTENTIAL LOSS	A1-60	Updated to be consistent with USAPWR EALs	Change RVWL values and description	0
CTS-01016	Appendix 1 Table 5-F-2 Fuel Clad Barrier Threshold 6-LOSS	A1-61	Updated to be consistent with USAPWR EALs	Replaced Containment Radiation Monitor TDB value with actual value	0
CTS-01017	Appendix 1 Table 5-F-2 RCS Barrier Threshold 2-POTENTIAL LOSS	A1-58	Updated to be consistent with USAPWR EALs	Replaced RCS Leak Rate TDB value with actual value	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01018	Appendix 1 Table 5-F-2 RCS Barrier Threshold 6-LOSS	A1-61	Updated to be consistent with USAPWR EALs	Replaced Containment High Range ARM TDB value with actual value	0
CTS-01019	Appendix 1 Table 5-F-2 Containment Barrier Threshold 2-POTENTIAL LOSS	A1-58	Removed specific hydrogen concentration value because it is not required by NEI 99-01. Deletion of setpoint value for EAL 3.a since it is not required by NEI 99-01.	Changed hydrogen concentration threshold value to "explosive mixture" Removed "TBD-value" from EAL 3.a.	0
CTS-01020	Appendix 1 Table 5-F-2 Containment Barrier Threshold 3-POTENTIAL LOSS	A1-59	Updated to be consistent with USAPWR EALs	Replaced CET TBD values with actual values	0
CTS-01021	Appendix 1 Table 5-F-2 Containment Barrier Threshold 3-POTENTIAL LOSS	A1-59	Updated to be consistent with USAPWR EALs	Replaced RVWL TBD value and description	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01022	Appendix 1 Table 5-F-2 Containment Barrier Threshold 6-POTENTIAL LOSS	A1-61	Updated to be consistent with USAPWR EALs	Replaced Containment Radiation Monitor TBD with actual value	0
CTS-01023	Appendix 1 Basis for Table 5-F-2 Fuel Clad Barrier Threshold 2	A-62	Updated to be consistent with USAPWR EALs	Replaced TBD value for Xe-133 with actual value and deleted unneeded text	0
CTS-01024	Appendix 1 Basis for Table 5-F-2 Fuel Clad Barrier Threshold 3	A-62	Updated to be consistent with USAPWR EALs	Replaced TBD values for CETs with actual values	0
CTS-01025	Appendix 1 Basis for Table 5-F-2 Fuel Clad Barrier Threshold 4	A-63	Updated to be consistent with USAPWR EALs	Replaced TBD threshold description for RVWL	0
CTS-01026	Appendix 1 Basis for Table 5-F-2 Fuel Clad Barrier Threshold 6	A-63	Updated to be consistent with USAPWR EALs	Replaced TBD values for Containment High Range ARM and Xe-133	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01027	Appendix 1 Basis for Table 5-F-2 Fuel Clad Barrier Threshold 6	A-63	Editorial	Made capitalization change and deleted unneeded text	0
CTS-01028	Appendix 1 Basis for Table 5-F-2 RCS Barrier Threshold	A-65	Updated to be consistent with USAPWR EALs	Deleted text for reference to "relief" valves.	0
CTS-01029	Appendix 1 Basis for Table 5-F-2 RCS Barrier Threshold 4	A-65	Editorial	Capitalization correction	0
CTS-01030	Appendix 1 Basis for Table 5-F-2 RCS Barrier Threshold 6	A-66	Updated to be consistent with USAPWR EALs	Replaced Containment High Range ARM TDB value with actual value	0
CTS-01031	Appendix 1 Basis for Table 5-F-2 RCS Barrier Threshold 6	A-66	Updated to be consistent with USAPWR EALs	Inserted Containment High Range value basis calculation and delete unneeded text	0
CTS-01032	Appendix 1 Basis for Table 5-F-2 RCS Barrier Threshold 6	A-68	Editorial	Delete "[" and "]" and change font Italic to Arial	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01033	Appendix 1 Basis for Table 5-F-2 Containment Barrier Threshold 4	A-69	Editorial	Deleted "Barrier" and removed brackets	0
CTS-01034	Appendix 1 Basis for Table 5-F-2 Containment Barrier Threshold 4	A-69	Updated to be consistent with USAPWR EALs	Replaced TBD value for Tech Spec limit with actual value	0
CTS-01035	Appendix 1 Basis for Table 5-F-2 Containment Barrier Threshold 6	A-70	Updated to be consistent with USAPWR EALs	Replaced Containment High Range ARM TBD with actual value	0
CTS-01036	Appendix 1 Basis for Table 5-F-2 Containment Barrier Threshold 6	A-70	Updated to be consistent with USAPWR EALs	Inserted basis calculation for Containment High Range ARM threshold value	0
CTS-01037	Appendix 1 Basis for Table 5-F-2 Containment Barrier Threshold 8	A-70	Editorial	Capitalization correction	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01038	Appendix1 HU1	A-73	Updated to be consistent with USAPWR EALs	Replaced Threshold 1 TBD with appropriate text	0
CTS-01039	Appendix1 HU1	A-74	Editorial	The paragraph starting with "The sustained" was connected to its upper paragraph	0
CTS-01040	Appendix1 HU1	A-74	Updated to be consistent with USAPWR EALs	Inserted detail for EAL#3 basis	0
CTS-01041	Appendix1 HU4	A-78	Editorial	Replaced standard text in EAL#1 basis with individual specific title and inserted "CPNPP Units 3 & 4"	0
CTS-01042	Appendix1 HA1	A-81	Updated to be consistent with USAPWR EALs, site specific values will be added when available.	In Threshold 1.a., inserted "site specific" and replaced TBDs	0
CTS-01043	Appendix1 HA1	A-82	Editorial	In EAL#2-5 Basis, removed text "site specific"	0
CTS-01044	Appendix1 HA1	A-83	Editorial	In EAL#1 Basis, replaced "site specific" with "CPNPP" and removed brackets	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01046	Appendix1 HA1	A-83	Editorial	The paragraph starting with "The sustained" was connected to its upper paragraph	0
CTS-01045	Appendix1 HA5	A-91	Clarification that site procedure will be added when available.	Replaced TBD procedure with "site-specific" procedure	0
CTS-01048	Appendix1 HA4	A1-89 A1-90	Editorial	Delete "[" and "]" and change font Italic to Arial.	0
CTS-01047	Appendix1 HA5	A-91	Clarification that site specific value will be added when available.	Inserted statement in Basis for filling in procedure number	0
CTS-01049	Appendix1 HS2	A-93	Clarification that site procedure will be added when available.	For Threshold 1b, replace TBD designation after "procedure"	0
CTS-01050	Appendix1 HS2	A-93	Updated to be consistent with USAPWR EALs	For Threshold 1b, replaced TDB value with actual value	0
CTS-01051	Appendix1 HS2	A-93	Clarification that site specific value will be added when available.	EAL#1b, inserted statement for filling in procedure number	0
CTS-01052	Appendix1 HS2	A-95	Editorial	Delete "[" and "]" and change font Italic to Arial	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01053	Appendix1 HG1	A-97	Deleted unnecessary phrase	In Threshold 2, removed text	0
CTS-01054	Appendix1 HG1	A-97	Editorial	EAL#1 Basis, removed brackets and change font Italic to Arial	0
CTS-01055	Appendix1 HG1	A-97	Deleted unnecessary phrase	EAL#2 Basis, removed text	0
CTS-01056	Appendix1 Table 5-S-1	A1-100	Updated to address digital I&C consistent with NEI 07-01.	Deleted ICs SU3, SA4 and SS6	0
CTS-01057	Appendix1 Table 5-S-1	A-99	Editorial	Edited "ac" in SA5	0
CTS-01058	Appendix1 Table 5-S-1	A-101	Updated to address digital I&C consistent with NEI 07-01.	Added SA7 and SS7	0
CTS-01059	Appendix1 SU3	A-104	Updated to address digital I&C consistent with NEI 07-01.	Deleted IC SU3	0
CTS-01060	Appendix1 SU4	A-105	Updated to be consistent with USAPWR EALs	Threshold 1, replaced TBD with appropriate text	0
CTS-01061	Appendix1 SU4	A-105	Updated to be consistent with USAPWR EALs	Replaced text with "Primary Coolant Monitor" in EAL#1 Basis	0
CTS-01062	Appendix1 SU6	A-107	Editorial	Fixed acronym in Threshold 2	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01063	Appendix1 SU6	A-107	Editorial	Removed brackets	0
CTS-01064	Appendix1 SU6	A-107	Editorial	Replaced text for clarification	0
CTS-01065	Appendix1 SU6	A-108	Standardize consistency with CU6	Inserted discussion in EAL Basis	0
CTS-01066	Appendix1 SA2	A-110	Updated to be consistent with USAPWR EALs	In Threshold 1b, replaced text for power range monitors	0
CTS-01067	Appendix1 SA2	A-110	Updated to be consistent with USAPWR EALs	In Threshold 1b, replaced text for intermediate range monitors	0
CTS-01068	Appendix1 SA2	A-110	Editorial	Included abbreviation for RPS	0
CTS-01069	Appendix1 SA4	A1-111 A1-112	Updated to address digital I&C consistent with NEI 07-01.	Removed IC SA4	0
CTS-01070	Appendix1 SA5	A-113	Editorial	Removed brackets, change font Italic to Arial and remove period after "MC-A"	0
CTS-01071	Appendix1 SA7	A1-114	Updated to address digital I&C consistent with NEI 07-01.	Added IC SA7	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01072	Appendix1 SS2	A-115	Updated to be consistent with USAPWR EALs	In Threshold 1b, included value for Power Range monitors and removed intermediate range monitors	0
CTS-01073	Appendix1 SS3	A-116	Editorial	Removed brackets and change font Italic to Arial	0
CTS-01074	Appendix1 SS7	A1-117 A1-118	Update to address digital I&C consistent with NEI 07-01	Replaced IC SS6 with SS7	0
CTS-01075	Appendix1 SG1	A-119	Updated to be consistent with USAPWR EALs	In Threshold 1b, replaced CET TBDs with actual values	0
CTS-01076	Appendix1 SG1	A1-119 A1-120	Editorial	Replaced brackets and change font Italic to Arial	0
CTS-01077	Appendix1 SG2	A-121	Editorial	Added text "(1 or 2)"	0
CTS-01078	Appendix1 SG2	A-121	Editorial	In Threshold 1b, replaced "less" with "greater"	0
CTS-01079	Appendix1 SG2	A-121	Updated to be consistent with USAPWR EALs	Added Threshold #2	0
CTS-01080	Appendix1 SG2	A-121	Editorial	Remove brackets, change font Italic to Arial and replaced TBD with "site-specific"	0
CTS-01081	Appendix1 SG2	A-121	Updated to be consistent with USAPWR EALs	In Basis, add valves, removed SG safety valves	0

Change ID	Section	EP Rev. 1 page	Reason for change	Change Summary	Rev. of EP T/R
CTS-01082	Appendix1 SG2	A-122	Clarification that procedures will be added when available.	In EAL#2 Basis, added statement for providing procedure number	0
CTS-01083	Appendix1 Reference 2	A-123	Editorial	Changed date	0
CTS-01085	Appendix1 Reference 4	A-123	Editorial	Changed date and removed "draft"	0
CTS-01086	Appendix1 Reference 10	A-123	Add reference	Added MHI EAL reference	0
CTS-01087	Appendix1 Reference 15	A1-124	Deletion of outdated reference	Deleted MHI DCD reference	0
CTS-01088	Appendix1 Reference 18 & Reference 19	A1-124	Deleted uncited reference	Deleted uncited reference	0

FOREWORD

This Emergency Classification and Action Level Scheme for the Comanche Peak Nuclear Power Plant (CPNPP) Units 3 & 4 document is based on NEI 99-01, *Methodology for Development of Emergency Action Levels, Revision 5*, Initiating Conditions associated with the digital control system were based on NEI 07-01, *Methodology for Development of Emergency Action Levels Advanced Passive Light Water Reactors*, Revision 0 (~~version under review by NRC in February~~July 2009~~2008~~). CTS-00923

This document acknowledges that some detailed design information, such as setpoints and some instrument numbers are not yet available for the Mitsubishi US-APWR. ~~-~~In many cases this data is necessary to determine emergency action level thresholds. ~~-~~Appropriately, this document provides the methodology to be employed to incorporate this information when it is available.~~a [TBD] (i.e., "To Be Determined") placeholder for future inclusion.~~ CTS-00924

ACRONYMS & ABBREVIATIONS

ac ..... Alternating Current
ARM ..... Area Radiation Monitor
CDE ..... Committed Dose Equivalent
CEDE ..... Committed Effective Dose Equivalent
CET ..... Core Exit Thermocouple
CFR ..... Code of Federal Regulations
CPNPP ..... Comanche Peak Nuclear Power Plant
CSF ..... Critical Safety Function
CSFST ..... Critical Safety Function Status Tree
CVCS ..... Chemical and Volume Control System
CVDT ..... Containment Vessel Reactor Coolant Drain Tank
DAS ..... Diverse Actuation System
dc ..... Direct Current
DCD ..... Design Control Document
DNBR ..... Departure from Nucleate Boiling Ratio
DPS ..... Texas Department of Public Safety
EAL ..... Emergency Action Level
ECCS ..... Emergency Core Cooling System
EDE ..... Effective Dose Equivalent
ENS ..... Emergency Notification System
EOP ..... Emergency Operating Procedure
EPA ..... Environmental Protection Agency
ESW ..... Essential Service Water
FAA ..... Federal Aviation Administration
FBI ..... Federal Bureau of Investigation
FEMA ..... Federal Emergency Management Agency
FSAR ..... Final Safety Analysis Report
GE ..... General Emergency
gpm ..... Gallons Per Minute
hr ..... Hour
IC ..... Initiating Condition
ID ..... Inner Diameter
K_{eff} ..... Effective Neutron Multiplication Factor
LCO ..... Limiting Condition for Operation
LHSI ..... Low Head Safety Injection
LOCA ..... Loss of Coolant Accident
µCi/gm ..... microcuries per gram
MHI ..... Mitsubishi Heavy Industries, Ltd. | CTS-00925
mR ..... milliRoentgen
mrem ..... milliRoentgen Equivalent Man
NEI ..... Nuclear Energy Institute
NPP ..... Nuclear Power Plant
NRC ..... Nuclear Regulatory Commission

ACRONYMS & ABBREVIATIONS (continued)

NORAD ..... North American Aerospace Defense Command
NOUE ..... Notification Of Unusual Event
OBE ..... Operating Basis Earthquake
OCA ..... Owner Controlled Area
ODCM ..... Off-site Dose Calculation Manual
ORO ..... Off-site Response Organization
OSHA ..... Occupational Safety and Health Administration
PA/PL ..... Public Address/Page
PABX ..... Private Automatic Branch Telephone Exchange
PAG ..... Protective Action Guideline
PCMS ..... Plant Control and Monitoring System
PRA ..... Probabilistic Risk Assessment
PSMS ..... Protection and Safety Monitoring System
PWR ..... Pressurized Water Reactor
RCP ..... Reactor Coolant Pump
RCS ..... Reactor Coolant System
RHR ..... Residual Heat Removal System
rem ..... Roentgen Equivalent Man
RPS ..... Reactor Protection System | CTS-00926
RV ..... Reactor Pressure Vessel
RVWL ..... Reactor Vessel Water Level
SAE ..... Site Area Emergency
SCBA ..... Self Contained Breathing Apparatus | CTS-00926
SG ..... Steam Generator
SI ..... Safety Injection
SFP ..... Spent Fuel Pit
T_{avg} ..... Average Reactor Coolant Temperature
TEDE ..... Total Effective Dose Equivalent
TOAF ..... Top of Active Fuel
TS ..... Technical Specifications
TSC ..... Technical Support Center
US ..... United States
US-APWR ..... Mitsubishi US Advanced Pressurized Water Reactor | CTS-00926
V ..... Volt

The EAL information has the primary threshold for NOUE as operation outside the safety envelope for the plant as defined by plant Technical Specifications (TS), including Limiting Conditions for Operation (LCOs) and Action Statement Times. In addition, certain precursors of more serious events such as loss of off-site alternating current (ac) power and earthquakes are included in NOUE EALs. This provides a clear demarcation between the lowest emergency classification level and "non-emergency" notifications as specified by Title 10, Code of Federal Regulations 50.72 (10 CFR 50.72). (Reference 9)

2.0 Changes Incorporated ~~Within~~ Revision ~~0~~2

CTS-00927

Information was updated to conform the CPNPP Units 3 and 4 EALs to Reference 10, "*Emergency Action Levels for Mitsubishi Heavy Industries US Advanced Pressurized Water Reactor*". Changes were made to digital control EALs, to conform to NEI 07-01, Rev. 0 (July 2009). CU9 and CA9 were added to address loss of indication, monitoring, and control in Cold Shutdown/Refueling. SA7 and SS7 replaced SU3, SA4, and SS6 to address loss of indication, monitoring, and control under System Malfunctions. Editorial corrections are also included in Revision 2.~~Reserved for future changes to this document.~~

3.0 Development of Basis for Generic Approach

This document addresses radiological emergency preparedness. Non-radiological events are included in the classification scheme only to the extent that these events represent challenges to the continued safety of the NPP and its operators. There are existing reporting requirements (United States Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA)) under which utilities operate for non-radiological emergencies. There are also requirements for emergency preparedness involving hazardous chemical releases. While the proposed classification structure could be expanded to include these non-radiological hazards, these events are beyond the scope of this document.

This classification scheme is based on the four classification levels promulgated by the NRC as the standard for the United States (US). The NRC has determined that US nuclear facilities will continue to classify events using the four classification levels and that the NRC will re-classify the event in any international communication.

3.1 Definitions Used to Develop EAL Methodology

The following definitions apply to the CPNPP Emergency Plan and are used throughout this document:

(6) A logical progression in classification for multiple events; and

(7) Objective, observable values.

3.5 Emergency Classification Level Descriptions

There are three considerations related to emergency classification levels. These are:

(1) The potential impact on radiological safety, either as known now or as can be reasonably projected;

(2) How far the plant is beyond its predefined design, safety, and operating envelopes; and

(3) Whether or not conditions that threaten health are expected to be confined to within the site boundary.

The ICs deal explicitly with radiological safety impact by escalating from levels corresponding to releases within regulatory limits to releases beyond EPA Protective Action Guideline (PAG) (Reference 1140) plume exposure levels. In addition, the "Discussion" sections below include off-site dose consequence considerations that were not included in NUREG 0654 Appendix 1. | CTS-00928

NOTIFICATION OF UNUSUAL EVENT (NOUE):

Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring off-site response or monitoring are expected unless further degradation of safety systems occurs.

Discussion: Potential degradation of the level of safety of the plant is indicated primarily by exceeding plant TS Limiting Condition for Operation (LCO) allowable action statement time for achieving required MODE change to a condition where the LCO is no longer applicable. Precursors of more serious events are also included because precursors do represent a potential degradation in the level of safety of the plant. Minor releases of radioactive materials are included. In this emergency classification level, however, releases do not require monitoring or off-site response.

ALERT:

Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA PAG exposure levels.

Therefore, it may be appropriate to enter an Alert classification for events approaching or exceeding design basis limits such as Operating Basis Earthquake (OBE), design basis wind loads, FIRE within VITAL AREAs, etc. This would give the operating staff additional support and improved ability to determine the extent of plant damage. If damage to barriers or challenges to CSFs have occurred or are identified, then the additional support can be used to escalate or terminate the Emergency Class based on what has been found. Security events must reflect potential for increasing security threat levels.

Plant EOPs are designed to maintain and/or restore a set of CSFs which are listed in the order of priority for restoration efforts during accident conditions. While the actual nomenclature of the CSFs may vary among plants, generally the PWR CSF set includes:

- Subcriticality
- Core cooling
- Heat sink
- Pressure-temperature-stress (RCS integrity)
- Containment
- RCS inventory

There are diverse and redundant plant systems to support each CSF. By monitoring the CSFs instead of the individual system component status, the impact of multiple events is inherently addressed, e.g., the number of OPERABLE components available to maintain the CSF.

The EOPs contain detailed instructions regarding the monitoring of these functions and provides a scheme for classifying the significance of the challenge to the functions. In providing EALs based on these schemes, the emergency classification can flow from the EOP assessment rather than being based on a separate EAL assessment. This is desirable as it reduces ambiguity and reduces the time necessary to classify the event.

PWR Owner's Group Emergency Response Guidelines (ERGs) classify challenges as YELLOW, ORANGE, and RED paths. If the core exit thermocouples (CETs) exceed ~~[TBD~~ 1200 degrees F (~~650~~649 degrees C) or 700 degrees F (~~400~~371 degrees C)~~]~~ with low reactor vessel water level, a RED path condition exists. The ERG considers a RED path as an extreme challenge to a plant function necessary for the protection of the public. It reasonably follows that if any CSF enters a RED path, a Site Area Emergency exists. A General Emergency could be considered to exist if core cooling CSF is in a RED path and

CTS-00929

the EOP function restoration procedures have not been successful in restoring core cooling.

Note: AU1, AA1, AS1, and AG1 EALs, in NEI 99-01 related to perimeter radiation monitoring systems, are not included because CPNPP does not have a perimeter radiation monitoring system. Similarly, for AU1 and AA1, EALs related to real-time dose assessment have not been included because CPNPP does not have this capability.

Note: HA1, EAL #4 related to VISIBLE DAMAGE affecting safety systems from a turbine failure, identified in NEI 99-01, is not included for CPNPP Units 3 & 4, because of specific design features incorporated into the US-APWR design.

Notes: F recognition Category EALs include Critical Safety Function Status Tree (CSFST) methodology only for applicants/licensees who are PWR Owner's Group members because this methodology is proprietary to the Owner's Group. CTS-00930

Note: SU3, SA4, and SS6 related to annunciator malfunctions ~~have been modified~~ as presented in NEI 99-01, have been replaced with SA7 and SS7 to address the digital control systems in the US-APWR. ~~Due to the similarity to the Westinghouse AP-1000 digital control system, t~~The approach for digital control ICs/EALs presented in NEI 07-01 was generally adopted for the US-APWR and included as CU9 and CA9, and SA7 and SS7. CTS-00931 CTS-00931

3.8 Treatment of Multiple Events and Classification Level Upgrading

When multiple simultaneous events occur, the emergency classification level is based on the highest EAL reached. For example, two Alerts remain in the Alert category or, an Alert and a Site Area Emergency is a Site Area Emergency. Further guidance is provided in Regulatory Information Summary, RIS 2007-02, Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events (Reference 12~~11~~). CTS-00932

Although the majority of the EALs provide very specific thresholds, the Emergency Coordinator must remain alert to events or conditions that lead to the conclusion that exceeding the EAL is IMMINENT. If, in the judgment of the Emergency Coordinator, an IMMINENT situation is at hand, the classification should be made as if the threshold has been exceeded. While this is particularly prudent at the higher emergency classification levels (as the early classification may provide for

more effective implementation of protective measures), it is nonetheless applicable to all emergency classification levels.

3.9 Classifying Transient Events

There may be cases in which a plant condition that exceeded an EAL Threshold was not recognized at the time of occurrence, but is identified well after the condition has occurred (e.g., as a result of routine log or record review) and the condition no longer exists. In these cases, an emergency should not be declared.

Reporting requirements of 10 CFR 50.72 are applicable and the guidance of NUREG-1022, (Reference 13~~12~~) Event Reporting Guidelines 10 CFR 50.72 and 50.73 (Reference 14~~13~~), should be applied. CTS-00933

Existing guidance for classifying transient events addresses the period of time of event recognition and classification (15 minutes). However, in cases when an EAL declaration criterion may be met momentarily during the normal expected response of the plant, declaration requirements should not be considered to be met when the conditions are a part of the designed plant response or result in appropriate operator actions.

3.10 Operating MODE Applicability

The plant operating MODE that existed at the time that the event occurred, prior to any protective system or operator action initiated in response to the condition, is compared to the MODE applicability of the EALs. If an event occurs, and a lower or higher plant operating MODE is reached before the emergency classification level can be declared, the emergency classification level shall be based on the MODE that existed at the time the event occurred.

For events that occur in Cold Shutdown or Refueling, escalation is via EALs that have Cold Shutdown or Refueling for MODE applicability, even if Hot Shutdown (or a higher MODE) is entered during any subsequent heat-up. In particular, the fission product barrier EALs are applicable only to events that initiate in Hot Shutdown or higher.

3.11 Operating MODEs

(1)	Power Operations:	Reactor Power > 5%, $K_{eff} \geq 0.99$
(2)	Startup:	Reactor Power ≤ 5%, $K_{eff} \geq 0.99$
(3)	Hot Standby:	$T_{avg} \geq 350$ °F (177 °C), $K_{eff} < 0.99$
(4)	Hot Shutdown:	200 °F (93 °C)$<T_{avg} < 350$ °F (177 °C), $K_{eff} < 0.99$
(5)	Cold Shutdown:	$T_{avg} \leq 200$ °F (93 °C), $K_{eff} < 0.99$

(6) Refueling:One or more vessel head closure bolts less than fully tensioned

Defueled (None): All reactor fuel removed from reactor pressure vessel (RV). (Full core off load during refueling or extended outage)

4.0 Human Factors Considerations

Human factor considerations discussed in NEI 99-01 were adopted in this document.

5.0 EAL Guidance

This document provides ICs and EALs for the CPNPP Units 3 & 4. ~~Placeholders ([TBD]) identify~~The methodology to provide information that is not yet available at the current stage of design for the US-APWR is included in the Bases for affected EALs. CTS-00934

5.1 Generic Arrangement

The information is presented by Recognition Categories:

A - Abnormal Rad Levels/Radiological Effluent

C - Cold Shutdown/Refueling System Malfunction

F - Fission Product Barrier Degradation

H - Hazards and Other Conditions Affecting Plant Safety

S - System Malfunction

The ICs for each of the above Recognition Categories A, C, H, and S are in the order of NOUE, Alert, Site Area Emergency, and General Emergency. For all Recognition Categories, an IC matrix versus emergency classification level is first shown. The purpose of the IC matrices is to provide an overview of how the ICs are logically related under each emergency classification level.

EAL guides in Recognition Categories A, C, H, and S are structured in the following way:

- Recognition Category - As described above.

5.4 Definitions

In the IC/EALs, selected words have been set in all capital letters. These words are defined terms having specific meanings as they relate to this document. Definitions of these terms are provided below.

~~ANTICIPATED OPERATIONAL OCCURRENCE: As described in Chapter 15 of the US-APWR Design Control Document (DCD) (Reference 14), ANTICIPATED OPERATIONAL OCCURRENCEs are events in which the reactor plant conditions are disturbed beyond the normal operating range. (AOOs are equivalent to "SIGNIFICANT TRANSIENT" used in NEI 99-01.)~~ CTS-00935

CONTAINMENT CLOSURE: The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under existing plant conditions.

CORE ALTERATION: As defined in TS, CORE ALTERATION is the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.

DOSE EQUIVALENT I-131: As defined in US-APWR TS, DOSE EQUIVALENT I-131 is the concentration of I-131 (microcuries/gram) that alone would produce the same committed effective dose equivalent (CEDE) as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The dose conversion factors used for this calculation shall be those listed in Table 2.1 of EPA Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," EPA-520/1-88-020, September 1988. (Reference 15)

DOSE EQUIVALENT XE-133: As defined in US-APWR TS, DOSE EQUIVALENT Xe-133 is the concentration of Xe-133 (microcuries per gram (μCi/gm)) that alone would produce the same effective dose equivalent (EDE) as the quantity and isotopic mixture of noble gases (Kr-85m, Kr-85, Kr-87, Kr-88, Xe-133, and Xe-135) actually present. The dose conversion factors used for this calculation shall be those listed in Table III.1 of EPA Federal Guidance Report No. 12, "External Exposure to Radionuclides in Air, Water, and Soil, "EPA 402-R-93-081, September 1993. (Reference 16)

EXPLOSION: A rapid, violent, unconfined combustion, or catastrophic failure of pressurized/energized equipment that imparts energy of sufficient force to potentially damage permanent structures, systems, or components.

FAULTED: The existence of secondary side LEAKAGE that results in an uncontrolled drop in SG pressure or the SG being completely depressurized.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Any release of gaseous or liquid radioactivity to the environment greater than 2 times the Off-site Dose Calculation Manual (ODCM) Limit for 60 minutes or longer.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3)

1. VALID reading on ANY of the following radiation monitors greater than the threshold for 60 minutes or longer:

   - High Sensitivity Main Steam Line Monitor (N-16 channel)
     [(Threshold - ~~TBD~~2 x High Alarm setpoint (R-65A, B, R-66A, B, R-67A, B, R-68A, B)]) CTS-00936

   - ~~Main Steam Line monitor -~~
     ~~[Threshold TBD (R-87, R-88, R-89, R-90)]~~ CTS-00936

   - Turbine Building Floor Drain Radiation Monitor
     [(Threshold - ~~TBD~~2 x High Alarm setpoint (R-58)]) CTS-00936

2. VALID reading on ANY of the following effluent monitor reading greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer:

   - Plant ~~v~~Vent ~~r~~Radiation ~~g~~Gas ~~m~~M onitor
     [(Threshold ~~TBD~~2 x ODCM Limit (R-21A, B, R-80,A, B)]) CTS-00937

   - Liquid ~~r~~Radwaste ~~d~~Discharge ~~m~~Monitor
     [(Threshold ~~TBD~~ 2 x ODCM Limit (R-35)])

   - Essential Service Water (ESW) radiation monitor
     [(Threshold ~~TBD~~ 2 x High Alarm setpoint (R-74A, B, C, D)]) CTS-00937

3. Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates greater than 2 times [~~TBD CPNPP 3/4~~{site-specfic ODCM values]] for 60 minutes or longer. CTS-00938

Basis:

~~[~~Refer to Attachment A for a detailed basis of the radiological effluent IC/EALs.~~]~~ CTS-00939

This IC addresses a potential decrease in the level of safety of the plant as indicated by a radiological release that exceeds regulatory commitments for an extended period of time.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

The US-APWR incorporates design features intended to control the release of radioactive effluents to the environment. Administrative controls are established to prevent unintentional releases, or control and monitor intentional releases. The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of a degradation in these features and/or controls. The ODCM multiples are specified in AU1 and AA1 only to distinguish between non-emergency conditions, and from each other. While these multiples obviously correspond to an off-site dose or dose rate, the emphasis in classifying these events is the degradation in the level of safety of the plant, not the magnitude of the associated dose or dose rate.

This EAL includes any release for which a radioactivity discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

EAL #1

This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed the threshold identified in the IC.

This EAL is for established effluent monitoring on non-routine release pathways for which a discharge permit would not normally be prepared.

The design basis secondary side steam activity is less than 1E-3 µCi/cm^3 [from US-APWR Design Control Document (DCD) (Reference 10) Table 11.1-6]. Two times the design basis secondary side steam activity value is less than the lower range of Main Steam Line Monitor (1E-1 µCi/cm^3). Therefore, Main Steam Line Monitor (R-87, R-88, R-89, R90) is not used for EAL #1. For a Steam Generator (SG) tube leak, the High Sensivity Main Steam Line Monitor (N-16 channel) can be used. CTS-00940

EAL #2

This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed the threshold identified in the IC established by the radioactivity discharge permit. This value may be associated with a planned batch release or a continuous release path.

EAL #3

This EAL addresses uncontrolled releases that are detected by sample analyses, particularly on unmonitored pathways, e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.

Note: For EALs #1, #2, #3, the ODCM setpoint is calculated using guidance provided in ODCM Subsections 6.2.1 and 6.3.1. CTS-00940

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AU2

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

UNPLANNED rise in plant radiation levels.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2)

1. a. UNPLANNED water level drop in a reactor refueling pathway as indicated by-: CTS-00942

   - Refueling Cavity Level Low [Setpoint ~~TBD~~ (894'-4" on L-401)] CTS-00941
   - Spent Fuel Pit (SFP) Level Low [Setpoint ~~TBD~~ (894'-4" on L-650)]
   - Visual observation

   AND

   b. VALID rise in Area Radiation Monitor (ARM) indication:

   - Containment High Range ARM [~~Setpoint TBD,~~ (R-91A, B, R-92A, B, R-93A, B, R-94A, B)] CTS-00941
   - Fuel Handling Area HVAC Radiation Gas Monitor [~~Setpoint TBD,~~ (R-49)]
   - SFP ARM [~~Setpoint TBD,~~ (R-5)]

2. UNPLANNED VALID ARM readings or survey results indicate a rise by a factor of 1000 over normal* levels in any area of the plant.

   *Normal ~~are be~~is ~~considered as~~ the highest reading in the past twenty-four hours excluding the current peak value. CTS-00942

Basis:

This IC addresses increased radiation levels as a result of water level decreases above irradiated fuel or events that have resulted, or may result, in UNPLANNED increases in radiation dose rates within plant buildings. These radiation increases represent a loss of control over radioactive material and represent a potential degradation in the level of safety of the plant.

EAL #1

Water~~Indications include instrumentation such as water~~ level indications on Refueling Cavity Level monitor (L-401) and SFP Level monitor (L-650) are used. The setpoint for the Low Level alarm on L-401 is 894'-4" and the setpoint for the CTS-00943

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

Low Level alarm on L-650 is 894'-4". Other indications include local ARMs, and personnel (e.g., refueling crew) reports. If available, video cameras may allow remote observation. | CTS-00943

The refueling pathway is a combination of cavities, tubes, canals and pools. While a radiation monitor could detect an increase in dose rate due to a drop in the water level, it might not be a reliable indication of whether or not the fuel is covered.

For example, a refueling bridge ARM or radiation survey reading may increase due to planned evolutions such as head lift, or even a fuel assembly being raised in the manipulator mast. Also, a monitor could in fact be properly responding to a known event involving transfer or relocation of a source, stored in or near the fuel pool or responding to a planned evolution such as removal of the reactor head. Generally, increased radiation monitor indications will need to be combined with another indicator (or personnel report) of water loss.

For refueling events where the water level drops below the RV flange classification would be via CU2. This event escalates to an Alert per AA2 if irradiated fuel outside the reactor vessel is uncovered. For events involving irradiated fuel in the reactor vessel, escalation would be via the Fission Product Barrier Table for events in operating MODEs 1-4.

EAL #2

This EAL addresses increases in plant radiation levels that represent a loss of control of radioactive material resulting in a potential degradation in the level of safety of the plant.

This EAL excludes radiation level increases that result from planned activities such as use of radiographic sources and movement of radioactive waste materials. A specific list of ARMs is not required as it would restrict the applicability of the threshold. The intent is to identify loss of control of radioactive material in any monitored area.

This event escalates to an Alert per AA3 if the increase in dose rates impedes personnel access necessary for safe operation.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA1

Initiating Condition - ALERT

Any release of gaseous or liquid radioactivity to the environment greater than 200 times the ODCM Limit for 15 minutes or longer.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3)

Note:

1. VALID reading on ANY of the following radiation monitors greater than the threshold for 15 minutes or longer:

   - High Sensitivity Main Steam Line Monitor(N-16 channel)
     {(Threshold - ~~TBD~~ 200 x High Alarm setpoint (R-65A, B, R-66A, B, R-67A, B, R-68A, B)}) CTS-00944

   - ~~Main Steam Line monitor~~
     ~~[Threshold - TBD (R-87, R-88, R-89, R-90)]~~ CTS-00944

   - Turbine Building Floor Drain Radiation Monitor
     {(Threshold - ~~TBD~~200 x High Alarm setpoint (R-58)}) CTS-00944

2. VALID reading on ANY of the following effluent monitor reading greater than 200 times the alarm setpoint established by a current radioactivity discharge permit for 15 minutes or longer:

   - Plant ~~v~~Vent ~~r~~Radiation ~~g~~Gas ~~m~~Monitor
     {(Threshold ~~TBD~~ 200 x ODCM limit (R-21A, B, R-80,A, B)}) CTS-00945

   - Liquid ~~r~~Radwaste ~~d~~Discharge ~~m~~Monitor
     {(Threshold ~~TBD~~ 200 x ODCM limit (R-35)})

   - ESW ~~r~~Radiation ~~m~~Monitor
     {(Threshold ~~TBD~~ 200 x High Alarm setpoint (R-74A, B, C, D)})

3. Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates greater than 200 times ~~[TBD -~~{site-specific ODCM values~~]~~} for 15 minutes or longer. CTS-00946

Basis:

~~[~~Refer to Attachment A for a detailed basis of the radiological effluent IC/EALs.~~]~~ CTS-00947

This IC addresses an actual or substantial potential decrease in the level of safety of the plant as indicated by a radiological release that exceeds regulatory commitments for an extended period of time.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

The US-APWR incorporates design features intended to control the release of radioactive effluents to the environment. -Administrative controls are established to prevent unintentional releases, or control and monitor intentional releases. These controls are located in the ODCM. The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of a degradation in these features and/or controls. CTS-00948

The ODCM multiples are specified in AU1 and AA1 only to distinguish between non-emergency conditions, and from each other. While these multiples obviously correspond to an off-site dose or dose rate, the emphasis in classifying these events is the degradation in the level of safety of the plant, not the magnitude of the associated dose or dose rate.

Releases should not be prorated or averaged. For example, a release exceeding 600x ODCM for 5 minutes does not meet the threshold.

This EAL includes any release for which a radioactivity discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

EAL #1

This EAL is intended for sites that have established effluent monitoring on non-routine release pathways for which a discharge permit would not normally be prepared.

The design basis secondary side steam activity is less than 1E-3 µCi/cm^3 (from US-APWR Design Control Document (DCD) (Reference 17) Table 11.1-6). Two hundred times the design basis secondary side steam activity value is less than the lower range of Main Steam Line Monitor (1E-1 µCi/cm^3). Therefore, Main Steam Line Monitor (R-87, R-88, R-89, R90) is not used for EAL #1. For a Steam Generator (SG) tube leak, the High Sensivity Main Steam Line Monitor (N-16 channel) can be used. CTS-00949

EAL #2

This EAL addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed the threshold identified in the IC established by the radioactivity discharge permit. This value may be associated with a planned batch release or a continuous release path.

EAL #3

This EAL addresses uncontrolled releases that are detected by sample analyses, particularly on unmonitored pathways, e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

Note: For EALs #1, #2, #3, the ODCM setpoint is calculated using guidance provided in PDCM Subsections 6.2.1 and 6.3.1. | CTS-00949

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA2

Initiating Condition - ALERT

Damage to irradiated fuel or loss of water level that has resulted or will result in the uncovering of irradiated fuel outside the reactor vessel.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2)

1. A water level drop in the reactor refueling cavity, spent fuel pool or fuel transfer canal that will result in irradiated fuel becoming uncovered~~.~~ as indicated by **ANY** of the following: CTS-00950

   - Refueling Cavity Level Low-Low Setpoint {site-specific} on L-401
   - Spent Fuel Pit (SFP) Level Low-Low Setpoint {site-specific} on L-650
   - Visual observation

2. A VALID alarm or ~~[TBD~~ elevated reading~~]~~ on ANY of the following due to damage to irradiated fuel or loss of water level.

   - Containment High Range ARM ~~[Setpoint TBD,~~ (R-91A, B, R-92A, B, R-93A, B, R-94A, B)~~]~~ CTS-00951
   - Fuel Handling Area HVAC Radiation Gas Monitor ~~[Setpoint TBD,~~ (R-49~~]~~)
   - SFP ARM ~~[Setpoint TBD,~~ (R-5)~~]~~

Basis:

This IC addresses increases in radiation dose rates within plant buildings, and may be a precursor to a radioactivity release to the environment. These events represent a loss of control over radioactive material and represent an actual or substantial potential degradation in the level of safety of the plant.

~~These events escalate from AU2 in that fuel activity has been released, or is anticipated due to fuel heatup. This IC applies to spent fuel requiring water coverage and is not intended to address spent fuel which is licensed for dry storage.~~ CTS-00952

EAL #1

~~SFP~~Water level ~~(L-650),~~indications on Refueling Cavity Level monitor (L-401) and SFP Level monitor (L-650) are used. The setpoint for the Low-Low Level alarm on L-401 is {site-specific}~~,~~ and the setpoint for the Low Level alarm on~~Visual Observation are applied to EAL #1. [Measurable range of~~ L-650 is {site-specific}. CTS-00953

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

If available, video cameras may allow remote observation.~~and L-401 are TBD (Generally, the measurable range of L-650 is +/- 59 inches (1.5 meters) around normal water level).]~~ CTS-00953

EAL #2

This EAL addresses radiation monitor indications of fuel uncovery and/or fuel damage.

Increased ventilation monitor readings may be indication of a radioactivity release from the fuel, confirming that damage has occurred. Increased background at the ventilation monitor due to water level decrease may mask increased ventilation exhaust airborne activity and needs to be considered.

While a radiation monitor could detect an increase in dose rate due to a drop in the water level, it might not be a reliable indication of whether or not the fuel is covered.

A refueling bridge ARM or radiation survey reading may increase due to planned evolutions such as head lift, or even a fuel assembly being raised in the manipulator mast. -A monitor could~~,~~ in fact~~,~~ be properly responding to a known event involving transfer or relocation of a source stored in~~,~~ or near~~,~~ the fuel pool or responding to a planned evolution such as removal of the reactor head. Generally, increased radiation monitor indications will need to be combined with another indicator (or personnel report) of water loss. CTS-00954

~~*[Application of this EAL requires understanding of the actual radiological conditions present in the vicinity of the monitor. Information Notice No. 90-08, "Kr-85 Hazards from Decayed Fuel" (Reference 17) should be considered in establishing radiation monitor EALs.]*~~ CTS-00955

Escalation of this emergency classification level, if appropriate, would be based on AS1 or AG1.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA3

Initiating Condition - ALERT

Rise in radiation levels within the facility that impedes operation of systems required to maintain plant safety functions.

Operating MODE Applicability: All

Emergency Action Level Thresholds:

1. Dose rate greater than 15 milliRoentgen (mR)/hour (hr) in ANY of the following areas requiring continuous occupancy to maintain plant safety functions:

• Main Control Room ARM	[(R-1)]	CTS-00956
• ~~Technical Support Center (TSC) ARM~~	~~[R-9]~~	
• Central Alarm Station ARM	[(site-specific Instrument Number) ~~TBD~~]	
• ~~Secondary Alarm Station ARM~~	~~[Instrument Number TBD]~~	

Basis:

This IC addresses increased radiation levels that impact continued operation in areas requiring continuous occupancy to maintain safe operation or to perform a safe shutdown.

The cause and/or magnitude of the increase in radiation levels is not a concern of this IC. The Emergency Coordinator must consider the source or cause of the increased radiation levels and determine if any other IC may be involved.

At the CPNPP site, this EAL could result in declaration of an Alert at one unit due to a radioactivity release or radiation shine resulting from a major accident at another unit. This is appropriate if the increase impairs operations at any of the operating units.

[The value of 15mR/hr is derived from the GDC 19 value of 5 rem in 30 days with adjustment for expected occupancy times. Although Section III.D.3 of NUREG-0737, "Clarification of TMI Action Plan Requirements" (Reference 18), provides that the 15 mR/hr value can be averaged over the 30 days, the value is used here without averaging, as a 30 day duration implies an event potentially more significant than an Alert.] CTS-00957

Areas requiring continuous occupancy to maintain plant safety functions include the Control Room, and ~~TSC,~~ the Central Alarm Station. ~~, and Secondary Alarm Station.~~ CTS-00958

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AS1

Initiating Condition - SITE AREA EMERGENCY

Off-site dose resulting from an actual or IMMINENT release of gaseous radioactivity greater than 100 mrem TEDE or 500 mrem Thyroid CDE for the actual or projected duration of the release.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3)

1. VALID reading on ANY of the following radiation monitors greater than the threshold for 15 minutes or longer:

   - Plant ~~v~~Vent ~~r~~Radiation ~~g~~Gas ~~m~~Monitor CTS-00960
     {(Threshold ~~TBD~~ {site-specific} (R-21A, B R-80,A, B)}) CTS-00959

   - Main Steam Line ~~m~~Monitor~~s~~
     {(Threshold ~~TBD~~ {site-specific} (R-87, R-88, R-89, and R-90)})

2. Dose assessment using actual meteorology indicates doses greater than 100 mrem total effective dose equivalent (TEDE) or 500 mrem thyroid committed dose equivalent (CDE) at or beyond the site boundary.

3. Field survey results indicate closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer; or analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation, at or beyond the site boundary.

Basis:

~~[~~Refer to Attachment A for a detailed basis of the radiological effluent IC/EALs.~~]~~ CTS-00961

This IC addresses radioactivity releases that result in doses at or beyond the site boundary that exceed 10% of the EPA PAGs. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public. While these failures are addressed by other ICs, this IC provides appropriate diversity and addresses events which may not be able to be classified on the basis of plant status alone. It is important to note that for the more severe accidents the release may be unmonitored or there may be large uncertainties associated with the source term and/or meteorology. CTS-00961

~~[While these failures are addressed by other ICs, this IC provides appropriate diversity and addresses events which may not be able to be classified on the basis of plant status alone. It is important to note that for the more severe accidents the release may be unmonitored or there may be large uncertainties associated with the source term and/or meteorology.]~~ CTS-00961

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

~~[~~The EPA PAGs are expressed in terms of the sum of the EDE and the CEDE, or as the thyroid CDE. For the purpose of these IC/EALs, the dose quantity TEDE, as defined in 10 CFR 20 (Reference 19), is used in lieu of "...sum of EDE and CEDE...." The EPA PAG guidance provides for the use of adult thyroid dose conversion factors.~~]~~ CTS-00961

~~[~~The TEDE dose is set at 10% of the EPA PAG, while the 500 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.~~]~~ CTS-00961

EAL #1

The ~~site-specific~~ monitor list in EAL #1 includes effluent monitors on all potential gaseous release pathways. CTS-00962

~~[The monitor reading EALs should be determined using a dose assessment method that back calculates from the dose values specified in the IC. Since doses are generally not monitored in real-time, it~~EAL #1 Threshold is ~~suggested that a release duration of one hour be assumed, and that the EALs be~~ based on a site-specific boundary (or beyond) dose of 100 mrem whole body or 500 mrem thyroid in one hour~~, whichever is more limiting (as was done for EAL #2)~~. ~~[~~The meteorology used ~~should be~~is the same as that~~those~~ used for determining AU1 and AA1 monitor reading EALs. ~~The same source term (noble gases, particulates, and halogens) may also be used as long as it maintains a realistic and near linear escalation between the EALs for the four classifications. If proper escalations do not result from the use of the same source term, if the calculated values are unrealistically high, or if correlation between the values and dose assessment values does not exist, then consider using an accident source term for AS1 and AG1 calculations.~~] CTS-00962

For Threshold #1, the monitor reading should be determined using a dose assessment method that back calculates from the dose values specified in the IC. Since doses are generally not monitored in real-time, it is suggested that a release duration of one hour be assumed, and that the EALs be based on a site specific boundary (or beyond) dose of 100 mrem whole body or 500 mrem thyroid in one hour, whichever is more limiting. If individual site analyses indicate a longer or shorter duration for the period in which the substantial portion of the activity is released, the longer duration should be used. CTS-00963

The meteorology used should be the same as those used for determining AU1 and AA1 monitor reading EALs. The same source term (noble gases, particulates, and halogens) may also be used as long as it maintains a realistic and near linear escalation between the EALs for the four classifications. If proper escalations do not result from the use of the same source term, if the calculated values are unrealistically high, or if correlation between the values and dose assessment values does not exist, then using an accident source term for AS1 and AG1 calculations is considered.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

EAL#2 | CTS-01099

Since dose assessment is based on actual meteorology, whereas the monitor reading EAL is not, the results from these assessments may indicate that the classification is not warranted, or may indicate that a higher classification is warranted. For this reason, emergency implementing procedures should call for the timely performance of dose assessments using actual meteorology and release information. If the results of these dose assessments are available when the classification is made (e.g., initiated at a lower classification level), the dose assessment results override the monitor reading EAL.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AG1

Initiating Condition - GENERAL EMERGENCY

Off-site dose resulting from an actual or IMMINENT release of gaseous radioactivity greater than 1000 mrem TEDE or 5000 mrem Thyroid CDE for the actual or projected duration of the release using actual meteorology.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3)

1. VALID reading on ANY of the following radiation monitors greater than the threshold for 15 minutes or longer:

   - Plant ~~v~~Vent ~~r~~Radiation ~~g~~Gas ~~m~~Monitor CTS-00965
     ~~[~~(Threshold ~~TBD~~ {site-specific} (R-21A, B, R-80,A, B)~~]~~ CTS-00964

   - Main Steam Line monitors
     ~~[~~(Threshold ~~TBD,~~ {site-specific} (R-87, R-88, R-89, and R-90)~~]~~ CTS-00964

2. Dose assessment using actual meteorology indicates doses greater than 1000 mrem TEDE or 5000 mrem thyroid CDE at or beyond the site boundary.

3. Field survey results indicate closed window dose rates greater than 1000 mR/hr expected to continue for 60 minutes or longer; or analyses of field survey samples indicate thyroid CDE greater than 5000 mrem for one hour of inhalation, at or beyond site boundary.

Basis:

~~[~~Refer to Attachment A for a detailed basis of the radiological effluent IC/EALs.~~]~~ CTS-00966

This IC addresses radioactivity releases that result in doses at or beyond the site boundary that exceed the EPA PAGs. -Public protective actions will be necessary. CTS-00967 Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public and likely involve fuel damage. While these failures are addressed by other ICs, this IC provides appropriate diversity and addresses events which may not be able to be classified on the basis of plant status alone. It is important to note that for the more severe accidents the release may be unmonitored or there may be large uncertainties associated with the source term and/or meteorology.

~~[~~The EPA PAGs are expressed in terms of the sum of the EDE and the CEDE, or as the thyroid committed dose equivalent (CDE). For the purpose of these IC/EALs, the dose quantity total effective dose equivalent (TEDE), as defined in 10 CFR 20, is used in lieu of "...sum of EDE and CEDE...." The EPA PAG guidance provides for the use of adult thyroid dose conversion factors.~~]~~ CTS-00966 CTS-00966

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

~~[~~The TEDE dose is set at the EPA PAG, while the 5000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.~~]~~ CTS-00966

EAL #1

The monitor list in EAL #1 includes US-APWR effluent monitors on all potential gaseous release pathways.

The monitor reading EALs should be determined using a dose assessment method that back-calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used should be the same as those used for determining the monitor reading EALs in ICs AU1 and AA1. This protocol will maintain intervals between the EALs for the four classifications. Since doses are generally not monitored in real-time, it is suggested that a release duration of one hour be assumed, and that the EALs be based on a site specific boundary (or beyond) dose of 1000 mrem whole body or 5000 mrem thyroid, whichever is more limiting (as was done for EALs #3 and #4). If individual site analyses indicate a longer or shorter duration for the period in which the substantial portion of the activity is released, the longer duration should be used. CTS-00970

The meteorology used should be the same as those used for determining AU1 and AA1 monitor reading EALs. The same source term (noble gases, particulates, and halogens) may also be used as long as it maintains a realistic and near linear escalation between the EALs for the four classifications. If proper escalations do not result from the use of the same source term, if the calculated values are unrealistically high, or if correlation between the values and dose assessment values does not exist, then using an accident source term for AS1 and AG1 calculations is considered.

~~*[The monitor reading EALs should be determined using a dose assessment method that back calculates from the dose values specified in the IC. Since doses are generally not monitored in real-time, it is suggested that a release duration of one hour be assumed, and that the EALs be based on a site specific boundary (or beyond) dose of 1000 mrem whole body or 5000 mrem thyroid in one hour, whichever is more limiting (as was done for EALs #2 and #4). If individual site analyses indicate a longer or shorter duration for the period in which the substantial portion of the activity is released, the longer duration should be used.]*~~

~~*[The meteorology used should be the same as those used for determining AU1 and AA1 monitor reading EALs. The same source term (noble gases, particulates, and halogens) may also be used as long as it maintains a realistic and near linear escalation between the EALs for the four classifications. If proper escalations do not result from the use of the same source term, if the calculated values are unrealistically high, or if correlation between the values and dose assessment*~~

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

~~*values does not exist, then consider using an accident source term for AS1 and AG1 calculations.]*~~ CTS-00970

EAL#2 CTS-00969

Since dose assessment is based on actual meteorology, whereas the monitor reading EAL is not, the results from these assessments may indicate that the classification is not warranted, or may indicate that a higher classification is warranted. For this reason, emergency implementing procedures should call for the timely performance of dose assessments using actual meteorology and release information. If the results of these dose assessments are available when the classification is made (e.g., initiated at a lower classification level), the dose assessment results override the monitor reading EAL.

Table 5-C-1: Recognition Category "C" Initiating Condition Matrix (Sheet 2 of 2)

		CU6 Loss of all On-site or Off-site communications capabilities. Op. MODEs: Cold Shutdown, Refueling, Defueled	
		CU7 UNPLANNED loss of required dc power for 15 minutes or longer. Op. MODEs: Cold Shutdown, Refueling	
		CU8 Inadvertent criticality. Op. MODEs: Cold Shutdown, Refueling	
	CA9 Inability to monitor and control the plant for ≥ 15 minutes. Op. MODEs: Cold Shutdown	**CU9** UNPLANNED partial loss of indicating and monitoring and control functions for ≥ 15 minutes. Op. MODEs: Cold Shutdown	CTS-00971

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

RCS LEAKAGE.

Operating MODE Applicability: Cold Shutdown

Emergency Action Level Thresholds:

1. RCS LEAKAGE results in the inability to maintain or restore level within {site-specific ~~[TBD~~-pressurizer level target band on L-451, L-452, L-453, L-454}~~]~~ for 15 minutes or longer. CTS-00972

Basis:

This IC is considered to be a potential degradation of the level of safety of the plant. The inability to maintain or restore level is indicative of loss of RCS inventory.

Relief valve (e.g., Residual Heat Removal (RHR), Letdown Orifice, Volume Control Tank, etc.) normal operation should be excluded from this IC. However, a Relief valve that operates and fails to close per design should be considered applicable to this IC if the Relief valve cannot be isolated.

EAL Threshold #1: The pressurizer level band value will be inserted when this information becomes available. CTS-00973

Prolonged loss of RCS Inventory may result in escalation to the Alert emergency classification level via either CA1 or CA4.

Note: The difference between CU1 and CU2 deals with the RCS conditions that exist between cold shutdown and refueling MODEs. In the refueling MODE, the RCS is not intact and RV level and inventory are monitored by different means. In cold shutdown, the RCS will normally be intact and standard RCS inventory and level monitoring means are available.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU2

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of RCS/RV inventory.

Operating MODE Applicability: Refueling

Emergency Action Level Thresholds: (1 or 2)

1. UNPLANNED RCS/RV level drop indicated by RCS/RV water level drop below the RV flange [(site-specific Threshold Value ~~—TBD~~ on RCS Level wide range (~~L~~L-402))] for 15 minutes or longer. CTS-00974 CTS-00975

2. RCS/RV level cannot be monitored with a loss of RCS/RV inventory as indicated by an unexplained level rise in **ANY** one of the following:

   - Refueling Water Storage Pit Level [~~Threshold Value — TBD~~ on L-1400, L-1401, L-1402, L-1403] CTS-00976
   - Containment Vessel Reactor Coolant Drain Tank (CVDT) Level [~~Threshold Value — TBD~~ on L-1000] CTS-00976
   - Pressurizer Relief Tank Level [~~Threshold Value — TBD~~ on L-560]
   - CCW Surge Tank (Train A & B) Level [~~Threshold Value — TBD~~ on L-1200 and L-1201 for Train A, L-1210 and L-1211 for Train B]
   - Containment Sump Level [~~Threshold Value TBD~~ on L-1083]

Basis:

This IC is a precursor of more serious conditions and considered to be a potential degradation of the level of safety of the plant.

Refueling evolutions that decrease RCS water level below the RV flange are carefully planned and procedurally controlled. An UNPLANNED event that results in water level decreasing below the RV flange, or the planned RCS water level for the given evolution (if the planned RCS water level is already below the RV flange), warrants declaration of a NOUE due to the reduced RCS inventory that is available to keep the core covered.

The allowance of 15 minutes was chosen because it is reasonable to assume that level can be restored within this time frame using one or more of the redundant means of refill that should be available. If level cannot be restored in this time frame then it may indicate a more serious condition exists.

Continued loss of RCS Inventory will result in escalation to the Alert emergency classification level via either CA1 or CA4.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

Note: The difference between CU1 and CU2 deals with the RCS conditions that exist between cold shutdown and refueling MODEs. In cold shutdown the RCS will normally be intact and standard RCS inventory and level monitoring means are available. In the refueling MODE the RCS is not intact and RV level and inventory are monitored by different means.

EAL #1

This EAL involves a decrease in RCS level below the top of the RV flange that continues for 15 minutes due to an UNPLANNED event. This EAL is not applicable to decreases in flooded reactor cavity level, which is addressed by AU2 EAL1 until such time as the level decreases to the level of the vessel flange.

-If RV level continues to decrease and reaches the Outlet Nozzle Bottom Inner Diameter (ID) of the RCS Loop then escalation to CA1 would be appropriate. CTS-01091

EAL Threshold #1: The value for RCS Level wide range (L-402) will be inserted when this information becomes available. CTS-00977

EAL #2

This EAL addresses conditions in the refueling MODE when normal means of core temperature indication and RCS level indication may not be available. Redundant means of RV level indication is installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that RV inventory loss was occurring by observing sump and tank level changes. Sump and tank level increases must be evaluated against other potential sources of LEAKAGE such as cooling water sources inside the containment to ensure they are indicative of RCS LEAKAGE.

Escalation to the Alert emergency classification level would be via either CA1 or CA4.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU6

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Loss of all On-site or Off-site communications capabilities.

Operating MODE Applicability:

Cold Shutdown, Refueling, Defueled

Emergency Action Level Thresholds: (1 or 2)

1. Loss of all of the following on-site communication methods affecting the ability to perform routine operations:

   - Public Address/Page (PA/PL)
   - Private Automatic Branch Telephone Exchange (PABX)
   - Sound Powered Telephone System (SPTS)
   - Plant Radio System

2. Loss of all of the following off-site communication methods affecting the ability to perform off-site notifications:

   - Dedicated circuit between Control Room and TX DPS (Garland), Somervell County Sheriff, Hood County Sheriff
   - Private Telephone (backup to Dedicated Circuit)
   - Private ~~Area~~ Automatic Branch Telephone Exchange (PABX) | CTS-00978
   - Emergency Notification System
   - Health Physics Network

Basis:

The purpose of this IC and its associated EALs is to recognize a loss of communications capability that either defeats the plant operations staff ability to perform routine tasks necessary for plant operations or the ability to communicate issues with off-site authorities. The loss of off-site communications ability is expected to be significantly more comprehensive than the condition addressed by 10 CFR 50.72.

The availability of one method of ordinary off-site communications is sufficient to inform federal, state, and local authorities of plant issues. This EAL is intended to be used only when extraordinary means (e.g., relaying of information from radio

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU7

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Loss of required direct current (dc) power for 15 minutes or longer.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Threshold:

1. Less than 105 V (volts) on required vital ~~DC~~dc busses (DCC-A, DCC-B, DCC-C, DCC-D) for 15 minutes or longer. CTS-00979

Basis:

The purpose of this IC and its associated EALs is to recognize a loss of dc power compromising the ability to monitor and control the removal of decay heat during Cold Shutdown or Refueling operations.

It is intended that the loss of the operating (OPERABLE) train is to be considered. If this loss results in the inability to maintain cold shutdown, the escalation to an Alert will be per CA4 "Inability to Maintain Plant in Cold Shutdown with Irradiated Fuel in the RV."

105V bus voltage is the minimum bus voltage necessary for the operation of safety related equipment. This voltage value incorporates a margin of at least 15 minutes of operation before the onset of inability to operate those loads.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU9 CTS-00980

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

UNPLANNED partial loss of indicating, monitoring and control functions for ≥ 15 minutes.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Threshold:

1. UNPLANNED partial loss of Protection and Safety Monitoring System (PSMS) and Plant Control and Monitoring System (PCMS) indicating, monitoring and control functions for 15 minutes or longer.

Basis:

This IC recognizes the difficulty associated with monitoring changing plant conditions without the use of a major portion of the control and indication systems.

This IC recognizes the challenge to the Control Room staff to monitor and control the plant due to partial loss of normal and safety indication and monitoring systems. A Notification of Unusual Event level is considered appropriate for this partial loss of indication and control IC due to the inherently safer condition of the core when in the cold condition. Escalation to an Alert will be via CA7 if a complete loss of control and indication occurs. Declaration of the Alert will provide the Control Room staff with additional personnel to assist in monitoring alternative indications, manipulating equipment and restoring the systems to full capability. The selection of 15 minutes was chosen to allow personnel sufficient time for restoration of required systems due to an inadvertent loss.

The PSMS provides the functions necessary to protect the plant during normal operations, to shutdown the plant, and to maintain the plant in a safe shutdown condition. The PCMS includes the control functions that provide for the control of the nuclear process, conversion of nuclear energy into heat energy, and transport of the heat energy from the nuclear reactor to the main steam turbine. The Diverse Actuation System (DAS) remains available to ensure monitoring and control capability. Loss of DAS would result in escalation to CA7.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA1

Initiating Condition - ALERT

Loss of RCS/RV inventory.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Thresholds: (1 or 2)

1. Loss of RCS/RV inventory as indicated by level less than ANY one of the following:

   - RCS level ~~(wide-range)~~ CTS-00981 CTS-00982
     ~~[~~{site-specific Threshold Value ~~TBD~~ on L-402~~]~~ (wide range) and L-404, L-405 (narrow range) (only available in Refueling)

   - Reactor Vessel Water Level (RVWL) CTS-00983 CTS-00984
     ~~[~~(Threshold Value – ~~TBD~~Top of Hot Leg (El 861'-5.17") on L-571, L-572~~]~~) (only available in Cold Shutdown)

2. RCS/RV level cannot be monitored for 15 minutes or longer with a loss of RCS/RV inventory as indicated by an unexplained level rise in ANY one of the following:

   - Refueling Water Storage Pit Level ~~[Threshold Value TBD~~ on L-1400, L-1401, L-1402, L-1403~~]~~ CTS-00985

   - CVDT Level ~~[Threshold Value TBD~~ on L-1000~~]~~ CTS-00985

   - Pressurizer Relief Tank Level ~~[Threshold Value TBD~~ on L-560~~]~~

   - CCW Surge Tank (Train A & B) Level ~~[Threshold Value TBD~~ on L-1200 and L-1201 for Train A, L-1210 and L-1211 for Train B~~]~~

   - Containment Sump Level ~~[Threshold Value TBD~~ on L-1083~~]~~

Basis:

These EALs serve as precursors to a loss of ability to adequately cool the fuel. The magnitude of this loss of water indicates that makeup systems have not been effective and may not be capable of preventing further RV level decrease and potential core uncovery. This condition will result in a minimum emergency classification level of an Alert.

EAL #1

The inability to restore and maintain level after reaching this setpoint would be indicative of a failure of the RCS barrier. ~~[TBD~~ The Alert ~~will be~~is based on alarm setpoint below Mid Loop Operation (Low-Low) on narrow range instruments CTS-00986

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

(L-404 and L-405).~~(Low-Low?),~~ corresponding to the level slightly above the centerline~~bottom ID~~ of the RCS loop.~~]~~ CTS-00986

EAL Threshold #1: The value for RCS Level wide range (L-402) will be inserted when this information becomes available. CTS-00987

EAL #2

In the cold shutdown MODE, normal RCS level and RV level instrumentation systems will usually be available. In the refueling MODE, normal means of RV level indication may not be available. Redundant means of RV level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that RV inventory loss was occurring by observing sump and tank level changes. Sump and tank level increases must be evaluated against other potential sources of LEAKAGE such as cooling water sources inside the containment to ensure they are indicative of RCS LEAKAGE.

~~[~~The 15-minute duration for the loss of level indication was chosen because it is half of the CS1 SAE EAL duration. Significant fuel damage is not expected to occur until the core has been uncovered for greater than 1 hour per the analysis referenced in the CG1 basis. Therefore this EAL meets the definition for an Alert.~~]~~ CTS-00988 CTS-00988

If RV level continues to lower then escalation to SAE will be via CS1.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

included to allow operator action to restore the heat removal function, if possible. [The allowed time frame is consistent with the guidance provided by Generic Letter 88-17, "Loss of Decay Heat Removal" (Reference 20) (discussed later in this basis) and is believed to be conservative given that a low pressure Containment barrier to fission product release is established.] CTS-00989 CTS-00989

Finally, complete loss of functions required for core cooling during refueling and cold shutdown MODEs when neither CONTAINMENT CLOSURE nor RCS integrity are established.

Note: RCS integrity is in place when the RCS pressure boundary is in its normal condition for the cold shutdown MODE of operation (e.g., no freeze seals or nozzle dams). No delay time is allowed because the evaporated reactor coolant that may be released into the Containment during this heatup condition could also be directly released to the environment.

The asterisk (*) in Table 5-C-2 indicates that this EAL is not applicable if actions are successful in restoring an RCS heat removal system to operation and RCS temperature is being reduced within the specified time frame.

In EAL 2, the 10 psi pressure increase addresses situations where, due to high decay heat loads, the time provided to restore temperature control, should be less than 60 minutes. The RCS pressure setpoint chosen should be 10 psi or the lowest pressure that the site can read on installed instrumentation that is equal to or greater than 10 psi.

Escalation to SAE would be via CS1 should boiling result in significant RV level loss leading to core uncovery.

[This IC and its associated EALs are based on concerns raised by Generic Letter 88-17, "Loss of Decay Heat Removal." A number of phenomena such as pressurization, vortexing, SG U-tube draining, RCS level differences when operating at a mid-loop condition, decay heat removal system design, and level instrumentation problems can lead to conditions where decay heat removal is lost and core uncovery can occur. NRC analyses show that there are sequences that can cause core uncovery in 15 to 20 minutes and severe core damage within an hour after decay heat removal is lost.] CTS-00989 CTS-00989

A loss of TS components alone is not intended to constitute an Alert. The same is true of a momentary UNPLANNED excursion above the TS cold shutdown temperature limit when the heat removal function is available.

The Emergency Coordinator must remain alert to events or conditions that lead to the conclusion that exceeding the EAL is IMMINENT. If, in the judgment of the Emergency Coordinator, an IMMINENT situation is at hand, the classification should be made as if the threshold has been exceeded.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA9 CTS-00990

Initiating Condition - ALERT

Inability to monitor and control the plant for > 15 Minutes.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Thresholds:

1. Loss of all PSMS, PCMS, and DAS digital monitoring and control function for 15 minutes or longer.

Basis:

This IC recognizes the inability of the Control Room staff to monitor and control the plant due to loss of normal and safety indication and monitoring systems, and diverse indication and control systems that allow the operators to monitor and safely shutdown the plant. An Alert level is considered appropriate for this IC due to the inherently safer condition of the core when in the cold condition. Declaration of the Alert will provide the Control Room staff with additional personnel to assist in monitoring alternative indications, manipulating equipment and restoring the systems to full capability. The selection of 15 minutes was chosen to allow personnel sufficient time for restoration of required systems due to an inadvertent loss.

The PSMS provides the functions necessary to protect the plant during normal operations, to shutdown the plant, and to maintain the plant in a safe shutdown condition. The PCMS includes the control functions that provide for the control of the nuclear process, conversion of nuclear energy into heat energy, and transport of the heat energy from the nuclear reactor to the main steam turbine. The DAS is a non-safety related system that provides a diverse backup to the protection system.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CS1

Initiating Condition - SITE AREA EMERGENCY

Loss of RCS/RV inventory affecting core decay heat removal capability.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Thresholds: (1 or 2 or 3)

1. With CONTAINMENT CLOSURE not established, RCS/RV level less than:

   Bottom of Hot Leg indication (El 858'-7.29")~~[TBD value~~ on RVWL (L-571, L-572) (Cold Shutdown only)~~]~~ CTS-00991

   ~~[TBD~~{site-specific value (~~inches above the bottom ID~~corresponding to centerline of the RCS loop}) on the RCS level – wide range (L-402), narrow range (L-404, L-405) (Refueling only) CTS-00992 CTS-00993

2. With CONTAINMENT CLOSURE established, RCS/RV level less than:

   ~~[TBD level for top of active fuel (TOAF)~~Upper Core Plate indication (El 855'-9.42") on RVWL (L-571, L-572) (Cold Shutdown only)~~]~~ CTS-00995

   ~~[TBD~~ {site-specific level for Bottom ID of ~~TOAF on~~ RCS loop} indication on Refueling Cavity Level~~level – wide range~~ (L-4012) (Refueling only)~~]~~. CTS-00996

3. RCS/RV level cannot be monitored for 30 minutes or longer with a loss of RCS/RV inventory as indicated by ANY of the following:

   - ~~[TBD radiation monitor]~~Containment High Range ARM (R-91A/B, R-92A/B, R-93A/B, R-94A/B) reading greater than 2000 R/hr~~TBD value~~]. CTS-00997
   - Erratic Source Range Monitor Indication.
   - Unexplained level rise in any of the following:
     - Refueling Water Storage Pit Level (–L-1401, L-1402, L-1403) CTS-00998
     - CVDT Level (L-1000)
     - Pressurizer Relief Tank Level (L-560)
     - CCW Surge Tank (Train A & B) Levels (L-1200 and L-1201 for Train A, L-1210 and L-1211 for Train B)
     - Containment Sump Level (L-1083)

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

Basis:

Under the conditions specified by this IC, continued decrease in RCS/RV level is indicative of a loss of inventory control. Inventory loss may be due to an RCS breach, pressure boundary LEAKAGE, or continued boiling in the RV. Thus, declaration of a SAE is warranted.

Escalation to a GE is via CG1 or AG1.

EAL #1

In the cold shutdown MODE, the bottom of the hot leg indication corresponds to El 858'-7.29" on RVWL (L-571, L-572). CTS-00999

In the Refueling MODE, the {site-specific value} corresponds to the centerline of the RCS loop, which is the lowermost measurable range of both wide and narrow range level instruments (L-402, L-404/L-405). Therefore at this level, especially in case of off-scale low, remote RCS level indication would be lost and loss of suction to decay heat removal system would occur. The centerline of the RCS loop was chosen as the threshold for this EAL instead of 6" below the bottom ID of the RCS loop specified in NEI 99-01 because the US-APWR does not have the capability to monitor the 6" below the bottom ID of the RCS loop and this scheme is considered conservative and appropriate in light of the intent of this EAL.

EAL#1 Threshold: The value corresponding to the centerline of the RCS loop on L-402, and L-404/L-405 will be filled in when the information is available.

EAL #2 CTS-01000

In cold shutdown, top of active fuel (TOAF) corresponds to the Upper Core Plate indication (El 855'-9.42") on the RVWL (L-571, L-572).

In the Refueling MODE, {site-specific level} corresponds to the bottom ID of the RCS level, which is monitored by refueling cavity level instrument (L-401). This monitor was chosen because at this level, especially in case of off scale low, remote RV level indication would be lost and the RV level would be decreasing toward TOAF. (US-APWR has no level instruments capable of monitoring the level for TOAF in the Refueling MODE. The threshold of the level for bottom ID of the RCS loop is considered conservative and appropriate in light of the intent of this EAL.)

EAL#2 Threshold: The value corresponding to the bottom ID of the RCS loop indication on Refueling Cavity Level (L-401) will be filled in when the information is available.

~~*[TBD - six inches (15 cm) below the bottom ID of the RCS loop is measured as TBD inches (TBD cm) above the upper core plate (TOAF) on L-402, L-404/L-405.]*~~

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

EAL #3

In the cold shutdown MODE, normal RCS level and RV level instrumentation systems will usually be available. In the refueling MODE, normal means of RV level indication may not be available. Redundant means of RV level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that RV inventory loss was occurring by observing sump and tank level changes. Sump and tank level increases must be evaluated against other potential sources of LEAKAGE such as cooling water sources inside the containment to ensure they are indicative of RCS LEAKAGE.

The 30-minute duration allows sufficient time for actions to be performed to recover inventory control equipment.

As water level in the RV lowers, the dose rate above the core will increase. The dose rate ~~due to this core shine should result in site specific monitor indication and possible alarm.~~at the point of Containment High Range ARM is approximately 2000 R/hr using the following calculation conditions: CTS-01001

- Source strength of fuel: 24 hr decayed (for refueling). 24 hours is based on Technical Specifications.
- RV: open
- Water level: TOAF

Therefore, EAL#3 Threshold is set to 2000 R/hr.

Note: Post-TMI studies indicate that the installed nuclear instrumentation will operate erratically when the core is uncovered and source range monitors can be used as a tool for making such determinations. The instrument reported an increasing signal about 30 minutes into the TMI accident. At that time, the reactor coolant pumps were running and the core was adequately cooled as indicated by the core outlet thermocouples. Hence, the increasing signal was the result of an increasing two-phase void fraction in the reactor core and vessel downcomer and the reduced shielding that the two-phase mixture provide to the source range monitor (Reference 21)

~~*[This EAL should conservatively estimate a site specific dose rate setpoin indicative of core uncovery (i.e., level at TOAF).]*~~ CTS-01001

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CG1

Initiating Condition - GENERAL EMERGENCY

Loss of RCS/RV inventory affecting fuel clad integrity with containment challenged.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Thresholds: (1 or 2)

1. a. RCS/RV level less than ~~[TBD level for TOAF~~Upper Core Plate indication (El 855'-9.42") on RVWL (L-571, L-572) (Cold Shutdown only)~~]~~ OR ~~[TBD~~ {site-specific} level for ~~TOAF on~~Bottom ID of RCS loop indication on Refueling Cavity L~~l~~evel – wide range (L-401~~2~~) (Refueling only)] for 30 minutes or longer. CTS-01002 CTS-01003 CTS-01004

   AND

   b. **ANY** containment challenge indication (see Table 5-C-3):

2. a. RCS/RV level cannot be monitored and core uncovery is indicated by **ANY** of the following for 30 minutes or longer.

   - ~~[TBD radiation monitor]~~Containment High Range ARM reading greater than ~~[TBD setpoint]~~2000 R/hr (R-91A/B, R-92A/B, R-93A/B, R-94A/B). CTS-01005
   - CET temperature greater than ~~[TBD value (~~700 degrees F (371~~0~~ degrees C)~~) on TBD Instrument Number]~~ (Cold Shutdown only) CTS-01006
   - Erratic source range monitor indication.
   - UNPLANNED level rise in any of the following:
     - Refueling Water Storage Pit Level (–L-1400, L-1401, L-1402, L-1403-) CTS-01007
     - CVDT Level (L-1000)
     - Pressurizer Relief Tank Level (L-560)
     - CCW Surge Tank (Train A & B) Levels (L-1200 and L-1201 for Train A, L-1210 and L-1211 for Train B)
     - Containment Sump Level (L-1083)

   AND

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

b. **ANY** containment challenge indication (see Table 5-C-3):

Table 5-C-3: Containment Challenge Indications
• CONTAINMENT CLOSURE not established.
• ~~[TBD Hydrogen concentration greater than 4%]~~Explosive mixture inside containment.
• UNPLANNED rise in containment pressure as indicated on P-950, P-951.

CTS-01008

Basis:

This IC represents the inability to restore and maintain RV level to above the TOAF with containment challenged. Fuel damage is probable if RV level cannot be restored, as available decay heat will cause boiling, further reducing the RV level. With the CONTAINMENT breached or challenged then the potential for unmonitored fission product release to the environment is high. This represents a direct path for radioactive inventory to be released to the environment. This is consistent with the definition of a GE. The GE is declared on the occurrence of the loss or IMMINENT loss of function of all three barriers.

CTS-01009

~~[~~These EALs are based on concerns raised by Generic Letter 88-17, Loss of Decay Heat Removal, SECY 91-283, Evaluation of Shutdown and Low Power Risk Issues (Reference 22), NUREG-1449, Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States (Reference 23), and, NUMARC 91-06, Guidelines for Industry Actions to Assess Shutdown Management (Reference 24).~~]~~

CTS-01009

A number of variables can have a significant impact on heat removal capability challenging the fuel clad barrier. Examples include:

- Mid-loop, reduced level/flange level, head in place, cavity flooded, RCS venting strategy, decay heat removal system design, vortexing pre-disposition, SG U-tube draining

Analysis indicates that core damage may occur within an hour following continued core uncovery, therefore, 30 minutes was conservatively chosen.

If CONTAINMENT CLOSURE is re-established prior to exceeding the 30 minute core uncovery time limit then escalation to GE would not occur.

~~[Site shutdown contingency plans typically provide for re-establishing CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory functions.]~~

CTS-01009

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

~~[~~In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to a core uncovery could result in an explosive mixture of dissolved gasses in Containment. However, Containment monitoring and/or sampling should be performed to verify this assumption and a GE declared if it is determined that an explosive mixture exists.~~]~~ CTS-01009 CTS-01009

EAL #1

TOAF for the US-APWR is considered as the upper core plate. RVWL (in Cold Shutdown) measuring less than or equal ~~[TBD]~~5.9 inches (~~[TBD]~~15 cm) above the upper core plate is used for this EAL. In the refueling mode, level for the bottom ID of the RCS loop monitored by the Refueling Cavity level instrument (L-401) is used as the threshold for this EAL because RCS level instruments have no capability to monitor TOAF (or upper core plate) level and the bottom ID of the RCS loop is the lowest measurable RV level by L-401. CTS-01010

EAL#1 Threshold: The value corresponding to the bottom ID of the RCS loop indication on Refueling Cavity Level (L-401) will be filled in when the information is available. CTS-01011

EAL #2

Sump and tank level increases must be evaluated against other potential sources of LEAKAGE such as cooling water sources inside the containment to ensure they are indicative of RCS LEAKAGE.

Note: In the cold shutdown MODE, normal RCS level and RV level instrumentation systems will usually be available. In the refueling MODE, normal means of RV level indication may not be available. Redundant means of RV level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that RV inventory loss was occurring by observing sump and tank level changes. Sump and tank level increases must be evaluated against other potential sources of LEAKAGE such as cooling water sources inside the containment to ensure they are indicative of RCS LEAKAGE.

As water level in the RV lowers, the dose rate above the core will increase. The dose rate ~~due to this core shine should result in site specific monitor indication and possible alarm.~~at the point of Containment High Range ARM is approximately 2000 R/hr using following calculation conditions; CTS-01012

- Source strength of fuel: 24 hr decayed (for refueling). 24 hours is based on Technical Specifications.
- RV: open

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

- Water level: TOAF

CTS-01012

Therefore, EAL#2.a Threshold is set at 2000 R/hr.

Note: Post-TMI studies indicate that the installed nuclear instrumentation will operate erratically when the core is uncovered and source range monitors can be used as a tool for making such determinations. The instrument reported an increasing signal about 30 minutes into the TMI accident. At that time, the reactor coolant pumps were running and the core was adequately cooled as indicated by the core outlet thermocouples. Hence, the increasing signal was the result of an increasing two-phase void fraction in the reactor core and vessel downcomer.

Comanche Peak Nuclear Power Plant, Units 3 & 4
COL Application
Part 5 - Emergency Plan
Table 5-F-2: EAL Fission Product Barrier Table (Sheet 2 of 5)
Thresholds for LOSS or POTENTIAL LOSS of Barriers*

*Determine which combination of the three barriers are lost or have a potential loss and use the following key to classify the event. Also, multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is IMMINENT. In this IMMINENT loss situation use judgment and classify as if the thresholds are exceeded.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Loss of ANY two barriers AND Loss or Potential Loss of third barrier.	Loss or Potential Loss of ANY two barrier.	ANY Loss or ANY Potential Loss of EITHER Fuel Clad or RCS.	ANY Loss or ANY Potential Loss of Containment.

Fuel Clad Barrier Thresholds		RCS Barrier Thresholds		Containment Barrier Thresholds		
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	
1. DOSE EQUIVALENT I-131 of 300 µCi/gm OR [DOSE EQUIVALENT XE-133 of ~~TBD~~1500 µCi/gm] as indicated on Primary Radiation Coolant Monitor R-70 or sample results.	Not Applicable	1. RCS leak rate greater than available makeup capacity as indicated by a loss of RCS subcooling.	1. RCS leak rate indicated greater than 180 gpm~~[TBD capacity of one charging pump~~ in the normal charging mode~~]~~ with Letdown isolated.	1. A containment pressure rise followed by a rapid unexplained drop in containment pressure. OR 2. Containment pressure or sump level response not consistent with LOCA conditions.	1. Containment Vessel pressure greater than 68 psig and rising. OR 2. ~~Containment Vessel Hydrogen Concentration greater than [4%]~~Explosive mixture in containment. OR 3. a. Pressure greater than Containment Spray actuation set point ~~[TBD value]~~ AND b. Less than two full trains of Containment Spray operating.	CTS-01017 CTS-01013 CTS-01019 CTS-01019

Table 5-F-2: EAL Fission Product Barrier Table (Sheet 3 of 5)
Thresholds for LOSS or POTENTIAL LOSS of Barriers*

*Determine which combination of the three barriers are lost or have a potential loss and use the following key to classify the event. Also, multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is IMMINENT. In this IMMINENT loss situation use judgment and classify as if the thresholds are exceeded.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Loss of ANY two barriers AND Loss or Potential Loss of third barrier.	Loss or Potential Loss of ANY two barrier.	ANY Loss or ANY Potential Loss of EITHER Fuel Clad or RCS.	ANY Loss or ANY Potential Loss of Containment.

Fuel Clad Barrier Thresholds		RCS Barrier Thresholds		Containment Barrier Thresholds		
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	
3. Core Exit Thermocouple Readings		3. Not Applicable		3. Core Exit Thermocouple Readings		
1. CETs reading greater than ~~[TBD~~ 1200 degrees F(~~650~~649 degrees C)~~]~~.	1. CETs reading greater than ~~[TBD 750~~ 700degrees F (~~400~~371 degrees C)~~]~~.	Not Applicable	Not Applicable	Not Applicable	1.a. CETs in excess of ~~[TBD~~ 1200 degrees F (~~650~~649 degrees C)] AND b. Restoration procedures not effective within 15 minutes. OR 2.a. CETs in excess of ~~[TBD 750~~700 degrees F (~~400~~371degrees C)~~]~~. AND b. RVWL ~~below [TBD level]~~indicates RCS level at Upper Core Plate. AND c. Restoration procedures not effective within 15 minutes.	CTS-01014 CTS-01020 CTS-01020 CTS-01021

Table 5-F-2: EAL Fission Product Barrier Table (Sheet 4 of 5)
Thresholds for LOSS or POTENTIAL LOSS of Barriers*

*Determine which combination of the three barriers are lost or have a potential loss and use the following key to classify the event. Also, multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is IMMINENT. In this IMMINENT loss situation use judgment and classify as if the thresholds are exceeded.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Loss of ANY two barriers AND Loss or Potential Loss of third barrier.	Loss or Potential Loss of ANY two barrier.	ANY Loss or ANY Potential Loss of EITHER Fuel Clad or RCS.	ANY Loss or ANY Potential Loss of Containment.

Fuel Clad Barrier Thresholds		RCS Barrier Thresholds		Containment Barrier Thresholds	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
4. Reactor Vessel Water Level		4. SG Tube Rupture		4. SG Secondary Side Release with P-to-S LEAKAGE	
Not Applicable	1. RVWL indicates less ~~than [TBD~~ RCS level ~~for TOAF]~~at Upper Core Plate.	1. RUPTURED SG results in an ECCS (SI) actuation.	Not Applicable	1. RUPTURED SG is also FAULTED outside of containment. OR 2.a. Primary-to-Secondary leak rate greater than 10 gpm. AND b. UNISOLABLE steam release from affected SG to the environment.	Not Applicable
5. Not Applicable		5. Not Applicable		5. Containment Isolation Failure or Bypass	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	1.a. Failure of all valves in any one line to close. AND b. Direct downstream pathway to the environment exists after containment isolation signal.	Not Applicable

CTS-01015

Comanche Peak Nuclear Power Plant, Units 3 & 4
COL Application
Part 5 - Emergency Plan
Table 5-F-2: EAL Fission Product Barrier Table (Sheet 5 of 5)
Thresholds for LOSS or POTENTIAL LOSS of Barriers*

*Determine which combination of the three barriers are lost or have a potential loss and use the following key to classify the event. Also, multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is IMMINENT. In this IMMINENT loss situation use judgment and classify as if the thresholds are exceeded.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Loss of ANY two barriers AND Loss or Potential Loss of third barrier.	Loss or Potential Loss of ANY two barrier.	ANY Loss or ANY Potential Loss of EITHER Fuel Clad or RCS.	ANY Loss or ANY Potential Loss of Containment.

Fuel Clad Barrier Thresholds		RCS Barrier Thresholds		Containment Barrier Thresholds	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
6. Containment Radiation Monitoring		6. Containment Radiation Monitoring		6. Containment Radiation Monitoring	
1. Containment High Range ARM reading greater than ~~[TBD value]~~16 R/hr.	Not Applicable	1. Containment High Range ARM reading greater than ~~[TBD value]~~3.2 R/hr.	Not Applicable	Not Applicable	1. Containment High Range ARM reading greater than ~~[TBD]~~15000 R/hr.
7. Other Indications		7. Other Indications		7. Other Indications	
1. Not applicable.	1. Not applicable.	1. Not applicable.	1. Not applicable.	1. Not applicable.	1. Not applicable.
8. Emergency Coordinator Judgment		8. Emergency Coordinator Judgment		8. Emergency Coordinator Judgment	
1. Any condition in the opinion of the Emergency Coordinator that indicates Loss of the Fuel Clad Barrier.	1. Any condition in the opinion of the Emergency Coordinator that indicates Potential Loss of the Fuel Clad Barrier.	1. Any condition in the opinion of the Emergency Coordinator that indicates Loss of the RCS Barrier.	1. Any condition in the opinion of the Emergency Coordinator that indicates Potential Loss of the RCS Barrier.	1. Any condition in the opinion of the Emergency Coordinator that indicates Loss of the Containment Barrier.	1. Any condition in the opinion of the Emergency Coordinator that indicates Potential Loss of the Containment Barrier.

CTS-01016, 01018, 01022

FUEL CLAD BARRIER THRESHOLDS: (1 or 2 or 3 or 4 or 6 or 8)

The Fuel Clad Barrier consists of the zircalloy fuel bundle tubes that contain the fuel pellets.

1. Critical Safety Function Status

Loss Threshold 1

Core Cooling - RED indicates significant superheating and core uncovery and is considered to indicate Loss of the Fuel Clad Barrier.

Potential Loss Threshold 1

Core Cooling - ORANGE indicates subcooling has been lost and that some clad damage may occur.

Potential Loss Threshold 2

Heat Sink - RED when heat sink is required indicates the ultimate heat sink function is under extreme challenge.

2. Primary Coolant Activity Level

The value corresponds to DOSE EQUIVALENT I-131 of 300 µCi/gm or ~~[TBD~~ DOSE EQUIVALENT XE-133 of 1500 µCi/gm~~]~~. This amount of coolant activity is well above that expected for iodine spikes and corresponds to less than 5% fuel clad damage. This amount of radioactivity indicates significant clad damage and thus the Fuel Clad Barrier is considered lost. CTS-01023

~~*[The value can be expressed either in mR/hr observed on the sample or as µCi/gm results from analysis.]*~~ CTS-01023

There is no Potential Loss Threshold associated with this item.

3. Core Exit Thermocouple Readings

The CETs provide an adequate measure of core temperatures to estimate temperatures at which potential cladding damage and core overheating may be occurring.

Loss Threshold #1

CETs with readings above ~~[TBD~~ 1200~~]~~ degrees F (~~[TBD 650]~~649 degrees C) indicate significant clad heating and the Loss of the Fuel Clad Barrier. This value corresponds to significant superheating of the coolant. CTS-01024

Potential Loss Threshold #1

The reading corresponds to loss of subcooling.

CETs with readings greater than ~~[TBD 700 to 900]~~ degrees F (~~[TBD 370 to 480]~~371 degrees C) indicate the onset of inadequate core cooling. CTS-01025

4. Reactor Vessel Water Level

There is no Loss Threshold associated with this item.

The Potential Loss Threshold corresponds to the TOAF.

The value for the Potential Loss Threshold corresponds to the ~~[TBD] the TOAF~~RVWL instrument Upper Core Plate indication. CTS-01025

5. Not Applicable (included for numbering consistency between Barrier tables)

6. Containment Radiation Monitoring

The reading of ~~[TBD value, TBD instrument numbers]~~16 R/hr on Containment High Range ARM (R-91A/B, R-92A/B, R-93A/B, R-94A/B) is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the containment. This reading is based on release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of DOSE EQUIVALENT I-131 of 300 µCi/gm or ~~[~~DOSE EQUIVALENT XE-133 of ~~TBD~~1500 µCi/gm~~]~~ into the containment atmosphere. CTS-01026 CTS-01026

Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within TS and are therefore indicative of fuel damage.

This value is higher than that specified for RCS Barrier Loss Threshold #6. Thus, this threshold indicates a ~~[~~Loss of both the Fuel Clad Barrier and RCS Barrier that appropriately escalates the emergency classification level to a SAE. CTS-01027

~~*[Caution: it is important to recognize that in the event the radiation monitor is sensitive to shine from the reactor vessel or piping, spurious readings will be present and another indicator of fuel clad damage is necessary or compensated for in the threshold value.]*~~ CTS-01027

There is no Potential Loss Threshold associated with this item.

7. Other Indications

Basis Information For EAL Fission Product Barrier Table 5-F-2

RCS BARRIER THRESHOLDS: (1 or 2 or 4 or 6 or 8)

The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety ~~and relief~~ valves, and other connections up to and including the primary isolation valves. CTS-01028

1. Critical Safety Function Status

Potential Loss Threshold 1

RCS Integrity - RED indicates an extreme challenge to the safety function derived from appropriate instrument readings.

Potential Loss Threshold 2

Heat Sink - RED when heat sink is required indicates the ultimate heat sink function is under extreme challenge.

There is no Loss Threshold associated with this item.

2. RCS Leak Rate

The Loss Threshold addresses conditions where LEAKAGE from the RCS is greater than available inventory control capacity such that a loss of subcooling has occurred. The loss of subcooling is the fundamental indication that the inventory control systems are inadequate in maintaining RCS pressure and inventory against the mass loss through the leak.

The Potential Loss is based on the inability to maintain normal liquid inventory within the RCS by the Chemical and Volume Control System (CVCS), which is considered to be the flow equivalent to one charging pump discharging to the charging header. Isolating letdown is a standard abnormal operating procedure action and may prevent unnecessary classifications when a non-RCS LEAKAGE path such as a CVCS leak exists. The intent of this condition is met if attempts to isolate Letdown are NOT successful. Additional charging pumps being required is indicative of a substantial RCS leak.

3. Not Applicable (included for numbering consistency between Barrier tables)

4. SG Tube Rupture

This threshold addresses the full spectrum of SG tube rupture events in conjunction with Containment Barrier Loss ~~t~~Thresholds. It addresses RUPTURED SG(s) for which the LEAKAGE is large enough to cause actuation of ECCS (SI). This is consistent to the RCS Barrier Potential Loss Threshold. CTS-01029

By itself, this threshold will result in the declaration of an Alert. However, if the SG is also FAULTED (i.e., two barriers failed), the declaration escalates to a SAE per Containment Barrier Loss Thresholds.

There is no Potential Loss Threshold associated with this item.

5. Not Applicable (included for numbering consistency between Barrier tables)

6. Containment Radiation Monitoring

The reading of ~~[TBD value, TBD instrument numbers]~~3.2 R/hr on Containment High Range ARM (R-91A/B, R-92A/B, R-93A/B, R-94A/B) is a value which indicates the release of reactor coolant to the containment. The reading ~~is based on an~~assumes the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating ~~conditions~~concentrations (i.e., with TS ~~limits~~) into the containment atmosphere. CTS-01030 CTS-01030

The dose rate of 3.2 R/hr on the Containment High Range ARM is based on the following calculation conditions: CTS-01031

- Source strength of RCS: 1% fuel defect as design basis source term.
- RCS leak rate: 180 gpm as stated in RCS Barrier Threshold for Potential Loss #2
- RCS leak time: 15 min as stated in EAL Containment Barrier Threshold for Potential Loss #3)
- Containment free volume: 2.8E+6 ft^3
- Thermal power: 4540 MWt (102% power)

~~This reading will be less than that specified for Fuel Clad Barrier Threshold #6. Thus, this threshold would be indicative of a RCS leak only. If the radiation monitor reading increased to that specified by Fuel Clad Barrier threshold, fuel damage would also be indicated.~~

There is no Potential Loss Threshold associated with this item.

7. Other Indications

This subcategory is not applicable to the CPNPP Units 3 & 4 but has been preserved for consistency with NEI 99-01.

This threshold represents a Potential Loss of containment in that the containment heat removal/depressurization system (i.e., Containment Spray, but not including containment venting strategies) is either lost or performing in a degraded manner, as indicated by containment pressure greater than the setpoint at which the equipment was supposed to have actuated.

3. Core Exit Thermocouple Readings

There is no Loss Threshold associated with this item.

Potential Loss Threshold #1

The conditions in these thresholds represent an IMMINENT core melt sequence which, if not corrected, could lead to vessel failure and an increased potential for containment failure. In conjunction with the Fuel Barrier CET criteria and RCS Barrier RCS leak rate criteria, this threshold would result in the declaration of a GE -- Loss of two Barriers and the Potential Loss of a third. If the function restoration procedures are ineffective, there is no "success" path.

The function restoration procedures are those EOPs that address the recovery of the core cooling CSFs. The procedure is considered effective if the temperature is decreasing or if the vessel water level is increasing.

*[*Severe accident analyses (e.g., NUREG-1150 (Reference 25)) have concluded that function restoration procedures can arrest core degradation within the reactor vessel in a significant fraction of the core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide a reasonable period to allow function restoration procedures to arrest the core melt sequence.*]* CTS-01032 CTS-01032

Whether or not the procedures will be effective should be apparent within 15 minutes. The Emergency Coordinator should make the declaration as soon as it is determined that the procedures have been, or will be ineffective.

4. SG Secondary Side Release With Primary to Secondary LEAKAGE

The Loss Threshold recognizes that SG tube LEAKAGE can represent a bypass of the Containment Barrier as well as a Loss of the RCS Barrier.

The two Loss Thresholds could be considered redundant, but the inclusion of a threshold that uses Emergency Procedure-commonly used terms like "RUPTURED and FAULTED" adds to the ease of the classification process and has been included based on this human factor concern.

This threshold results in a NOUE for smaller breaks that; (1) do not exceed the normal charging capacity threshold in RCS Barrier Potential Loss Threshold, or (2) do not result in ECCS actuation in RCS SG tube rupture ~~Barrier~~ Loss CTS-01033

Threshold. For larger breaks, RCS Barrier threshold criteria would result in an Alert. For SG tube ruptures which may involve multiple SGs or UNISOLABLE secondary line breaks, this threshold would exist in conjunction with RCS Barrier thresholds and would result in a SAE. Escalation to GE would be based on "Potential Loss" of the Fuel Clad Barrier.

Loss Threshold #1

This threshold addresses the condition in which a RUPTURED SG is also FAULTED. This condition represents a bypass of the RCS and Containment Barriers and is a subset of the second threshold. In conjunction with RCS Barrier Loss Threshold, this would always result in the declaration of a SAE.

Loss Threshold #2

This threshold addresses SG tube leaks that exceed 10 gallons per minute (gpm) in conjunction with an UNISOLABLE release path to the environment from the affected SG. The threshold for establishing the UNISOLABLE secondary side release is intended to be a prolonged release of radioactivity from the RUPTURED SG directly to the environment. This could be expected to occur when the main condenser is unavailable to accept the contaminated steam (i.e., SG tube rupture with concurrent loss of off-site power and the RUPTURED SG is required for plant cooldown or a stuck open relief valve). If the main condenser is available, there may be releases via air ejectors, gland seal exhausters, and other similar controlled, and often monitored, pathways. These pathways do not meet the intent of an UNISOLABLE release path to the environment. These minor releases are assessed using Abnormal Rad Levels/Radiological Effluent ICs.

[TS limits ([~~TBD~~ 150] gallons per day) provide a defense in depth associated with alternate SG plugging criteria. The [~~TBD~~ 150] gallons per day threshold is deemed too low for use as an emergency threshold. A pressure boundary LEAKAGE of 10 gpm was used as the threshold in IC SU5, RCS LEAKAGE, and is deemed appropriate for this threshold.] CTS-01034 CTS-01034

5. Containment Isolation Failure or Bypass

This threshold addresses incomplete containment isolation that allows direct release to the environment.

The use of the modifier "direct" in defining the release path discriminates against release paths through interfacing liquid systems. The existence of an in–line charcoal filter does not make a release path indirect since the filter is not effective at removing fission product noble gases. Typical filters have an efficiency of 95-99% removal of iodine. Given the magnitude of the core inventory of iodine, significant releases could still occur. In addition, since the fission product release would be driven by boiling in the reactor vessel, the high humidity in the release stream can be expected to render the filters ineffective in a short period.

There is no Potential Loss Threshold associated with this item.

6. Containment Radiation Monitoring

There is no Loss Threshold associated with this item.

The ~~[TBD value]~~15000 R/hr reading on Containment High Range ARM (R-91A/B, R-92A/B, R-93A/B, R-94A/B) is a value which indicates significant fuel damage well in excess of the ~~T~~thresholds associated with both Loss of Fuel Clad and Loss of RCS Barriers. A major release of radioactivity requiring off-site protective actions from core damage is not possible unless a major failure of fuel cladding allows radioactive material to be released from the core into the reactor coolant. CTS-01035 CTS-01037

Regardless of whether containment is challenged, this amount of activity in containment, if released, could have such severe consequences that it is prudent to treat this as a Potential Loss of containment, such that a GE declaration is warranted.

NUREG-1228, *Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents*, (Reference 26) indicates that such conditions do not exist when the amount of clad damage is less than 20%. The Containment High Range ARM reading corresponds to 20% fuel clad damage~~.~~ and is based on the following calculation conditions: CTS-01036

- Source strength of fuel gap activity: 2.5%
- RG1.183 (alternative source term) states 5% fuel gap activity released to containment in 30 minutes during LOCA and release rate is constant. This EAL assumed a 15 minute release. Therefore, the source strength of the fuel gap activity is half of the RG 1.183 activity. CTS-01036
- RCS leak time: 15 minutes as stated EAL Threshold for Containment Potential Loss #3
- Containment free volume: 2.8E+6 ft^3
- Thermal power: 4540 MWt (102% power)

7. Other Indications

This subcategory is not applicable to CPNPP Units 3 & 4 but has been preserved for consistency with NEI 99-01.

8. Emergency Coordinator Judgment

These thresholds address any other factors that are to be used by the Emergency Coordinator in determining whether the Containment Barrier is lost or potentially

lost. In addition, the inability to monitor the Barrier should also be incorporated in this threshold as a factor in Emergency Coordinator judgment that the Barrier may be considered lost or potentially lost.

The Containment Barrier should not be declared lost or potentially lost based on exceeding TS action statement criteria, unless there is an event in progress requiring mitigation by the Containment ~~b~~Barrier. When no event is in progress (Loss or Potential Loss of either Fuel Clad and/or RCS) the Containment ~~b~~Barrier status is addressed by TS. CTS-01037

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Natural or destructive phenomena affecting the PROTECTED AREA.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3 or 4)

1. Seismic event identified by **ANY 2** of the following:

   - Seismic event confirmed by ~~[TBD instrument name and number]~~actuation of seismic system indicators | CTS-01038
   - Earthquake felt in plant
   - National Earthquake Center

2. Tornado striking within PROTECTED AREA boundary or sustained high winds greater than 80 mph.

3. Internal flooding that has the potential to affect safety related equipment required by TS for the current operating MODE in ANY of the following areas:

   - Containment Vessel
   - Reactor Building
   - Power Source Buildings

4. Turbine failure resulting in casing penetration or damage to turbine or generator seals.

Basis:

These EALs are categorized on the basis of the occurrence of an event of sufficient magnitude to be of concern to plant operators.

EAL #1

Damage may be caused to some portions of the site, but should not affect ability of safety functions to operate.

The National Earthquake Center can confirm if an earthquake has occurred in the area of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

EAL #2

This EAL is based on a tornado striking (touching down) or sustained high winds within the PROTECTED AREA. The wind speed selected is a site-specific value that can be reliably monitored by plant meteorological instrumentation. Although design basis for the US-APWR is 155 mph, this wind speed may not be available due to loss of meteorological instrumentation at sustained winds of this magnitude. The sustained wind value used for CPNPP Units 3 & 4, 80 mph, was selected for consistency with the Units 1 & 2 EAL Threshold. CTS-01039

Escalation of this emergency classification level, if appropriate, would be based on VISIBLE DAMAGE, or by other in plant conditions, via HA1.

EAL #3

This EAL addresses the effect of internal flooding caused by events such as component failures, equipment misalignment, or outage activity mishaps.

The areas listed contain systems required for safe shutdown of the plant, which are not designed to be partially or fully submerged. CTS-01040

Escalation of this emergency classification level, if appropriate, would be based on VISIBLE DAMAGE via HA1, or by other plant conditions.

EAL #4

This EAL addresses main turbine rotating component failures of sufficient magnitude to cause observable damage to the turbine casing or to the seals of the turbine generator. Generator seal damage observed after generator purge does not meet the intent of this EAL because it did not impact normal operation of the plant.

Of major concern is the potential for LEAKAGE of combustible fluids (lubricating oils) and gases (hydrogen cooling) to the plant environs. Actual FIRES and flammable gas build up are appropriately classified via HU2 and HU3.

This EAL is consistent with the definition of a NOUE while maintaining the anticipatory nature desired and recognizing the risk to non-safety related equipment.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU4

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Confirmed SECURITY CONDITION or threat which indicates a potential degradation in the level of safety of the plant.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3)

1. A SECURITY CONDITION that does NOT involve a HOSTILE ACTION as reported by the Security Shift Supervisor

2. A credible site-specific security threat notification.

3. A validated notification from NRC providing information of an aircraft threat.

Basis:

Security events which do not represent a potential degradation in the level of safety of the plant are reported under 10 CFR 73.71 (Reference 27) or in some cases under 10 CFR 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under HA4, HS4 and HG1.

A higher initial classification could be made based upon the nature and timing of the security threat and potential consequences. The licensee shall consider upgrading the emergency response status and emergency classification level in accordance with the site's Safeguards Contingency Plan and Emergency Plan.

EAL #1

Reference is made to ~~site-specific s~~Security ~~s~~Shift Supervisors~~supervision~~ because these individuals are the designated personnel on-site qualified and trained to confirm that a security event is occurring or has occurred. Training on security event classification confirmation is closely controlled due to the strict secrecy controls placed on the ~~plant~~CPNPP Units 3 & 4 Safeguards Contingency Plan. CTS-01041 CTS-01041

This threshold is based on CPNPP Units 3 & 4 security plans. CPNPP Units 3 & 4 Safeguards Contingency Plans are based on guidance provided by NEI 03-12 (Reference 28). CTS-01041

EAL #2

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA1

Initiating Condition - ALERT

Natural or destructive phenomena affecting VITAL AREAS.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3 or 4 or 5)

1. a. Seismic event greater than {site-specific OBE value ~~as indicated by [TBD seismic instrumentation] reading [TBD~~ based on the Ultimate Heat Sink OBE limit~~]~~} as indicated by seismic instrumentation. CTS-01042

   AND

   b. Earthquake confirmed by ANY of the following:

   - Earthquake felt in plant
   - National Earthquake Center
   - Control Room indication of degraded performance of systems required for the safe shutdown of the plant

2. Tornado striking or sustained high winds greater than 80 mph resulting in VISIBLE DAMAGE to ANY of the following structures containing safety systems or components OR Control Room indication of degraded performance of those safety systems:

   - Containment Vessel
   - Reactor Building
   - Power Source Buildings
   - Cooling Tower Structures
   - Power Source Fuel Storage Vault
   - Power Source Fuel Pipe Tunnel
   - ESW Pipe Tunnel
   - Auxiliary Building
   - Turbine Building

3. Internal flooding in ANY of the following areas resulting in an electrical shock hazard that precludes access to operate or monitor safety

should not be interpreted as mandating a lengthy damage assessment prior to classification. No attempt is made in this EAL to assess the actual magnitude of the damage. The significance here is not that a particular system or structure was damaged, but rather, that the event was of sufficient magnitude to cause this degradation.

Escalation of this emergency classification level, if appropriate, would be based on System Malfunction ICs.

EALs #2 - #5

These EALs specify ~~site-specific~~ structures or areas that contain safety systems, or components and functions required for safe shutdown of the plant. CTS-01043

EAL #1

Seismic events of this magnitude can result in a VITAL AREA being subjected to forces beyond design limits, and thus damage may be assumed to have occurred to plant safety systems.

[The OBE limit for other US-APWR design is 0.1g. ~~Site-specific~~CPNPP design of cooling towers includes an OBE limit, which may differ from US-APWR OBE limit]. The National Earthquake Center can confirm if an earthquake has occurred in the area of the plant. CTS-01044

EAL #2

This EAL is based on a tornado striking (touching down) or sustained high winds that have caused VISIBLE DAMAGE to structures containing functions or systems required for safe shutdown of the plant. The wind speed selected is a value that can be reliably monitored by plant meteorological instrumentation. Although design basis for the US-APWR is 155 mph, this wind speed may not be available due to loss of meteorological instrumentation at sustained winds of this magnitude. The sustained wind value used for CPNPP Units 3 & 4, 80 mph, was selected for consistency with the Units 1 & 2 EAL Threshold. CTS-01046

EAL #3

This EAL addresses the effect of internal flooding caused by events such as component failures, equipment misalignment, or outage activity mishaps. It is based on the degraded performance of systems, or has created industrial safety hazards (e.g., electrical shock) that preclude necessary access to operate or monitor safety equipment. The inability to access, operate or monitor safety equipment represents an actual or substantial potential degradation of the level of safety of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA4

Initiating Condition - ALERT

HOSTILE ACTION within the Owner Controlled Area or airborne attack threat.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2)

1. A HOSTILE ACTION is occurring or has occurred within the OCA as reported by the Security Shift Supervisor.

2. A validated notification from NRC of an airliner attack threat within 30 minutes of the site.

Basis:

These EALs address the contingency for a very rapid progression of events, such as that experienced on September 11, 2001. They are not premised solely on the potential for a radiological release. Rather the issue includes the need for rapid assistance due to the possibility for significant and indeterminate damage from additional air, land or water attack elements.

The fact that the site is under serious attack or is an identified attack target with minimal time available for further preparation or additional assistance to arrive requires a heightened state of readiness and implementation of protective measures that can be effective (such as on-site evacuation, dispersal or sheltering).

EAL #1

This EAL addresses the potential for a very rapid progression of events due to a HOSTILE ACTION. It is not intended to address incidents that are accidental events or acts of civil disobedience, such as small aircraft impact, hunters, or physical disputes between employees within the OCA. Those events are adequately addressed by other EALs.

This EAL is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OCA.

[Although nuclear plant security officers are well trained and prepared to protect against HOSTILE ACTION, it is appropriate for OROs to be notified and encouraged to begin activation (if they do not normally) to be better prepared should it be necessary to consider further actions.] CTS-01048 CTS-01048

[If not previously notified by the NRC that the airborne HOSTILE ACTION was intentional, then it would be expected, although not certain, that notification by an appropriate Federal agency would follow. In this case, appropriate federal agency

is intended to be NORAD, Federal Bureau of Investigation (FBI), Federal Aviation Administration (FAA) or NRC. However, the declaration should not be unduly delayed awaiting Federal notification.] CTS-01048

EAL #2

This EAL addresses the immediacy of an expected threat arrival or impact on the site within a relatively short time.

The intent of this EAL is to ensure that notifications for the airliner attack threat are made in a timely manner and that OROs and plant personnel are at a state of heightened awareness regarding the credible threat. Airliner is meant to be a large aircraft with the potential for causing significant damage to the plant.

This EAL is met when a plant receives information regarding an airliner attack threat from NRC and the airliner is within 30 minutes of the plant. Only the plant to which the specific threat is made need declare the Alert.

The NRC Headquarters Operations Officer will communicate to the licensee if the threat involves an airliner (airliner is meant to be a large aircraft with the potential for causing significant damage to the plant). The status and size of the plane may be provided by NORAD through the NRC.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA5

Initiating Condition - ALERT

Control Room evacuation has been initiated.

Operating MODE Applicability: All

Emergency Action Level Thresholds:

1. ~~[TBD~~ {site-specific procedure}~~]~~ requires Control Room evacuation. | CTS-01045

Basis:

With the Control Room evacuated, additional support, monitoring and direction through the TSC and/or other emergency response facilities may be necessary.

EAL Threshold #1: The site-specific procedure number will be inserted when determined. | CTS-01047

Inability to establish plant control from outside the Control Room will escalate this event to a SAE via HS2.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS2

Initiating Condition - SITE AREA EMERGENCY

Control Room evacuation has been initiated and plant control cannot be established.

Operating MODE Applicability: All

Emergency Action Level Threshold:

1. a. Control Room evacuation has been initiated.

   AND

   b. Control of the plant cannot be established per [{site-specific procedure} ~~TBD~~] within [~~TBD~~ 15 minutes]. CTS-01049 CTS-01050

Basis:

The intent of this IC is to capture those events where the Control Room has been evacuated and control of the plant cannot be reestablished in a timely manner. In this case, expeditious transfer of control of safety systems has not occurred (although fission product barrier damage may not yet be indicated).

The intent of the EAL is to establish control of important plant equipment and knowledge of important plant parameters in a timely manner. Primary emphasis should be placed on those components and instruments that supply protection for and information about safety functions. Typically, these safety functions are reactivity control, RCS inventory, and secondary heat removal.

The determination of whether or not control is established at the remote shutdown panel is based on Emergency Coordinator judgment. The Emergency Coordinator is expected to make a reasonable, informed judgment within the site-specific time for transfer that the licensee has control of the plant from the remote shutdown panel.

Escalation of this emergency classification level, if appropriate, would be by Fission Product Barrier Degradation or Abnormal Rad Levels/Radiological Effluent EALs.

EAL #1.b Threshold: The CPNPP procedure number will be included when determined. CTS-01051

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS4

Initiating Condition - SITE AREA EMERGENCY

HOSTILE ACTION within the PROTECTED AREA.

Operating MODE Applicability: All

Emergency Action Level Threshold:

1. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervisor.

Basis:

This condition represents an escalated threat to plant safety above that contained in the Alert in that a HOSTILE FORCE has progressed from the OCA to the PROTECTED AREA.

This EAL addresses the contingency for a very rapid progression of events, such as that experienced on September 11, 2001. It is not premised solely on the potential for a radiological release. Rather the issue includes the need for rapid assistance due to the possibility for significant and indeterminate damage from additional air, land or water attack elements.

The fact that the site is under serious attack with minimal time available for further preparation or additional assistance to arrive requires ORO readiness and preparation for the implementation of protective measures.

This EAL addresses the potential for a very rapid progression of events due to a HOSTILE ACTION. It is not intended to address incidents that are accidental events or acts of civil disobedience, such as small aircraft impact, hunters, or physical disputes between employees within the PROTECTED AREA. Those events are adequately addressed by other EALs.

[Although nuclear plant security officers are well trained and prepared to protect against HOSTILE ACTION, it is appropriate for OROs to be notified and encouraged to begin preparations for public protective actions (if they do not normally) to be better prepared should it be necessary to consider further actions.] CTS-01052 CTS-01052

[If not previously notified by NRC that the airborne HOSTILE ACTION was intentional, then it would be expected, although not certain, that notification by an appropriate Federal agency would follow. In this case, appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. However, the declaration should not be unduly delayed awaiting Federal notification.] CTS-01052 CTS-01052

Escalation of this emergency classification level, if appropriate, would be based on actual plant status after impact or progression of attack.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG1

Initiating Condition - GENERAL EMERGENCY

HOSTILE ACTION resulting in loss of physical control of the facility.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2)

1. A HOSTILE ACTION has occurred such that plant personnel are unable to operate equipment required to maintain safety functions.

2. A HOSTILE ACTION has caused failure of Spent Fuel Cooling Systems and IMMINENT fuel damage is likely ~~for a recently off-loaded reactor core in SFP~~. CTS-01053

Basis:

EAL #1

This EAL encompasses conditions under which a HOSTILE ACTION has resulted in a loss of physical control of VITAL AREAS (containing vital equipment or controls of vital equipment) required to maintain safety functions and control of that equipment cannot be transferred to and operated from another location.

These safety functions are reactivity control (ability to shut down the reactor and keep it shutdown), RCS inventory (ability to cool the core), and secondary heat removal (ability to maintain a heat sink).

~~[~~Loss of physical control of the Control Room or remote shutdown capability alone may not prevent the ability to maintain safety functions per se. Design of the remote shutdown capability and the location of the transfer switches should be taken into account. Primary emphasis should be placed on those components and instruments that supply protection for and information about safety functions.~~]~~ CTS-01054 CTS-01054

If control of the plant equipment necessary to maintain safety functions can be transferred to another location, then the threshold is not met.

EAL #2

This EAL addresses failure of spent fuel cooling systems as a result of HOSTILE ACTION if IMMINENT fuel damage is likely, such as when a recently off-loaded reactor core ~~[e.g., TBD days following reactor shutdown]~~ is in the SFP. CTS-01055

5.9 System Malfunction EALs

Table 5-S-1: Recognition Category "S" Initiating Condition Matrix (Sheet 1 of 3)

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT		
SG1	Prolonged loss of all Off-site and all On-site ac power to emergency busses. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	SS1	Loss of all Off-site ~~AC~~ac power and On-Site ac power capability to emergency busses for 15 minutes or longer. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	**SA5**	AC power capability to emergency busses reduced to a single power source for 15 minutes or longer such that any additional single failure would result in station blackout. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	**SU1**	Loss of all Off-site ac power to emergency busses for 15 minutes or longer. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	|CTS-01057
		SS3	Loss of all vital dc power for 15 minutes or longer. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*					
SG2	Automatic Trip and all manual actions fail to shutdown the reactor and indication of an extreme challenge to the ability to cool the core exists. *Op. MODEs: Power Operation, Startup*	**SS2**	Automatic Trip fails to shutdown the reactor and manual actions taken in the Control Room are not successful in shutting down the reactor. *Op. MODEs: Power Operation, Startup*	**SA2**	Automatic Trip fails to shutdown the reactor and the manual actions taken Control Room are successful in shutting down the reactor. *Op. MODEs: Power Operation, Startup*	**SU8**	Inadvertent criticality. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	

Table 5-S-1: Recognition Category "S" Initiating Condition Matrix (Sheet 2 of 3)

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
	~~SS6~~ ~~Inability to monitor an ANTICIPATED OPERATIONAL OCCURRENCE in progress.~~ ~~*Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*~~	~~SA4~~ ~~Loss of Indicating and Monitoring Capability for ALL Protection and Safety Monitoring System and Plant Control and Monitoring System with either Diverse Actuation System unavailable or ANTICIPATED OPERATIONAL OCCURRENCE in progress.~~ ~~*Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*~~	~~SU3~~~~Loss of Indicating and Monitoring Capability for ALL Protection and Safety Monitoring System and Plant Control and Monitoring System.~~ ~~*Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*~~
			SU2 Inability to reach required shutdown within Technical Specification limits. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*
			SU4 Fuel Clad degradation. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*
			SU5 RCS LEAKAGE. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*

CTS-01056

Table 5-S-1: Recognition Category "S" Initiating Condition Matrix (Sheet 3 of 3)

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT	
			SU6 Loss of all On-site or Off-site communications capabilities. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	
	SS7 Inability to monitor and control the plant for ≥ 15 minutes. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	**SA7** UNPLANNED partial loss of indicating and monitoring and control functions for ≥ 15 minutes. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*		CTS-01058

SYSTEM MALFUNCTIONS

~~SU3~~ CTS-01059

~~Initiating Condition - ALERT~~

~~Loss of Indicating and Monitoring Capability for ALL Protection and Safety Monitoring System and Plant Control and Monitoring System~~

~~Operating MODE Applicability:~~ ~~Power Operation, Startup, Hot Standby, Hot Shutdown~~

~~Emergency Action Level Thresholds:~~

1. ~~Loss of All Protection and Safety Monitoring System (PSMS) and Plant Control and Monitoring System (PCMS) Indicating and Monitoring Functions for 15 minutes or longer.~~

~~Basis:~~

~~This IC recognizes the difficulty associated with monitoring changing plant conditions without the use of a major portion of the control and indication systems.~~

~~[The PSMS provides the functions necessary to protect the plant during normal operations, to shutdown the plant, and to maintain the plant in a safe shutdown condition. The PCMS includes the control functions that provide for the control of the nuclear process, conversion of nuclear energy into heat energy, and transport of the heat energy from the nuclear reactor to the main steam turbine.]~~

~~This NOUE will be escalated to an Alert if the operating crew does not have the Diverse Actuation System (DAS) available.~~

SYSTEM MALFUNCTIONS

SU4

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Fuel Clad degradation.

Operating MODE Applicability:

Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Thresholds: (1 or 2)

1. Primary Coolant Monitor (R-70) Radiation Level High Alarm. ~~[TBD radiation monitor readings indicating fuel clad degradation greater than TS allowable limits.]~~ CTS-01060

2. DOSE EQUIVALENT I 131 greater than 60 µCi/gm OR DOSE EQUIVALENT XE 133 greater than 300 µCi/gm for more than 6 hours as determined by sampling and analysis.

Basis:

This EAL is included because it is a precursor of more serious conditions and, as result, is considered to be a potential degradation of the level of safety of the plant.

Escalation of this EAL to the Alert level is via the Fission Product Barriers.

EAL #1

This threshold addresses ~~site-specific radiation m~~Primary Coolant Monitor readings that provide indication of a degradation of fuel clad integrity. CTS-01061

EAL #2

This threshold addresses coolant samples exceeding coolant TS for transient iodine spiking and xenon limits.

SYSTEM MALFUNCTIONS

SU6

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Loss of all On-site or Off-site communications capabilities.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Thresholds: (1 or 2)

1. Loss of all of the following on-site communication methods affecting the ability to perform routine operations.

   - PA/PL
   - PABX
   - SPTS
   - Plant Radio System

2. Loss of all of the following off-site communication methods affecting the ability to perform off-site notifications.

   - Dedicated ~~c~~Circuit between Control Room and TX DPS (Garland), Somervell County Sheriff, Hood County Sheriff | CTS-01062
   - Private Telephone (backup to Dedicated Circuit)
   - ~~Private Area Branch Exchange (~~PABX~~)~~ | CTS-01062
   - Emergency Notification System
   - Health Physics Network

Basis:

The purpose of this IC and its associated EALs is to recognize a loss of communications capability that either defeats the plant operations staff ability to perform routine tasks necessary for plant operations or the ability to communicate issues with off-site authorities. ~~[~~The loss of off-site communications ability is expected to be significantly more comprehensive than the condition addressed by 10 CFR 50.72.~~]~~ | CTS-01063 | CTS-01063

The availability of one method of ordinary off-site communications is sufficient to inform federal, state, and local authorities of plant ~~problems~~issues. This EAL is intended to be used only when extraordinary means (e.g., relaying of information | CTS-01064

SYSTEM MALFUNCTIONS

from ~~non-routine~~ radio transmissions, individuals being sent to off-site locations, etc.) are being ~~used~~utilized to make communications possible. CTS-01064

Notifications of emergencies to State and local off-site agencies are accomplished with the Dedicated Circuit between each Control Room and the Texas Department of Public Safety Garland office. Private telephone system serves as backup to the dedicated circuit. In addition, CPNPP Units 3 and 4 have a PABX, which is used for routine telephone service into and around the site. The Emergency Notification System and the Health Physics Network are NRC telephone circuits. CTS-01065

EAL -#2 CTS-01064

The list for off-site communications loss encompasses the loss of all means of communications with off-site authorities. This includes the ENS, commercial telephone lines, telecopy transmissions, and dedicated phone systems that are routinely used for off-site emergency notifications.

SYSTEM MALFUNCTIONS

SA2

Initiating Condition - ALERT

Automatic Trip fails to shutdown the reactor and the manual actions taken in the Control Room are successful in shutting down the reactor.

Operating MODE Applicability: Power Operation, Startup

Emergency Action Level Threshold:

1. a. An automatic trip failed to shutdown the reactor.

   AND

   b. Manual actions taken in the Control Room successfully shutdown the reactor as indicated by [Power Range (N-41, N-42, N-43, N-44) ~~greater~~less than ~~TBD~~5%, ~~(~~ and Intermediate Range (N-35, N-36 ~~greater than TBD amps~~]) indicate a decreasing trend. CTS-01066 CTS-01067

Basis:

Manual trip actions taken in the Control Room are any set of actions by the reactor operator(s) which causes or should cause control rods to be rapidly inserted into the core and shuts down the reactor.

This condition indicates failure of the automatic protection system to trip the reactor. This condition is more than a potential degradation of a safety system in that a front line automatic protection system did not function in response to a plant transient. Thus the plant safety has been compromised because design limits of the fuel may have been exceeded. An Alert is indicated because conditions may exist that lead to potential loss of fuel clad or RCS and because of the failure of the Reactor Protection System (RPS) to automatically shutdown the plant. CTS-01068

If manual actions taken in the Control Room fail to shutdown the reactor, the event would escalate to a SAE.

SYSTEM MALFUNCTIONS

~~SA4~~ CTS-01069

~~Initiating Condition – ALERT~~

~~Loss of Indicating and Monitoring Capability for ALL Protection and Safety Monitoring System and Plant Control and Monitoring System With Either Diverse Actuation System Unavailable or Anticipated Operational Occurrence in Progress~~

~~Operating MODE Applicability:~~ ~~Power Operation, Startup, Hot Standby, Hot Shutdown~~

~~Emergency Action Level Thresholds:~~ —

1. ~~a.~~ ~~UNPLANNED Loss of All PSMS and PCMS Indicating and Monitoring Functions for 15 minutes or longer~~

   ~~**AND**~~

~~b.~~ ~~EITHER of the following:~~

- ~~ALL DAS instrumentation is unavailable~~
- ~~An ANTICIPATED OPERATIONAL OCCURRENCE is in progress~~

~~**Basis:**~~

~~This IC recognizes the difficulty associated with monitoring changing plant conditions without the use of a major portion of the control and indication systems.~~

~~*[The PSMS provides the functions necessary to protect the plant during normal operations, to shutdown the plant, and to maintain the plant in a safe shutdown condition. The PCMS includes the control functions that provide for the control of the nuclear process, conversion of nuclear energy into heat energy, and transport of the heat energy from the nuclear reactor to the main steam turbine.]*~~

~~*[The DAS provides analog control and indication backup to the digital control systems.]*~~

~~The concern is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by the specific TS. The initiation of a TS imposed plant shutdown related to the instrument loss will be reported via 10 CFR 50.72. If the shutdown is not in compliance with the TS action, the NOUE is based on SU2 "Inability to Reach Required Shutdown Within Technical Specification Limits."~~

~~This Alert will be escalated to a SAE if the operating crew cannot monitor the transient in progress due to a concurrent loss of compensatory indications with an~~

SYSTEM MALFUNCTIONS

~~ANTICIPATED OPERATIONAL OCCURRENCE in progress during the loss of control and indication systems.~~ CTS-01069

SYSTEM MALFUNCTIONS

SA5

Initiating Condition - ALERT

AC power capability to emergency busses reduced to a single power source for 15 minutes or longer such that any additional single failure would result in station blackout.

Operating MODE Applicability:

Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Thresholds:

1. a. AC power capability to Class 1E emergency busses (MC-A,. MC-B, MC-C, MC-D) reduced to a single power source for 15 minutes or longer.

   AND

   b. Any additional single power source failure will result in station blackout.

Basis:

{This IC and the associated EALs are intended to provide an escalation from IC SU1, "Loss of All Off-site ac Power To Emergency Busses for Greater Than 15 Minutes."} CTS-01070 CTS-01070

The condition indicated by this IC is the degradation of the off-site and on-site ac power systems such that any additional single failure would result in a station blackout. This condition could occur due to a loss of off-site power with a concurrent failure of all but one gas turbine generator to supply power to its emergency busses. Another related condition could be the loss of all on-site gas turbine generators with only one train of emergency busses being backfed from off-site power. The subsequent loss of this single power source would escalate the event to a SAE in accordance with SS1.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

SYSTEM MALFUNCTIONS

SA7 CTS-01071

Initiating Condition - ALERT

UNPLANNED Partial Loss of Indicating, Monitoring and Control Functions for ≥ 15 minutes.

Operating MODE Applicability:

Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Thresholds:

1. UNPLANNED Loss of All Protection and Safety Monitoring System (PSMS) and Plant Control and Monitoring System (PCMS) Indicating and Monitoring Functions for 15 minutes or longer.

Basis:

This IC recognizes the difficulty associated with monitoring changing plant conditions without the use of a major portion of the control and indication systems.

This IC recognizes the challenge to the Control Room staff to monitor and control the plant due to partial loss of normal and safety indication and monitoring systems. An Alert is considered appropriate if the Control Room staff requires additional personnel to assist in monitoring alternative indications, manipulate equipment and restore the systems to full capability. The selection of 15 minutes was chosen to allow personnel sufficient time for restoration of required systems due to an inadvertent loss.

The PSMS provides the functions necessary to protect the plant during normal operations, to shutdown the plant, and to maintain the plant in a safe shutdown condition. The PCMS includes the control functions that provide for the control of the nuclear process, conversion of nuclear energy into heat energy, and transport of the heat energy from the nuclear reactor to the main steam turbine. The Diverse Actuation System (DAS) remains available to ensure monitoring and control capability. Loss of the DAS would result in escalation to SS7 due to the operating crew being unable to monitor and control the plant.

SYSTEM MALFUNCTIONS

SS2

Initiating Condition - SITE AREA EMERGENCY

Automatic Trip fails to shutdown the reactor and manual actions taken in the Control Room are not successful in shutting down the reactor.

Operating MODE Applicability: Power Operation, Startup

Emergency Action Level Thresholds:

1. a. An automatic trip failed to shutdown the reactor.

   AND

   b. Manual actions taken in the Control Room DO NOT shutdown the reactor as indicated by [Power Range (N-41, N-42, N-43, N-44) greater than [~~TBD~~5%~~., (Intermediate Range (N-35, N-36) greater than TBD amps~~]] CTS-01072

Basis:

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed and efforts to bring the reactor subcritical are unsuccessful. A SAE is warranted because conditions exist that lead to IMMINENT loss or potential loss of both fuel clad and RCS.

Manual trip actions taken in the Control Room are any set of actions by the reactor operator(s) which causes or should cause control rods to be rapidly inserted into the core and shuts down the reactor.

Manual trip actions are not considered successful if action away from the Control Room is required to trip the reactor. This EAL is still applicable even if actions taken away from the Control Room are successful in shutting the reactor down because the design limits of the fuel may have been exceeded or because of the gross failure of the RPS.

Escalation of this event to a GE would be due to a prolonged condition leading to an extreme challenge to either core-cooling or heat removal.

SYSTEM MALFUNCTIONS

SS3

Initiating Condition - SITE AREA EMERGENCY

Loss of all vital dc power for 15 minutes or longer.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Thresholds:

1. Less than 105 V on ALL vital dc Busses (DCC-A, DCC-B, DCC-C, DCC-D) for 15 minutes or longer.

Basis:

Loss of all dc power compromises ability to monitor and control plant safety functions. Prolonged loss of all dc power will cause core uncovering and loss of containment integrity when there is significant decay heat and sensible heat in the reactor system.

*[*105 V bus voltage is the minimum bus voltage necessary for the operation of safety related equipment. This voltage value incorporates a margin of at least 15 minutes of operation before the onset of inability to operate those loads.*]* CTS-01073 CTS-01073

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation to a GE would occur by Abnormal Rad Levels/Radiological Effluent, Fission Product Barrier Degradation.

SYSTEM MALFUNCTIONS

SS~~6~~7 CTS-01074

Initiating Condition - SITE AREA EMERGENCY

Inability to ~~M~~monitor and control the plant for ≥ 15 minutes. ~~ANTICIPATED OPERATIONAL OCCURRENCE in Progress.~~ CTS-01074

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Thresholds:

1. ~~a.~~ Loss of all PSMS, PCMS, and DAS digital~~Indication and M~~monitoring and control function~~capability~~ for 15 minutes or longer. CTS-01074

   ~~AND~~ CTS-01074

   ~~b. An ANTICIPATED OPERATIONAL OCCURRENCE in progress.~~

Basis:

This IC recognizes the inability of the Control Room staff to monitor the plant ~~response~~due to loss of normal and safety indication and monitoring systems, and diverse indication and control systems that allow the operators to monitor and safely shutdown the plant.~~a transient.~~ A SAE is considered to exist if the Control Room staff cannot monitor safety functions needed for protection of the public. The selection of 15 minutes was chosen to allow personnel sufficient time for restoration of required systems due to an inadvertent loss. CTS-01074

The PSMS provides the functions necessary to protect the plant during normal operations, to shutdown the plant, and to maintain the plant in a safe shutdown condition. The PCMS includes the control functions that provide for the control of the nuclear process, conversion of nuclear energy into heat energy, and transport of the heat energy from the nuclear reactor to the main steam turbine. The DAS remains available to ensure monitoring and control capability. The DAS is a non-safety-related system that provides a diverse backup to the protection system.

~~*[As discussed in Chapter 15 of the DCD, ANTICIPATED OPERATIONAL OCCURRENCES are events in which the reactor plant conditions are disturbed beyond the normal operating range. ANTICIPATED OPERATIONAL OCCURRENCEs are expected to occur one or more times during the lifetime of the plant. During a transient caused by an assumed ANTICIPATED OPERATIONAL OCCURRENCE, the reactor core must be undamaged and be ready to return to normal operation. ANTICIPATED OPERATIONAL OCCURRENCEs generally result from one of the following:*~~

SYSTEM MALFUNCTIONS

CTS-01074

- ~~*A single component failure.*~~
- ~~*A single malfunction, including passive failures such as leaks or minor pipe breaks, which could occur during the life of the plant while the plant is operating.*~~
- ~~*A single operator error.*~~

~~*Acceptance criteria generally applied to ANTICIPATED OPERATIONAL OCCURRENCEs include the following:*~~

- ~~*The minimum departure from nucleate boiling ratio (DNBR) shall be greater than or equal to the 95/95 DNBR limit.*~~
- ~~*Pressure in the RCS and main steam system shall be equal to or less than 1.1 times the system design pressure.*~~
- ~~*The maximum fuel centerline temperature shall be less than the fuel melting point so that the fuel cladding will not be mechanically damaged.*~~

~~*An ANTICIPATED OPERATIONAL OCCURRENCE shall not generate a Postulated Accident without other faults occurring independently or result in a consequential loss of function of the RCS or Containment Barriers.]*~~

SYSTEM MALFUNCTIONS

SG1

Initiating Condition - GENERAL EMERGENCY

Prolonged loss of all Off-site and all On-Site ac power to emergency busses.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Thresholds:

1. a. Loss of all off-site and all on-site ac power to Class 1E emergency busses (MC-A, MC-B, MC-C, MC-D)for greater than 15 minutes.

   AND

   b. EITHER of the following:

   - Restoration of at least two emergency busses in less than 8 hours is not likely.
   - Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring as indicated by CETs reading greater than ~~[TBD-~~1200 degrees F (~~650~~649 degrees C)~~]~~. CTS-01075

Basis:

Loss of all ac power to emergency busses compromises all plant safety systems requiring electric power including RHR, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all ac power to emergency busses will lead to loss of fuel clad, RCS, and containment, thus warranting declaration of a GE.

*[*The 8 hours to restore ac power is based on US-APWR blackout coping analysis. Appropriate allowance for off-site emergency response including evacuation of surrounding areas should be considered. Although this IC may be viewed as redundant to the Fission Product Barrier Degradation IC, its inclusion is necessary to better assure timely recognition and emergency response.*]* CTS-01076 CTS-01076

This IC is specified to assure that in the unlikely event of a prolonged station blackout, timely recognition of the seriousness of the event occurs and that declaration of a GE occurs as early as is appropriate, based on a reasonable assessment of the event trajectory.

The likelihood of restoring at least one emergency bus should be based on a realistic appraisal of the situation since a delay in an upgrade decision based on only a chance of mitigating the event could result in a loss of valuable time in preparing and implementing public protective actions.

SYSTEM MALFUNCTIONS

In addition, under these conditions, fission product barrier monitoring capability may be degraded.

~~[~~Although it may be difficult to predict when power can be restored, it is necessary to give the Emergency Coordinator a reasonable idea of how quickly (s)he may need to declare a GE based on two major considerations: | CTS-01076

1. Are there any present indications that core cooling is already degraded to the point that loss or potential loss of Fission Product Barriers is IMMINENT?

2. If there are no present indications of such core cooling degradation, how likely is it that power can be restored in time to assure that a loss of two barriers with a potential loss of the third barrier can be prevented?

Thus, indication of continuing core cooling degradation must be based on Fission Product Barrier monitoring with particular emphasis on Emergency Coordinator judgment as it relates to IMMINENT loss or potential loss of fission product barriers and degraded ability to monitor fission product barriers.~~]~~ | CTS-01076

SYSTEM MALFUNCTIONS

SG2

Initiating Condition - GENERAL EMERGENCY

Automatic Trip and all manual actions fail to shutdown the reactor and indication of an extreme challenge to the ability to cool the core exists.

Operating MODE Applicability: Power Operation, Startup

Emergency Action Level Thresholds: (1 or 2) CTS-01077

1. a. An automatic trip failed and ALL manual actions failed to shutdown the reactor

   AND

   b. All manual actions do not shutdown the reactor as indicated by Trip Breaker Status, Control Rod Bottom Indication, or Neutron Flux ~~less~~greater than 5% (N-41, N-42, N-43, N-44). CTS-01078

   AND

   c. EITHER of the following exist or have occurred due to continued power generation:

   - Core Cooling RED with Subcriticality RED

   OR

   - Heat Sink RED with Subcriticality RED

2. a. An automatic trip failed and ALL manual actions failed to shutdown the reactor CTS-01079

   AND

   b. All manual actions do not shutdown the reactor as indicated by Trip Breaker Status, Control Rod Bottom Indication, or Neutron Flux greater than 5% (N-41, N-42, N-43, N-44).

   AND

   c. EITHER of the following exist or have occurred due to continued power generation:

   - Indications exist that core cooling is extremely challenged as indicated by CETs greater than 1200 degrees F (649 degrees C).

SYSTEM MALFUNCTIONS

OR CTS-01079

- Indications exist that heat removal is extremely challenged as indicated by {site-specific EOPs}.

Basis:

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed and efforts to bring the reactor subcritical are unsuccessful.

~~[~~The reactor should be considered shutdown when it producing less heat than the maximum decay heat load for which the safety systems are designed.~~]~~ CTS-01080

Challenges to heat removal capability are indicated by any of the following as described in site-specific EOPs: ~~[TBD—secondary heat removal via main steam SG safeties and~~safety valves, main steam relief valves, turbine bypass, EFW flow, SG level, other indications~~]~~. CTS-01081

In the event either of these challenges exists at a time that the reactor has not been brought below the power associated with the safety system design a core melt sequence exists. In this situation, core degradation can occur rapidly. For this reason, the GE declaration is intended to be anticipatory of the fission product barrier table declaration in order to allow off-site agencies time to prepare for appropriate response.

EAL #2 Threshold: The EOP procedure numbers will be provided when available. CTS-01082

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