

Westinghouse Electric Corporation **Energy Systems**

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> NSD-NRC-97-5226 DCP/NRC0948 Docket No.: 52-003

> > July 17, 1997

Document Control Desk U.S. Nuclear Regulatory Commission Washington, DC 20555

ATTENTION: T. R. QUAY

SUBJECT: WESTINGHOUSE RESPONSE TO NRC RAIS 440.648 THROUGH 440.658

Reference:

 DCP/NRC0947, "Submittal of AP600 Emergency Response Guidelines Revision 4," dated July 17, 1997.

Dear Mr. Quay:

Enclosed are three copies of the responses to NRC requests for additional information related to the shutdown Emergency Response Guidelines (ERGs). RAIs 440.648 through 440.658. With this submittal and the referenced letter, the Westinghouse status for open item tracking system item 5519 is changed to "closed." The NRC should review the attached RAI responses and Revision 4 of the ERGs, submitted by the referenced letter.

Please contact Robin K. Nydes at 412-374-4125 if you have any questions regarding this submittal or the AP600 Emergency Response Guidelines.

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Brian A. McIntyre, Manager Advanced Plant Safety and Licensing

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N. J. Liparulo, Westinghouse (w/o Enclosure)







The following responses are provided to close open item tracking system item 5519 which requires a response to the NRC Requests for Additional Information, RAIs 440.648 through 440.658, related to the Shutdown Emergency Response Guidelines.

Question: 440.648

Westinghouse should explain why the shutdown safety status tree SDF-0.1 does not show the conventional critical safety functions such as Subcriticality, Core Cooling, Heat Sink, Integrity, Containment and Inventory.

Response:

The shutdown safety status tree addresses the concerns of the critical safety functions as they relate to shutdown. Section 2 of the ERG Background document for the shutdown safety status tree discusses the relationship of the shutdown critical safety functions to the conventional, at-power critical safety functions. Core cooling is addressed by the monitoring of both the RCS water level (either pressurizer or hot leg) and operability of the normal residual heat removal system (RNS); Heat sink during shutdown is provided by the RNS; Containment is addressed by monitoring containment radiation; Subcriticality is addressed by monitoring nuclear flux; Integrity is addressed by monitoring the RCS pressure / temperature limits; Inventory is addressed by monitoring RCS water level. In addition, RCS temperature changes are monitored as an early indication of a potential loss of core cooling.

SSAR Revision:	NONE
ERG Revision:	NONE
References:	NONE

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The ERGs, in general, should provide symptom-based, as opposed to event-based guidance to the operator. It is not clear that the AP600 Shutdown ERGs are symptom based. The shutdown safety status tree "BLOCKS" 1 to 9 shown in SDF-01 may not cover all possible symptoms during shutdown conditions. In addition, the six shutdown ERGs, SDG-1 to SDG-6, seems to be event-based procedures. These six shutdown ERGs also may not comprehensively cover all the critical safety functions for shutdown conditions. Clarify the ERG philosophy used for shutdown conditions.

Response:

The shutdown ERGs provide symptom-based guidance. As discussed in response to 440.648, the parameters (i.e. symptoms) monitored during shutdown represent the status of the critical safety functions during shift down. The parameters selected provide the indication of a potential challenge to the safety of the plant during shutdown.

SSAR Revision:	NONE
ERG Revision:	NONE
References:	NONE



NRC REQUEST FOR ADDITIONAL INFORMATION



Question: 440.650

A number of shutdown ERGs contain the statement: "Include additional AP600 details in the EOPs." Please explain why these details are not included in the ERGs and how these details will be developed.

Response:

As discussed in the Introduction to the ERGs, the AP606 ERGs provide functional guidelines for terminating accidents and transients that affect plant safety, and contain the technical basis for constructing the Emergency Operating Procedures. The statement "Include Additional AP600 Details in the EOPs" is an acknowledgement that additional details as to how to implement a step should be added based upon more detailed plant information.

SSAR Revision:	NONE
ERG Revision:	NONE
References:	NONE





A number of shutdown ERGs state: "Go to appropriate plant procedure." How is the appropriate plant procedure determined? Should not criteria for exiting the ERGs in these situations be verified to exist and specified in the ERGs?

Response:

Criteria for exiting the ERGs are provided where appropriate. For example, for the Loss of Inventory and Loss of RNS guidelines, the ERG does not permit the operator to exit the ERG until the status of the entry condition is normal (i.e. RCS inventory is acceptable, RNS cooling is restored). For the other ERGs, the ERG provides guidance to alleviate the condition, and then permits the operator to transition to a more appropriate step (either another SD ERG or a normal procedure) depending on the plant conditions. For example, for high containment radiation, guidance is provided to secure containment, and once accomplished, allows the operator to transition to a more appropriate procedure, for example, the loss of RCS inventory, if the containment radiation was due to low RCS inventory. However, if the radiation alarm was generated due to some maintenance operation inside containment, once the operator completes the guidelines associated with high containment radiation. Therefore, the appropriate plant procedure is dependent on the conditions of the plant, and is therefore not prescribed presupposing a plant condition or event.

SSAR Revision:	NONE
ERG Revision:	NONE
References:	NONE







What is a "BLOCK" in the Shutdown Safety Status Tree? Are they alarms in the control room?. Are there any symptoms or entry conditions to the shutdown ERGs besides the condition of the shutdown safety status tree?

Response:

The AP600 ERGs were developed using the same format and rules of usage as the Westinghouse Owners Group ERGs (Reference 1). The eventual format for the AP600 emergency operating procedures will be determined in the MMIS effort when the display information and operator aides are finalized. The Status Trees for the WOG ERGs were developed in two basic formats. They are referred to as the "branch" and "block" types. The branch version states each question requiring a decision on separate branches, that is, each question is asked twice - first in a positive sense, then in a negative sense, on symmetric branches. In the block version, each question is simply stated once in a positive sense, and the decision options "YES" or "NO" provide the branching. The block version has been found easier to evaluate since a question only needs to be answered once and the branching follows from the decision. This form more closely approximates the logic which would be programmed for a computer evaluation of a "branch point". For that reason the "block" version was the format selected for developing the Status Trees for the AP600 ERGs.

SSAR Revision:	NONE
ERG Revision:	NONE
References:	NONE



NRC REQUEST FOR ADDITIONAL INFORMATION



Question: 440.653

Background information Section 3.2, Page 3-3: Change reference from step 9 to step 11, and from step 25 to 27 to correctly refer to the containment evacuation steps.

Response:

The recommended change has been made and is included in Revision 4.

SSAR Revision: NONE

ERG Revision: This change is incorporated into Revision 4 of the ERGs.

References: NONE

Question: 440.654

Step 5b, Page 3 of 12: If the RCS hot ieg level can not be established, what is the alternate action?

Response:

Under the rules of usage of the ERGs discussed in Reference 1, if no contingency is provided, the operator is instructed to move on to the next step. Specific guidance is provided for exceptions to this rule. Therefore, if hot leg level can not be established, the operator is instructed to move on to the next step, which is to identify and isolate RCS leakage.

SSAR Revision:	NONE
ERG Revision:	NONE

References: NONE



NRC REQUEST FOR ADDITIONAL INFORMATION



Question: 440.655

Step 8c, Page 4 of 12: Confirm that step 11 is correct.

Response:

Steps 7 and step 8 have been corrected and provided in Revision 4. Under RNO 7, the guideline has been revised to instruct the operator to continue with Step 9, not Step 11. Under RNO 8.c, the guideline has been revised to instruct the operators to proceed to Step 9, not Step 11.

SSAR Revision:	NONE
ERG Revision:	This change is incorporated into Revision 4 of the ERGs.
References:	NONE

Question: 440.656

Step 10a, Page 5 of 12: Change the RNO step from a.3) to a.2).

Response:

The correction has been made to Step 10 and Step 19 as provided in Revision 4.

SSAR Revision.	NONE
ERG Revision:	This change is incorporated into Revision 4 of the ERGs.
References:	NONE





The background for step 11 describes core boiling and release of steam and/or gases to the containment through vents in the RCS. Since containment steaming is possible during shutdown conditions, why is only containment radiation included in the Shutdown Safety Status Tree? Why are not containment temperature and containment pressure included?

Response:

High containment temperature and / or high containment pressure that result from either a loss of RCS inventory and / or a loss of RNS cooling are addressed in SDG-1 and SDG-2 respectively. High containment temperature and / or pressure does not result from causes other than a loss of RNS cooling or a loss of RCS inventory.

SSAR Revision:	NONE
ERG Revision:	NONE
References:	NONE





Steps 3, 4 and 5, page 2 of 3: The action statement "Determine cause of RCS pressurization" does not seem sufficient. Westinghouse should provide additional guidance for the operator to find the cause of RCS pressurization and specify additional corrective actions.

Response:

Section 2 of the background information for this guideline provides insights to the causes of potential cold overpressure events. However, a comprehensive checklist for potential causes of cold overpressure events, over and above the information provided in the Background Document is not necessary, as the cause of the cold overpressure event can be very scenario dependent. Moreover, the guidance to determine the cause of the pressurization is to be performed after the transient is mitigated.

SSAR Revision:	NONE
ERG Revision:	NONE
References:	NONE

