

Docket No. 50-313

SEP 15 1977

Arkansas Power & Light Company  
ATTN: Mr. William Cavanaugh, III  
Executive Director, Generation  
and Construction  
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Gentlemen:

RE: ARKANSAS NUCLEAR ONE - UNIT 1

Recently at an operating PWR facility, a limited boron dilution incident occurred due to the inadvertent injection of a portion of the contents of the NaOH tank into the reactor coolant system while the reactor was in the cold shutdown condition. While performing surveillance testing (valve cycling) of the NaOH tank isolation valve, with the Decay Heat Removal (DHR) system lined up for reactor coolant recirculation, a portion of the tank's contents drained into the DHR system. Upon resumption of coolant recirculation this NaOH was injected into the reactor coolant system.

In the above-mentioned case, only a limited amount of NaOH (approximately 600 gallons) was injected and the reactor remained subcritical by a large margin. However, this event highlighted the fact that a postulated single failure at this facility (i.e., misposition of the isolation valve for the NaOH tank when the DHR system is lined up for recirculation or operating in the recirculation mode) could result in a moderator dilution incident which had not been previously considered. Subsequent analysis by the licensee and his vendor revealed that, for certain conservative assumptions (e.g., reactor in the cold shutdown condition, vessel temperature less than 100°F, beginning of core life characteristics, vessel drained to a level approximately equal to the height of the outlet nozzle, lowest initial boron concentration allowed by Technical Specifications, the maximum worth control rod stuck in the fully out position, and no credit assumed for operator action), the injection of the NaOH tank contents into the reactor coolant system due to the misposition of a single isolation valve could result in reactor criticality with the control rods inserted.

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Based upon our review of this particular incident, we concluded that the assumption that operator action would not be taken in sufficient time to terminate the event prior to reactor criticality would be overly conservative. This determination was influenced by the length of the dilution time necessary before return to criticality and by the number of indications and alarms available to the operator at this facility. Due to plant-specific system design and instrumentation differences, we are not able at this time to reach a similar conclusion for all PWR's. Furthermore most PWR boron dilution analyses have been limited to addressing a malfunction in the makeup and purification system (chemical and volume control system). The incident discussed above is an example of a boron dilution accident not covered by these analyses. Therefore we are requesting that each licensee of a PWR facility provide an analysis of the potential for and consequences of boron dilution accidents at his facility.

You are requested to perform and submit the results of such an analysis within 90 days of receipt of this letter. Your analysis should be based upon conservative assumptions consistent with the design of your facility and your Technical Specifications and should include the assumption of the most limiting single failure. The analysis should also include an assessment of the factors which affect the capability of the operator to take corrective action which would terminate the postulated events prior to achieving reactor criticality.

If, based on the results of this analysis, you determine that corrective actions (design or procedural) are required to preclude the occurrence or mitigate the consequences of postulated boron dilution accidents, your response should include proposals for such actions.

Sincerely,

Original signed by

*Don K. Davis*  
Don K. Davis, Acting Chief  
Operating Reactors Branch #2  
Division of Operating Reactors

cc: See next page

OFFICE	DOR:ORB-2	DOR:ORB-4	DOR:ORB-2		
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DATE	9/13/77	9/15/77	9/15/77		

September 15, 1977

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