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September 24, 1979

1-099-17
2-099-17

Mr. K. V. Seyfrit, Director
Office of Inspection & Enforcement
Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Subject: Arkansas Nuclear One - Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6
Response to IE Bulletin No. 79-21
(Files: 1510.1, 2-1510.1)

Gentlemen:

The following is provided in response to IE Bulletin 79-21 for Arkansas Nuclear One Units 1 and 2.

Item 1

Review the liquid level measuring systems within containment to determine if the signals are used to initiate safety actions or are used to provide post-accident monitoring information. Provide a description of systems that are so employed; a description of the type of reference leg shall be included, i.e., open column or sealed reference leg.

Response ANO-1

The liquid level measuring systems for the steam generators, pressurizer and Reactor Building sump have been examined. The steam generator and pressurizer level measuring systems are of the delta pressure, open column, uninsulated reference leg type. The level measuring system for the Reactor Building Sump is a float type.

None of these systems initiates a safety action. The steam generator water level is monitored to provide an indication and a control of the steam generator water inventory below 15% power. The pressurizer water level is monitored to provide an indication of reactor coolant inventory and to control makeup. The float type Reactor Building sump level indicating system is not affected by ambient temperatures and therefore will not be discussed further.

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Response ANO-2

The liquid level measuring systems for the steam generators, pressurizer and Containment Building sump have been examined. The steam generator and pressurizer level measuring systems are of the delta pressure, open column, uninsulated reference leg type. The level measuring system for the Containment Building sump is a float type.

The steam generator level measuring system provides a reactor trip signal on low level and is used to monitor and control steam generator water inventory. The pressurizer level measuring system does not initiate a safety action but is monitored to provide an indication of reactor coolant inventory and to control make up. The float type Containment Building sump level indicating system is not affected by ambient temperatures and therefore will not be discussed further.

Item 2

On those systems described in Item 1 above, evaluate the effect of post-accident ambient temperatures on the indicated water level to determine any change in indicated level relative to actual water level. This evaluation must include other sources of error including the effects of varying fluid pressure and flashing of reference leg to steam on the water level measurements. The results of this evaluation should be presented in a tabular form similar to Tables 1 and 2 of Enclosure 1.

Response ANO-1

The effect of reference leg temperature on the level measurement systems identified in Item 1 above is listed in Tables 1-ANO-1 and 2-ANO-1 (attached). The effects of varying fluid pressure and flashing of the reference leg to steam have been considered.

Response ANO-2

The effect of reference leg temperature on the level measurement systems identified in Item 1 above is listed in Tables 1-ANO-2, 2-ANO-2 and 3-ANO-2 (attached). The effects of varying fluid pressure and flashing of the reference leg to steam have been considered. The effects of flashing in the reference leg were negligible and therefore were not included in the Tables.

Item 3

Review all safety and control setpoints derived from level signals to verify that the setpoints will initiate the action required by the plant safety analyses throughout the range of ambient temperatures encountered by the instrumentation, including accident temperatures. Provide a listing of these setpoints.

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Response ANO-1

No reactor protection system actions are initiated by these instruments therefore no safety system setpoints are affected.

Response ANO-2

Reactor protection system actions are initiated by the steam generator level measurement system. This system initiates a reactor trip at 46.5% indicated level. Ambient temperature effects on the reference leg were previously considered in development of setpoints. This is discussed in Section 2.3.2.5 of CEN - 98(A)-P submitted to Mr. J. Stolz by our letter of February 28, 1979. Therefore no action is required for the low steam generator level setpoint.

The pressurizer level measurement system does not initiate a safety action therefore no action is required for this system.

Item 4

Review and revise, as necessary, emergency procedures to include specific information obtained from the review and evaluation of Items 1, 2 and 3 to ensure that the operators are instructed on the potential for and magnitude of erroneous level signals. All tables, curves, or correction factors that would be applied to post-accident monitors should be readily available to the operator. If revisions to procedures are required, provide a completion date for the revisions and a completion date for operator training on the revisions.

Response ANO-1

Correction factors are appropriate from Tables 1-ANO-1 and 2-ANO-1 will be made readily available to the operators for post accident monitoring. Instruction will be provided as to its use. This will be completed by November 15, 1979.

Response ANO-2

Correction factors as appropriate from Tables 1-ANO-2 and 2-ANO-2 will be made readily available to the operators for post accident monitoring. Instruction will be provided as to its use. This will be completed by November 15, 1979.

Very truly yours,

David C. Trimble

David C. Trimble
Manager, Licensing

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DCT/JTE/vb

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TABLE 1-ANO-1

Correction to indicated water level for post-accident temperature effects of the steam generator operate level, steam generator full range level, and pressurizer level.

<u>Reference leg temperature (°F)</u>	<u>Correction to indicated level (%) of full span</u>
100	+ 2.0
150	+ 3.0
200	+ 5.0
250	+ 7.0
300	+ 9.0
350	+ 12.0
400	+ 15.0

Note: The increase in reference leg temperature causes the measured level to indicate higher than actual level.

TABLE 2-ANO-1

Correction to indicated water level for post-accident temperature effects on the steam generator start-up level.

<u>Reference leg temperature (°F)</u>	<u>Correction to indicated level (%) of full span</u>
100	+ 2.0
150	+ 3.0
200	+ 5.0
250	+ 8.5
300	+ 12.0
350	+ 16.5
400	+ 21.0

Note: The increase in reference leg temperature causes the measured level to indicate higher than actual level.

TABLE 1-ANO-2

Correction to steam generator water level due to Reference Leg Heatup effects.

<u>Reference Leg Temperature, °F</u>	<u>Correction to S/G Level (% of Span)</u>
120°	+ 0%
200°	+ 4%
250°	+ 7%
300°	+ 10%
350°	+ 14%
400°	+ 18%
450°	+ 23%

Level Calibration Pressure
 Reference Leg Calibration Temperature
 Reference Leg Temperature assumed equal
 to Containment temperature (before
 reference trip)

900 PSIA
 120°F

TABLE 2-ANO-2

Corrections to allowable indicated steam generator water level for Reference Leg Heatup and varying fluid pressure effects to assure that true level is between the level taps.

Reference Leg Temperature °F	Correction to Minimum Allowed Indicated Level % of Span	Correction to Maximum Allowed Indicated Level % of Span
120°	+ 1	- 4
200°	+ 5	- 4
250°	+ 8	- 4
300°	+ 11	- 4
350°	+ 15	- 4
400°	+ 19	- 4
450°	+ 24	- 4

Basis:

Level Calibration - 900 psia
 Reference Leg Calibration Temperature - 120°F
 Applicable Pressure Range - 2500 psia to 50 psia.
 Flashing in the Reference Leg is not assumed.

TABLE 3 - ANO-2

Corrections to allowable indicated pressurizer water level for Reference Leg Heatup and varying fluid pressure effects to assure that true level is between the level taps.

Reference Leg Temperature °F	Correction To Minimum Allowed Indicated Level % of Span	Correction To Maximum Allowed Indicated Level % of Span
120°	+ 4	- 7
200°	+ 9	- 7
250°	+ 13	- 7
300°	+ 18	- 7
350°	+ 23	- 7
400°	+ 29	- 7
450°	+ 36	- 7

Basis:

Level Calibration Pressure - 2250 psia
 Reference Leg Calibration Temperature - 120° F
 Applicable Pressure Range <2500 psia
 Flashing in Reference Leg is not assumed