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August 28, 1996

UNION ELECTRIC

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Gentlemen:

ULNRC-03425
TAC No. M95220

CALLAWAY PLANT
DOCKET NUMBER 50-483
REVISION TO TECHNICAL SPECIFICATION
3/4.3 - INSTRUMENTATION

References: 1) ULNRC-3356 dated April 17, 1996
2) ULNRC-3401 dated July 15, 1996
3) K. M. Thomas ltr to D. F. Schnell dated July 22, 1996
4) ULNRC-3408 dated July 31, 1996

This letter provides additional information in support of the Callaway Plant amendment application and modification that will replace existing fixed logic portions of the Main Steam and Feedwater Isolation System with programmable digital processor equipment. This information is submitted as a result of discussions held on August 19, 1996, with Ms. K. M. Thomas, NRC Project Manager, and supplements the information transmitted by References 1, 2, and 4.

A best-estimate evaluation was performed to determine the impact of a common cause failure to close the main steam line isolation valves on the Callaway Plant accident analyses. The evaluation considers conditions beyond the plant design and licensing bases and is described herein.

If you have any questions concerning this information, please contact us.

Very truly yours,

030076

Alan C Passwater
for Donald F. Schnell

WEK/
Attachment

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STATE OF MISSOURI)
) S S
COUNTY OF CALLAWAY)

Alan C. Passwater, of lawful age, being first duly sworn upon oath says that he is Manager, Licensing and Fuels (Nuclear) for Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By Alan C Passwater

Alan C. Passwater
Manager, Licensing and Fuels
Nuclear

SUBSCRIBED and sworn to before me this 28th day of August, 1996.

Barbara J. Pfaff

BARBARA J. PFAFF
NOTARY PUBLIC — STATE OF MISSOURI
MY COMMISSION EXPIRES APRIL 22, 1997
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SUPPLEMENTAL INFORMATION FOR THE CALLAWAY PLANT MSFIS MODIFICATION AND TECHNICAL SPECIFICATION AMENDMENT

A best-estimate evaluation, as transmitted by letter dated July 15, 1996, was performed for a main steamline break (MSLB) inside containment coincident with a failure of the MSIVs to close. The evaluation consisted of generating mass/energy releases with a system analysis code. The mass/energy releases were used as driving functions in a containment analysis code to determine peak containment pressures and temperatures. Two of the 16 MSLB inside containment cases were evaluated; Case 1 (100% power, full double-ended rupture) and Case 6 (75% power, split rupture). Case 1 was chosen for evaluation based upon the energy content of the primary system at 100% power. Peak temperature and pressure occur prior to steam generator dryout, indicating initial steam generator mass is not a concern. Case 6 was chosen for evaluation since it yields the highest containment temperature in Callaway's current analysis. It also provids a good comparison to case 1 because of the different power level and break size. These two cases were judged to yield representative, yet limiting, results. The revised results are discussed below.

Mass/Energy Release Analysis

The mass and energy release due to a MSLB inside containment coincident with a failure of the MSIVs to close was evaluated using RETRAN-02 MOD5.1 computer code. The Callaway V5 RETRAN base deck was used as the basis for the evaluation. The main steam header was added to the base model to provide more realistic reverse break flows. Nominal initial conditions were used for both the 100% and 75% power cases.

Table 1 provides a comparison of the licensing basis MSLB analysis assumptions and the assumptions used in this evaluation. There is significant margin in the evaluation since safety analysis limits were assumed for setpoints and maximum allowable times were assumed for delays. In addition, conservative main feedwater addition assumptions and EOL reactivity and scram coefficients were used.

A sensitivity case was run using BOL reactivity and scram coefficients at 100% power. The BOL case generated lower energy releases and a lower peak containment pressure than the EOL case.

Containment Pressure/Temperature Analysis

Containment pressure/temperature, due to a MSLB inside containment coincident with a failure of the MSIVs to close, was evaluated with the CONTEMPT-LT/028 computer code. Table 2 provides a comparison of the licensing basis MSLB analysis assumptions and the assumptions used in this evaluation.

A calculation, which was performed to determine a best-estimate average UHS temperature for the Individual Plant Examination, determined that a UHS temperature of 70°F could be justified. To provide margin, an 85°F temperature was assumed for both ESW flow to the fan coolers and RWST flow to the containment sprays. Based upon containment cooler capacity at 85°F inlet water temperature, the fan cooler performance increases approximately 70% over the design case information. This 70% increase was applied to the fan cooler heat extraction rates given in FSAR Figure 6.2.1-15.

Figure 1 shows the pressure trace for the 100% power case. Peak containment pressure is 73.52 psia (58.82 psig) at 202 seconds and peak containment temperature is 379.4°F at 43 seconds. Figure 2 shows the pressure trace for the 75% power case. Peak containment pressure is 67.88 psia (53.18 psig) at 510 seconds and peak containment temperature is 324.3°F at 120 seconds. Callaway containment design pressure is 74.7 psia (60 psig) and peak containment temperature is 384.9°F.

Additional Information

Callaway plant design does not include a leak-before-break monitoring system for the main steam system. However, the plant design does include leak detection capabilities. Operators monitor for secondary leaks by using the main control board and plant computer indications. Inside containment leakage of the main steam line can be monitored by observing containment temperature, pressure and cooler unidentified leak rate computer points and alarms. Containment sump level and humidity indications are available on the main control board and an adverse condition in containment (pressure = 1.5 psig) causes an annunciator alarm. Operators evaluate these indications and alarms and take actions in accordance with plant procedures.

Additional operator simulator results for a double-ended MSLB and a smaller split break are included as Table 3. These simulator runs were conducted the week of August 19, 1996. The simulator results support and add to the

simulator information transmitted by letter dated July 31, 1996 (ULNRC-3408).

In ULNRC-3408, response (6) to NRC question 4, we state that "The operator can visually observe that the 'A' solenoid has been energized on the Test Panel located in the front of the MSFIS cabinets". This statement was incorrect. The operator will not have indication that the 'A' solenoid has been energized on the test panel since operation of the manual override switch bypasses the 'A' solenoid. The operator can visually observe that the MSIVs are closed by valve close limit switch indication on the main control board. We regret any inconvenience this error may have caused.

Conclusion

A potential common cause failure of the MSFIS that results in a failure of all MSIVs to close during an MSLB in containment, is bounded by the best-estimate evaluation described herein. This evaluation, in conjunction with the evaluation transmitted by ULNRC-3401 and ULNRC-3408, demonstrates that the MSFIS modification and related amendment application, do not adversely affect the safety analysis. The evaluation considers conditions beyond the plant design and licensing bases and does not supersede the FSAR analysis. A failure to close the feedwater isolation valves was not considered due to the diverse backup for feedwater isolation provided by the feedwater regulating valves.

Table 1

Comparison of Assumptions
for Mass/Energy Release Analysis*

Parameter	Current Analysis Assumption	MSFIS Evaluation Assumption
Power**	102% of 3565 MWt	100% of 3565 MWt
Decay Heat	1.2 x ANS 1973	1.0 x ANS 1973
Steam Generator Level	50%	50%
Reverse Break Area	3 x 1.4 ft^2	1.42 ft^2 (area from common header)
AFW flow	Maximum runout flow	300 gpm per steam generator

* Other input assumptions (e.g., MFW flow, setpoints, delay time, etc.) remain the same as the licensing-basis analysis. In addition, the kinetics feedback used in RETRAN produces a significant return to power which provides additional heat to the secondary. This return to power is conservative, but is typically not seen in Westinghouse analyses due to the use of different feedback parameters below approximately 550°F.

** This includes nominal values of average RCS temperature, pressurizer level, etc., that are consistent with the power assumed.

Table 2

Comparison of Assumptions
for Pressure/Temperature Analysis*

Parameter	Current Analysis Assumption	MSFIS Evaluation Assumption
Mass/energy release	from WCAP-8822	from RETRAN
Revaporization of condensate	0%	8% as allowed by NUREG-0588
Initial containment temperatures	120°F	95°F
Fan cooler start time	60 seconds	3 or 8 seconds based on fans already running and 3.5 psig hi-1 SI signal
Number of fan coolers	2	4 - no additional failures
Fan cooler heat extraction	Based upon FSAR Figure 6.2.1-15	FSAR Figure 6.2.1-15 increased by 70% based upon Bechtel letter BLSE-13487 and an 85°F inlet water temperature
Spray start	On Hi-3 containment pressure of 30 psig, with a 30 sec delay (includes diesel startup)	On Hi-3 containment pressure of 27 psig (nominal), with a 20 sec delay (no diesel startup) T/S values
Number of spray pumps	1	2 - no additional failures
Spray temperature	100°F	85°F to be consistent with the fan coolers

* Other input assumptions (e.g., spray flow, containment volume, etc.) remain the same as in the licensing-basis analysis.

Table 3

Additional Simulator Results

Times to Manually Close the MSIV toggle switches	Crew 1*	Crew 2*
Time to assess the accident scenario for a double-ended MSLB and take action to close the MSIVs at the MCB	75 sec.	80 sec.
≤30 seconds to walk to MSFIS cabinets and fast close the MSIVs	30 sec.	30 sec.
Total	105 sec.	110 sec.
Time to assess the accident scenario for a smaller split MSLB and take action to close the MSIVs at the MCB	120 sec.	
≤30 seconds to walk to MSFIS cabinets and fast close the MSIVs	30 sec.	
Total	150 sec.	

* Five members per crew (normal crew size per T/S)

Figure 1
MSLB Inside Containment
100% Power, Full DE Rupture
Failure cf MSIVs to Close

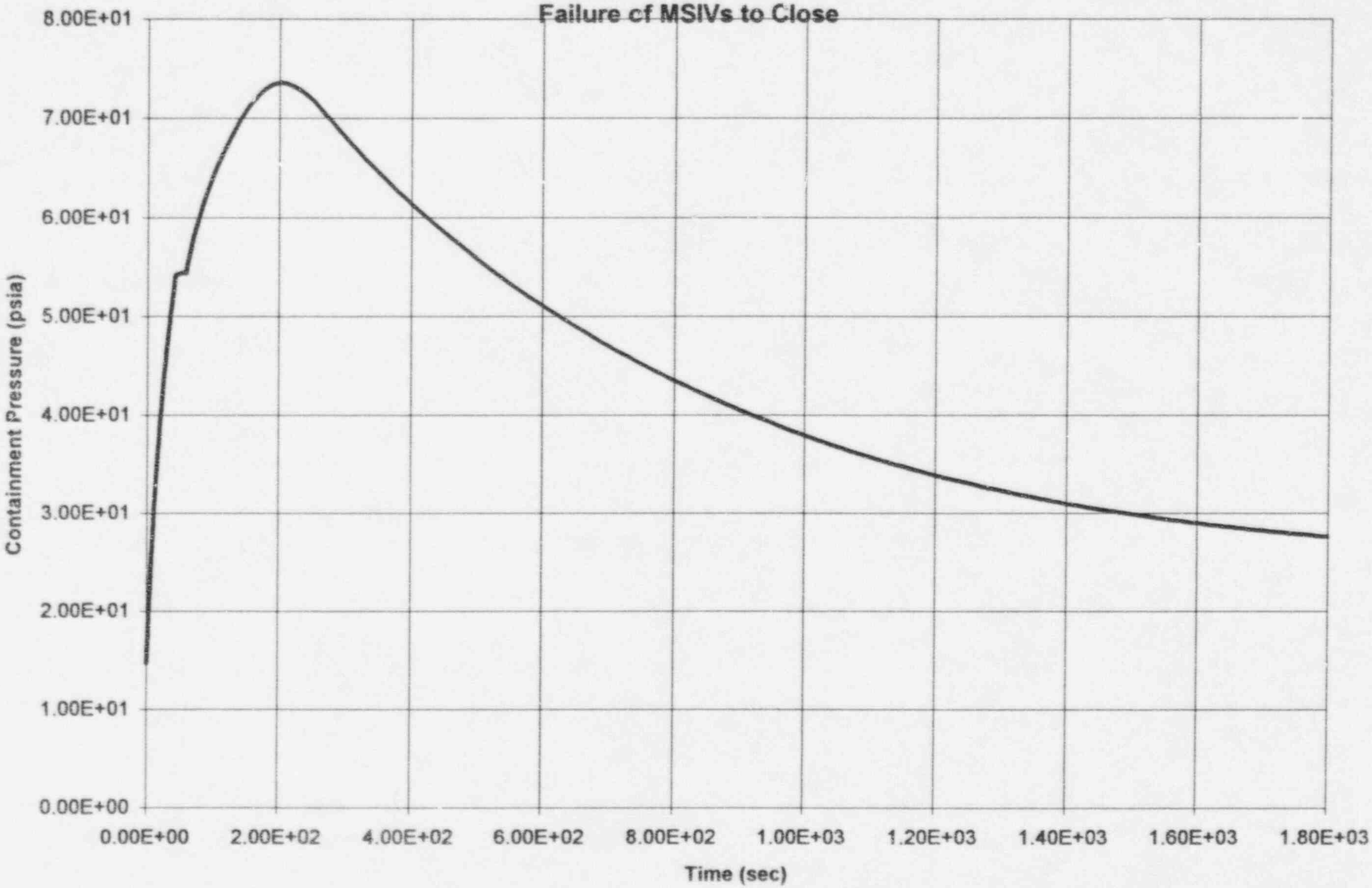

Figure 2
MSLB Inside Containment
75% Power, 0.84 ft2 Rupture
Failure of MSIVs to Close