10 CFR PART 21 VERBAL NOTIFICATION: NON-CONSERVATIVE MODELING OF RCS SENSIBLE HEAT FOR CONTAINMENT PRESSURE RESPONSE SAFETY ANALYSIS COULD RESULT IN A SLIGHT INCREASE IN POST-ACCIDENT CONTAINMENT TEMPERATURE

I. SUMMARY

During a review of our Updated Final Safety Analysis Report (UFSAR) Safety Analysis concerning containment pressure response we determined the Bechtel analysis of the long-term cooling phase of a loss-of-coolant accident (LOCA) did not model heat transfer from Reactor Coolant System (RCS) metal components to the RCS coolant. This omission potentially results in a non-conservative calculated containment temperature during a specific time period in the analysis (after containment peak temperature until several days after the event). Preliminary analysis for Calvert Cliffs indicates this issue has no impact on containment peak temperature or pressure and no impact several days after the event initiates. Under the current analysis assumptions, this omission increases the post accident load on our Service Water (SRW) system which removes heat from containment via the containment air coolers. We do not have a current operability concern because ultimate heat sink temperatures are currently low enough to ensure full compliance with our plants current design and licensing basis.

II. BACKGROUND

Chapter 14.20 of our UFSAR, "Containment Pressure Response," is an analysis of the pressure and temperature response of our containments to design basis accidents such as a main steam line break or a LOCA. A spectrum of RCS break sizes were considered to determine the worst condition of RCS mass and energy releases in combination with sensible and shutdown heat sources during the blowdown phase of a LOCA. The containment response to these breaks was analyzed assuming minimum operable safety injection systems with two containment air coolers and one containment spray pump in operation.

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The RCS blowdown transient results in primary containment pressure and temperature peaks as a result of the mass and energy transferred from the reactor core to the primary coolant and to the containment atmosphere. During the refill and reflood phases of the accident scenario, heat in the steam generator water mass is transferred to the primary coolant via a reverse heat flow and then into the containment atmosphere. In addition, safety injection water reflooding into an uncovered core and the hot RCS system picks up heat from those sources and deposits it into the Containment as saturated or even superheated steam.

The mass and energy transfer from the RCS for various phases of the accident are calculated by Combustion Engineering (CE) and Bechtel. The blowdown phase is modeled using the CE FLASH code, the refill and reflood phases by the FLOOD code and the long-term cooling phase by Bechtels' Containment Pressure and Temperature Transient Analysis (COPATTA) code. During the long-term cooling phase (after reflood) the transfer of sensible heat from the RCS metal back into the coolant is not modeled. When RCS metal sensible heat is included, this results in coolant with a higher enthalpy flowing from the RCS break into Containment and leads to slightly higher containment temperatures for several days after the containment temperature peak.

III. ASSESSMENT OF ISSUE

We have asked ABB-CE to provide new mass and energy transfer data that accounts for sensible heat transfer from the RCS metal to the coolant. The revised data produced by CE will be provided to Bechtel

to produce revised containment pressure and temperature response curves. The results of the revised containment response curves are expected to show:

A. Containment primary peak pressure and temperature will be unaffected.

B. The intermediate containment temperature will be increased by less than 2°F.

C. The containment temperature and pressure will be essentially unaffected beginning several days after the start of the event.

The results of this reanalysis are being evaluated for impact on other aspects of our current licensing basis. The most significant potential impact was the increased load on our SRW system via the containment air coolers. We have no current operability concerns due to low ultimate heat sink temperatures at the present time.

IV. CONCLUSIONS

Even though this problem has minor safety consequences for Calvert Cliffs, we feel the deficiency in the modeling method used by Bechtel may potentially present a Safety Consequence to other licensees who use the same method. Thus, we are conservatively reporting it under 10 CFR Part 21.

POWER REACTOR

EVENT NUMBER: 28125

FACILITY: CALVERT CLIFFS REGION: 1
UNIT: [1] [2] [ ] STATE: MD
RX TYPE: [1] CE, [2] CE

NOTIFICATION DATE: 12/09/94
NOTIFICATION TIME: 11:47 [ET]
EVENT DATE: 12/09/94
EVENT TIME: 11:00 [EST]
LAST UPDATE DATE: 12/09/94

NRC NOTIFIED BY: CRAIG SLY
HQ OPS OFFICER: DICK JOLLIFFE

NOTIFICATIONS

EMERGENCY CLASS: NOT APPLICABLE
10 CFR SECTION:
CCCC 21.21 UNSPECIFIED PARAGRAPH

UNIT	SCRAM CODE	RX CRIT	INIT PWR	INIT RX MODE	CURR PWR	CURR RX MODE
1	N	Y	100	POWER OPERATION	100	POWER OPERATION
2	N	Y	100	POWER OPERATION	100	POWER OPERATION

EVENT TEXT

- HEAT TRANSFER FROM RCS METAL TO Rx COOLANT NOT MODELED IN SAFETY ANALYSIS

DURING A REVIEW OF THE UFSAR SAFETY ANALYSIS CONCERNING CONTAINMENT PRESSURE RESPONSE, LICENSEE DETERMINED THAT THE ANALYSIS OF THE LONG TERM COOLING PHASE OF A LOCA DID NOT MODEL HEAT TRANSFER FROM REACTOR COOLANT SYSTEM METAL COMPONENTS TO THE REACTOR COOLANT.

WHEN THE Rx COOLANT SYSTEM METAL SENSIBLE HEAT IS INCLUDED, THIS RESULTS IN REACTOR COOLANT WITH A HIGHER ENTHALPY FLOWING FROM THE REACTOR COOLANT SYSTEM BREAK INTO CONTAINMENT AND LEADS TO SLIGHLY HIGHER CONTAINMENT TEMPERATURES FOR SEVERAL DAYS AFTER THE CONTAINMENT TEMPERATURE PEAK.

THIS OMISSION INCREASES THE POST ACCIDENT LOAD ON THE SERVICE WATER SYSTEM WHICH REMOVES HEAT FROM CONTAINMENT VIA THE CONTAINMENT AIR COOLERS.

HOWEVER, THE LICENSEE DOES NOT HAVE AN OPERABILITY CONCERN BECAUSE ULTIMATE HEAT SINK TEMPERATURES ARE LOW ENOUGH TO ENSURE FULL COMPLIANCE WITH CURRENT PLANT DESIGN AND LICENSING BASIS.

LICENSEE INFORMED THE NRC RESIDENT INSPECTOR.