Omaha Public Power District

444 South 16th Street Mall
Omaha NE 68102-2247

August 16, 2006
LIC-06-0089

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Reference:
1. Docket No. 50-285
2. Letter from Ross Ridenoure (OPPD) to Document Control Desk (NRC) dated September 30, 2005, Fort Calhoun Station Unit No. 1 - License Amendment Request to Support Use of AREVA Realistic Large Break Loss of Coolant Accident Methodology (LIC-05-0106) (ML052770174)
3. Letter from Jeffrey A. Reinhart (OPPD) to Document Control Desk (NRC) dated May 23, 2006, Response to Request for Additional Information Related to the License Amendment Request to Support Use of AREVA Realistic Large Break Loss of Coolant Accident Methodology (LIC-06-0060) (ML061460190)

SUBJECT: Response to Request for Additional Information Related to the License Amendment Request to Support Use of AREVA Realistic Large Break Loss of Coolant Accident Methodology

Reference 2 provided the Omaha Public Power District's request for a license amendment to support use of AREVA Realistic Large Break Loss of Coolant Accident (RLBLOCA) Methodology. Reference 3 provided information requested in emails dated February 10, 2006 and May 2, 2006 regarding Reference 2. Attachment 1 to this letter provides additional information requested in emails dated July 20, 2006 and July 24, 2006.

I declare under penalty of perjury that the foregoing is true and correct. (Executed on August 16, 2006.)

No commitments are made to the NRC in this letter. If you have additional questions, or require further information, please contact Thomas R. Byrne at (402) 533-7368.

Sincerely,

Jeffrey A. Reinhart
Site Director
Fort Calhoun Station

JAR/TRB/trb

Attachment:

1. Response to Request for Additional Information Related to the License Amendment Request to Support Use of AREVA Realistic Large Break Loss of Coolant Accident Methodology

ATTACHMENT 1

Response to Request for Additional Information Related to the License Amendment Request to Support Use of AREVA Realistic Large Break Loss of Coolant Accident Methodology

Response to Request for Additional Information Related to the License Amendment Request to Support Use of AREVA Realistic Large Break Loss of Coolant Accident Methodology

NRC Request #1

Section 3.3 of Attachment 5 to your submittal dated September 30, 2005, states that "For the FANP RLBLOCA evaluation model, significant containment parameters, as well as NSSS parameters, were established via a [Phenomena Identification and Ranking Table (PIRT)] process. The PIRT outcome yielded two important (relative to PCT) containment parameters - containment pressure and temperature."

However, Table 4.18, Important PIRT Phenomena and Methodology Treatment, in Reference 1, lists only containment pressure but not containment temperature as PIRT phenomena. Please explain the basis for identifying containment temperature as a PIRT outcome.

OPPD Response

Table 4.18 does include the containment temperature, indirectly. The containment temperature is used to set the value/range of the passive Emergency Core Cooling System (ECCS) injection—for Combustion Engineering (CE) plants, the Safety Injection Tank (SIT) temperature. Note: Table 3.3 of Attachment 5 to OPPD's September 30, 2005 submittal shows that the containment and SIT temperatures are both sampled over the same range.

NRC Request #2

Section 3.3 of Attachment 5 to your submittal, dated September 30, 2005, states that "Containment pressure is indirectly ranged by sampling the upper containment volume (Table 3.3)." Please explain. Please confirm whether the containment pressure of 14.2 psia value listed in Table 1 of your May 23, 2006 response to staff's request for additional information was not used in the analysis because of indirect sampling of containment pressure.

OPPD Response

Containment pressure is not a sampled parameter. However, containment volume (proportional to pressure) is sampled; hence, the phraseology that containment pressure is indirectly sampled. The containment volume is ranged from empty—the most conservative value since, all things being equal, it will produce the lowest containment pressure—to its nominal value. A containment pressure of 14.2 psia was used in the Fort Calhoun Unit No. 1 (FCS) realistic large break Loss of Coolant Accident (RLBLOCA) analysis.

NRC Request #3

The following requests are regarding the information listed in Table 1 of your May 23, 2006, response to staff's request for additional information related to the license amendment request to support use of AREVA realistic large break loss of coolant accident methodology:

1.1 Please provide the bases for the following:

- Containment gas temperature, 83.44 to 120°F
- Containment pressure, 14.2 psia
- Containment volume, 1.02E6 to 1.16E6 ft^3
- Spray flow, 801.2 lb_m/s
- Spray temperature, 40°F.

OPPD Response

Values for the parameters and sampled ranges in question were provided to AREVA NP Inc. by OPPD. The containment gas temperature is a uniformly sampled parameter ranged over its normal operating conditions. Containment pressure is set at its nominal value. Containment volume is also uniformly sampled from an empty containment (which, all things being equal, would conservatively produce the lowest containment pressure—maximum steam binding) to its nominal full value. The spray flow is based on two pumps operating at their maximum flow rates (a conservatism to minimize containment pressure). The 40°F spray temperature is a conservative representation of the 50°F minimum Technical Specification temperature for the safety injection and refueling water tank (SIRWT) (a conservatism to minimize containment pressure). [Note that the spray temperature is not used for the ECCS pumped injection (see Table 3.2, Item 3h of Attachment 5 to OPPD's September 30, 2005 submittal).]

NRC Request #4

The table states that an approved code model was used for the model parameter on containment steam mixing with spilled ECCS water. Please describe this model or provide a reference.

OPPD Response

The statement refers to the use of the ICECON containment code in the RLBLOCA evaluation model (EM). ICECON is NRC-approved for use within the context of the RLBLOCA EM. ICECON is a CONTEMPT-type containment pressure code and uses the normal instantaneous equilibrium steam-water mixing model. All ECCS fluid is injected into the reactor coolant system (RCS). There is no direct spillage of ECCS to the containment. The RCS resistance network determines what ECCS is processed through the break and into the containment. Then, in ICECON, the break discharge of steam and liquid components are instantaneously equilibrated in the containment atmosphere.

NRC Request #5

Using the Ft. Calhoun USAR Section 6.2(I)(B) value 3100 gpm/pump for containment spray pump flow rate and a water temperature of 40 degrees F, I calculated a spray flow rate (for 2 pumps) of 862.2 lbm/s, which is higher than that used in the analysis (801.2 lbm/s). Please explain.

OPPD Response

Framatome Calculation Notebook, "Fort Calhoun Cycle 24 ICECON Model for RLBLOCA", indicates that Containment Spray (CS) flow rate, assuming maximum flow rates, used in the analysis is 5765 gpm which when converted at 40°F is 801.2 lbm/sec. This was supplied by OPPD to Siemens Power Corporation and was used in their Cycle 20 Appendix K Large Break LOCA analysis. This value is based on a parametric study calculation of the containment spray flow rates in a variety of CS System configurations that can be credited in containment heat removal during a Design Basis Accident (DBA) LOCA. The parametric calculation determined the expected CS flow rate as a function of number of operating CS pumps, number of CS headers, containment atmospheric pressures, and water levels in the SIRWT.

The value quoted by the NRC reviewer in his email (3100 gpm/pump) from USAR Section 6.2.1 I. B.A is a value of 3142 gpm/pump which is specified as "Required NPSH of CS Pumps (3142 gpm/pump) = 26.84 ft." This is the required NPSH for a design basis flow rate of 3142 gpm. Therefore this value is not used as CS flow rate parameter for LOCA analysis.

NRC Request #6

You stated that "However, containment volume (proportional to pressure) is sampled." Did you assume a constant mass of containment air for the containment volume to be proportional to the containment pressure? If so, at what temperature, volume, and pressure did you calculate the mass of containment air? If not, please explain how containment volume can be proportional to the containment pressure.

OPPD Response

The proportionality mentioned is noted in a general relationship: the larger the initial containment volume, the lower the expected containment backpressure and vice-a-versa. For a given case, the mass of containment air remains constant throughout the transient. The initial containment air mass is determined based on the containment volume (noted in a prior response as being a sampled parameter), the initial containment pressure (noted in a prior response as having a value of 14.2 psia), and the initial containment temperature (noted in a prior response as being a sampled parameter). The primary influence on the containment pressure during the transient is the size of the containment, which varies from case to case as a statistical parameter. The range of sampled containment sizes is skewed toward large values, which result in low containment pressures during the LOCA and, thus, higher Peak Centerline Temperatures (PCTs), in order to assure that the simple containment model is conservative.