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RS-03-063

March 21, 2003

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

Dresden Nuclear Power Station, Units 2 and 3
Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Quad Cities Nuclear Power Station, Units 1 and 2
Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Additional Information Supporting the Request for License Amendment Related to Application of Alternative Source Term

Reference: Letter from K. R. Jury (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Request for License Amendments Related to Application of Alternative Source Term," dated October 10, 2002

In the referenced letter, Exelon Generation Company, LLC (EGC) requested an amendment to the facility operating licenses for Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2. The proposed change supports application of an alternative source term (AST) methodology. To support the proposed change, EGC evaluated the four design basis accidents (i.e., loss-of-coolant, main steam line break, refueling, and control rod drop accidents) that could potentially result in main control room or offsite doses.

On February 26, 2003, the NRC requested additional information related to manual operator actions credited in the AST analyses. Attachment 2 to this letter provides the requested information.

EGC has reviewed the information supporting a finding of no significant hazards consideration that was previously provided to the NRC in Attachment C of the referenced letter. The supplemental information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration.

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If you have any questions or require additional information, please contact Mr. Kenneth M. Nicely at (630) 657-2803.

Respectfully,

Patrick R. Simpson

Patrick R. Simpson
Manager - Licensing
Mid-West Regional Operating Group

Attachments:
Attachment 1: Affidavit
Attachment 2: Response to Request for Additional Information

cc: Regional Administrator - NRC Region III
NRC Senior Resident Inspector - Dresden Nuclear Power Station
NRC Senior Resident Inspector - Quad Cities Nuclear Power Station
Office of Nuclear Facility Safety - Illinois Department of Nuclear Safety

ATTACHMENT 1
Affidavit

STATE OF ILLINOIS	)	
COUNTY OF DUPAGE	)	
IN THE MATTER OF	)	
EXELON GENERATION COMPANY, LLC	)	**Docket Numbers**
DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3	)	**50-237 and 50-249**
QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2	)	**50-254 and 50-265**

SUBJECT: **Additional Information Supporting the Request for License Amendment Related to Application of Alternative Source Term**

AFFIDAVIT

I affirm that the content of this transmittal is true and correct to the best of my knowledge, information and belief.

Patrick R. Simpson
Manager - Licensing
Mid-West Regional Operating Group

Subscribed and sworn to before me, a Notary Public in and for the State above named, this 21st day of March, 2003.

Anese L. Grigsby
Notary Public

OFFICIAL SEAL
ANESE L. GRIGSBY
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 3-13-2005

ATTACHMENT 2
Response to Request for Additional Information

NRC Request

Is the licensee proposing to take credit for any new manual action or modify any existing manual action in order to implement AST? For example, the analysis performed for the DBA LOCA uses the SLC System to maintain pH in the suppression pool at/above 7 for some period of time, post-LOCA, to ensure iodine does not re-evolve. This seems like a new/different application of SLC (as it was for Browns Ferry, for example). If this is the case for Quad Cities and Dresden, the licensee should provide a technical basis for crediting manual initiation/operation of SLC under this (new) condition, i.e., explain what the operator is required to do to maintain pH at the required value (e.g., specific actions required, how much time the operator has to successfully initiate and complete the actions, what cues alert the operator to take these actions, how does the licensee know the actions can be successfully completed, will changes to procedures and training be required, what are the consequences if the operator fails to complete the required action, etc.). This type of analysis/explanation should be provided by the licensee for any new/or modified manual action being credited in the AST request.

Response

In the referenced letter, Exelon Generation Company, LLC (EGC) indicated that, as a result of using alternative source term (AST) methodology, the design basis accident (DBA) loss-of-coolant accident (LOCA) analysis takes credit for minimizing the re-evolution of elemental iodine from the suppression pool, which is strongly dependent upon suppression pool pH. The referenced letter described the method used for controlling pH of the suppression pool. The analysis assumed that injection of a borated solution is manually initiated and that a minimum of 3769.4 pounds of sodium pentaborate, or equivalent, is delivered into the suppression pool within 24 hours following a DBA LOCA.

The current design function of the Standby Liquid Control (SLC) system is to bring the reactor, at any time in a fuel cycle, from full power and minimum control rod inventory (which is at the peak of the xenon transient) to a subcritical condition with the reactor in the most reactive, xenon free state without taking credit for control rod movement.

In addition to the design function, manual initiation of SLC is directed in via the current emergency operating procedures (EOPs) following a LOCA when reactor water level cannot be maintained above the top of active fuel. Manual initiation of SLC is also directed in the severe accident management guidelines (SAMGs), which are entered when adequate core cooling cannot be maintained. The specific cues and procedural directions are as follows.

- Dresden Nuclear Power Station (DNPS) EOP DEOP 100, "RPV Control," and Quad Cities Nuclear Power Station (QCNPS) EOP QGA 100, "RPV Control," are entered with reactor pressure vessel (RPV) water level below the scram setpoint, RPV pressure above the high pressure scram setpoint, drywell pressure above the scram setpoint, or reactor power above the low power alarm with a scram signal present. The RPV low level and the drywell high pressure entry conditions ensure that these procedures are entered for a LOCA.

  DEOP 100 and QGA 100 contain the steps that would be followed during a DBA LOCA. Following the LOCA, when RPV level stabilizes, the steps in these procedures direct use

of the alternate injection systems if needed to control RPV water level above top of active fuel (TAF). In a DBA LOCA, the accident analyses show that RPV water level would stabilize at 2/3 core height. Since level will not be controlled above TAF in a DBA LOCA, use of the alternate injection systems will be needed.

- Entry conditions to the SAMGs are listed within the EOPs. When conditions defined in the EOPs indicate that adequate core cooling cannot be restored and maintained, for any reason, then SAMG entry is directed. Adequate core cooling is defined as any of the following: core submersion, spray cooling, steam cooling with injection, or steam cooling without injection. In the reactor power leg of SAMG-2, "RPV, Containment, and Radioactivity Release Control," SLC initiation is directed upon entry to the SAMGs with no qualifying or conditional restrictions.

- At QCNPS, when the EOPs or SAMGs direct SLC initiation, the operator is referenced to operating procedure QCOP 1100-02, "Injection of Standby Liquid Control," for the specific steps to perform.

- At DNPS, when the SAMGs direct the use of SLC, the operator will use Dresden operating procedure DOP 1100-02, "Injection of Standby Liquid Control," for the specific steps to perform.

- At DNPS, when the EOPs direct the use of alternate injection systems, the operator is referenced to DEOP 500-3, "Alternate Water Injection Systems," for the specific steps to perform. This procedure currently contains steps that may prevent the operator from injecting boron or meeting the assumed concentration when manually initiating SLC. Prior to implementation of the AST amendment, DEOP 500-3 will be revised to specifically direct boron injection without dilution until the required amount of boron is injected for pH control following a LOCA.

With the revision to DEOP 500-3 described above, the procedural cues to manually initiate SLC will be adequate to ensure that sodium pentaborate is injected to meet the analysis assumptions. As noted above, the EOPs ensure that SLC will be initiated following a DBA LOCA. For any other conditions which may require SLC initiation, the cues for SAMG entry rely on indications of inadequate core cooling, which is a precursor to fuel damage. If adequate core cooling is maintained, significant fuel damage will not occur, and SLC initiation is not required by the AST analysis.

Crediting manual initiation of the SLC system is appropriate, since there is adequate time available for SLC system initiation during these events. The analysis assumes that 3769.4 pounds of sodium pentaborate, or equivalent, is delivered into the suppression pool within 24 hours following a DBA LOCA. This is equivalent to approximately 3000 gallons of 14% (by weight) of sodium pentaborate solution. The SLC systems at DNPS and QCNPS consist of two positive displacement pumps, each capable of injecting 40 gallons per minute into the reactor vessel. At 40 gallons per minute, only 75 minutes are required to inject 3000 gallons of solution. Therefore, there is adequate time following a DBA LOCA or any loss of adequate core cooling to assure that the required amount of sodium pentaborate is injected within 24 hours. Thus, crediting manual initiation, in lieu of automatic initiation, is acceptable.

Initiating the SLC system is accomplished entirely from the main control room with a simple keylock switch manipulation. Actuating this switch is the only action necessary to initiate injection of the SLC system into the reactor vessel. The operators have indication in the main control room of proper SLC system operation. Indications of successful injection include explosive valve continuity lights extinguished, flow light illuminated, reactor water cleanup system isolation, SLC tank level decrease, and adequate SLC pump discharge pressure.

At QCNPS, since the cues and required actions for SLC initiation are not changing for implementation of AST, no changes to procedures and training are required. At DNPS, procedure DEOP 500-3 will be revised as described above, and DNPS will train operators on the revised procedure.

If the operators fail to complete the required action, additional elemental iodine may re-evolve from the suppression pool following a DBA LOCA involving fuel damage, resulting in increased control room and offsite doses. However, since manual initiation of the SLC system involves only a single operator action from the control room, the dose consequences of the failure to complete the required action were not specifically assessed.

There are no other new or modified manual operator actions credited in the AST analyses.

Reference

Letter from K. R. Jury (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Request for License Amendments Related to Application of Alternative Source Term," dated October 10, 2002