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UniStar
NUCLEAR ENERGY

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July 15, 2009

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

Subject: UniStar Nuclear Energy, NRC Docket No. 52-016
Response to Request for Additional Information for the Calvert Cliffs Nuclear Power Plant, Unit 3,
RAI No. 104, Questions 02.04.13-1, 02.04.13-2, and 02.04.13-3, Liquid Radioactive Release

References:
1) John Rycyna (NRC) to Robert Poche (UniStar Nuclear Energy), "RAI No. 104 RHEB 2093.doc (PUBLIC)" email dated April 20, 2009

2) UniStar Nuclear Energy Letter UN#09-249, from Greg Gibson to Document Control Desk, U.S. NRC, Submittal of Response to RAI No. 104, Liquid Radioactive Release, dated May 20, 2009

The purpose of this letter is to respond to the request for additional information (RAI) identified in the NRC e-mail correspondence to UniStar Nuclear Energy, dated April 20, 2009 (Reference 1). This RAI addresses Liquid Radioactive Release, as discussed in Section 2.4 of the Final Safety Analysis Report (FSAR), as submitted in Part 2 of the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 Combined License Application (COLA), Revision 5.

Reference 2 stated that a response to RAI No. 104, Questions 02.04.13-1, 02.04.13-2, and 02.04.13-3 would be provided by July 15, 2009.

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The enclosure provides our response to RAI No. 104, Questions 02.04.13-1, 02.04.13-2, and 02.04.13-3, and includes revised COLA content. A Licensing Basis Document Change Request has been initiated to incorporate these changes into a future revision of the COLA. Our response to Questions 02.04.13-1, 02.04.13-2, and 02.04.13-3 does not include any new regulatory commitments.

If there are any questions regarding this transmittal, please contact me at (410) 470-4205, or Mr. Michael J. Yox at (410) 495-2436.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 15, 2009

Greg Gibson

Enclosure: Response to NRC Request for Additional Information RAI No. 104, Questions 02.04.13-1, 02.04.13-2, and 02.04.13-3, Liquid Radioactive Release, Calvert Cliffs Nuclear Power Plant, Unit 3

cc: John Rycyna, NRC Project Manager, U.S. EPR COL Application
Laura Quinn, NRC Environmental Project Manager, U.S. EPR COL Application
Getachew Tesfaye, NRC Project Manager, U.S. EPR DC Application (w/o enclosure)
Loren Plisco, Deputy Regional Administrator, NRC Region II (w/o enclosure)
Silas Kennedy, U.S. NRC Resident Inspector, CCNPP, Units 1 and 2
U.S. NRC Region I Office

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Enclosure

Response to NRC Request for Additional Information RAI No. 104, Questions 02.04.13-1, 02.04.13-2, and 02.04.13-3, Liquid Radioactive Release, Calvert Cliffs Nuclear Power Plant, Unit 3

RAI No. 104

Question 02.04.13-1

Provide confirmation of, and the technical basis for, the use of the Reactor Coolant Storage Tank as the source tank with the greatest inventory for the purposes of the accidental release analysis.

Response

The reactor coolant storage tank (RCST) is the largest tank outside containment with radioactive contents. The liquid source terms considered included waste system Group I liquid waste hold-up tanks. The highest liquid source term is in the reactor coolant storage tank with the assumption of 0.25% failed fuel (two times the Branch Technical Position 11-6 assumption), unpurified, undiluted, and undecayed reactor coolant. As a result, the total activity released from the reactor coolant storage tank with the assumptions made bound the other liquid sources.

Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 COLA FSAR Table 2.4-44 was evaluated for alignment with the radiological portions of proposed U.S. NRC Interim Staff Guidance (ISG) DC/COL-ISG-013. There are two radionuclides in the proposed ISG that are not in FSAR Table 2.4-44. These are Mn-56 and Tc-99. These are being added by the proposed ISG and are not part of the ANSI/ANS 18.1 Standard from which the radionuclides in FSAR Table 2.4-44 were derived.

An evaluation of Mn-56 concluded that this radionuclide has a relatively short half-life of about 2.6 hours, and would therefore not accumulate in ground water in significant concentrations as a result of accidental release. An evaluation of Tc-99 took into consideration an undecayed specific concentration of Tc-99 on the order of 1E-09 µCi/g. The concentration of Tc-99m is on the order of 1E-02 µCi/g and decays to Tc-99 with a half-life of about 6 hours. The total Tc-99 contribution will build up in the ground water migration to a maximum concentration of 1.5E-10 µCi/g. This concentration of Tc-99 is not significant and the effects of including Mn-56 and Tc-99 in the RCST radionuclide inventory would not significantly impact the results of the accidental release of liquid effluents analysis.

COLA Impact

The COLA FSAR will not be revised as a result of this response.

Question 02.04.13-2

Provide a reference for the radionuclide activities used as the source in the accidental release analysis (FSAR Table 2.4-44).

Response

The fission product radionuclide activities in the source of the postulated accidental release are based on the maximum normal operations reactor coolant concentration without decay and the assumption of 0.25% defective fuel. The halogen concentrations are based on the 1.0 µCi/g DEI-131 Technical Specification limit. The maximum reactor coolant concentration was generated by selecting the maximum nuclide activities for core exposures ranging between 5 to 41 GWD/MTU for 5% enriched fuel. The core average burn-up of 41GWD/MTU and 5% enriched fuel bound the average burn-up and enrichment for 18 or 24 month equilibrium cycles. The corrosion products and tritium concentrations are based on ANSI/ANS 18.1.

It should be noted that there is a typographical error in the concentration units shown in CCNPP Unit 3 COLA FSAR Table 2.4-44. The correct units for the concentration of radioisotopes are microcuries per gram (µCi/g).

COLA Impact

FSAR Table 2.4-44 column heading will be updated as follows in a future COLA revision:

Table 2.4-44 – {Reactor Coolant Storage Tank Radionuclide Inventory}

Radioisotope	Half-life $t^{1/2}$ (days)	Concentration ~~(Ci/mL)~~ (µCi/g)	Radioisotope	Half-life $t^{1/2}$ (days)	Concentration ~~(Ci/mL)~~ (µCi/g)
H-3	4.51E+03	1.0E+00	Te-127m	1.09E+02	6.6E-04
Na-24	6.25E-01	3.8E-02	Te-127*	3.90E-01	0.0E+00
Cr-51	2.77E+01	2.1E-03	I-129	5.73E+09	4.6E-08
Mn-54	3.13E+02	1.1E-03	I-130	5.15E-01	5.0E-02
Fe-55	9.86E+02	8.1E-04	Te-129m	3.36E+01	1.9E-03
Fe-59	4.45E+01	2.0E-04	Te-129*	4.83E-02	3.1E-03
Co-58	7.08E+01	3.1E-03	Te-131m	1.25E+00	4.6E-03
Etc.					

Question 02.04.13-3

Provide information on the presence or absence of chelating agents in the tank used for the source in the accidental release analysis. Also discuss the planned use of any chemical agents anywhere at the site which could modify the radionuclide transport characteristics of the sub-surface region.

Response

The tank used as the source in the postulated accidental release analysis is the reactor coolant storage tank, which is located in the Nuclear Auxiliary Building (NAB). No chelating agents or other chemical agents which could modify radionuclide transport characteristics are used in the reactor coolant treatment system or are present in the reactor coolant during normal operations. The only chemicals that could be present in the coolant storage tank would be those normally present in the reactor coolant.

Chelating agents may be used in the CCNPP Unit 3 Radioactive Waste Processing Building (RWPB), in a chemical decontamination process to remove solids from the liquid radwaste evaporator column. The chelating agents would be used to dissolve the oxide coatings on precipitated solids and to complex the released radionuclides that are loosened or broken up by strong oxidizing agents. The complexed radionuclides and any excess uncomplexed chelates are typically removed onto cation-, anion-, and mixed-bed ion exchange resins. These spent resins constitute the principal waste from the decontamination process.

COLA Impact

The COLA FSAR will not be revised as a result of this response.