Greg Gibson
Vice President, Regulatory Affairs

750 East Pratt Street, Suite 1600
Baltimore, Maryland 21202

UniStar
NUCLEAR ENERGY

10 CFR 50.4
10 CFR 52.79

August 10, 2009

UN#09-304

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

Subject: UniStar Nuclear Energy, NRC Docket No. 52-016
Updated Response to Request for Additional Information for the
Calvert Cliffs Nuclear Power Plant, Unit 3,
RAI No. 9, Evaluation of Potential Accidents

Reference: UniStar Nuclear Energy Letter UN#08-063, from Greg Gibson to Document Control Desk, U.S. NRC, Submittal of Response to RAI No. 9, External Hazards, dated November 11, 2008

The purpose of this letter is to amend the response to the request for additional information (RAI) identified in the UniStar Nuclear Energy correspondence to the NRC, dated November 11, 2008 (Reference). This updated RAI response addresses Evaluation of Potential Accidents, as discussed in Section 2.2.3 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.

The enclosure provides our amended input for portions of the response to Question 02.02.03-4 in RAI No. 9 and includes revised COLA content. The identified corrections update vendor input; but do not affect the original response conclusions. A Licensing Basis Document Change Request has been initiated to incorporate these changes into a future revision of the COLA. A condition report has been initiated in the corrective action program in response to this error. Our updated response to Question 02.02.03-4 does not include any new regulatory commitments.

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NRO

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 August 10, 2009

Greg Gibson

Enclosure: Updated Response to NRC Request for Additional Information RAI No. 9, Question 02.02.03-4, Evaluation of Potential Accidents, 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

GTG/SFW/kat

Enclosure

Updated Response to NRC Request for Additional Information
RAI No. 9, Question 02.02.03-4, Evaluation of Potential Accidents,
Calvert Cliffs Nuclear Power Plant, Unit 3

RAI No. 9

Question 02.02.03-4

RG 1.206 provides guidance regarding the information that is needed to ensure potential hazards in the site vicinity are identified and evaluated to meet the siting criteria in 10 CFR 100.20 and 10 CFR 100.21. FSAR Section 2.2.3.1.2 does not provide enough information for the NRC staff to perform an independent review of that section. Please provide a sensitivity analysis demonstrating that the assumed meteorological conditions for ALOHA model maximize evaporation while minimizing dispersion resulting in a conservative minimum separation distance due to explosion. The applicant stated that "the maximum allowable surface area of the spill that ALOHA would allow (31400 m^2) was used". How was the total chemical inventory (i.e., 5,200,000 lbs) accounted for in the calculation?

Amended Response

The sensitivity analysis tables provided in response to RAI Set No. 9 Question 02.02.03-4[a] are corrected as shown in the following table. The values in the benzene and toluene tables have been updated and the heading for the propane sensitivity analysis table was incorrectly titled as "Ammonia (1,200,000 lbs)". The tables are updated with the corrected values underlined for clarity. Other RAI No. 9 question responses and the unaffected portions of Question 02.02.03-4 remain as provided in the referenced transmittal.

Benzene (5,200,000 lbs)

Stability Class	Wind Speed (m/s)	Distance to UFL (feet)	Distance to LFL (feet)	Safe Distance for Vapor Cloud Explosions (feet)	Peak Overpressure at NSRS (psi)
F	1	951	2,172	4,095	0.209
F	2	756	1,593	3,240	0.157
F	3	LOC never exceeded	1,065	2,463	0.129
E	1	786	1,641	3,540	0.178
E	2	210	999	2,580	0.138
E	3	LOC never exceeded	729	2,031	0.105
E	4	LOC never exceeded	603	1,761	No significant overpressure
E	5	LOC never exceeded	510	1,599	No significant overpressure
D	3	LOC never exceeded	564	1,788	No significant overpressure
D	4	LOC never exceeded	459	1,542	No significant overpressure
D	5	LOC never exceeded	387	1,362	No significant overpressure
D	6	LOC never exceeded	342	1,239	No significant overpressure

[a] G. Gibson (UniStar) to Document Control Desk (NRC) "Response to RAI Set No. 9, External Hazards," letter dated November 11, 2008 (ML083180126)

Toluene (5,200,000 lbs)

Stability Class	Wind Speed (m/s)	Distance to UFL (feet)	Distance to LFL (feet)	Safe Distance for Vapor Cloud Explosions (feet)	Peak Overpressure at NSRS (psi)
F	1	696	1,302	2,604	0.115
F	2	LOC never exceeded	711	1,815	No significant overpressure
F	3	LOC never exceeded	471	1,356	No significant overpressure
E	1	576	1,002	2,259	No significant overpressure
E	2	LOC never exceeded	465	1,395	No significant overpressure
E	3	LOC never exceeded	255	900	No significant overpressure
E	4	LOC never exceeded	LOC never exceeded	No explosion	No significant overpressure
E	5	LOC never exceeded	LOC never exceeded	No explosion	No significant overpressure
D	3	LOC never exceeded	LOC never exceeded	No explosion	No significant overpressure
D	4	LOC never exceeded	LOC never exceeded	No explosion	No significant overpressure
D	5	LOC never exceeded	LOC never exceeded	No explosion	No significant overpressure
D	6	LOC never exceeded	LOC never exceeded	No explosion	No significant overpressure

Propane (50,000 lbs)

Stability Class	Wind Speed (m/s)	Distance to UFL (feet)	Distance to LFL (feet)	Safe Distance for Vapor Cloud Explosions (feet)	Peak Overpressure at NSRS (psi)
F	1	657	1,362	3,552	0.46
F	2	987	2,274	4,056	0.508
F	3	1,167	2,361	4,185	0.526
E	1	648	1,347	3,543	0.459
E	2	945	2,004	3,930	0.497
E	3	1,032	1,941	3,918	0.496
E	4	918	1,824	3,798	0.481
E	5	810	1,737	3,708	0.466
D	3	990	1,911	3,915	0.497
D	4	813	1,749	3,765	0.481
D	5	699	1,590	3,624	0.459
D	6	627	1,458	3,501	0.44

COLA Impact

FSAR Section 2.2.3.1.2 will be updated as follows in a future COLA revision:

Additionally, because each of the identified chemicals has the potential to explode, a vapor cloud explosion analysis was performed as described in Section 2.2.3.1.2. The results of the vapor cloud explosion analysis indicate that the safe distances, the minimum distances, with drift taken into consideration, required for an explosion to have less than a 1 psi (6.9 kPa) peak incident pressure, are less than the shortest distance to the nearest safety related structure for CCNPP Unit 3, the intake structure, and a probable release point on the Chesapeake Bay. The safe distance for gasoline is 3,312 ft (1,009 m); for benzene, ~~2,409 ft (734 m)~~ 4,095 ft (1,248 m); for toluene, ~~1,554 ft (474 m)~~ 2,604 ft (794 m); and for ammonia, 10,032 ft (3,058 m). (Table 2.2-9) Therefore, a flammable vapor cloud with the possibility of explosion from a transported hazardous material on the Chesapeake Bay would not adversely affect the safe operation of CCNPP Unit 3.

FSAR Section 2.2.3.1.2 will be updated as follows in a future COLA revision:

As described previously in Section 2.2.3.1.2, the ALOHA dispersion model was used to determine the distance a vapor cloud can travel before reaching the LFL boundary (i.e., the safe distance for exposure to thermal radiation heat flux) once a vapor cloud has formed from release of the identified chemical. The distances to the LFL boundary from the release point for the identified chemicals are: gasoline, 234 ft (71 m); hydrazine (35% solution), less than 33 ft (10 m); dimethylamine (2% solution), ~~36 ft (11 m)~~ 45 ft (14 m); hydrogen; ~~96 ft (29 m)~~ 492 ft (150 m); argon-methane gas cylinder 69 ft (21 m); and hydrogen gas cylinder 75 ft (23 m). Each of these distances is less than the distance from a potential release site to the nearest safety-related CCNPP Unit 3 structure. The location of the argon-methane gas cylinder and hydrogen gas cylinder is not yet determined therefore they should be stored at distances greater than those reported above and in Table 2.2-9.

A vapor cloud explosion analysis was also performed using the methodology described in Section 2.2.3.1.2 to obtain minimum separation distances (i.e., safe distances) for the identified chemicals. With the exception of a postulated release from a gasoline tanker, the results indicate that the minimum separation distance (i.e., the distance required for an explosion to have less than a 1 psi (6.9 kPa) peak incident pressure) are less than the shortest distance to a safety-related CCNPP Unit 3 structure from the storage location of these chemicals.

The minimum separation distance for the 3,500 gallon (13,250 l) gasoline tank truck is 648 ft (198 m). Minimum separation distance for other identified chemicals are: hydrazine (35% solution), N/A (no explosion can occur at resulting concentrations); dimethylamine (2% solution), 180 ft (55m); hydrogen, ~~114 ft (35 m)~~ 738 ft (225 m); argon-methane gas cylinder 126 ft (38m); hydrogen gas cylinder 138 ft (42 m). Except for gasoline, each of these chemicals is stored further away from CCNPP Unit 3 than the minimum separation distance. The filling operation for gasoline occurs approximately 310 ft (95 m) from the nearest safety-related CCNPP Unit 3 structure, which is the Ultimate Heat Sink. The storage of other identified chemicals stored at CCNPP Units 1 and 2 relative to the nearest safety related CCNPP Unit 3 structure, which is the Ultimate Heat Sink makeup intake structure, are: hydrazine, approximately 891 ft (272 m); dimethylamine (2% solution), 462 ft; and hydrogen, 745 ft (227 m).

FSAR Table 2.2-9 will be updated as follows in a future COLA revision:

Table 2.2-9—{Flammable Vapor Cloud Events (Delayed Ignition) and Vapor Cloud Explosion Analysis}

Source	Pollutant Evaluated & Quantity	Distance to Nearest Safety Related CCNPP Unit 3 Structure	Distance to UFL	Distance to LFL	Safe Distance for Vapor Cloud Explosions	Peak Over pressure at Nearest Safety Related CCNPP Unit 3 Structure
Waterway (Chesapeake Bay)	Benzene (5,200,000 lbs)/ 2,360,000 kg (Note 6)	11,678 ft/ 3,560 m to UHS makeup intake water structure	951 ft/ 240 m	2,172 ft/ 662 m	~~2,409 ft/734 m~~ 4,095 ft/1,248 m	~~Not Significant (Note 5)~~ 0.209 psi/1.44kPa
	Toluene (5,200,000 lbs)/ 2,360,000 kg (Note 6)		696 ft/ 212 m	1,302 ft/ 397 m	~~2,409 ft/ 734 m~~ 2,604 ft/794 m	~~Not Significant (Note 5)~~ 0.115 psi/0.793 kPa
On-site (CCNPP Units 1 & 2)	Dimethylamine (Note 9) (2% solution) (350 gal)/1,325 l	462 ft/ 141 m	<33 ft/ <10.1 m	~~36 ft/11m~~ 45 ft/14 m	180 ft/55m	0.282 psi/1.94 kPa
	Hydrogen (460 cu. ft)/ 13 cu. m	745 ft/ 227.1 m	~~<33 ft/<10.1 m~~ 108 ft/33 m	~~96 ft/29 m~~ 492 ft/150 m	~~114 ft/35 m~~ 738 ft/225 m	0.984 psi/6.78 kPa
On-site (CCNPP Units 3)	Argon-Methane (Note 10) (282 scf)/7.99 Nm^3 (considered as Methane)	~~233 ft/ 71 m~~	39 ft/ 11.9 m	69 ft/ 21m	126 ft/ 38m	0.24 psi/ 1.69 kPa
	Hydrogen (Note 11) (278 scf)/7.87 Nm^3 (considered as Methane)	~~233 ft/ 71 m~~	< 33 ft/ <10.1 m	75 ft/ 23m	138 ft/ 42m	0.17 psi/ 1.2 kPa