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UniStar
NUCLEAR ENERGY

10 CFR 50.4
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April 1, 2011

UN#11-124

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

Subject: UniStar Nuclear Energy, NRC Docket No. 52-016
Calvert Cliffs Nuclear Power Plant, Unit 3,
Evaluation of Potential Accidents

Reference: UniStar Nuclear Energy Letter UN#11-121, from Greg Gibson to Document Control Desk, U.S. NRC, Evaluation of Potential Accidents, dated March 28, 2011

The purpose of this letter is to provide confirmatory information involving the 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 7. The referenced letter provided preliminary hazards analysis results for a postulated scenario involving the storage or transport of carbon dioxide at CCNPP Units 1 and 2 for CCNPP Unit 3, and stated that final hazard analysis results would be provided by April 1, 2011.

The hazards analysis has been finalized and concludes that there are no postulated events involving the on-site storage or transport of carbon dioxide at CCNPP Units 1 and 2 where an exceedance of the IDLH (40,000 ppm) would occur in the CCNPP Unit 3 control room. Therefore, storage and transport of carbon dioxide at CCNPP Units 1 and 2 does not present a design-basis event for CCNPP Unit 3.

The hazards analysis results are based on the following assumptions:

- Carbon dioxide is stored on-site in an insulated tank at the 12 foot level of the CCNPP Unit 2 Turbine Building on the south west side (located approximately 2250 feet from the control room intake for CCNPP Unit 3).

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- The on-site storage tank quantity is 4 tons.
- The carbon dioxide delivery truck path is through the far southern end of the CCNPP Unit 1 and 2 property where the sally port is into the CCNPP Unit 1 and 2 protected area (placing the closest approach to the CCNPP Unit 3 control room that the delivery truck would make at approximately 900 feet).
- The quantity of carbon dioxide for the delivery truck is 50,000 pounds. (Using this quantity, the frequency of shipment/delivery is not a factor and therefore, the assumption of quarterly delivery is not required.)
- The inventory of the carbon dioxide delivery truck is directly released to the atmosphere over a ten minute period.

COLA markup pages reflecting the results of the additional hazardous chemical analyses performed are provided in the Enclosure to this letter. None of these changes affect the control room habitability assessment and features description provided in FSAR Section 6.4. A Licensing Basis Document Change Request has been initiated to incorporate these changes into a future revision of the COLA.

UNE is currently performing a review of chemical hazards identified in the CCNPP Unit 1 and 2 FSAR to identify extent of condition for the chemical hazard that was inadvertently omitted from the CCNPP Unit 3 FSAR. This review is being performed under the UniStar Corrective Action Program. In the event that additional chemical hazards requiring consideration in the CCNPP Unit 3 FSAR are identified during this review, FSAR Section 2.2.3 will be updated to include the evaluation of these hazards.

Our response does not include any new regulatory commitments. This letter does not contain any sensitive or proprietary information.

If there are any questions regarding this transmittal, please contact me at (410) 470-4205, or Mr. Wayne A. Massie at (410) 470-5503.

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

Executed on April 1, 2011

Greg Gibson

Enclosure: COLA Page Markups Incorporating Hazardous Chemical Analysis Results for Carbon Dioxide, Calvert Cliffs Nuclear Power Plant Unit 3

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cc: Surinder Arora, NRC Project Manager, U.S. EPR Projects Branch
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Charles Casto, Deputy Regional Administrator, NRC Region II
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U.S. NRC Region I Office

GTG/RJP/mdf

Enclosure

COLA Page Markups Incorporating Hazardous Chemical Analysis Results for Carbon Dioxide

Calvert Cliffs Nuclear Power Plant Unit 3

COLA Impacts

FSAR Section 2.2.3.1.3 and Tables 2.2-2, 2.2-5 and 2.2-10, are being updated as follows:

2.2.3.1.3 Toxic Chemicals

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Onsite Chemical Storages

The hazardous materials stored onsite that were identified for further analysis with regard to the potential of the formation of toxic vapor clouds formed after an accidental release are: gasoline; ammonium hydroxide (28% solution); sodium hypochlorite; hydrazine (35% solution); monoethanolamine; dimethylamine (2% solution); hydrochloric acid (30% solution); carbon dioxide; hydrogen (asphyxiant) and liquid nitrogen (asphyxiant). Two water treatment chemicals, a non-oxidizing biocide containing ethanol and sodium hypochlorite, gas cylinders stored at CCNPP Unit 3 containing argon, argon□methane, hydrogen, and nitrogen, which are all asphyxiants, were identified for further analysis for the formation of toxic/asphyxiating vapor clouds.

As described in Section 2.2.3.1.3, the identified hazardous materials were analyzed utilizing the ALOHA dispersion model to determine whether the formed vapor cloud will reach the control room intake and what the concentration of the toxic chemical will be in the main control room after an accidental release. The worst case release scenario in these analyses included either a total loss of the largest vessel into an unconfined puddle or direct release over 10 minutes under determined worst case meteorological conditions.

Hydrogen and liquid nitrogen concentrations were determined at the control room after a release of the largest vessel. In each case, the concentration at the CCNPP Unit 3 control room of the asphyxiants located at CCNPP Unit 1 and 2, (53.0 ppm for hydrogen, and 635 ppm for liquid nitrogen), would not displace enough oxygen for the CCNPP Unit 3 main control room to become an oxygen deficient environment. Similarly, the asphyxiants associated with the gas cylinder storage at CCNPP Unit 3, are stored farther than the determined safe distance (the distance to where the vapor cloud would travel prior to falling below a concentration which could result in the displacement of a significant fraction of the control room air-defined by the OSHA) under worst case meteorological conditions (42 ft for argon gas and argon-methane gas cylinders, 39 ft for hydrogen gas cylinders, and 36 ft for nitrogen gas cylinders).

For each toxic chemical evaluated, with ~~With~~ the exception of the 3,500 gallon (13,250 l) gasoline delivery truck, the remaining chemical analyses indicate that the control room would remain habitable for the worst case release scenario. ~~The worst case release scenario in this analysis included a total loss of the largest vessel into an unconfined puddle under determined worst case meteorological conditions.~~

Table 2.2-2 {CCNPP Units 1, 2 and 3 Onsite Chemical Storage}

(Page 1 of 3)

Material	Toxicity Limit (IDLH)	Quantity	Largest Container	Location	Shipping Mode	Annual Frequency
			CCNPP Units 1 and 2			
Ammonium Hydroxide (28% solution)	300 ppm as Ammonia	8500 gal (32,000 l)	8,500 gal (32,000 l)	Tank Farm	Ground	1/year
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Hydrogen	None established	460 cu ft (13 cu m)	460 cu ft (13 cu m)	Tank Farm	Ground	8-10/year
Carbon Dioxide	40,000 ppm	8,000 lbs (3,629 kg)	8,000 lbs (3,629 kg)/ 50,000 lbs (22,680 kg) delivery truck (Note 4)	12 ft Turbine Building	Ground	1-4/year

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Note 1: The 4,000 gal (15,000 l) gasoline tank is an underground tank. Therefore, the toxicity event is bounded by the 3,500 gal (13,000 l) gasoline delivery truck.)

Note 2: Quantities for compressed gas cylinders are reported at standard temperature and pressure (25°C and 1 atmosphere). The container volume is the inside volume of the cylinder.

Note 3: Shipping mode and annual frequency is not available because chemical is not currently stored on-site, but will be stored at CCNPP Unit 3.

Note 4: The toxicity event for the 8,000 lb storage tank in the Turbine Bldg. is bounded by the 50,000 lb delivery truck.

Table 2.2-5 {Onsite Chemicals Disposition}

(Page 1 of 3)

Material	Toxicity Limit (IDLH)	Flammability	Explosion Hazard?	Vapor Pressure	Disposition
			CCNPP Units 1 and 2		
Ammonium Hydroxide (28% solution)	300 ppm as Ammonia	Not flammable	None listed	Not available	Toxicity Analysis

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Material	Toxicity Limit (IDLH)	Flammability	Explosion Hazard?	Vapor Pressure	Disposition
Hydrogen	None estab.	4.0-75%	Vapor may explode	29.030 psi @ -418°F/ 200 kPa @ -250°C ~~214°C~~	Toxicity-consider as asphyxiant Flammability Analysis Explosion Analysis
Carbon Dioxide	40,000 ppm	Not flammable	None listed	833 psi @ 68°F 5,743 kPa @ 20°C	Toxicity Analysis

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Table 2.2-10 {Toxic Vapor Cloud Analysis}
(Page 1 of 3)

Source	Chemical	Quantity	IDLH	Distance to CCNPP Unit 3 Control Room Intake	Distance to IDLH (Note 1)	Maximum Control Room Concentration (Note 2)
Maryland 2/4	Gasoline	8,500 gal/ 32,200 l	300 ppm TWA/ 500 ppm STEL (Note 3)	6,531 ft/ 1,991 m	1,752 ft/ 534 m	9.44 ppm (Note 4)
	Gasoline (aviation)	8,500 gal/ 32,200 l	300 ppm TWA/ 500 ppm STEL (Note 3)		1,752 ft/ 534 m	9.45 ppm (Note 4)
	Propane	50,000 lbs/ 22,700 kg	2,100 ppm		5,022 ft/ 1,531 m	114 ppm
	Ammonium Hydroxide (19% solution)	50,000 lbs/ 22,700 kg	300 ppm for ammonia		8,448 ft/ 2,575 m	70.9 ppm (Note 5)

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Source	Chemical	Quantity	IDLH	Distance to CCNPP Unit 3 Control Room Intake	Distance to IDLH (Note 1)	Maximum Control Room Concentration (Note 2)
On-site (CCNPP Units 1 & 2)	Ammonium Hydroxide (28% solution)	8,500 gal/ 32,176 l	300 ppm as ammonia	2,994 ft/ 913 m	6,864 ft/ 2,092 m	194 ppm (Note 15)
	Gasoline (Note 10)	3,500 gal/ 13,250 l	300 ppm TWA/ 500 ppm STEL	617 ft/ 188 m	1,230 ft/ 375 m	343 ppm (Note 9)
	Sodium Hypochlorite	8,500 gal/ 32,176 l	10 ppm as chlorine	2,472 ft/ 753 m	174 ft/ 53 m	0.049 ppm (Note 4)
	Hydrazine (35% solution)	350 gal/ 1,325 l	50 ppm	1,489 ft/ 454 m	1,197 ft/ 365 m	10.1 ppm (Note 5)
	Monoethanolamine	350 gal/ 1,325 l	30 ppm	2,889 ft/ 881 m	135 ft/ 41 m	0.0784 ppm (Note 5)
	Dimethylamine (2% solution)	350 gal/ 1,325 l	500 ppm	2,889 ft/ 881 m	288 ft/ 88 m	0.743 ppm
	Hydrochloric Acid (30% Solution)	3,000 gal/ 11,360 l	50 ppm	2,994 ft/ 913 m	3,102 ft/ 945 m	14.1 ppm (Note 5)
	Hydrogen	460 cu ft/ 13 cu m	Asphyxiant	2,994 ft/ 913 m	Asphyxiant	53.0 ppm
	Carbon Dioxide	50,000 lbs/ 22,680 kg	40,000 ppm	900 ft 274 m	1,749 ft 533 m	25,300 ppm (Note 16)
	Liquid Nitrogen	11,300 gal/ 42,775 l	Asphyxiant	2,994 ft/ 913 m	Asphyxiant	635 ppm (Note 5)

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Table 2.2-10 {Toxic Vapor Cloud Analysis}
(Page 3 of 3)

Source	Chemical	Quantity	IDLH	Distance to CCNPP Unit 3 Control Room Intake	Distance to IDLH (Note 1)	Maximum Control Room Concentration (Note 2)

TLV-TWA: Threshold Limit Value□Time□Weighted Average

STEL: Short term exposure limit

IDLH: Immediately Dangerous to Life and Health threshold value

scf: Standard cubic feet

Nm^3: Normal cubic meter

Note 1: The reported value for the distance to the IDLH (or other determined toxicity limit) is the resultant distance to the IDLH for the determined worst case meteorological conditions for each postulated event. The worst case meteorological conditions were based upon those meteorological conditions yielding the highest concentration in the control room during a postulated event.

Note 2: The concentrations reported represent indoor concentrations. The air exchange rate of 0.45 air exchanges per hour that was used in the ALOHA model was calculated from the control room volume and the rate of fresh air intake. Unless noted, the worst case combination of stability class and wind speed is F stability and a wind speed of 1 m/sec.

Note 3: For gasoline and gasoline (aviation) the time weighted average (TWA) and short term exposure limit (STEL) were conservatively used as no IDLH is available for either of these hazardous materials.

Note 4: The worst case combination of stability class and wind speed is F stability and a wind speed of 3 m/sec.

Note 5: The worst case combination of stability class and wind speed is F stability and a wind speed of 2 m/sec.

Note 6: For benzene, and toluene a combined total of 28,000 short tons/year are shipped by barge. It is conservatively assumed that they are shipped in equal quantities (14,000 short tons per year each) and that they each have the minimum 50 shipments (Regulatory Guide 1.78) and each shipment contains the same quantity, 560,000 lbs each.

Note 7: The amount of ammonia transported by barge near the plant is 1,000 short tons. It is conservatively assumed that there are 50 shipments per year (Regulatory Guide 1.78), with each shipment, therefore, containing 40,000 lbs. This quantity was reduced further because of the high rate at which ammonia dissolves in water. A 0.60 partition coefficient was assigned, reducing the volume to16,000 lbs.

Note 8: This event was evaluated to not be a credible event based on screening criteria for event frequency in accordance with Regulatory Guide 1.78. Refer to Section 2.2.3.1.3 for the analysis of this event.

Note 9: An additional probabilistic evaluation was conducted for this postulated event and this spill event was determined not to be a credible event, in accordance with Regulatory Guide 1.78 risk frequency evaluation requirements. Refer to Section 2.2.3.1.3 for the analysis of this event.

Note 10: The 4,000 gallon gasoline tank reported in Table 2.2-2 is an underground storage tank. Therefore, the toxicity event is bounded by the 3,500 gallon gasoline delivery tank truck.

Note 11: The reported distance to the IDLH for this asphyxiant is the distance at which the concentration outside the control room is such that enough oxygen may become displaced to create an oxygen deficient atmosphere.

Note 12: The actual quantity of ethanol analyzed (10 percent by weight of non-oxidizing biocide) was 122 gal/ 462 l.

Note 13: The actual quantity of ethanol analyzed (10 percent by weight of non-oxidizing biocide) was 42.66 gal/ 161.3 l.

Note 14: The evaluated chemical is stored at a distance greater than the reported safe distance (the distance the chemical cloud could travel before it disperses enough such that the concentration in the vapor cloud falls below the IDLH limit, other determined toxicity limit concentration, or at a level where an oxygen deficient atmosphere is plausible). For these evaluated chemicals the control room air exchange rate was not accounted for in the analyses.

Note 15: Because the ammonium hydroxide (28%) is stored at the tank farm and must travel directly over/around structures to reach the control room air intake, a ground roughness value of 50 cm was entered.

<u>Note 16: The toxicity event for the 8,000 lb storage tank in the Turbine Bldg. is bounded by the 50,000 lb delivery truck.</u>