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Dominion®

May 27, 2009

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Serial No. NA3-09-016
Docket No. 52-017
COL/JPH

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 033
(FSAR CHAPTER 2)

On March 9, 2009, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA). The letter contained eight RAIs. The responses to the following two RAIs are provided in Enclosures 1 and 2 of this letter:

- RAI Question 02.02.03-5 Basis for Analysis/Screening Chemicals
- RAI Question 02.02.03-6 Screening Criteria for Sodium Hydroixide

Five of the RAI responses associated with Letter No. 33 were submitted in Dominion Letter Serial No. NA3-09-10R dated April 3, 2009. They included:

- RAI Question 02.04.02-2 Locally-Intense Precipitation Flood Event
- RAI Question 02.04.02-3 Design Measures for PMP-Generated Flood Event
- RAI Question 12.02-13 Citation for ESP Variance
- RAI Question 14.03.07-1 Revise Reference to Mobile LWMS
- RAI Question 14.03.07-2 Revise Reference to Mobile SWMS

NRC RAI Letter No. 35, dated April 6, 2009, indicated that a response to the eighth RAI, RAI 8.2.40, Cable Submergence in the Switchyard, is not necessary and that the NRC considers the RAI to be closed.

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NRO

Please contact Regina Borsh at (804) 273-2247 (regina.borsh@dom.com) if you have questions.

Very truly yours,

Eugene S. Grecheck

COMMONWEALTH OF VIRGINIA

COUNTY OF HENRICO

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Eugene S. Grecheck, who is Vice President-Nuclear Development of Virginia Electric and Power Company (Dominion Virginia Power). He has affirmed before me that he is duly authorized to execute and file the foregoing document on behalf of the Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 27th day of May, 2009
My registration number is 7173057 and my
Commission expires: August 31, 2012

Notary Public

WANDA K. MARSHALL
Notary Public
Commonwealth of Virginia
7173057
My Commission Expires Aug 31, 2012

Enclosures:

1. Response to NRC RAI Letter No. 033, RAI Question No. 02.02.03-5
2. Response to NRC RAI Letter No. 033, RAI Question No. 02.02.03-6

Commitments made by this letter:

1. None.

cc: U. S. Nuclear Regulatory Commission, Region II
T. A. Kevern, NRC
J. T. Reece, NRC
J. J. Debiec, ODEC
R. Kingston, GEH
P. Smith, DTE

ENCLOSURE 1

Response to NRC RAI Letter 033

RAI Question 02.02.03-5

NRC RAI 02.02.03-5

In response to RAI 02.02.03-02, the applicant provided information/analysis pertaining to only chemicals Nitrogen and Carbon Dioxide. Please provide the rationale, bases and methodology used for analysis/screening the other chemicals in calculating the toxic chemical concentrations at the intake of control room, and potential toxic chemical concentration inside the control room for the addressed toxicity analysis in Section 6.4. Based on the FSAR Table 2.2-203, the other chemicals addressed for toxicity analysis in addition to Nitrogen and Carbon Dioxide are identified to be Sodium Hypochlorite, Nalco 3D, Nalco H-130, Hydrogen Peroxide, Hydrogen, Oxygen, Hydrazine, Bromotrifluoromethane.

Dominion Response

FSAR Table 2.2-203 lists the chemicals with a toxicity limit (in terms of Immediately Dangerous to Life and Health, IDLH) which were dispositioned for toxicity analysis. The FSAR Table 2.2-203 chemicals addressed were analyzed and/or screened out considering the following rationale:

Sodium Hypochlorite:
Sodium hypochlorite was listed as needing a disposition for toxicity in North Anna 3 FSAR Table 2.2-203, since chlorine is listed as a hazardous chemical in Regulatory Guide (RG) 1.78 and NUREG/CR-6624. However, Table 6.4-1 of the North Anna Power Station Units 1 & 2 UFSAR provides justification for not evaluating this chemical further regarding maximum concentrations in the Units 1 & 2 control room as "Insignificant vapor given off at ambient temperature." This is also the basis for its screening for the Unit 3 control room.

Nalco 3D TRASAR® 3DT177:
Nalco 3D TRASAR® 3DT177 contains phosphoric acid (with an IDLH toxicity limit of 1000 mg/m^3) and is listed as needing a disposition for toxicity in North Anna 3 FSAR Table 2.2-203. The Nalco 3D TRASAR® 3DT177 MSDS indicates inhalation is not a likely route of exposure, with no adverse effects expected. Any expected mechanical dispersion action would result in formation of local mists with only nearby deposition, with negligible control room exposure.

Nalco H-130 Microbiocide:
The Nalco H-130 Microbiocide contains ethanol (with an IDLH toxicity limit of 3300 ppm) and is listed as needing a disposition for toxicity in North Anna 3 FSAR Table 2.2-203. The Nalco H-130 MSDS section on "Human Health Hazards – Acute" for inhalation indicates: "Repeated or prolonged exposure may irritate the respiratory tract. Can cause central nervous system depression." However, the MSDS also indicates Nalco H-130 is a liquid which is completely soluble in water, with handling recommendations to "use with adequate ventilation," "avoid release of vapors or mists into workplace air," and "have emergency equipment (for fires, spills, leaks, etc.) readily available." With (again

per the Nalco H-130 MSDS) vapors much heavier than air and a vapor pressure of a relatively low 30 torr, no significant unreported and prolonged release that could affect control room habitability would be expected even in the event of a major spill.

Hydrogen and Oxygen:
Hydrogen and oxygen were evaluated for flammability and explosion hazards (more limiting than any toxicity hazards). The adequacy of separation between hydrogen and oxygen supplies and the Unit 3 control room is based on separation distances for postulated catastrophic releases from cryogenic liquid storage vessels and postulated pipe ruptures per the Electric Power Research Institute Report EPRI NP-5283-SR-A, Guidelines for Permanent BWR Hydrogen Water Chemistry Installations, 1987 Revision. The NRC has accepted these guidelines for utility use in implementing permanent hydrogen water chemistry installations. The ESBWR Design Control Document (Sections 9.3.9 and 9.3.10) references these guidelines to be used by applicants implementing hydrogen water chemistry. All distances from sources to the Unit 3 control room were found acceptable.

Bromotrifluoromethane:
This chemical, also called Trifluorobromomethane, is better known as Halon 1301. Halon 1301 is listed as a hazardous chemical in RG 1.78 with a toxicity limit of 50,000 ppm. The North Anna Units 1 & 2 UFSAR Section 9.5.1.2.2.2 establishes the Unit 1 & 2 control room habitability for a complete discharge of Halon 1301 stored in the control room. Any subsequent release would be diluted and therefore of no significant consequence for Unit 3 control room habitability. Similarly, all other Halon 1301 sources are located in enclosed spaces and are not significant sources with respect to Unit 3 control room habitability.

Hydrogen Peroxide:
Hydrogen Peroxide (with an IDLH toxicity limit of 75 ppm) was listed as needing a disposition for toxicity in North Anna 3 FSAR Table 2.2-203. Table 6.4-1 of the North Anna Power Station Units 1 & 2 UFSAR indicates this chemical would result in acceptable control room concentration at Units 1 & 2, even for the extremely conservative assumption that the entire quantity of the chemical evaporates directly into the control room air intake. This is also the basis for its screening for the Unit 3 control room, as illustrated in the following Unit 3 Control Room Acceptability Determination.

North Anna Units 1 & 2 control room volume = 230,000 cu. ft. (from North Anna Units 1 & 2 UFSAR, Revision 43, Table 15.4-31)

North Anna Unit 3 control room volume = 2,200 cu. meter = 77,692 cu. ft. (ESBWR Design Control Document Tier 2, Revision 5 Table 15.3-13)

Ratio of the Units 1 & 2 to the Unit 3 control room volume = 230,000 / 77,692 = 2.96

As indicated in the North Anna Units 1 & 2 UFSAR Table 6.4-1, the maximum calculated concentration for an assumed direct control room release of 55 gallons of

Hydrogen Peroxide is 2.00 ppm. Using this information, the Unit 3 concentrations are calculated using the control room volume ratio.

Hydrogen Peroxide inventory for Unit 3 is 300 gallons. Therefore,

Unit 3 concentration = (Unit 1 concentration) x (ratio of Units 1 & 2 control room volume to that of Unit 3) x (Hydrogen peroxide inventory for Unit 3 / Hydrogen peroxide inventory for Units 1 & 2)

Unit 3 concentration = 2.00 ppm x 2.96 x (300 gallons / 55 gallons)

Unit 3 Hydrogen Peroxide concentration = 32.3 ppm

IDLH limit for Hydrogen peroxide per MSDS is 75 ppm. The value calculated is well under the limit.

Hydrazine:
Hydrazine has a toxicity limit of 50 ppm as given in NUREG/CR-6624. Table 6.4-1 of the North Anna Power Station Units 1 & 2 UFSAR indicates this chemical would result in acceptable control room concentration at Units 1 & 2, even for the extremely conservative assumption that the entire quantity of the chemical evaporates directly into the control room air intake. This is also the basis for its screening for the Unit 3 control room, as illustrated in the following Unit 3 Control Room Acceptability Determination.

As indicated in the North Anna Units 1 & 2 UFSAR Table 6.4-1, the maximum calculated concentration for an assumed direct control room release of 345 gallons of Hydrazine is 5.33 ppm. Using this, the Unit 3 concentrations are calculated using the control room volume ratio.

Hydrazine inventory for Unit 3 is 345 gallons. Therefore,

Unit 3 concentration = (Unit 1 concentration) x (ratio of Units 1 & 2 control room volume to that of Unit 3) x (Hydrazine inventory for Unit 3 / Hydrazine inventory for Units 1 & 2)

Unit 3 concentration = 5.33 ppm x 2.96 x (345 gallons / 345 gallons)

Unit 3 Hydrazine concentration = 15.8 ppm

IDLH limit for Hydrazine per MSDS is 50 ppm. The value calculated is well under the limit.

Proposed COLA Revision

None.

ENCLOSURE 2

Response to NRC RAI Letter 033

RAI Question 02.02.03-6

NRC RAI 02.02.03-6

In response to RAI 02.02.03-04, the applicant stated that the vapor pressure of Sodium Hydroxide is 6.33 mmHg (6.33 torr) and if a chemical has vapor pressure below 10 torr it is not considered a hazard by referencing RG 1.78. The NRC staff interprets RG 1.78 guidance of vapor pressure of 10 torr as guidance in considering to determine the rate of evaporation and time duration of release of a chemical but not to be a criterion for screening out a chemical from toxicity analysis. Please provide any other reference, methodology or justification for screening out the chemical from toxicity analysis.

Dominion Response

The U.S. Environmental Protection Agency (EPA) has long utilized 10 mm of mercury (mm Hg), (i.e., 10 torr) as a threshold vapor pressure for regulated substances. In particular, the EPA's "List of Regulated Substances and Thresholds for Accidental Release Prevention; Requirements for Petitions under Section 112(r) of the Clean Air Act as Amended," in its Section IV, "Discussion of Comments on Major Regulatory Changes" describes a public comment regarding EPA's former use of a lower "Vapor Pressure Cut-off" with these words:

> "EPA has decided to set the vapor pressure criterion at the higher level of 10 mm Hg. In selecting this new vapor pressure cut-off, the Agency examined the substances on the proposed list that have vapor pressures of less than 10 mm Hg and compared the rate of volatilization expected in a large release to the rate expected for substances with a vapor pressure greater than 10 mm Hg. As expected, volatilization rates increase with increasing vapor pressure and increasing pool sizes. The Agency believes that a timely facility response after the onset of an accidental release will likely limit the amount that could volatilize for substances with vapor pressures lower than 10 mm Hg, thereby reducing the potential public or off-site impact. The Agency believes that a greater amount of substances with vapor pressures above 10 mm Hg is likely to be volatilized and released, even after a timely facility response occurs, potentially causing off-site impacts. The Agency also reviewed accident history and production volume information on the substances that would be delisted at this vapor pressure. This review has led the Agency to conclude that the accident histories or production volumes associated with the delisted substances do not warrant their listing under this rulemaking at this time."

The EPA's Code of Federal Regulations are contained in 40CFR. In particular, 40CFR68 Subpart F on "Regulated Substances for Accidental Release Prevention" indicates the 10 torr threshold quantity for regulated substances as follows:

> ". . . if the concentration of the regulated substance in the mixture is one percent or greater by weight, but the owner or operator can demonstrate that the partial

> pressure of the regulated substance in the mixture (solution) under handling or storage conditions in any portion of the process is less than 10 millimeters of mercury (mm Hg), the amount of the substance in the mixture in that portion of the process need not be considered when determining whether more than a threshold quantity is present at the stationary source."

The original NRC Regulatory Guide 1.78 and its more recent Revision 1 both contain the 10 torr vapor pressure as an apparent threshold similar to that of the EPA. We interpret the 10 torr vapor pressure in Regulatory Guide 1.78 as an intended threshold value for consideration because of its similarity to the EPA criterion.

Proposed COLA Revision

None.