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Dominion®

June 13, 2011

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

Serial No. NA3-11-027R
Docket No. 52-017
COL/DEA

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
SRP 06.04: RESPONSE TO RAI LETTER 70

On May 12, 2011, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA) which consisted of five questions. The responses to the following three Request for Additional Information (RAI) Questions are provided in Enclosures 1 through 3:

- RAI 5669, Question 06.04-1 — Onsite and offsite surveys of stationary and mobile sources of hazardous chemicals
- RAI 5669, Question 06.04-2 — Chemical dispersion analyses calculations
- RAI 5669, Question 06.04-4 — Compliance with regulatory requirements and required operator actions during a toxic gas release

This information will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the enclosures.

The responses to the remaining two questions, RAI 5669, Questions 06.04-3 and 06.04-5 require additional time to prepare and review. The responses to these questions will be provided by July 11, 2011. This extension was discussed with C. Patel, the NRC's North Anna Unit 3 Project Manager, on June 1, 2011.

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

Very truly yours,

Eugene S. Grecheck

D089
NRO

Enclosures:

1. Response to NRC RAI Letter No. 70, RAI 5669 Question 06.04-1.
2. Response to NRC RAI Letter No. 70, RAI 5669 Question 06.04-2.
3. Response to NRC RAI Letter No. 70, RAI 5669 Question 06.04-4.

Commitments made by this letter:

1. Incorporate proposed changes in a future COLA submission.

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 8th day of June, 2011
My registration number is 310847 and my
Commission expires: 4/30/2015

Virginia L. Rutherford
Notary Public

cc: U. S. Nuclear Regulatory Commission, Region II
C. P. Patel, NRC
T. S. Dozier, NRC
J. T. Reece, NRC

ENCLOSURE 1

Response to NRC RAI Letter 70

RAI 5669 Question 06.04-1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5669 (RAI Letter 70)

SRP SECTION: 6.4 – CONTROL ROOM HABITABILITY SYSTEM

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

DATE OF RAI ISSUE: 05/12/2011

QUESTION NO.: 06.04-1

Dominion indicated in its letter (ML103160406) to the staff of November 10, 2010 (Serial No. NA3-10-019), that the SCOL applicant did not endorse the RCOL applicant's response to RAI #3451, (CP RAI # 77) Question #06.04-1. There was no note provided in the letter's "Endorsement Clarification" column that would explain the SCOL applicant's reasons for non endorsement. The staff requests that the SCOL applicant provide resolutions to the following issues documented in Question #06.04-1.

North Anna 3 combined license NAPS COL 6.4(1) pertains to the evaluation of threats from toxic chemicals of mobile and stationary sources to control room habitability. During the NRC staff's review of the regulatory requirements associated with NAPS COL 6.4(1), the NRC staff could find no commitment by the applicant nor mechanism in the COL FSAR that will drive the SCOL applicant to perform future surveys of stationary and mobile sources of hazardous chemicals on a periodic basis.

The NRC staff notes that Regulatory Guide 1.196 Regulatory Position 2.5 "Hazardous Chemicals" states:

> "Regulatory Guide 1.78 encourages licensees to conduct periodic surveys of stationary and mobile sources of hazardous chemicals in the vicinity of their plant sites. The periodicity should be based on the number, size, and type of industrial and transportation activities in the vicinity of the plant and regional and local changes in uses of land. The staff recommends conducting a survey of the location, types, and quantities of the mobile and stationary hazardous chemical sources at least once every 3 years, or more frequently as applicable.

The staff also recommends annual performance of an onsite survey of hazardous chemical sources.

As such, the NRC staff requests additional information as to how the SCOL applicant intends to satisfy the intent of this regulatory guide during the life cycle of North Anna Unit 3. The NRC staff requests that the SCOL applicant amend the COL FSAR to ensure that the intent of this passage from Regulatory Guide 1.196 is satisfied throughout the life cycle of North Anna Unit 3.

Dominion Response

As shown in FSAR Table 1.9-202, Unit 3 will conform to the requirements in Regulatory Guide (RG) 1.196, *Control Room Habitability At Light-Water Nuclear Power Reactors.* Periodic surveys of stationary and mobile sources of hazardous chemicals onsite and in the vicinity of Unit 3 will be conducted under the control room habitability program consistent with the guidance of RGs 1.196 and 1.78.

Onsite surveys will be conducted annually. Changes to onsite chemical storage locations will be controlled by the 10 CFR 50.59 process and reflected in revisions to FSAR Table 2.2-202 and, if needed, to Tables 2.2-203, 2.2-204 and 6.4-201.

Offsite surveys will be conducted every five years, rather than every three years as encouraged by the RG. The periodicity of such surveys for offsite chemical hazards is determined based on the number, size, and types of industrial and transportation activities, as well as changes in regional and local land use in the vicinity of the plant. As described in SSAR Section 2.2.3, there are no industrial facilities within a 5-mile radius of the NAPS site. Also, as described in SSAR Section 2.2.3, chemical transportation activities occur at a distance greater than five miles (i.e., state Route 522) and at a frequency and weight such that further evaluation in accordance with the RG is not required. Finally, the generally rural and residential nature of the area surrounding the NAPS site supports Dominion's determination that risks from offsite chemical hazards are minimal and can be expected to be slow to change. Thus, a frequency of every five years for conducting offsite mobile and stationary sources of hazardous chemicals within five miles of the site is appropriate.

Proposed COLA Revision

FSAR Section 6.4.4.2 will be revised as indicated on the attached markup.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

Procedures provide appropriate directions to operators upon sensing of toxic or asphyxiating chemicals or upon notification by external sources that a release of such material has occurred. The procedures are consistent with the guidance of Regulatory Position C.2.6 of Regulatory Guide 1.196 on "Reactor Control." The procedures include guidance to operators as to the assessment of the threat to the operators and provide criteria for the implementation of a range of potential protective actions, such as the donning of respirators and manual isolation of the CRE.

Procedures for testing and maintenance are consistent with DCD Section 6.4.5; Technical Specifications, Section 5.5.20, "Control Room Envelope Habitability Program"; the Maintenance Rule Program (Section 17.6); and the guidance provided in Regulatory Position C.2.7.1 of Regulatory Guide 1.196.

6.4.4.1 Radiological Protection

NAPS SUP 6.4(1)

Add the following text after the paragraph in DCD Subsection 6.4.4.1:

The impact of a post-accident release on the maximum MCR dose has been evaluated and addressed in the DCD. The DCD analysis credits operation of the MCR HVAC system in the pressurization mode. Impact from North Anna Unit 1 or Unit 2 design basis accidents to Unit 3, without credit for any benefit of the MCR HVAC system, is bounded by the DCD analyses. Simultaneous post-accident radiological releases from multiple units at a single site are not considered to be credible.

6.4.4.2 Toxic Gas Protection

NAPS COL 6.4(1)
NAPS COL 6.4(2)

Replace the second paragraph in DCD Subsection 6.4.4.2 with the following.

Accidents involving the release of toxic or asphyxiating chemicals are evaluated to confirm that an external release of hazardous chemicals does not impact control room habitability. These sources include: 1) offsite industrial facilities and transportation routes; 2) Units 1 and 2; and 3) Unit 3.

Evaluation of potentially hazardous off-site chemicals within 8 km (5 miles) of the MCR is addressed in Section 2.2. As described therein, there are no manufacturing plants, chemical plants, storage facilities, major water transportation routes, oil pipelines or gas pipelines within

8 km (5 miles) of the MCR. There are also no significant control room habitability impacts due to chemicals being transported along offsite routes within 8 km (5 miles) of the plant.

Toxic gas analysis for potentially hazardous chemicals stored on site is performed in accordance with the guidelines of RG 1.78. RG 1.78 establishes the Occupational Safety and Health Administration (OSHA) National Institute for Occupational Safety and Health (NIOSH) Immediately Dangerous to Life and Health (IDLH) guidelines for 30-minute exposure as the required screening criteria for airborne hazardous chemicals. Per RG 1.78, the NIOSH IDLH values were used to screen chemicals and to evaluate concentrations of hazardous chemicals to determine their effect on control room habitability. Asphyxiating chemicals were evaluated to determine if their release resulted in the displacement of a significant fraction of the MCR air defined by the OSHA in accordance with RG 1.78. The on-site storage locations and quantities for potentially toxic chemicals at Units 1 and 2 and Unit 3 are identified in Table 2.2-202. Table 2.2-203 provides the toxicity limits for these chemicals.

In the evaluation of control room habitability following a postulated release of hazardous chemicals, RG 1.78 states that the atmospheric transport of a released hazardous chemical should be calculated using a dispersion or diffusion model that permits temporal as well as spatial variations in release terms and concentrations. With the exception of the evaluation of NOVEC 1230, the subject evaluation for Unit 3 used the ALOHA air dispersion model. The ALOHA air dispersion model provides the required evaluation consistent with the requirements presented in RG 1.78 to predict the concentrations of toxic or asphyxiating chemical clouds as they disperse downwind. Using the ALOHA model, a meteorological sensitivity analysis was performed.

NOVEC 1230 is a fire suppressant that is used inside the Unit 3 MCR. To evaluate this chemical, the entire quantity of NOVEC 1230 was released and the maximum concentration was determined by dividing the gaseous volume by the MCR volume. A second chemical, sodium hypochlorite, required an upfront evaluation prior to modeling the release. Because of the nature of this chemical, sodium hypochlorite may decompose, especially upon heating, and release chlorine. Thus, a decomposition analysis was performed to determine the quantity of chlorine that may be released into the atmosphere over a 60 minute period. That quantity was

then released, as chlorine, and evaluated using the ALOHA code. The results of the hazardous chemical dispersion analyses are presented in Table 6.4-201, which provides the postulated maximum MCR concentrations for the evaluated chemicals.

Hydrogen and nitrogen storage facilities are 986 ft and 910 ft from the Unit 3 MCR, respectively. Nitrogen and hydrogen can cause asphyxiation if enough oxygen is displaced in the MCR. Standard air contains 21 percent oxygen by volume. An oxygen-deficient atmosphere is any atmosphere containing oxygen at a concentration below 19.5 percent per 29 CFR 1910.134. Calculations performed to evaluate the habitability of the MCR for accidental releases of hydrogen or nitrogen indicate MCR personnel are not subject to the hazard of breathing air with insufficient oxygen inside the MCR due to a release of hydrogen or nitrogen.

The relative locations for the chemical storage areas, as well as the MCR intakes and refresh rates for Unit 3 were considered in the analysis along with the properties of the stored chemicals. The analysis performed shows that the MCR concentration for a given chemical does not exceed the applicable toxicity limit. However, in the event of a hazardous chemical release, the MCR operators have the option of manually actuating the emergency isolation mode of the MCR HVAC system.

In accordance with RG 1.196, Regulatory Position C.2.5, Hazardous Chemicals, surveys will be conducted annually for onsite chemical hazards. The periodicity of surveys for offsite chemical hazards is determined based on the number, size, and types of industrial and transportation activities, as well as changes in regional and local land use in the vicinity of the plant. As described in SSAR Section 2.2.3, there are no industrial facilities within a 5-mile radius of the NAPS site. As such, offsite mobile and stationary sources of hazardous chemicals within five miles of the site will be surveyed every five years.

The control room habitability program will be developed in accordance with RGs 1.196 and 1.78.

6.4.6 Instrumentation Requirement

STD COL 6.4(5)** Replace the last paragraph in DCD Subsection 6.4.6 with the following.

Instrumentation to detect and alarm a hazardous chemical release in the vicinity, and to automatically isolate the control room envelope (CRE) from such releases is not required based on analyses described in

ENCLOSURE 2

Response to NRC RAI Letter 70

RAI 5669 Question 06.04-2

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5669 (RAI Letter 70)

SRP SECTION: 6.4 – CONTROL ROOM HABITABILITY SYSTEM

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

DATE OF RAI ISSUE: 05/12/2011

QUESTION NO.: 06.04-2

As part of its review per the guidance of NUREG-0800, Standard Review Plan (SRP) Chapter 6.4 and Regulatory Guide 1.78, 'Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release.' the staff plans to perform confirmatory modeling with either ALOHA and/or HABIT as appropriate for the toxic gas events described in North Anna 3 FSAR subsection 6.4.4.2 and summarized in Table 6.4-201.

North Anna 3 FSAR section 6.4.4.2 "Toxic Gas Protection" reads that *"With the exception of the evaluation of NOVEC 1230, the subject evaluation for Unit 3 used the ALOHA air dispersion model."* The SCOL applicant went on to provide a brief description of methodology used to evaluate the NOVEC1230 concentration within the main control room (MCR). In the same FSAR section the applicant indicated that sodium hypochlorite required an upfront calculation before performing a hazardous chemical dispersion analyses via ALOHA. FSAR section 6.4.4.2 also reads *"Calculations performed to evaluate the habitability of the MCR for accidental releases of hydrogen or nitrogen indicate MCR personnel are not subject to the hazard of breathing air with insufficient oxygen inside the MCR due to a release of hydrogen or nitrogen."*

The applicant's FSAR fails to include an update to DCD section 6.4.8 "References" that would capture in engineering document form, the said evaluations and calculations. Does the applicant have a calculation available for audit that reflects the above calculations and evaluations? Does the applicant have a formal engineering calculation that summarizes the inputs used in the ALOHA modeling and the outcomes of the ALOHA modeling for all the chemicals/materials of FSAR Table 6.4-201?

The NRC staff requests that the applicant make available to the staff, the calculations, assumptions and input parameters used in their hazardous chemical dispersion analyses.

Dominion Response

The chemical dispersion analyses for North Anna Unit 3 detailed in FSAR 6.4.4.2 and summarized in Table 6.4-201 are comprised of two calculations for the evaluation of the main control room (MCR) habitability. One of those calculations, the *US-APWR Onsite Chemical Hazards Analysis*, is currently being revised to support the response to RAI 5669 Question 06.04-5. Both calculations, the *US-APWR Unit 3 Offsite Chemical Analysis, 25161-ENV-507 Revision 002,* and the *US-APWR Onsite Chemical Hazards Analysis, 25161-ENV-505 Revision 002*, will be made available by July 15, 2011. Arrangements will be made with the NRC North Anna Unit 3 Project Manager for the staff to review the calculations at a mutually agreeable location. The calculations include the assumptions and input parameters used in the hazardous chemical dispersion analyses.

Proposed COLA Revision

None

ENCLOSURE 3

Response to NRC RAI Letter 70

RAI 5447 Question 06.04-4

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5669 (RAI Letter 70)

SRP SECTION: 6.4 – CONTROL ROOM HABITABILITY SYSTEM

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

DATE OF RAI ISSUE: 05/12/2011

QUESTION NO.: 06.04-4

Dominion indicated in its letter (ML103160406) to the staff of November 10, 2010 (Serial No. NA3-10-019), that the SCOL applicant did not endorse the RCOL applicant's response to RAI #3451, (CP RAI # 77) Question #06.04-6. There was no note provided in the letter's "Endorsement Clarification" column that would explain the SCOL applicant's reasons for non endorsement. As similarly documented in Question #06.04-6, the staff requests that the SCOL applicant provide resolutions to the following issues:

The level of detail provided in the SCOL FSAR 6.4.3 is not adequate to determine if the regulatory requirements are met. Please provide in the FSAR the essential elements of the training and procedures necessary to demonstrate the regulatory commitments are met. Specifically, what will the operators be directed and trained to do to meet the recommendations in RG 1.196. The NRC staff requests that in responding and revising the FSAR, that the applicant establish a consistency with the following regulatory positions:

Regulatory Position C.5 "Emergency Planning" of Regulatory Guide 1.78;

Regulatory Position 2.5 "Hazardous Chemicals" of Regulatory Guide 1.196;

Regulatory Position 2.2.1 "Comparison of System Design, Configuration, and Operation with the Licensing Bases" of Regulatory Guide 1.196; and

Regulatory Position 2.7.1 Periodic Evaluations and Maintenance of Regulatory Guide 1.196

Please include a discussion of what operators will be directed to do when they smell toxic gas or are notified by external sources that there was a toxic gas release. Please include a discussion any arrangements that will be in place for notification of the control

include a discussion any arrangements that will be in place for notification of the control room when a release has occurred. The staff requests that the SCOL applicant amend the FSAR to provide a short description of how the training and procedures will address these regulatory positions.

Please provide a sufficient level of detail in the FSAR for the staff to make a safety finding. A short description is needed in the SCOL FSAR explaining how the procedures and training will address the noted regulatory positions.

Dominion Response

As discussed in FSAR Table 1.9-202, Unit 3 will conform to the guidance of Regulatory Guides 1.78, Revision 1 (RG 1.78) and 1.196, Revision 1 (RG 1.196).

In general, as discussed in FSAR Section 6.4.3, toxic gas hazards analyses concluded that no hazardous chemical exceeded the IDLH criteria of RG 1.78 so that no specific automatic action of the main control room (MCR) HVAC system is required to protect operators within the control room envelope (CRE). However, as discussed in FSAR Section 6.4.4.2, should a toxic gas release occur, the operators have the option of manually actuating the emergency isolation mode of the MCR HVAC system. Based on toxic gas hazards analyses, no special instrumentation to detect and alarm a hazardous chemical release in the vicinity and to automatically isolate the CRE from such a release is required per FSAR Section 6.4.6.

Procedures and training will address the toxic chemical events[1] addressed in FSAR Sections 2.2 and 6.4, consistent with the guidance provided in Regulatory Position C.5 of RG 1.78, including arrangements with Federal, State, and local agencies or other cognizant organizations for the prompt notification of the nuclear power plant when accidents involving hazardous chemicals occur within five miles of the plant.

Procedures will provide appropriate directions to operators upon sensing toxic gas or notification by external sources that a toxic gas release has occurred. The procedures will be developed, consistent with the guidance of Regulatory Position C.2.6 of RG 1.196 on "Reactor Control." Procedures will include guidance to operators as to the assessment of the threat to the operators and provide criteria for the implementation of a range of potential protective actions, such as the donning of respirators and manual isolation of the CRE.

As described in Regulatory Position C.2.2.1 of RG 1.196, the comparison of the configuration of the MCR HVAC system to the licensing basis for new plants is performed upon completion of construction. This is accomplished as part of the pre-operational test program (DCD Section 14.2.12.1.101) and ITAAC (DCD Tier 1, Section 2.7.5.1).

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[1] Asphyxiants to be addressed in the response to RAI 5669, Question 06.04-3.

As described in DCD Section 6.4.5, the MCR HVAC system and components are tested in accordance with ASME AG-1-2003 (DCD Ref. 6.4-5). Inservice test program requirements, including inleakage testing, are described in Technical Specifications, Section 5.5.20, "Control Room Envelope Habitability Program." Procedures for testing and maintenance will be developed consistent with the these requirements, the maintenance rule program, described in Section 17.6, and the guidance provided in Regulatory Position C.2.7.1 of RG 1.196.

See response to Question 06.04-1 (Enclosure 1 to this letter) for discussion of Regulatory Position C.2.5 of RG 1.196.

Proposed COLA Revision

FSAR Section 6.4.3 will be revised as indicated on the attached markup.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

6.3 Emergency Core Cooling Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

6.3.2.5 System Reliability

NAPS DEP 14.2(3)

Replace the first sentence of the sixth paragraph of DCD Subsection 6.3.2.5 with the following.

Chapter 14 discusses the initial test program for the ECCS.

6.3.4.1 ECCS Performance Tests

NAPS DEP 14.2(3)

Replace the seventh paragraph of DCD Subsection 6.3.4.1 with the following.

The initial test program for the ECCS is described in Section 14.2.

6.4 Habitability Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

6.4.3 System Operational Procedures

STD* COL 6.4(2)

Replace the third paragraph in DCD Subsection 6.4.3 with the following.

The analyses of control room habitability during postulated release of toxic chemicals described in Subsection 6.4.4.2 identify no hazardous chemical that exceeds the IDLH criteria of RG 1.78, so that no specific automatic action of MCR HVAC system is required to protect operators within the CRE against toxic gas release event. The emergency isolation mode may be initiated by manual action as described in Subsection 6.4.4.2.

Procedures and training address the toxic or asphyxiating chemical events addressed in Sections 2.2 and 6.4, consistent with the guidance provided in Regulatory Position C.5 of Regulatory Guide 1.78, including arrangements with Federal, State, and local agencies or other cognizant organizations for the prompt notification of the nuclear power plant when accidents involving hazardous chemicals occur within five miles of the plant.

Procedures provide appropriate directions to operators upon sensing of toxic or asphyxiating chemicals or upon notification by external sources that a release of such material has occurred. The procedures are consistent with the guidance of Regulatory Position C.2.6 of Regulatory Guide 1.196 on "Reactor Control." The procedures include guidance to operators as to the assessment of the threat to the operators and provide criteria for the implementation of a range of potential protective actions, such as the donning of respirators and manual isolation of the CRE.

Procedures for testing and maintenance are consistent with DCD Section 6.4.5; Technical Specifications, Section 5.5.20, "Control Room Envelope Habitability Program"; the Maintenance Rule Program (Section 17.6); and the guidance provided in Regulatory Position C.2.7.1 of Regulatory Guide 1.196.

6.4.4.1 Radiological Protection

NAPS SUP 6.4(1)

Add the following text after the paragraph in DCD Subsection 6.4.4.1:

The impact of a post-accident release on the maximum MCR dose has been evaluated and addressed in the DCD. The DCD analysis credits operation of the MCR HVAC system in the pressurization mode. Impact from North Anna Unit 1 or Unit 2 design basis accidents to Unit 3, without credit for any benefit of the MCR HVAC system, is bounded by the DCD analyses. Simultaneous post-accident radiological releases from multiple units at a single site are not considered to be credible.

6.4.4.2 Toxic Gas Protection

NAPS COL 6.4(1)
NAPS COL 6.4(2)

Replace the second paragraph in DCD Subsection 6.4.4.2 with the following.

Accidents involving the release of toxic or asphyxiating chemicals are evaluated to confirm that an external release of hazardous chemicals does not impact control room habitability. These sources include: 1) offsite industrial facilities and transportation routes; 2) Units 1 and 2; and 3) Unit 3.

Evaluation of potentially hazardous off-site chemicals within 8 km (5 miles) of the MCR is addressed in Section 2.2. As described therein, there are no manufacturing plants, chemical plants, storage facilities, major water transportation routes, oil pipelines or gas pipelines within