PMNorthAnna3COLPEmails Resource

From: Barry Bryant [barry.bryant@dom.com]
Sent: Friday, February 15, 2013 3:32 PM
To: Otto, Ngola
Cc: Patel, Chandu; Joseph Hegner; Ross G Millikan
Subject: RAI 6880, Questions 12.03-37 through 12.03-45
Attachments: Draft Response to RAI 6880.pdf

Ngola,

As we discussed earlier this week, I am sending you draft responses to RAI 6880, questions 12.03-37 through 12.03-45 (attached). We would like to schedule a meeting at your earliest convenience to discuss these draft RAI responses. Our objective is to ensure that each response provides the information needed by the staff to complete the Chapter 12 review and avoid further follow-up questions.

Please let me know when you are available. Thank you.

Regards,

Barry

Barry C. Bryant, P.E.
Dominion Resources Services, Inc.
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From: Barry Bryant (Generation - 6)
Sent: Monday, February 11, 2013 4:15 PM
To: Otto, Ngola
Cc: 'Patel, Chandu'; Ross G Millikan (Generation - 6)
Subject: RAI 6880, Questions 12.03-37 through 12.03-45

Ngola,

We have prepared draft responses to RAI 6880, questions 12.03-37 through 12.03-45. We believe the responses adequately address the RAI questions, but because they are follow-up questions to previous responses, we would like to discuss them with you and the Chapter 12 reviewer before we formally submit them.

Please let me know when you and the Chapter 12 reviewer would be available to discuss these draft RAI responses. We could have the discussion by phone or, if you prefer, we could meet at your office. Our intent is to summarize the responses and describe any proposed changes to the COLA. Our goal is to provide the staff with the information that is needed to complete the Chapter 12 review and avoid further follow-up questions.

Regards,

Barry

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ENCLOSURE 1

Response to NRC RAI Letter No. 105

RAI No. 6880, Question 12.03-37

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: **6880 (RAI Letter105)**

SRP SECTION: 12.03-12.04 RADIATION PROTECTION DESIGN FEATURES

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 11/13/2012

QUESTION NO.: 12.03-37

10 CFR 20 Subparts G, requires the licensee to ensure that an individual is not able to gain unauthorized or inadvertent access to Very High Radiation Areas (VHRA). The guidance in RG 8.38 and SRP Section 12.3-12.4 states that to the extent practicable, physical barriers should be sufficient to thwart undetected circumvention of the barrier and the facility design should minimize the potential for creating a VHRA. NAPS COL FSAR Revision 5 Appendix 11AA "Interim Radwaste Storage Facility" (IRSF) states that the facility is designed for the remote removal of shield covers and handling of radioactive waste containers.
In RAI 5972-93 Question 12.03-12.04-24 dated 14 November 2011, the staff asked the applicant to provide additional information about the design of physical barriers provided to thwart inadvertent or unauthorized access to VHRAs located within the IRSF. The applicant's response to RAI 5972-93 Question 12.03-12.04-24 dated 23 January 2012, stated that NAPS COL FSAR Subsection 11AA.3.4 would be revised to note that when high integrity container (HIC) waste movement is in progress, the truck bay doors are locked to prevent personnel access. However, the applicant only committed to modifying the NAPS COL FSAR Subsection 11AA.3.4 to state "During storage, the wall separating the vault area from the truck bay is sufficiently high (>30') and thick to provide shielding to keep personnel exposure ALARA at < 2.5 mrem/hr as shown on Figure 11AA-202. The height of the wall also acts as a physical barrier to prevent undetected access to the vault area," and Table 12.2-201 to state that "As indicated on Figure 11AA-202, the storage vault can become a VHRA as it contains HICs with Class B/C waste. The IRSF truck bay doors are locked, and the vault area is shielded with a wall of sufficient height and thickness to ensure personnel exposure is ALARA during storage." The staff confirmed that NAPS COL FSAR Revision 5 Appendix 11AA "Interim Radwaste Storage Facility," and Table 12.2-201 did contained the information indicated in the Proposed COLA Revision, however, the proposed COLA revisions did

not address the assertion, contained in the applicant's response, that the IRSF doors would be locked during HIC movement.

Please update and revise NAPS COL FSAR Appendix 11AA, Table 12.2-201 and the response to RAI 5972-93 Question 12.03-12.04-24 to provide a consistent description of the design features provided to prevent access to VHRAs within the IRSF by unauthorized personnel, or provide the specific alternative approaches used and the associated justification.

Dominion Response

As stated in the response to RAI 5972-93 Question 12.03-12.04-24 (Serial No. NA3-11-066R, dated January 23, 2012), the storage vault area can become a very high radiation area (VHRA) (>500 rad/hr) during high integrity container (HIC) movement and storage within the IRSF. The truck bay is not expected to become a VHRA area, but can become a Zone IX area (<500 rad/hr) during HIC movement.

The IRSF truck bay doors will be locked to prevent personnel access when HIC movement is on-going. This administrative control of the truck bay doors will be included in the plant operating procedures to prevent personnel from entering a Zone IX area. Locking the truck bay doors during HIC movement is not intended to prevent personnel from accessing a VHRA, as the only area that can become a VHRA within the IRSF is the inside of the vault storage area, which is not accessible by plant personnel. The lack of accessibility to the VHRA within the IRSF was addressed in Dominion's response to RAI 5972-93 Question 12.03-12.04-24 and is further described in RAI 6880-105 Question 12.03-39 (Enclosure 3 of this letter).

The information provided in the response to RAI 5972-93 Question 12.03-12.04-24, FSAR Appendix 11AA, and FSAR Table 12.5-201 is consistent with the approach described above for maintaining IRSF operations ALARA. However, FSAR Appendix 11AA, Section 3.4 will be revised to more explicitly describe the administrative control of locking the IRSF truck bay doors during HIC movement.

Proposed COLA Revision

FSAR Appendix 11AA, Section 3.4 will be revised as indicated on the attached markup.

Section 12.3.2.2. [The use of individual vaults serves to keep worker and public dose rates ALARA and within the site limits (0.25 mrem/hr for external areas outside the IRSF, 2.5 mrem/hr in the truck bay during storage).] SOF-225

NAPS SUP 12.3(1)

11AA.3.3 Radiation Zone Maps

The dose limits for the IRSF are summarized in the radiation zone map in Figure 11AA-202.

NAPS COL 12.2(2)

11AA.3.4 Personnel Exposure

The waste containers are placed in shielded vaults to keep personnel radiation exposure ALARA. During storage, the wall separating the vault area from the truck bay is sufficiently high (>30') and thick to provide shielding to keep personnel exposure ALARA at < 2.5 mrem/hr as shown on Figure 11AA-202. The height of the wall also acts as a physical barrier to prevent undetected access to the vault area. To minimize radiation dose access to the IRSF is limited by physical control (i.e., locked doors) and administrative control. Plant operating procedures providing guidance for waste handling (in accordance with site radiation protection program) are implemented in order to expedite waste handling operations and to minimize personnel exposure time. Expected occupational doses from IRSF operations are shown in Table 11AA-208.

INSERT: "When HIC movement is in progress, the truck bay doors will be locked to prevent personnel access."

11AA.3.5 Gas Generation

The gamma, beta and alpha radiation in the waste material causes the radiolysis reaction of the organic materials, and the hydrolysis of the water trapped in the resins. These reactions generate a small amount of combustible gases inside the waste containers. [The combustible gases, consisting of predominantly hydrogen, with a small amount of methane, are generated at a rate about 0.020 to 0.054 liters/hour per container]. SOF-226 This rate estimate is based on the gamma, beta and alpha radiation analysis, and the resin gas generation rate G-values data analyzed by the industry (Ref 11AA-202).

Passive ventilation holes are built into the vault covers as escape pathways for the generated gases, primarily hydrogen. Hydrogen, being a lighter gas, tends to be more buoyant and escape from the vault into the building. The IRSF is also equipped with a building exhaust fan mounted on the ceiling to maintain ventilation air flows (see Section 11AA.4.1). This design works in conjunction with the small

ENCLOSURE 2

Response to NRC RAI Letter No. 105

RAI No. 6880, Question 12.03-38

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: **6880 (RAI Letter105)**

SRP SECTION: 12.03-12.04 RADIATION PROTECTION DESIGN FEATURES

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 11/13/2012

QUESTION NO.: 12.03-38

10 CFR 20 Subparts G, requires the licensee to ensure that an individual is not able to gain unauthorized or inadvertent access to Very High Radiation Areas (VHRA). The guidance in RG 8.38 and SRP Section 12.3-12.4 states that to the extent practicable, physical barriers should be sufficient to thwart undetected circumvention of the barrier and the facility design should minimize the potential for creating a VHRA. The guidance in RG 8.38 states that a key provided to control access to a very high radiation area should unlock only that area. NAPS COL FSAR Revision 5 Appendix 11AA Interim Radwaste Storage Facility states that the facility is designed for the remote removal of shield covers and handling of radioactive waste containers. North Anna Power Station Unit 3 (NAPS) Combined License (COL) Figure 11AA-202 "Radiation Zones for IRSF (Sheet 1 of 3)" indicates that portions of the vault area may become a VHRA. However, NAPS COL FSAR Revision 5 Appendix 11AA Interim Radwaste Storage Facility, NAPS COL FSAR Section 12.3 and the response to RAI 5972-93 Question 12.03-12.04-24 dated January 23, 2012 do not describe the design features (e.g., captured key control lock switches or breaker position locks) provided to prevent unauthorized operation of the crane shield cover removal features.

Please update and revise NAPS COL FSAR Appendix 11AA “Interim Radwaste Storage Facility” and 12.3.1.3.1.1 “Design Considerations for Site Specific Design,” to describe the site specific design features provided to prevent access to VHRAs by unauthorized operation of the Interim Radwaste Storage Facility crane shield cover removal features, or provide the specific alternative approaches used and the associated justification.

Dominion Response

As stated in the response to RAI 5972-93 Question 12.03-12.04-24 (Serial No. NA3-11-066R, dated January 23, 2012), the storage vault area can become a very high radiation area (VHRA) (>500 rad/hr) during high integrity container (HIC) movement and storage within the IRSF. As described in the response to RAI 6880-105 Question 12.03-37 (Enclosure 1 of this letter), the vault storage area is not accessible by plant personnel as there is no door to provide entry into this space and the truck bay doors are locked. All operations are handled remotely in the crane operating room.

Therefore, there are no means for personnel to enter a VHRA within the IRSF. The crane controls will be administratively controlled to prevent unauthorized use of the crane, and Subsection 11AA.4.6 will be revised to reflect this administrative control feature. Administrative control features and restriction to VHRA or high radiation areas is controlled in accordance with the facility Radiation Protection Program.

To maintain consistency with the DCD, and avoid duplicating information within the COLA, Section 12.3.1.3.1.1 “Design Considerations for Site Specific Design” will not be revised as part of this response.

Proposed COLA Revision

FSAR Section 11AA.4.6 will be revised as indicated on the attached markup

11AA.4.5 **Electrical**

The IRSF is provided power from the Unit 3 Non-Class 1E 480VAC, 3 Phase, 60Hz distribution system. A 480VAC, 3 Phase, Panelboard is designed to supply power to 480 VAC rated equipment in the IRSF. The radwaste handling crane assembly is powered from a dedicated power circuit from the 480VAC panelboard.

The 480VAC panelboard is designed to provide power to a local 120/208VAC distribution panel through a step down 3 Phase 480-120/208VAC transformer. The 120/208VAC distribution panel is designed to provide power to 120 or 208VAC rated equipment (such as adequate lighting throughout the facility) in the IRSF.

The 480VAC panelboard, transformer and 120/208VAC distribution panel are located in the IRSF crane operating room which has sufficient ventilation to ensure adequate protection against adverse environmental conditions and to minimize vulnerability to physical damage. Adequate electric circuit protection and coordination of protective devices are provided to prevent damage to the equipment, maintain operational continuity, and reduce the safety hazard to the plant personnel.

The 480VAC panelboard, transformer and 120/208VAC distribution panel are designed with adequate capacity and capability to power all electrical loads in the IRSF building. The electrical distribution system is designed to permit periodic in-service testing and inspection of components to assure system integrity and capability to perform its intended function.

11AA.4.6 **IRSF Crane**

INSERT: "The crane controls are administratively controlled to prevent unauthorized use of the crane."

The IRSF is designed for remote waste handling operation. The crane control is equipped with indexing for precise waste handling operation with vault identification. A closed-circuit television (CCTV) is provided to monitor all crane operations. The CCTV consists of trolley-mounted downward viewing cameras with pan, tilt, and zoom controls to allow an operator to read container identification markings and see a general view of storage area. Bridge crane mounted cameras, with pan, tilt, and zoom controls are provided for general surveillance of storage area and crane block. The crane is equipped with its own flood lighting for general illumination and for illumination of the HIC and grapple. The intensity of the lighting is matched to that required by the cameras. All crane operations are capable of being performed from the crane operating room.

ENCLOSURE 3

Response to NRC RAI Letter No. 105

RAI No. 6880, Question 12.03-39

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: **6880 (RAI Letter 105)**

SRP SECTION: 12.03-12.04 – RADIATION PROTECTION DESIGN FEATURES

QUESTIONS for Health Physics Branch

DATE OF RAI ISSUE: 11/13/2012

QUESTION NO.: 12.03-39

10 CFR 20 Subparts G, requires the licensee to ensure that an individual is not able to gain unauthorized or inadvertent access to very high radiation areas (VHRA). The guidance in RG 8.38 and SRP Section 12.3-12.4 states that to the extent practicable, physical barriers should be sufficient to thwart undetected circumvention of the barrier and the facility design should minimize the potential for creating a VHRA. North Anna Power Station Unit 3 (NAPS) Combined License (COL) FSAR Revision 5 Appendix 11AA “Interim Radwaste Storage Facility” states that the facility is designed for the remote removal of shield covers and handling of radioactive waste containers. NAPS COL FSAR Figure 11AA-202 "Radiation Zones for IRSF (Sheet 1 of 3)" indicates that portions of the vault area may become a VHRA. Subsection 11 AA.2 states that the truck bay is partitioned from the storage vault area by a wall that serves to provide shielding and fall protection when vault access is deemed necessary, and Figure 11AA-201 "IRSF Layout Plan (Sheet 3 of 4)" depicts a notch in the shield wall between the truck bay and the vault area, but does not provide the dimensions of the wall or the notch.

In RAI 5972-93 Question 12.03-12.04-24 dated 14 November 2011, the staff asked the applicant to provide additional information about design features of physical barriers provided to thwart inadvertent or unauthorized access to VHRAs. The applicant’s response to RAI 5972-93 Question 12.03-12.04-24 dated January 23, 2012 committed to revising COL FSAR Section 11AA.3.4 “Personnel Exposure,” to state that the wall separating the vault area from the truck bay is sufficiently high (>30') and thick enough to provide shielding to keep personnel exposure ALARA and to act as a physical barrier to prevent undetected access to the vault area. However, the applicant’s response did not describe the height of the bottom of the notch provided in shield wall to allow the passage of high integrity containers (HIC) from the truck bay area to the vault area. The

distance to the bottom of the notch and the height and configuration of access platforms or ladders used to access the top of the HIC transport cask is closely related to how the facility design would prevent unauthorized access by personnel to the vault area.

Please update and revise NAPS COL FSAR Appendix 11AA "Interim Radwaste Storage Facility" and 12.3.1.3.1.1 "Design Considerations for Site Specific Design," to describe the site specific design features provided to prevent unauthorized access to VHRAs by personnel through the truck bay shield wall HIC transport notch, or provide the specific alternative approaches used and the associated justification.

Dominion Response

The notch described in FSAR Appendix 11AA is located in the wall between the truck bay and the waste storage vaults. The purpose of this notch is to allow HICs to be transported by the IRSF crane between the vaults and the truck bay. The rest of the wall is designed to be sufficiently high and thick for shielding and ALARA considerations. Based on the use of CNS 8-120 HICs and the preliminary crane design, the notch will be at least twenty feet above the truck bay floor, which is sufficient to deter unauthorized access to the vault storage area. There are no ladders installed on the wall between the truck bay and the storage vaults. The height of the wall acts as the physical barrier to deter unauthorized access. The FSAR will be revised to include the statement that the notch is high enough, such that the wall between the truck bay and storage vaults is considered a physical barrier.

To maintain consistency with the DCD, and avoid duplicating information within the COLA, Section 12.3.1.3.1.1 "Design Considerations for Site Specific Design" will not be revised as part of this response.

Proposed COLA Revision

FSAR Section 11AA.3.4 will be revised as indicated on the attached markup.

Section 12.3.2.2. [The use of individual vaults serves to keep worker and public dose rates ALARA and within the site limits (0.25 mrem/hr for external areas outside the IRSF, 2.5 mrem/hr in the truck bay during storage).] SOF-225

NAPS SUP 12.3(1)

11AA.3.3 Radiation Zone Maps

The dose limits for the IRSF are summarized in the radiation zone map in Figure 11AA-202.

NAPS COL 12.2(2)

11AA.3.4 Personnel Exposure

The waste containers are placed in shielded vaults to keep personnel radiation exposure ALARA. During storage, the wall separating the vault area from the truck bay is sufficiently high (>30') and thick to provide shielding to keep personnel exposure ALARA at < 2.5 mrem/hr as shown on Figure 11AA-202. The height of the wall also acts as a physical barrier to prevent undetected access to the vault area. To minimize radiation dose access to the IRSF is limited by physical control (i.e., locked doors) and administrative control. Plant operating procedures providing guidance for waste handling (in accordance with site radiation protection program) are implemented in order to expedite waste handling operations and to minimize personnel exposure time. Expected occupational doses from IRSF operations are shown in Table 11AA-208.

INSERT: "A notch in the wall allows for movement of high integrity containers (HICs) between the vault area and the truck bay. The height of the bottom of the notch is at least 20' above the truck bay floor, thus the wall is a physical barrier to deter unauthorized access and keep personnel radiation exposure ALARA."

11AA.3.5 Gas Generation

The gamma, beta and alpha radiation in the waste material causes the radiolysis reaction of the organic materials, and the hydrolysis of the water trapped in the resins. These reactions generate a small amount of combustible gases inside the waste containers. [The combustible gases, consisting of predominantly hydrogen, with a small amount of methane, are generated at a rate about 0.020 to 0.054 liters/hour per container]. SOF-226 This rate estimate is based on the gamma, beta and alpha radiation analysis, and the resin gas generation rate G-values data analyzed by the industry (Ref 11AA-202).

Passive ventilation holes are built into the vault covers as escape pathways for the generated gases, primarily hydrogen. Hydrogen, being a lighter gas, tends to be more buoyant and escape from the vault into the building. The IRSF is also equipped with a building exhaust fan mounted on the ceiling to maintain ventilation air flows (see Section 11AA.4.1). This design works in conjunction with the small

ENCLOSURE 4

Response to NRC RAI Letter No. 105

RAI No. 6880, Question 12.03-40

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: **6880 (RAI Letter 105)**

SRP SECTION: 12.03-12.04 – RADIATION PROTECTION DESIGN FEATURES

QUESTIONS for Health Physics Branch

DATE OF RAI ISSUE: 11/13/2012

QUESTION NO.: 12.03-40

CFR 20.1902(c) requires that licensees post each very high radiation area (VHRA) with a conspicuous sign or signs bearing the radiation symbol and words "GRAVE DANGER, VERY HIGH RADIATION AREA." The guidance contained in SRP Section 12.3-12.4 states that removable shielding used for plant radiation source having radiation levels greater than 1 Gy per hour (100 rads per hour), should be clearly marked with a sign stating that potentially lethal radiation fields are possible. North Anna Power Station Unit 3 (NAPS) Combined License (COL) FSAR Revision 5 Appendix 11AA “Interim Radwaste Storage Facility” states that the facility is designed for the remote removal of shield covers and handling of radioactive waste containers. North Anna Power Station Unit 3 (NAPS) Combined License (COL) Figure 11AA-202 "Radiation Zones for IRSF (Sheet 1 of 3)" indicates that portions of the vault area located under removable shielding may become a VHRA or have dose rates exceeding 1 Gy per hour.
In RAI 5972-93 Question 12.03-12.04-24 dated 14 November 2011, the staff asked the applicant to provide additional information about design features of physical barriers at the ladder provided to thwart inadvertent or unauthorized access to VHRAs. The applicant’s response to RAI 5972-93 Question 12.03-12.04-24 dated January 23, 2012 did not discuss any of the marking provisions identified above, that could be used to help prevent the unauthorized creation of a very high radiation area, or access to areas with dose rates greater than 1 Gy per hour.

Please update and revise NAPS COL FSAR Appendix 11AA “Interim Radwaste Storage Facility” and 12.3.1.3.1.1 “Design Considerations for Site Specific Design,” to describe the site specific design features (e.g., permanent markings) provided to notify personnel about the potential presence of VHRAs below removable shielding in the IRSF, or provide the specific alternative approaches used and the associated justification.

Dominion Response

The area within the IRSF waste storage vaults (i.e., under the removable concrete vault covers) is a very high radiation area (VHRA), as described in FSAR Table 12.5-201. This area complies with the requirements of the plant Radiation Protection Program (RPP), which is developed in accordance with NEI 07-03A, "Generic FSAR Template Guidance for Radiation Protection Program Description," Revision 0. NEI 07-03A is incorporated by reference in FSAR Section 12.5. The RPP description addresses appropriate VHRA signage for radiation areas. DCD Section 12.3.1.2.1.2, which is incorporated by reference in FSAR Section 12.3, states that all VHRAs will be labeled in accordance with the requirements of 10 CFR 20.1902. Therefore, Appendix 11AA and FSAR section 12.3.1.3.1.1 do not need to be revised.

It should be noted that the area above the vaults and the vaults themselves are not accessible by plant personnel (Enclosure 1 of this letter).

Proposed COLA Revision

None.

ENCLOSURE 5

Response to NRC RAI Letter No. 105

RAI No. 6880, Question 12.03-41

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: **6880 (RAI Letter105)**

SRP SECTION: 12.03-12.04 RADIATION PROTECTION DESIGN FEATURES

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 11/13/2012

QUESTION NO.: 12.03-41

RG 1.206 Subsection C.I.12.3.1 “Facility Design Features” states that layout drawings should show locations of controlled access areas including locked high radiation areas (LHRA). The guidance contained within RG 8.38 states that areas that are accessible to personnel and that have radiation levels greater than 1.0 rem in 1 hour at 30 cm, should be provided with locked doors to prevent unauthorized entry. US-APWR Technical Specifications Section 5.7.2 states those high radiation areas (but not a VHRA) with dose rates Greater than 1.0 rem/hour at 30 centimeters from the radiation source shall be provided with a locked or continuously guarded door or gate that prevents unauthorized entry. North Anna Power Station Unit 3 (NAPS) Combined License (COL) Section 16 states that the generic technical specifications and bases provided with Chapter 16 of the DCD are incorporated directly into the plant-specific technical specifications and bases.

NAPS COL FSAR Figure 11AA-203 "Fire Zones and Fire Areas Zones for IRSF" identifies a ladder to the crane platform, but does not identify the type of barrier at the ladder provided to prevent unauthorized entry into an LHRA. In RAI 5972-93 Question 12.03-12.04-24 dated 14 November 2011, the staff asked the applicant to provide additional information about the design of physical barriers provided to thwart inadvertent or unauthorized access to VHRAs located within the IRSF. The applicant’s response to RAI 5972-93 Question 12.03-12.04-24 dated 23 January 2012, stated that the ladder to the crane platform shown on Figure 11 AA-203 is for crane maintenance only and is located in a Zone III radiation zone when crane maintenance would be performed (i.e., not during HIC movement) and that access to the ladder for maintenance activities is controlled by a Radiation Work Permit (RWP) that establishes the necessary protection to keep radiation exposure as low as reasonably achievable (ALARA).

Based on information provided by the applicant, with a shield cover removed from a vault (e.g., when doing a visual inspection of the vault contents) containing the design basis radioactive material content, the dose rate on the inside of the shielded roof structure exceeds 0.01 Sv (1.0 rem) in 1 hour. However, NAPS COL FSAR Revision 5 Appendix 11AA “Interim Radwaste Storage Facility,” NAPS COL FSAR Section 12.3 and the response to RAI 5972-93 Question 12.03-12.04-24 dated January 23, 2012 do not describe the design features provided to prevent unauthorized access to LHRAs above the vault area, and do not identify this ladder as a potential access point to a LHRA.

Please revise and update the NAPS COL FSAR Appendix 11AA "Interim RadwasteStorage Facility" or Subsection 12.3.1.3.1.1 “Design Considerations for Site Specific Design,” to provide a description of potential LHRAs within the IRSF and to describe the site specific design features provided to prevent unauthorized access to potential LHRAs within the IRSF, or provide the specific alternative approaches used and the associated justification.

Dominion Response

As stated in response to RAI 5972-93 Question 12.03-12.04-24 (Serial No. NA3-11-066R, dated January 23, 2012), the ladder to the IRSF crane platform is for crane maintenance only and is located in a Zone III (≤ 2.5 mrem/h) radiation zone when crane maintenance would be performed (i.e., not during HIC movement or when a vault cover is open). This ladder, as shown on FSAR Figure 11AA-203, is on the truck bay wall opposite the wall containing the notch separating the truck bay from the storage vault area. This ladder will be in a fixed location along this wall and can only provide access to the crane platform. It cannot be used to gain access to the storage vault area. Access to the ladder for maintenance activities is controlled by a Radiation Work Permit (RWP) in order to keep radiation exposure as low as reasonably achievable (ALARA).

There is no access to a locked high radiation area (LHRA) by means of this ladder, since the ladder is located within the IRSF truck bay and only provides access to the crane platform that is located entirely within the truck bay. The ladder cannot be used to gain unauthorized access to high radiation areas above the vault area. Further, the IRSF truck bay doors will be locked during the movement of HICs, as described in the response to RAI 6880-105, Question 12.03-37 (Enclosure 1 of this letter). Administrative controls in plant operating procedures prevent personnel from occupying the truck bay area, where the crane platform access ladder is located, whenever a vault cover is open, including during HIC transfer operation or when vault inspections are conducted remotely from the crane operating room. Therefore, the location of the ladder, coupled with the administrative controls in place, in accordance with the Radiation Protection Program, ensures that exposures are ALARA at all times.

To maintain consistency with the DCD, and avoid duplicating information within the COLA, Section 12.3.1.3.1.1 “Design Considerations for Site Specific Design” will not be revised as part of this response.

Proposed COLA Revision

FSAR Section 11AA.2 will be revised as indicated on the attached markup.

radiation exposure each vault is shielded with concrete covers. The vault covers are supported by steel-reinforced concrete beams. The vault covers have ventilation holes to prevent accumulation of hydrogen inside a storage vault.

The vault covers are designed with remote hookup for placement and removal. The facility crane is equipped with a flood light, a set of remote viewing cameras, and a heavy duty grapple device to facilitate vault cover hookup and lifting. During waste container placement, the cover is lifted and placed on an adjacent vault top before waste is placed into the vault for storage.

INSERT: "The ladder to access the crane maintenance platform is in a fixed location on the truck bay wall opposite the storage vault wall. The ladder can only be used to access this platform."

The vaults, including the walls and floor are coated with an epoxy liner to provide a smooth surface to facilitate decontamination.

Truck Bay

The truck bay is designed so that a truck is driven through and does not need to turn around for waste retrieval operations. The truck bay has two roll-up doors and two personnel access doors, one each at the entrance and the exit (see Figure 11AA-201). The entrance and exit also have curbs to retain drainage within the facility and to prevent rain water from entering the building. The truck bay is partitioned from the storage vault area by a wall that serves to provide shielding and fall protection when vault access is deemed necessary.

A crane maintenance platform is provided to service and maintain the crane.

IRSF Crane Operating Room/Mechanical Equipment Room

The IRSF is equipped with a crane operating room to operate the crane remotely for placement and handling of the waste containers using the remote viewing cameras on the crane. The crane operating room is provided with adequate shield walls and roof to protect personnel and to keep radiation exposure ALARA. The control room is also used for the radiation monitor, the fire alarm panel, ventilation panel, and storage of waste documentation files.

The IRSF crane operating room is provided with heating, ventilation fan, and air conditioning to support IRSF operation.

The mechanical equipment room contains the electrical panels, the valve for the fire suppression system, and appropriate heating and ventilation.

ENCLOSURE 6

Response to NRC RAI Letter No. 105

RAI No. 6880, Question 12.03-42

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: **6880 (RAI Letter105)**

SRP SECTION: 12.03-12.04 RADIATION PROTECTION DESIGN FEATURES

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 11/13/2012

QUESTION NO.: 12.03-42

10 CFR 20 Subparts G, requires the licensee to ensure that an individual is not able to gain unauthorized or inadvertent access to Very High Radiation Areas (VHRA). The guidance in RG 8.38 and SRP Section 12.3-12.4 states that to the extent practicable, physical barriers should be sufficient to thwart undetected circumvention of the barrier and the facility design should minimize the potential for creating a VHRA. The guidance in RG 1.206 C.I.12.3.1 “Facility Design Features,” states that the applicant should describe equipment and facility design features used to ensure that occupational radiation exposures are ALARA.

The west side of the vault storage area as depicted on North Anna Power Station Unit 3 (NAPS) Combined License (COL) Revision 5 Figure 11AA-202 “Radiation Zones for IRSF (Sheet 1 of 3)” and Figure 11AA-202 “Radiation Zones for IRSF (Sheet 2 of 3),” show a large open space between the outer high integrity containers (HIC) and the building wall. Appendix 11AA “Interim Radwaste Storage Facility,” describes events or activities that could require personal access into the vault area. Subsection 11AA.5 “Testing and Inspection Requirements,” states that epoxy coatings are inspected every five years but Appendix 11AA does not appear to state what areas within the confines of the vault would be subject to these inspections. Subsection 11AA.4.2 “IRSF Drainage System,” states that in the event of a fire in one of the vaults during waste handling operation, the heat from the fire will activate the sprinkler system nearest to the fire and the released water would flow into and accumulate in the affected vault to suppress the fire. Subsection 11AA.4.3.2.1 “FA7-303 IRSF Truck Bay and Storage Vault Area,” states that the storage vaults are normally closed and that a sprinkler system and an automatic smoke detection system are provided in this fire area. The locations of the sprinkler heads smoke detectors are not described in Appendix 11AA.

In RAI 5972-93 Question 12.03-12.04-24 dated 14 November 2011, the staff asked the applicant to provide additional information about the design of physical barriers provided to thwart inadvertent or unauthorized access to VHRAs located within the IRSF. The applicant's response to RAI 5972-93 Question 12.03-12.04-24, dated 23 January 2012, stated that Figure 11AA-202, Sheet 2 indicates that the vault areas can become a Zone X radiation zone (500 rad/hr or greater) while HICs are stored in the vaults. However, NAPS COL FSAR Revision 5 Appendix 11AA "Interim Radwaste Storage Facility," NAPS COL FSAR Section 12.3 and the response to RAI 5972-93 Question 12.03-12.04-24 do not describe the expected use of described area, the types of permanent plant equipment located within this area, potential reasons for personnel access to this area or the methods personnel would use to access this area.

Please revise and update the NAPS COL FSAR Appendix 11AA "Interim Radwaste Storage Facility," to provide a description of the intended use of this area within the site specific IRSF, any permanent plant equipment located within this area, any anticipated needs for personnel to access this area for the purposes of inspection, testing or maintenance, and the methods personnel would use to access this area to perform the identified tasks, or provide the specific alternative approaches used and the associated justification.

Dominion Response

The vault area of the IRSF is strictly for the storage of Class B and C radioactive waste and will not house any permanent plant equipment. The vaults are covered by lids and are normally inaccessible. As described in the response to RAI 6880-105 Question 12.03-37 (Enclosure 1 of this letter), there is no access route or doorway for personnel to enter the VHRA within the storage vaults in the IRSF.

As described in FSAR Section 11AA.5, the HIC storage vaults are epoxy-coated and testing and inspection requirements are carried out remotely using crane cameras and crane-mounted equipment. There is no anticipated need for personnel to access the vault storage area for the purpose of inspection, testing or maintenance. In the event that it does become necessary for personnel to access this area, the Radiation Protection Program will ensure measures are taken to maintain radiation exposure ALARA.

The locations of the sprinkler heads and smoke detectors are not described in Appendix 11AA. The location of this equipment will be determined during the development of the detailed design.

Proposed COLA Revision

FSAR Section 11AA.2 will be revised as indicated on the attached markup.

radiation exposure each vault is shielded with concrete covers. The vault covers are supported by steel-reinforced concrete beams. The vault covers have ventilation holes to prevent accumulation of hydrogen inside a storage vault.

INSERT "The vault area of the IRSF is restricted to Class B and C radioactive waste storage, and will not house any permanent plant equipment. The vaults are covered by lids and are normally inaccessible."

The vault covers are designed with remote hookup for placement and removal. The facility crane is equipped with a flood light, a set of remote viewing cameras, and a heavy duty grapple device to facilitate vault cover hookup and lifting. During waste container placement, the cover is lifted and placed on an adjacent vault top before waste is placed into the vault for storage.

The vaults, including the walls and floor are coated with an epoxy liner to provide a smooth surface to facilitate decontamination.

Truck Bay

The truck bay is designed so that a truck is driven through and does not need to turn around for waste retrieval operations. The truck bay has two roll-up doors and two personnel access doors, one each at the entrance and the exit (see Figure 11AA-201). The entrance and exit also have curbs to retain drainage within the facility and to prevent rain water from entering the building. The truck bay is partitioned from the storage vault area by a wall that serves to provide shielding and fall protection when vault access is deemed necessary.

A crane maintenance platform is provided to service and maintain the crane.

IRSF Crane Operating Room/Mechanical Equipment Room

The IRSF is equipped with a crane operating room to operate the crane remotely for placement and handling of the waste containers using the remote viewing cameras on the crane. The crane operating room is provided with adequate shield walls and roof to protect personnel and to keep radiation exposure ALARA. The control room is also used for the radiation monitor, the fire alarm panel, ventilation panel, and storage of waste documentation files.

The IRSF crane operating room is provided with heating, ventilation fan, and air conditioning to support IRSF operation.

The mechanical equipment room contains the electrical panels, the valve for the fire suppression system, and appropriate heating and ventilation.

ENCLOSURE 7

Response to NRC RAI Letter No. 105

RAI No. 6880, Question 12.03-43

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: **6880 (RAI Letter 105)**

SRP SECTION: 12.03-12.04 – RADIATION PROTECTION DESIGN FEATURES

QUESTIONS for Health Physics Branch

DATE OF RAI ISSUE: 11/13/2012

QUESTION NO.: 12.03-43

The guidance contained in Standard Review Plan (SRP) Appendix 11.4-A "Design Guidance for Temporary Storage of Low-Level Radioactive Waste" directs applicants to the guidance contained in SECY-94-198 "Review of Existing Guidance Concerning the Extended Storage of Low-Level Radioactive Waste." SECY-94-198 states that the facility design should describe how the adverse effects of extreme temperature and humidity on waste and waste containers will be avoided. North Anna Power Station Unit 3 (NAPS) Combined License (COL) FSAR Table 2.0-201 "Evaluation of Site/Design Parameters and Characteristics" indicates that the minimum dry bulb temperature is expected to be below freezing during portions of the year. NAPS COL FSAR Appendix 11AA "Interim Radwaste Storage Facility," (IRSF) Subsection 11AA.4.1 "IRSF Heating, Ventilation, and Air Conditioning," states that no heating is provided in truck bay and the vault areas. Therefore in RAI 5972-93 Question 12.03-12.04-29 dated 14 November 2011, the staff asked the applicant to describe how the design of the IRSF avoids adverse effects on waste containers.

The applicant's response to RAI 5972-93 Question 12.03-12.04-29 dated 23 January 2012, stated that the IRSF will only contain dry stabilized waste, which has been dewatered in the Solid Waste Management System, stored in polyethylene high integrity containers (HICs) located within a shielded vault area, so it is not considered necessary to have heating in the vault area, as freezing should have no effect on the waste containers. The waste inside the containers has less than 1 % free water by volume. This free water may freeze at extreme temperatures, but is in small quantities and is not expected to adversely affect the waste containers. However, literature available to the staff, regarding storage of dewatered materials, including resins, indicate that freeze/thaw temperature cycles may cause the water content in HICs to increase over time due to condensation of moisture contained in air. The literature also states that

freeze/thaw cycles may cause failures or clogging of dewatering laterals, membranes, and verification stones; cause resin bead fracturing or result in other high solids contents in waste containers. Exposure to freeze/thaw conditions may present life limiting factors for polyethylene HICs, or may result in the need to employ non-traditional methods for verifying the contents of containers prior to shipment. Rectifying damage to sampling/dewatering components, employing alternate methods for verifying the contents of containers, or repacking of waste due to degraded containers would result in additional occupational radiation exposure (ORE), which may not be consistent with the ALARA provisions of 10 CFR 20.1101.

Please update and revise NAPS COL FSAR Appendix 11AA and the response to RAI 5972-93 Question 12.03-12.04-29 to describe how the design features of the heating and ventilation system provided in the IRSF will preclude damage to radioactive material and the associated storage containers, located within the IRSF, or provide the specific alternative approaches used and the associated justification.

Dominion Response

As stated in the response to RAI 5972-93 Question 12.03-12.04-29 (Serial No. NA3-11-066R, dated January 23, 2012), the waste stored in the North Anna Unit 3 Interim Radwaste Storage Facility (IRSF) is dewatered prior to storage in polyethylene high integrity containers (HICs). The IRSF is only heated in the Crane Operating Room during waste movement operations for operator occupancy. The HICs are stored indoors to minimize the impacts of freeze/thaw cycles. The HICs reside inside concrete, covered vaults within the concrete IRSF building. The potential for freeze/thaw cycles is minimized by the layout of the vault storage area, the decay heat generated by the stored waste and the site temperatures at North Anna.

Prior to any waste stored in the IRSF being shipped for disposal, the chemical contents and free water volume in the container will be verified to meet the requirements for disposal. If any disposal requirements are not met, including those impacted by freeze/thaw cycles, the container will be sent back to the Auxiliary Building for reprocessing in the Solid Waste Management System. Any reprocessing activities will be performed in accordance with plant procedures and the plant ALARA program.

The information stated above augments and is consistent with the Dominion's response to RAI 5972-93 Question 12.03-12.04-29 and Appendix 11AA, therefore the response to Question 12.03-12.04-29 and Appendix 11AA do not need to be revised.

Proposed COLA Revision

None.

ENCLOSURE 8

Response to NRC RAI Letter No. 105

RAI No. 6880, Question 12.03-44

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: **6880 (RAI Letter105)**

SRP SECTION: 12.03-12.04 RADIATION PROTECTION DESIGN FEATURES

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 11/13/2012

QUESTION NO.: 12.03-44

NAPS COL FSAR Revision 5 Subsection 11AA.4.7 “Instrumentation and Control,” states that the IRSF instrumentation is specified to operate within the site design temperatures and expected humidity in the IRSF however, the design temperature ranges are not specified in Appendix 11AA. Subsection 11AA.4.4 “Radiation Monitoring,” states that the crane operating room building ventilation exhaust monitor is similar to the Plant Vent Extended Gas Monitor RM-RE-080A described in US-APWR DCD Table 11.5-3 “Effluent Gas Monitors,” and that the truck bay area radiation monitor (RME-120) located on the south wall of the IRSF is similar to the Waste Management Monitor RM-RE-008 in US-APWR DCD Table 12.3-4 “Area Radiation Monitors.” US-APWR DCD Revision 3 subsection 12.3.4 “Area Radiation and Airborne Radioactivity Monitoring Instrumentation,” DCD Table 12.3-4, US-APWR DCD Revision 3 Subsection 11.5 “Process Effluent Radiation Monitoring and Sampling Systems,” and DCD Table 11.5-3 do not specify the minimum design temperature of the radiation monitoring equipment. A staff review of the manufacture specifications for some current commercially available radiation monitoring equipment provided for use by nuclear power plants indicates that some airborne and area radiation monitoring equipment may have limited operability within the temperature and humidity ranges the staff expects to be present within the IRSF.
Please update and revise NAPS COL FSAR Appendix 11AA and the response to RAI 5972-93 Question 12.03-12.04-29 to describe design specifications of the radiation monitoring equipment that is consistent with the capabilities of the heating and ventilation system provided in the IRSF as described in Appendix 11AA, or provide the specific alternative approaches used and the associated justification.

Dominion Response

The IRSF exhaust fan airborne radiation monitor (RME-121), located on the ventilation exhaust from the crane operating room, and the IRSF area radiation monitor (RME-120), located on the south wall of the truck bay, will be selected based on their operability within the North Anna site-specific environmental conditions. Plant operating procedures will prohibit IRSF operations, including HIC movement and the removal of vault lids, outside of the design temperature and humidity ranges provided by the radiation monitor vendor. The design temperature and humidity ranges for the radiation monitor will be determined within the detailed design phase and during procurement.

The information stated above augments and is consistent with the Dominion's response to RAI 5972-93 Question 12.03-12.04-29 (Serial No. NA3-11-066R, dated January 23, 2012). Therefore, the response to Question 12.03-12.04-29 does not need to be revised.

Proposed COLA Revision

FSAR Section 11AA.4.4 will be revised as indicated on the attached markup.

brigade. The structure reinforcement and integrity ensures limitation on the fire spreading in the adjacent areas of the IRSF building.

Fire Protection System Integrity

The fire protection capability for this area is provided from portable fire extinguishers and the manual hose station applied by the plant fire brigade. The fire boundaries are of substantial construction and provide at least a 3-hour fire rating. The plant fire brigade will respond to the fire alarm.

Safe Shutdown Evaluation

A fire in this area has no potential to damage the ability of safe shutdown function, as the IRSF does not impact any components required for safe shutdown of the plant. The fire in this fire area, therefore, will not adversely impact the ability to achieve and maintain safe shutdown.

Radioactive Release to Environment Evaluation

Radiological material is not allowed within the crane operating room and mechanical equipment room by administrative controls. The structural integrity provides sufficient separation from the location where the HICs will be stored. As such, a fire in this area is not deemed credible of causing a radioactive release to the environment.

NAPS SUP 12.3(2)

11AA.4.4 **Radiation Monitoring**

The IRSF is equipped with a radiation element on the building ventilation exhaust (RME-121). Building air is drawn to a radiation element contained in the IRSF crane operating room to be monitored for nuclide contamination. The radiation element is inspected and calibrated periodically to ensure operability. The radiation element provides an alarm signal to the MCR if and when a predetermined setpoint is reached. The exhaust monitor has local annunciation consisting of an audible alarm and a warning light at the local readout. The crane operating room building ventilation exhaust monitor is similar to the Plant Vent Extended Gas Monitor RM-RE-080A in DCD Table 11.5-3.

Additionally, there is an area radiation monitor in the truck bay which alarms locally with a warning light at the local readout and also alarms in the MCR if an abnormally high radiation level is detected. The truck bay area radiation monitor (RME-120) is on the south wall and is similar to the Waste Management Monitor RM-RE-008 in DCD Table 2.3-4.

INSERT, "Plant operating procedures prohibit IRSF operations, including HIC movement and the removal of vault lids, while temperature and/or humidity are outside of the operability ranges specified by the radiation monitor manufacturers."

ENCLOSURE 9

Response to NRC RAI Letter No. 105

RAI No. 6880, Question 12.03-45

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: **6880 (RAI Letter 105)**

SRP SECTION: 12.03-12.04 – RADIATION PROTECTION DESIGN FEATURES

QUESTIONS for Health Physics Branch

DATE OF RAI ISSUE: 11/13/2012

QUESTION NO.: 12.03-45

The guidance contained in Standard Review Plan (SRP) Appendix 11.4-A "Design Guidance for Temporary Storage of Low-Level Radioactive Waste" directs applicants to the guidance contained in SECY-94-198 "Review of Existing Guidance Concerning the Extended Storage of Low-Level Radioactive Waste." SECY-94-198 states gas generation rates should be evaluated to ensure that the facility design precludes potentially explosive conditions. North Anna Power Station Unit 3 (NAPS) Combined License (COL) FSAR Appendix 11AA "Interim Radwaste Storage Facility" (IRSF) section 11AA.3.5 "Gas Generation" stated that the combustible gases, consisting of predominantly hydrogen, with a small amount of methane, are generated at a rate about 0.020 to 0.054 liters/hour per container using the resin gas generation rate G-values data as documented in WSRCTR-97-00338, "Radiation Studies with Argentine Ion Exchange Material," C.L. Crawford, Savannah River Site, US DOE, 6/2002.

The applicant's response to RAI 5972-93 Question 12.03-12.04-30 dated 23 January 2012, stated that WSRC-TR-97-00338 document gives G-values for hydrogen generation of 0.3 to 0.8 molecules/100eV. To be conservative, a G-value of 0.8 molecules/100eV was used, giving a calculated result of 0.054 liters/hr as documented in the NAPS COL FSAR. The generation of other combustible gases has been found to be negligible in comparison to hydrogen. The applicant further stated that the literature referenced by the staff, specifically NUREG/CR-3383 BNL-NUREG-51691, reports G-values in the range of 0.13 to 0.6 molecules/100eV. Based on the review of this NUREG, the current calculation as reported in the FSAR is conservative, due to the use of a higher G-value. The staff reexamined the information contained in GEND-041 and NUREG/CR-3383, and confirmed that the listed G-values of about 0.6 molecules/100eV, are less than the G-value of 0.8 molecules/100eV stated in WSRC-TR-97-00338. As stated in the original question, DOE maintains RADCALC, an

American Society of Mechanical Engineers (ASME) Quality Assurance Requirements for Nuclear Facility Applications (NQA) 1 validated safety system software classified as Safety Level B. RADCALC was originally based on GEND-041, "A Calculational Technique to Predict Combustible Gas Generation in Sealed Radioactive Waste Containers," a methodology the NRC accepted for use in ensuring compliance with NRC initiating event (IE) Information Notice No. 84-72 "Clarification of Conditions For Waste Shipments Subject To Hydrogen Gas Generation." The staff has confirmed that the current version of RADCALC, Version 4.1, lists a number of resin types with G-values up to a factor of 4 greater than the value assumed in NAPS COL FSAR Revision 5 Appendix 11AA. Therefore, it is not clear to the staff that the assertion by the applicant that the current calculation as reported in the FSAR is conservative, due to the use of a higher G-value, is supported by data contained in RADCALC Version 4.1.

Please update and revise NAPS COL FSAR Appendix 11AA and the response to RAI 5972-93 Question 12.03-12.04-30 to describe the methods to be used to ensure that the actual G-values of resins stored within the IRSF will be conservative with respect to the G-values assumed to ensure that gas concentrations within the IRSF will remain below explosive levels, or provide the specific alternative approaches used and the associated justification.

Dominion Response

As described in the response to RAI 5972-93 Question 12.03-12.04-30 (Serial No. NA3-11-066R, dated January 23, 2012), NAPS COL FSAR Appendix 11AA uses 0.8 molecules/100eV as the G-value for stored resins, which is conservative with respect to the G-values contained in NUREG/CR-3383 BNL-NUREG-51691. The information in RADCALC Version 4.1 was reviewed to confirm that the 0.8 molecules/100 eV G-value is conservative. According to RADCALC, there are four ion exchange resins with G-values greater than 0.8 molecules/100 eV: KU-2x8, H+ form; KU-2x8, Na+ form; KB-4P-2, H+ form; and KB-4P-2, Na+ form. These resins are not commonly used in U.S. nuclear plants, and are not readily available through U.S. vendors. Therefore, the FSAR is conservative in using a G-value of 0.8 molecules/100 eV for the North Anna Unit 3 IRSF for the resins which will be used at the site. In accordance with the site Process Control Program (PCP), when resin is procured, resin G-values will be verified to be bounded by the G-value of 0.8 molecules/100eV to ensure that gas concentrations within the IRSF remain below explosive levels. FSAR Section 11AA.3.5 will be revised to show that the selected resins will be bounded by this G-value.

The information stated above augments and is consistent with the Dominion's response to RAI 5972-93 Question 12.03-12.04-30. Therefore, the response to Question 12.03-12.04-30 does not need to be revised.

Proposed COLA Revision

FSAR Section 11AA.3.5 will be revised as indicated on the attached markup.

Section 12.3.2.2. [The use of individual vaults serves to keep worker and public dose rates ALARA and within the site limits (0.25 mrem/hr for external areas outside the IRSF, 2.5 mrem/hr in the truck bay during storage).] SOF-225

NAPS SUP 12.3(1)

11AA.3.3 Radiation Zone Maps

The dose limits for the IRSF are summarized in the radiation zone map in Figure 11AA-202.

NAPS COL 12.2(2)

11AA.3.4 Personnel Exposure

The waste containers are placed in shielded vaults to keep personnel radiation exposure ALARA. During storage, the wall separating the vault area from the truck bay is sufficiently high (>30') and thick to provide shielding to keep personnel exposure ALARA at < 2.5 mrem/hr as shown on Figure 11AA-202. The height of the wall also acts as a physical barrier to prevent undetected access to the vault area. To minimize radiation dose access to the IRSF is limited by physical control (i.e., locked doors) and administrative control. Plant operating procedures providing guidance for waste handling (in accordance with site radiation protection program) are implemented in order to expedite waste handling operations and to minimize personnel exposure time. Expected occupational doses from IRSF operations are shown in Table 11AA-208.

11AA.3.5 Gas Generation

The gamma, beta and alpha radiation in the waste material causes the radiolysis reaction of the organic materials, and the hydrolysis of the water trapped in the resins. These reactions generate a small amount of combustible gases inside the waste containers. [The combustible gases, consisting of predominantly hydrogen, with a small amount of methane, are generated at a rate about 0.020 to 0.054 liters/hour per container]. SOF-226 This rate estimate is based on the gamma, beta and alpha radiation analysis, and the resin gas generation rate G-values data analyzed by the industry (Ref 11AA-202).

INSERT: "In accordance with the site Process Control Program, resins used at North Anna 3 have G-values of 0.8 molecules/100eV or lower, which results in the gas generation rate of 0.054 liters/ hour per container or less."

Passive ventilation holes are built into the vault covers as escape pathways for the generated gases, primarily hydrogen. Hydrogen, being a lighter gas, tends to be more buoyant and escape from the vault into the building. The IRSF is also equipped with a building exhaust fan mounted on the ceiling to maintain ventilation air flows (see Section 11AA.4.1). This design works in conjunction with the small