Part 07

Exelon Generation
Victoria County Station, Units 1 and 2
COL Application

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Part 07

Generic DCD Departures Report

Revision 0

1. DEPARTURES

A departure is a plant-specific deviation from design information in a standard design certification rule. This report identifies three departures from the reference Economic Simplified Boiling Water Reactor (ESBWR) Design Control Document (DCD) which are evaluated consistent with regulatory requirements and guidance. Each departure is examined in accordance with 10 CFR Part 52 requirements.

Departure: VCS DEP 2.0-1 Toxic Gas Concentrations at the Main Control Room HVAC Intakes

Table 5.1-1 of DCD Tier 1 and Table 2.0-1 of DCD Tier 2 require that the maximum toxic gas concentrations at the main control room (MCR) heating, ventilation, and air conditioning (HVAC) intakes be less than toxicity limits. As described in FSAR Subsection 2.2.3.1.3, maximum toxic gas concentrations could exceed toxicity limits as a result of postulated accidents involving the shipment of toxic chemicals by road and rail in the vicinity of the Victoria County Station (VCS) site. As described in FSAR Table 2.0-201 under the heading, “Hazards in Site Vicinity, Toxic Gases,” and FSAR Subsection 6.4.5, a toxic gas detection system (TGDS) is provided to monitor air passing through the MCR outside air intake louvers. In the event the concentrations of any of the toxic gases listed in FSAR Table 2.2-213 reach or exceed the designated setpoint of the TGDS monitors, the TGDS initiates an alarm in the MCR. Upon actuation of this toxic gas alarm, personnel in the MCR will don protective clothing and breathing apparatus to ensure they are not exposed to toxic chemical concentrations that exceed the Immediately Dangerous to Life and Health (IDLH) concentration defined by the National Institute for Occupational Safety and Health (NIOSH). In accordance with the guidance contained in RG 1.78, the alarm capability of the TGDS and the protective actions taken by MCR personnel ensure that control room operators can remain in the control room and take actions to safely operate the plant under normal conditions and to maintain it in a safe condition under accident conditions.

An exemption for this departure is requested in Section 2.1 of this COLA Part.

Departure: VCS DEP 2.5.4-1 Minimum Shear Wave Velocity

Table 5.1-1 of DCD Tier 1 and Table 2.0-1 of DCD Tier 2 require that the equivalent uniform shear wave velocity of the soil underneath the foundation be a minimum of 300 m/s (1000 ft/s). The calculated shear wave velocities for VCS, Units 1 and 2, are less than the required minimum value; therefore, a site-specific soil-structure interaction (SSI) analysis was performed to confirm the applicability of the ESBWR design for the VCS site, addressing the departure from the minimum shear wave velocity parameter. The preliminary results of the site-specific SSI analysis, when compared with the seismic design of the ESBWR, are bounded by those specified in the DCD for maximum seismic structural loads and floor response spectra at key locations (see FSAR Subsection 3.7.2.4). In addition, site-specific foundation input response spectra were developed which are bounded by the certified seismic design response spectra (See

FSAR Figures 2.0-201 through 2.0-204). A final SSI analysis will be provided in a future COLA revision.

It is expected that this departure is temporary and will be removed in a later revision of the COLA, when Revision 5 of the ESBWR DCD is incorporated. Revision 5 of the DCD includes a Note 16 to Table 2.0-1 of DCD Tier 2 that requires a site-specific analysis be performed when a site does not meet the soil property requirements as specified in Table 2.0-1 of DCD Tier 2. Similarly, Revision 5 of Section 5.1 of DCD Tier 1 allows deviations from the specified soil parameters in Table 5.1-1 of DCD Tier 1 to be justified with a site-specific SSI analysis. The site-specific SSI analysis complies with these DCD Revision 5 requirements without the need for this departure.

An exemption for this temporary departure is requested in Section 2.2 of this COLA Part.

Departure: VCS DEP 9.2-1 Makeup Water System

Summary of Departure:

Section 9.2.3.1 of DCD Tier 2 states that the makeup water system (MWS) Standard Plant design does not share any structure, system, or component (SSC) with any other unit. In the VCS design, the MWS is a common system shared by Units 1 and 2.

Scope/Extent of Departure:

The text in Section 9.2.3.1 of DCD Tier 2 that is incorporated by reference into FSAR Section 9.2.3.1 has been altered to account for the MWS being a shared system.

Departure Justification:

The equipment required for storing, transferring, and demineralizing makeup water supplied to systems in Units 1 and 2 is optimized by designing the MWS as a shared system.

The MWS design for VCS Units 1 and 2 meets General Design Criterion (GDC) 5 for shared systems and components important to safety, because the sharing does not impair the ability of any SSC from performing its safety functions. Therefore, the sharing of the MWS has no safety consequence to VCS Units 1 and 2.

Departure Evaluation:

This Tier 2 departure has no safety consequence to VCS Units 1 and 2. Accordingly, it does not:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD;

2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety and previously evaluated in the plant-specific DCD;

3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD;

4. Result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the plant-specific DCD;

5. Create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD;

6. Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD;

7. Result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered; or

8. Result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses.

This departure does not affect resolution of a severe accident issue identified in the plant-specific DCD.

Therefore, this departure has no safety significance, and pursuant to Section VIII.B.5 of the design certification rule for the ESBWR, this departure does not require NRC approval.

2. EXEMPTION REQUESTS

2.1 Toxic Gas Concentrations at the Main Control Room HVAC Intakes Exemption Request

An exemption must be requested if information proposed in the COLA would not comply with one or more NRC regulations. If the NRC were to issue a design certification rule for the ESBWR based on the maximum toxic gas concentrations at the MCR HVAC intakes specified in Tier 1 of the DCD, Exelon would require an exemption from those Tier 1 DCD requirements. If this is necessary, then pursuant to 10 CFR 52.7 and the expected Section VIII.A.4 of the design certification rule for the ESBWR, Exelon requests an exemption from the requirements of 10 CFR 52.79(d)(1), which requires the FSAR to demonstrate that the site characteristics fall within the site parameters specified in the design certification, and Tier 1 of the ESBWR DCD. Table 5.1-1 of DCD Tier 1 specifies that the maximum toxic gas concentrations at the main control room (MCR) HVAC intakes be less than toxicity limits. As described in FSAR Subsection 2.2.3.1.3, maximum toxic gas concentrations could exceed toxicity limits as a result of postulated accidents involving the shipment of toxic chemicals by road and rail in the vicinity of the VCS site. Since the requirement that maximum toxic gas concentrations at the MCR HVAC intakes be less than toxicity limits is Tier 1 information and the VCS site characteristic does not fall within the corresponding DCD site parameter, an exemption from 10 CFR 52.79(d)(1) and Tier 1 of the DCD is required.

Discussion

Table 5.1-1 of DCD Tier 1 and Table 2.0-1 of DCD Tier 2 require that the maximum toxic gas concentrations at the MCR HVAC intakes be less than toxicity limits. As described in FSAR Subsection 2.2.3.1.3, maximum toxic gas concentrations could exceed toxicity limits as a result of postulated accidents involving the shipment of toxic chemicals by road and rail in the vicinity of the VCS site. As described in FSAR Table 2.0-201 under the heading, "Hazards in Site Vicinity, Toxic Gases," and FSAR Subsection 6.4.5, a TGDS is provided to monitor air passing through the MCR outside air intake louvers. In the event the concentrations of any of the toxic gases listed in FSAR Table 2.2-213 reach or exceed the designated setpoint of the TGDS monitors, the TGDS initiates an alarm in the MCR. Upon actuation of this toxic gas alarm, personnel in the MCR will don protective clothing and breathing apparatus to ensure they are not exposed to toxic chemical concentrations that exceed the IDLH concentration defined by NIOSH. In accordance with the guidance contained in RG 1.78, the alarm capability of the TGDS and the protective actions taken by MCR personnel ensure that control room operators can remain in the control room and take actions to safely operate the plant under normal conditions and to maintain it in a safe condition under accident conditions.

Therefore, the departure from the maximum toxic gas concentrations at the MCR HVAC intakes specified in Tier 1 of the DCD does not have an adverse impact on the ESBWR Standard Plant design.

Conclusion

This exemption request was evaluated in accordance with the expected Section VIII.A.4 of the design certification rule which requires that 1) the change will not result in a significant decrease in the level of safety otherwise provided by the design; 2) the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security; 3) special circumstances are present as specified in 10 CFR 50.12(a)(2); and 4) the special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption. As shown below, each of these four criteria are satisfied.

(1) As described above, the exemption does not have an adverse impact on the ESBWR Standard Plant design and therefore will not result in a significant decrease in the level of safety otherwise provided by the design. In accordance with the guidance contained in RG 1.78, the alarm capability of the TGDS and the protective actions taken by MCR personnel ensure that control room operators can remain in the control room and take actions to safely operate the plant under normal conditions and to maintain it in a safe condition under accident conditions.

(2) The exemption is not inconsistent with the Atomic Energy Act or any other statute and therefore is authorized by law. As discussed above, the exemption does not have an adverse impact on the ESBWR Standard Plant design. In accordance with the guidance contained in RG 1.78, the

alarm capability of the TGDS and the protective actions taken by MCR personnel ensure that control room operators can remain in the control room and take actions to safely operate the plant under normal conditions and to maintain it in a safe condition under accident conditions. Therefore, the exemption will not present an undue risk to the public health and safety. The exemption does not relate to security and does not otherwise pertain to the common defense and security.

(3) Special circumstances are present as specified in 10 CFR 50.12(a)(2).

Special circumstance (ii) is present, since application of Section 52.79(d)(1) and the site parameters in Tier 1 of the DCD is not necessary to achieve the underlying purpose of the rules. The analysis described above shows that the presence of toxic gas concentrations in excess of toxicity limits at the MCR HVAC intakes as a result of postulated accidents involving the shipment of toxic chemicals by road and rail in the vicinity of the VCS site does not affect the ESBWR Standard Plant design. In accordance with the guidance contained in RG 1.78, the alarm capability of the TGDS and the protective actions taken by MCR personnel ensure that control room operators can remain in the control room and take actions to safely operate the plant under normal conditions and to maintain it in a safe condition under accident conditions.

Special circumstance (iii) is present, since compliance would necessitate relocating the facility to another site, which would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted.

Special circumstance (vi) is present in that there are material circumstances not considered during development of the DCD (i.e., road and rail shipments of toxic chemicals in this part of Texas). Given the need for power in Texas, it is in the public interest to allow construction of reactors at the VCS site.

(4) The special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption. The exemption does not change the ESBWR Standard Plant design. Further, in accordance with the guidance contained in RG 1.78, the alarm capability of the TGDS and the protective actions taken by MCR personnel ensure that control room operators can remain in the control room and take actions to safely operate the plant under normal conditions and to maintain it in a safe condition under accident conditions.

As demonstrated above, this exemption request complies with the requirements in the expected Section VIII.A.4 of the design certification rule for the ESBWR. Therefore, the exemption also satisfies the requirements in 10 CFR 52.7 for an exemption from 10 CFR 52.79(d)(1), since the criteria in 10 CFR 52.7 are a subset of the criteria in Section VIII.A.4 of the expected design certification rule for the ESBWR.

2.2 Minimum Shear Wave Velocity Exemption Request

An exemption must be requested if information proposed in the COLA would not comply with one or more NRC regulations. If the NRC were to issue a design certification rule for the ESBWR based on the shear wave velocity limits currently specified in Tier 1 of DCD Revision 4, Exelon would require an exemption from those Tier 1 DCD requirements. If this is necessary, then pursuant to 10 CFR 52.7 and the expected Section VIII.A.4 of the design certification rule for the ESBWR, Exelon requests an exemption from the requirements of 10 CFR 52.79(d)(1), which requires the FSAR to demonstrate that the site characteristics fall within the site parameters specified in the design certification, and Tier 1 of the ESBWR DCD. Table 5.1-1 of DCD Tier 1 specifies a minimum shear wave velocity of 300 m/s (1000 ft/s). As described in FSAR Table 2.0-201 under the heading "Minimum Shear Wave Velocity," the site characteristic values for shear wave velocity are 221 m/s (726 ft/s) for VCS Unit 1 and 219 m/s (719 ft/s) for VCS Unit 2, which are less than the minimum shear wave velocity of 300 m/s (1000 ft/s). Since the minimum shear wave velocity is Tier 1 information and the VCS site characteristics do not fall within the corresponding DCD site parameter, an exemption from 10 CFR 52.79(d)(1) and Tier 1 of the DCD is required.

Discussion

As described in FSAR Table 2.0-201 under the heading "Minimum Shear Wave Velocity," the site characteristic values for shear wave velocity are 221 m/s (726 ft/s) for VCS Unit 1 and 219 m/s (719 ft/s) for VCS Unit 2, which are less than the minimum shear wave velocity of 300 m/s (1000 ft/s) specified in Table 5.1-1 of DCD Tier 1.

As described in FSAR Subsection 3.7.2.4, the site characteristic minimum shear wave velocities were evaluated to determine their impact on the standard design. A site-specific soil-structure interaction (SSI) analysis was performed to confirm the applicability of the ESBWR design for the VCS site, addressing the departure from the minimum shear wave velocity parameter. The preliminary results of the site-specific SSI analysis, when compared with the seismic design of the ESBWR, are bounded by those specified in the DCD for maximum seismic structural loads and floor response spectra at key locations. In addition, site-specific foundation input response spectra were developed which are bounded by the certified seismic design response spectra (See FSAR Figures 2.0-201 through 2.0-204). A final SSI analysis will be provided in a future COLA revision.

Therefore, the departure from the minimum shear wave velocity specified in Tier 1 of the DCD does not have an adverse impact on the ESBWR Standard Plant design.

Conclusion

This exemption request was evaluated in accordance with the expected Section VIII.A.4 of the design certification rule which requires that 1) the change will not result in a significant decrease in the level of safety otherwise provided by the design; 2) the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense

and security; 3) special circumstances are present as specified in 10 CFR 50.12(a)(2); and 4) the special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption. As shown below, each of these four criteria are satisfied.

(1) As described above, the exemption does not have an adverse impact on the ESBWR Standard Plant design and therefore will not result in a significant decrease in the level of safety otherwise provided by the design.

(2) The exemption is not inconsistent with the Atomic Energy Act or any other statute and therefore is authorized by law. As discussed above, the exemption does not have an adverse impact on the ESBWR Standard Plant design and therefore will not present an undue risk to the public health and safety. The exemption does not relate to security and does not otherwise pertain to the common defense and security.

(3) Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, special circumstance (ii) is present, since application of Section 52.79(d)(1) and the site parameters in Tier 1 of the DCD is not necessary to achieve the underlying purpose of the rules. The analysis described above shows that the reduction in the minimum shear wave velocity does not affect the ESBWR Standard Plant design. Additionally, special circumstance (iii) is present, since compliance would necessitate relocating the facility to another site, which would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted. Further, special circumstance (vi) is present in that there are material circumstances not considered during development of the DCD (i.e., minimum shear wave velocities in this part of Texas). Given the need for power in Texas, it is in the public interest to allow construction of reactors at the VCS site.

(4) The special circumstances outweigh any decrease in safety that may result from the reduction in standardization (due to the reduction in the minimum shear wave velocity) caused by the exemption. Specifically, the exemption does not change the ESBWR Standard Plant design and does not affect the configuration of the plant or the manner in which the plant is operated.

As demonstrated above, this exemption request complies with the requirements in the expected Section VIII.A.4 of the design certification rule for the ESBWR. Therefore, the exemption also satisfies the requirements in 10 CFR 52.7 for an exemption from 10 CFR 52.79(d)(1), since the criteria in 10 CFR 52.7 are a subset of the criteria in Section VIII.A.4 of the expected design certification rule for the ESBWR.

It is expected that this request for exemption is temporary and will be removed in a later revision of the COLA, when Revision 5 of the ESBWR DCD is incorporated. Revision 5 of the DCD includes a Note 16 to Table 2.0-1 of DCD Tier 2 that requires a site-specific analysis be performed when a site does not meet the soil property requirements as specified in Table 2.0-1 of DCD Tier 2. Similarly, Revision 5 of Section 5.1 of DCD Tier 1 allows deviations from the specified soil parameters in

Table 5.1-1 of DCD Tier 1 to be justified with a site-specific SSI analysis. The site-specific SSI analysis complies with these DCD Revision 5 requirements without the need for this exemption request.