PMNorthAnna3COLPEmails Resource

From: Berrios, Ilka
Sent: Friday, June 19, 2009 9:37 AM
To: NorthAnna3COL Resource
Subject: FW: June 22 Conference Call to Discuss NRC Questions on RAI 02.04.02-3
Attachments: ATT00001.gif; rai 2.4.2-3 response ltr33.doc

From: Barry.Bryant@dom.com [mailto:Barry.Bryant@dom.com]
Sent: Thursday, June 18, 2009 1:57 PM
To: Berrios, Ilka; gquinn@bechtel.com; dakemp@bechtel.com
Cc: Joseph.Hegner@dom.com; Regina.Borsh@dom.com
Subject: June 22 Conference Call to Discuss NRC Questions on RAI 02.04.02-3

A conference call is scheduled for 12:00 on June 22 to discuss NRC questions pertaining to Dominion's response to RAI 02.04.02-3 (attached).

To join the call, dial 866.740.1260, and enter the access code, 3652786.

Barry C. Bryant, P.E.
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NRC RAI 02.04.02-3

The COL must contain information to assure that construction of Unit 3 will not impact the existing units (see 10 CFR 52.79(a)(31)). Revision 1 of the application states "at the eastern edge of the Unit 3 site where the plant access road crosses the south drainage ditch, the grade elevation at the high point between the Unit 3 site and the Units 1 and 2 site is at Elevation 82.98 m (272.25 ft) msl. The maximum water level at the inline weir is Elevation 82.94 m (272.1 ft) msl, which is 0.05 m (0.15 ft) below the high point elevation and thus all Unit 3 PMP flows will be confined to the Unit 3 site and runoff generated from Unit 3 will not impact the Units 1 and 2 site." Because the (revision 0) HEC-RAS predicted water velocities in south ditch immediately upstream of the abrupt bend near the plant access road exceed 10 ftls and because of the relatively small margin, NRC staff request that the applicant describe the design measures to ensure all discharge in the south ditch will complete the 90-degree abrupt bend during the PMP-generated flood event. This description should include how two-dimensional effects, superelevation of flow, and the potential hydraulic jump were factored into the design. In addition, describe fortification measures to prevent failure of the plant access road when the SWM basin is at the PMP-generated maximum elevation.

Dominion Response

Just upstream of where the south drainage ditch crosses the plant access road, the channel slope of the ditch is approximately 3.5%. PMP-generated flood flows in this portion of the ditch are supercritical. Before reaching the culvert, the channel slope of the ditch flattens out to nearly level and a 2.0 foot deep sump is located at the culvert entrance. During normal precipitation events, runoff collected in the south drainage ditch passes under the access road through a culvert. During the local PMP storm event, the HEC-RAS computer model assumes that the culvert is clogged and all flow passes over the plant access road at the culvert crossing. The PMP flood flow is forced above the elevation of the road crossing, resulting in a subcritical flow regime. It is therefore postulated that a hydraulic jump will occur upstream of the sump areas at the culvert crossing, which is also upstream of the abrupt bend in the south ditch.

The channel velocities in the ditch upstream of the hydraulic jump location are greater than 10 fps. However, as indicated in the HEC-RAS model results, the flow velocities for the section of the ditch upstream of the culvert crossing decrease to 2 to 3 fps in the subcritical flow regime downstream of the jump. The turbulence of the hydraulic jump dissipates much of the energy from the high velocities in the upstream portion of the ditch. To direct the flow over the road, the grading of the slope along the south side of the south drainage ditch, downstream of the hydraulic jump, will be altered as shown by the "slope

alteration" in Figure 1 (provided for clarification on page 4 of this response). This slope will be protected with rip rap sufficiently sized to withstand the ditch channel velocities and turbulence associated with the hydraulic jump. The altered grading is located downstream of the hydraulic jump area. This design will confine floodwaters to the Unit 3 site and runoff will not reach the Units 1 and 2 site. The structure shown near the altered slope in Figure 1 is an existing Units 1 and 2 plant building which does not perform a safety-related function and is not credited for directing flow for Unit 3.

The conveyance flow width over the access road was conservatively restricted to 100 feet (60 feet left (west) and 40 feet right (east) of the channel centerline) in the HEC-RAS model. The actual width of water flowing over the road is about 160 feet. By restricting the flow to this width, computed water levels are higher than those that would be computed with a wider section. Even with this channel width restriction, the super-elevation at the outer bend as a result of the flow turning will be small (estimated to be on the order of 0.10 ft based on the water surface width to radius of curvature ratio of no more than one in a subcritical flow regime) due to the much lower velocities near the bend (about 2.5 fps) and will be against the altered slope shown on Figure 1.

The Unit 3 stormwater management basin is currently an existing depression area that resulted from a previous excavation. The embankment between the Unit 3 stormwater management basin and the low area adjacent to the Unit 2 turbine building is an existing safety-related flood dike protecting the Unit 2 turbine building from floodwater rising up from Lake Anna and filling the existing excavation. As such, the flood dike has been designed for exposure to floodwaters against it. The Unit 3 PMP flow velocities adjacent to the plant access road will be less than 0.5 fps. Such low velocities will not cause erosion of the embankment or plant access road and no additional fortification measures other than grass seeding or rip rap protection are required.

Proposed COLA Revision

None.