UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 27, 2018

Mr. Bradley J. Sawatzke
Chief Executive Officer
Energy Northwest
76 North Power Plant Loop
P.O. Box 968 (Mail Drop 1023)
Richland, WA 99352-0968

SUBJECT: COLUMBIA GENERATING STATION – CORRECTION OF ERRORS IN SAFETY EVALUATION ASSOCIATED WITH LICENSE AMENDMENT NO. 199 (EPID L-2018-LLL-0001)

Dear Mr. Sawatzke:

By letter dated November 27, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML062610429), the U.S. Nuclear Regulatory Commission (NRC) issued Amendment No. 199 to Facility Operating License No. NPF-21 for the Columbia Generating Station (CGS). The amendment consisted of changes to the Technical Specifications (TSs) and Final Safety Analysis Report in response to your application dated September 30, 2004 (ADAMS Accession No. ML042930316), as supplemented by letters dated March 16, 2005, September 29, 2005, March 21, 2006, August 7, 2006, August 24, 2006, and September 11, 2006 (ADAMS Accession Nos. ML050900256, ML052850270, ML060900602, ML062260219, ML062490395, and ML062620329, respectively).

By letter dated January 31, 2018 (ADAMS Accession No. ML18032A458), Energy Northwest requested a clarification to the Safety Evaluation (SE) associated with Amendment No. 199. The need for a clarification was first determined during the 2016 Component Design Basis Inspection (CDBI), 2016 CDBI Inspection Report (ADAMS Accession No. ML16218A239) where the NRC questioned the text used in the SE associated with Amendment No. 199 because it did not clearly represent (1) the CGS plant's activation of the Standby Liquid Control (SLC) System for buffering suppression pool pH, and (2) CGS's continuous spray versus intermittent spray for aerosol removal.

The following two corrections are made in the associated SE for Amendment No. 199 (please note that the SE for Amendment No. 199 was also corrected by letter dated March 27, 2007

(ADAMS Accession No. ML070780388), but did not alter the text for the two SE sections below.)

Amendment No. 199 SE Section	**Current SE text**	**Corrected SE text**
Section 3.1.1.2, "Release Pathways" (SE page 5)	EN assumes that a portion of the fission products released from the reactor pressure vessel will be removed by drywell sprays. The sprays are assumed to be initiated at 15 minutes and turned off after 1 day.	EN assumes that a portion of the fission products released from the reactor pressure vessel will be removed by drywell sprays. Fission product removal by drywell sprays is credited from 15 minutes through 24 hours based upon the approved methodology. The sprays are operated as directed by the Emergency Operating Procedures (EOPs)/severe accident management guidelines (SAMGs) procedures.
Section 4.3, "TS 3.1.7, 'Standby Liquid Control (SLC) System," Item 6 (SE page 24)	Emergency Operating Procedures (EOP's) direct the activation of SLC following a LOCA when reactor water level cannot be maintained above the top of active fuel. Manual initiation of SLC is also directed in the severe accident management guidelines (SAMGs), which are entered when adequate core cooling cannot be maintained.	Emergency Operating Procedures (EOPs) allow activation of SLC following a LOCA as an alternate injection source for reactor water inventory control. Manual initiation of SLC is directed in the severe accident management guidelines (SAMGs), which are entered when adequate core cooling cannot be maintained.

The NRC staff has reviewed the corrections above and determined that the corrections do not change any of the conclusions in the SE associated with Amendment No. 199 for CGS, and do not affect the associated notice to the public.

The corrected SE pages 5 and 24 are enclosed. The changes are identified by a vertical bar on the right margin. Please replace the affected pages in the November 27, 2006, SE with these revised pages.

If you have any questions regarding this matter, I may be reached at (301) 415-5136 or via e-mail at John.Klos@nrc.gov.

Sincerely,

L. John Klos, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosure:
Corrected SE pages 5 and 24
Associated with Amendment No. 199

cc: Listserv

ENCLOSURE

ENERGY NORTHWEST

COLUMBIA GENERATING STATION

DOCKET NO. 50-397

CORRECTED SAFETY EVALUATION PAGES 5 AND 24 ASSOCIATED WITH LICENSE AMENDMENT NO. 199 ISSUED NOVEMBER 27, 2006

water, the steam is condensed, thereby reducing the pressure in the wetwell and drywell. A reactor trip occurs and the ECCS actuates to remove fuel decay heat. Thermodynamic analyses, performed using a spectrum of RCS break sizes, show that the ECCS and other plant safety features are effective in preventing significant fuel damage. Nonetheless, the radiological consequence portion of the LOCA analysis assumes that ECCS is not effective and that substantial fuel damage occurs. Appendix A of RG 1.183 identifies acceptable radiological analysis assumptions for a LOCA. The source term and release pathways related to the LOCA are discussed below.

3.1.1.1 Source Term

EN projected the core inventory of fission products using the ORIGEN 2 computer code. The resulting core inventories of dose-significant radionuclides were tabulated in Table 4.4-4 to Attachment 1 of Enclosure 1 of the September 30, 2004, submittal. These inventories are based upon an adjusted plant-specific pre-1995 ORIGEN 2 run. The three adjustments were: (1) a scale factor to bound the power level to 3556 megawatts thermal (Mwt), (2) a correction to increase selected krypton values (based on comparisons to other core inventory tables), and (3) an increase in the activity of longer-lived isotopes. The assumed power level of 3556 Mwt is the licensed power increased by 2 percent to account for measurement uncertainties. The ORIGEN 2 computer code is acceptable to the NRC staff for estimating the core inventory. The core inventory used excluded two cobalt nuclides from the RADTRAD inventory file of 60 nuclides. It also added 8 additional nuclides for a total of 66 nuclides.

Because the list of radionuclides is slightly different from the standard default nuclides in RADTRAD, the NRC staff asked EN to confirm that the most conservative radionuclides were used to determine the source for the CGS shielding studies for the shine doses from external sources to the control room (CR), and inhalation doses both for offsite and CR locations. EN provided this confirmation in the March 21, 2006, supplement.

3.1.1.2 Release Pathways

The release to the environment is assumed to occur through the following pathways:

- Design leakage of primary containment atmosphere.
- Design leakage through main steam line isolation valves (MSIVs).
- Design leakage from ECCS piping and components that recirculate suppression pool water outside of the primary containment.

Under the previous TID-14844 source term assumption of instantaneous core damage, the initial blowdown would also include all of the released fission products, a fraction of which would be retained by the suppression pool water. Under the AST, a substantial fraction of the fission product release occurs after the initial blowdown is complete. As such, EN did not credit any reduction in fission products transferred to the wetwell air space by suppression pool scrubbing, assuming instead a well-mixed wetwell air space and drywell after 2 hours.

EN assumes that a portion of the fission products released from the reactor pressure vessel will be removed by drywell sprays. Fission product removal by drywell sprays is credited from 15 minutes through 24 hours based upon the approved methodology. The sprays are operated as directed by the Emergency Operating Procedures (EOPs)/severe accident management guidelines (SAMGs) procedures.

2. The system is provided with emergency power from the emergency diesel generators.
3. The system is subject to American Society of Mechanical Engineers Section XI, Inservice inspection requirements as required by 10 CFR 50.55a, codes and standards.
4. The system is within the scope of the 10 CFR 50.65 Maintenance Rule.
5. Most components (pumps, squib valves, etc.) are redundant in parallel trains powered from different electrical busses. The exceptions are the containment isolation check valves. This is discussed below under single-failure review.
6. Emergency Operating Procedures (EOPs) allow activation of SLC following a LOCA as an alternate injection source for reactor water inventory control. Manual initiation of SLC is directed in the severe accident management guidelines (SAMGs), which are entered when adequate core cooling cannot be maintained.
7. Training will be provided on the new SLC injection function as part of operator re-qualification training and EOP and SAMG training.

The NRC staff considered components that could be subject to single failure. The licensee identified two components, the containment isolation check valves on the injection line as not being redundant. The containment isolation valves are Borg-Warner Lift Check Valves, Model 76797-1 valves, mounted in the injection line. In the periodic inspections and testing of these valves, CGS has not experienced any failures of these valves to open on demand. A review of the industry databases, EPIX and NPRDS, was performed and no failures of check valves of this type and manufacture failing to open were identified. Although acknowledging that a single failure to open of one of the two check valves could prevent SLC injection, the NRC staff has determined that the potential for failure is very low based on the quality as established by its procurement, periodic testing, inspection, and historical performance of the component. The NRC staff finds that the use of a single penetration of the containment with the identified check valves as described by the licensee to be acceptable.

The NRC staff considered the transport of the sodium pentaborate from the reactor vessel to the suppression pool. The SLC system injects the sodium pentaborate to the reactor vessel. The transport of reactor vessel contents, including the sodium pentaborate, to the suppression pool is by flow through the break (assumed to be a large recirculation pipe break) to the drains that feed the suppression pool. Core Spray systems and low-pressure coolant injection (LPCI) systems are used to maintain water level and assure core cooling after a LOCA accident.

Using the LPCI for suppression pool cooling also provides mixing. The NRC staff concluded that there would be mixing and transport at some rate and that it was reasonable to assume the concentration of sodium pentaborate in the core would equalize with the concentration in the suppression pool within an acceptable time after SLC injection. As a consequence, there would be sufficient pH control to deter and prevent iodine re-evolution.

The specific changes being made to TS Section 3.1.7 are the extensions of applicability to MODE 3 and an additional Required Action for Condition C to require Mode 4 if completion times are not met. The extension of applicability to Mode 3 provides the capability of injecting SLC during hot standby. This would not be necessary for the ATWS function of SLC, but is reasonable for the LOCA pH control function. Clarifying the action and response time is

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