TVA

**Tennessee Valley Authority**, 1101 Market Street, LP 5A, Chattanooga, Tennessee 37402-2801

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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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| In the Matter of | ) | Docket Numbers | 52-014 and 52-015 |
| Tennessee Valley Authority | ) | | |

BELLEFONTE COMBINED LICENSE APPLICATION – ENVIRONMENTAL REPORT CHANGES FOR CONSISTENCY WITH REVISION 17 OF THE WESTINGHOUSE AP1000 DESIGN CONTROL DOCUMENT

Reference:
1. Letter from Mr. Ashok S. Bhatnagar (TVA) to Mr. R. William Borchardt, NRC, "Application for Combined License for Bellefonte Units 3 and 4," dated October 30, 2007 [ML073110527].
2. Letter from Mr. Robert Sisk (Westinghouse) to NRC Document Control Desk, "Update to Westinghouse's Application to Amend the AP1000 Design Certification Rule," dated September 22, 2008 [ML083230167].

This letter updates the Environmental Report (ER) for Bellefonte Nuclear Plant, Units 3 and 4 (BLN) Combined License Application (COLA) by providing the changes necessary to reference the current revision, Revision 17, of the AP1000 Design Control Document (DCD).

By letter dated October 30, 2007 (Reference 1), the Tennessee Valley Authority (TVA) submitted an application for a combined license, as defined in 10 CFR 52.1, for two Westinghouse AP1000 simplified passive advanced light water reactor plants at the Bellefonte site. The BLN ER referenced DCD Revision 16, including supplemental material (APP-GW-GLR-134, dated October 2007). By letter dated September 22, 2008 (Reference 2), Westinghouse submitted to the NRC Revision 17 to the AP1000 DCD. This letter updates the BLN ER reference to DCD Revision 17, and provides the changes necessary for consistency with Revision 17. The enclosure to this letter identifies the ER changes that will be made in a future revision of the BLN application and provides a brief description of these changes.

If you should have any questions, please contact Thomas Spink at 1101 Market Street, LP5A, Chattanooga, Tennessee 37402-2801, by telephone at (423) 751-7062, or via email at tespink@tva.gov.

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NRO

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 15th day of Dec, 2008.

Jack A. Bailey

Jack A. Bailey
Vice President; Nuclear Generation Development
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Enclosure: Environmental Report Changes for Consistency with Revision 17 of the AP1000 DCD

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# Environmental Report Changes for Consistency with Revision 17 of the AP1000 DCD

This enclosure provides changes to the Bellefonte Nuclear Plant, Units 3 and 4 (BLN) Applicant's Environmental Report – Combined License Stage (ER), Revision 1, as needed to incorporate by reference Revision 17 of the AP1000 Design Control Document (DCD). The following general ER changes are made to conform to the revised material in Revision 17:

- Administrative changes to update the cited reference from Revision 16 (plus supplemental material) to Revision 17. (Changes 1 and 2)
- Administrative changes to cite 10 CFR 50.34, rather than 10 CFR Part 100, as the source of the reference values for evaluating plant features and site characteristics intended to mitigate radiological consequences of accidents. Because the radiological values specified in 10 CFR 50.34 are the same as the siting criteria of Part 100, these changes are considered administrative, and they do not affect the ER impacts assessment. (Changes 3 and 5)
- Editorial correction to the names of Tables 7.1-9 through 7.1-22 in the Chapter 7 List of Tables. (Change 4)
- Changes to update the loss-of-coolant accident (LOCA) atmospheric dispersion factor ($\chi$/Q) values and resultant dose values based upon DCD Revision 17 changes resulting from the removal of the containment leakage pathway impaction model credit. These changes, which do not affect any accidents other than LOCA, are shown as changes to ER Tables 7.1-9, 7.1-11, 7.1-12, and 7.1-21. (Changes 6 – 9)

The specific changes to the BLN COLA are as follows:

1. Change COLA Part 3, ER, Chapter 1, Section 1.1, first paragraph, to reflect incorporation by reference of Revision 17 of the AP1000 Design Control Document, as follows:

   This ~~application incorporates the Design Control Document (DCD) (Reference 1) for a~~ Environmental Report (ER) is based upon the construction and operation of two simplified passive advanced light water reactor plants provided by Westinghouse Electric ~~Corporation~~ Company, LLC (Westinghouse), the entity originally sponsoring and obtaining the AP1000 design certification documented in 10 CFR Part 52, Appendix D. Additional details of the AP1000 design are provided in the AP1000 Design Control Document (DCD) (Reference 1) submitted by Westinghouse in support of the AP1000 design certification. ~~Throughout this application, the "referenced DCD" is the AP1000 DCD submitted by Westinghouse as Revision 16, including any supplemental material as identified in Reference 2.~~

2. Change COLA Part 3, ER, Chapter 1, Subsection 1.1.1, to reflect incorporation by reference of Revision 17 of the AP1000 Design Control Document, by updating Reference 1 to Rev. 17 and deleting Reference 2, as follows:

   1. Westinghouse Electric Company, LLC, ~~2007~~, AP1000 Design Control Document, APP-GW-GL-700, Revision ~~16~~17, September 2008.
   2. ~~Westinghouse Electric Company, LLC, October 2007, AP1000 Design Control Document Impacts to Support Combined Operating License Application Standardization, APP-GW-GLR-134.~~

3. Change COLA Part 3, ER, Chapter 3, Subsection 3.2.1, to cite 10 CFR 50.34, rather than 10 CFR Part 100, as the source of the radiological consequences reference values, as follows:

   Engineered safety features protect the public in the event of an accidental release of radioactive fission products from the reactor coolant system. The engineered safety features function to localize, control, mitigate, and terminate such accidents and to maintain radiation exposure levels to the public below applicable limits and guidelines, such as those in 10 CFR ~~Part 100~~ 50.34. The following subsections define the engineered safety features.

4. Correct COLA Part 3, ER, Chapter 7, List of Tables (LOT), to reflect the correct names for Tables 7.1-9 through 7.1-22, as shown below. [NOTE: In the LOT, the title for Table 7.1-9 was inappropriately replaced with the title for Table 7.1-10. This error was repeated throughout the remaining tables for Section 7.1, such that the title for Tables 7.1-11 through 7.1-22 was placed next to the table number preceding it. This change corrects these editorial errors in the Chapter 7 LOT.]



5. Change COLA Part 3, ER, Chapter 7, Section 7.1.4, third paragraph, second sentence, to cite 10 CFR 50.34, rather than 10 CFR Part 100, as the source of the radiological consequences reference values, as follows:

   Although NRC Regulatory Guide 1.183 does not address these two accidents, NUREG-0800 indicates that the dose limit is a "small fraction" or 10 percent of the 10 CFR ~~Part 100~~ 50.34 guideline of 25 rem, meaning a limit of 2.5 rem for these accidents.

6. Replace COLA Part 3, ER, Chapter 7, Table 7.1-9, to reflect the revised time-dependent isotopic activities released to the environment following a loss-of-coolant accident resulting from a spectrum of postulated piping breaks, as shown on pages 3 through 5 of this attachment.

TABLE 7.1-9 (Sheet 1 of 3)
ACTIVITY RELEASES FOR LOSS-OF-COOLANT ACCIDENT RESULTING FROM A SPECTRUM OF POSTULATED PIPING BREAKS WITHIN THE REACTOR COOLANT PRESSURE BOUNDARY

Activity Release (Ci)

| Isotope | 0-8 hr | 8-24 hr | 24-96 hr | 96-720 hr | Total |
|---|---|---|---|---|---|
| I-130 | 1.11E+02 | 6.21E+00 | 6.28E-01 | 6.00E-03 | 1.18E+02 |
| I-131 | 3.49E+03 | 2.56E+02 | 1.91E+02 | 5.79E+02 | 4.52E+03 |
| I-132 | 2.14E+03 | 1.62E+01 | 6.00E-03 | 0.00E+00 | 2.16E+03 |
| I-133 | 6.54E+03 | 3.71E+02 | 8.40E+01 | 7.80E+00 | 7.00E+03 |
| I-134 | 1.14E+03 | 3.07E-02 | 0.00E+00 | 0.00E+00 | 1.14E+03 |
| I-135 | 4.90E+03 | 1.56E+02 | 4.80E+00 | 0.00E+00 | 5.06E+03 |
| Kr-85m | 3.77E+03 | 1.87E+03 | 8.60E+01 | 0.00E+00 | 5.73E+03 |
| Kr-85 | 2.97E+02 | 7.06E+02 | 1.59E+03 | 1.36E+04 | 1.62E+04 |
| Kr-87 | 1.95E+03 | 5.00E+01 | 0.00E+00 | 0.00E+00 | 2.00E+03 |
| Kr-88 | 7.26E+03 | 1.70E+03 | 1.70E+01 | 0.00E+00 | 8.98E+03 |
| Xe-131m | 2.94E+02 | 6.79E+02 | 1.37E+03 | 5.57E+03 | 7.92E+03 |
| Xe-133m | 1.54E+03 | 3.15E+03 | 4.11E+03 | 2.58E+03 | 1.14E+04 |
| Xe-133 | 5.19E+04 | 1.16E+05 | 2.06E+05 | 4.07E+05 | 7.81E+05 |
| Xe-135m | 3.59E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.59E+01 |
| Xe-135 | 9.64E+03 | 1.01E+04 | 2.10E+03 | 1.00E+01 | 2.19E+04 |
| Xe-138 | 1.21E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.21E+02 |
| Rb-86 | 6.32E+00 | 2.80E-01 | 1.00E-03 | 8.00E-03 | 6.61E+00 |
| Cs-134 | 5.38E+02 | 2.40E+01 | 1.00E-01 | 1.20E+00 | 5.63E+02 |
| Cs-136 | 1.52E+02 | 6.70E+00 | 0.00E+00 | 2.00E-01 | 1.59E+02 |
| Cs-137 | 3.13E+02 | 1.41E+01 | 0.00E+00 | 7.00E-01 | 3.28E+02 |
| Cs-138 | 3.30E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.30E+02 |
| Sb-127 | 4.81E+01 | 2.14E+00 | 1.00E-02 | 1.00E-02 | 5.03E+01 |

TABLE 7.1-9 (Sheet 2 of 3)
ACTIVITY RELEASES FOR LOSS-OF-COOLANT ACCIDENT RESULTING FROM A SPECTRUM OF POSTULATED PIPING BREAKS WITHIN THE REACTOR COOLANT PRESSURE BOUNDARY

Activity Release (Ci)

| Isotope | 0-8 hr | 8-24 hr | 24-96 hr | 96-720 hr | Total |
|---|---|---|---|---|---|
| Sb-129 | 8.94E+01 | 1.48E+00 | 0.00E+00 | 0.00E+00 | 9.09E+01 |
| Te-127m | 6.30E+00 | 2.95E-01 | 2.00E-03 | 1.30E-02 | 6.61E+00 |
| Te-127 | 3.83E+01 | 1.11E+00 | 0.00E+00 | 0.00E+00 | 3.94E+01 |
| Te-129m | 2.14E+01 | 1.00E+00 | 1.00E-02 | 3.00E-02 | 2.25E+01 |
| Te-129 | 2.84E+01 | 3.00E-02 | 0.00E+00 | 0.00E+00 | 2.84E+01 |
| Te-131m | 6.20E+01 | 2.51E+00 | 0.00E+00 | 1.00E-02 | 6.45E+01 |
| Te-132 | 6.41E+02 | 2.84E+01 | 1.00E-01 | 1.00E-01 | 6.70E+02 |
| Sr-89 | 1.88E+02 | 5.40E+00 | 1.00E-01 | 3.00E-01 | 1.94E+02 |
| Sr-90 | 1.59E+01 | 7.50E-01 | 0.00E+00 | 4.00E-02 | 1.67E+01 |
| Sr-91 | 1.81E+02 | 5.30E+00 | 0.00E+00 | 0.00E+00 | 1.86E+02 |
| Sr-92 | 1.13E+02 | 1.00E+00 | 0.00E+00 | 0.00E+00 | 1.14E+02 |
| Ba-139 | 8.30E+01 | 1.50E-01 | 0.00E+00 | 0.00E+00 | 8.32E+01 |
| Ba-140 | 3.25E+02 | 1.51E+01 | 0.00E+00 | 4.00E-01 | 3.41E+02 |
| Mo-99 | 4.25E+01 | 1.86E+00 | 1.00E-02 | 0.00E+00 | 4.44E+01 |
| Tc-99m | 2.66E+01 | 5.90E-01 | 0.00E+00 | 0.00E+00 | 2.72E+01 |
| Ru-103 | 3.46E+01 | 1.62E+00 | 1.00E-02 | 6.00E-02 | 3.63E+01 |
| Ru-105 | 1.43E+01 | 2.40E-01 | 0.00E+00 | 0.00E+00 | 1.46E+01 |
| Ru-106 | 1.14E+01 | 5.40E-01 | 0.00E+00 | 3.00E-02 | 1.20E+01 |
| Rh-105 | 2.02E+01 | 8.30E-01 | 0.00E+00 | 0.00E+00 | 2.10E+01 |
| Ce-141 | 7.78E+00 | 3.64E-01 | 2.00E-03 | 1.20E-02 | 8.16E+00 |
| Ce-143 | 6.78E+00 | 2.78E-01 | 1.00E-03 | 0.00E+00 | 7.06E+00 |
| Ce-144 | 5.88E+00 | 2.76E-01 | 2.00E-03 | 1.30E-02 | 6.17E+00 |

TABLE 7.1-9 (Sheet 3 of 3)
ACTIVITY RELEASES FOR LOSS-OF-COOLANT ACCIDENT RESULTING FROM A SPECTRUM OF POSTULATED PIPING BREAKS WITHIN THE REACTOR COOLANT PRESSURE BOUNDARY

Activity Release (Ci)

| Isotope | 0-8 hr | 8-24 hr | 24-96 hr | 96-720 hr | Total |
|---|---|---|---|---|---|
| Pu-238 | 1.84E-02 | 8.60E-04 | 0.00E+00 | 4.00E-05 | 1.93E-02 |
| Pu-239 | 1.62E-03 | 7.60E-05 | 1.00E-06 | 3.00E-06 | 1.70E-03 |
| Pu-240 | 2.36E-03 | 1.11E-04 | 1.00E-06 | 5.00E-06 | 2.48E-03 |
| Pu-241 | 5.32E-01 | 2.50E-02 | 1.00E-04 | 1.20E-03 | 5.58E-01 |
| Np-239 | 8.87E+01 | 3.84E+00 | 2.00E-02 | 1.00E-02 | 9.26E+01 |
| Y-90 | 1.60E-01 | 7.00E-03 | 0.00E+00 | 0.00E+00 | 1.67E-01 |
| Y-91 | 2.37E+00 | 1.11E-01 | 1.00E-03 | 4.00E-03 | 2.49E+00 |
| Y-92 | 1.35E+00 | 1.80E-02 | 0.00E+00 | 0.00E+00 | 1.37E+00 |
| Y-93 | 2.28E+00 | 6.80E-02 | 0.00E+00 | 0.00E+00 | 2.35E+00 |
| Nb-95 | 3.19E+00 | 1.49E-01 | 1.00E-03 | 5.00E-03 | 3.34E+00 |
| Zr-95 | 3.17E+00 | 1.49E-01 | 0.00E+00 | 6.00E-03 | 3.33E+00 |
| Zr-97 | 2.74E+00 | 9.80E-02 | 0.00E+00 | 0.00E+00 | 2.84E+00 |
| La-140 | 3.29E+00 | 1.39E-01 | 0.00E+00 | 0.00E+00 | 3.43E+00 |
| La-141 | 1.78E+00 | 2.70E-02 | 0.00E+00 | 0.00E+00 | 1.81E+00 |
| La-142 | 8.31E-01 | 2.00E-03 | 0.00E+00 | 0.00E+00 | 8.33E-01 |
| Nd-147 | 1.23E+00 | 5.70E-02 | 0.00E+00 | 1.00E-03 | 1.29E+00 |
| Pr-143 | 2.78E+00 | 1.28E-01 | 1.00E-03 | 3.00E-03 | 2.91E+00 |
| Am-241 | 2.40E-04 | 1.13E-05 | 0.00E+00 | 6.00E-07 | 2.52E-04 |
| Cm-242 | 5.65E-02 | 2.65E-03 | 2.00E-05 | 1.20E-04 | 5.93E-02 |
| Cm-244 | 6.94E-03 | 3.26E-04 | 1.00E-06 | 1.60E-05 | 7.28E-03 |
| Total | 9.86E+04 | 1.35E+05 | 2.15E+05 | 4.29E+05 | 8.78E+05 |

7. Change COLA Part 3, ER, Chapter 7, Table 7.1-11, to reflect the LOCA χ/Q values in DCD Rev. 17, Table 15A-5, and to indicate that different χ/Q values are used for LOCA and non-LOCA accidents, as follows:

TABLE 7.1-11
ATMOSPHERIC DISPERSION FACTORS

| Accident | Location | Time (hr.) | DCD χ/Q ($s/m^3$) | Site χ/Q ($s/m^3$) | χ/Q Ratio (Site/DCD) |
|---|---|---|---|---|---|
| All Accidents (except LOCA) | EAB | 0 – 2 | 1.00E-03 | 1.04E-04 | 1.04E-01 |
| | LPZ | 0 – 8 | 5.00E-04 | 9.65E-06 | 1.93E-02 |
| | | 8 – 24 | 3.00E-04 | 8.35E-06 | 2.78E-02 |
| | | 24 – 96 | 1.50E-04 | 6.09E-06 | 4.06E-02 |
| | | 96 – 720 | 8.00E-05 | 3.88E-06 | 4.85E-02 |
| LOCA | EAB | 0 – 2 | 5.10E-04 | 1.04E-04 | 2.04E-01 |
| | LPZ | 0 – 8 | 2.20E-04 | 9.65E-06 | 4.39E-02 |
| | | 8 – 24 | 1.60E-04 | 8.35E-06 | 5.22E-02 |
| | | 24 – 96 | 1.00E-04 | 6.09E-06 | 6.09E-02 |
| | | 96 – 720 | 8.00E-05 | 3.88E-06 | 4.85E-02 |

Note: The χ/Q values used for the various postulated non-LOCA accident dose analyses ~~are consistent with DCD Table 15.A-5~~ were provided in Revision 16 of the AP1000 DCD. In DCD Revision 17, the χ/Q values used for the LOCA dose analyses were re-calculated to reflect removal of the containment leakage pathway impaction model credit. The χ/Q values used for the LOCA dose analyses are consistent with DCD, Revision 17, Table 15A-5. It is seen that the site χ/Q values are bounded by the DCD χ/Q values for all time intervals. The site χ/Q values were obtained from Table 2.7-118 of Subsection 2.7.3.

8. Change COLA Part 3, ER, Chapter 7, Table 7.1-12, to reflect the dose values obtained using the LOCA χ/Q values in DCD Rev. 17, Table 15A-5, by updating the EAB and LPZ site dose values for the DCD/SRP Subsection 15.6.5 Loss-of-Coolant-Accident, as follows:

| DCD/SRP Subsection | DCD Description Accident | Site Dose (rem TEDE) EAB | LPZ | Limit[a] | Reference Dose Table |
|---|---|---|---|---|---|
| 15.6.5 | Loss-of-Coolant Accident Resulting from a Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary | ~~1.20~~ 5.02 | ~~0.31~~ 1.04 | 25 | 7.1-21 |

9. Change COLA Part 3, ER, Chapter 7, Table 7.1-21, to provide the DCD and Site LOCA doses based upon the updated $\chi$/Q values in DCD Rev. 17, as follows:

TABLE 7.1-21
DOSES FOR LOSS-OF-COOLANT ACCIDENT RESULTING FROM A SPECTRUM OF POSTULATED PIPING BREAKS WITHIN THE REACTOR COOLANT PRESSURE BOUNDARY

| | DCD Dose (rem TEDE) | | $\chi$/Q Ratio | Site Dose (rem TEDE) | |
|---|---|---|---|---|---|
| Time | EAB[a] | LPZ | (Site/DCD) | EAB | LPZ |
| ~~1.2 – 3.2 hr.[b]~~<br>1.4 – 3.4 hr.[b] | ~~1.15E+01~~<br>2.46E+01 | | ~~1.04E-01~~<br>2.04E-01 | ~~1.20E+00~~<br>5.02E+00 | |
| 0 – 8 hr. | | ~~1.22E+01~~<br>2.17E+01 | ~~1.93E-02~~<br>4.39E-02 | | ~~2.35E-01~~<br>9.52E-01 |
| 8 – 24 hr. | | ~~9.31E-01~~<br>7.50E-01 | ~~2.78E-02~~<br>5.22E-02 | | ~~2.59E-02~~<br>3.91E-02 |
| 24 – 96 hr. | | ~~4.58E-01~~<br>2.93E-01 | ~~4.06E-02~~<br>6.09E-02 | | ~~1.86E-02~~<br>1.78E-02 |
| 96 – 720 hr. | | ~~6.09E-01~~<br>5.49E-01 | 4.85E-02 | | ~~2.95E-02~~<br>2.66E-02 |
| Total | ~~1.15E+01~~<br>2.46E+01 | ~~1.42E+01~~<br>2.33E+01 | | ~~1.20E+00~~<br>5.02E+00 | ~~3.10E-01~~<br>1.04E+00 |
| Limit | | | | 25 | 25 |

a) EAB dose obtained from Subsection 15.6.5.3.8.1 and Table 15.6.5-3 of the DCD.

b) Per DCD Section 15.6.5.3.8.1, the reported exclusion area boundary doses are for the time period of ~~1.2 – 3.2~~ 1.4 – 3.4 hr. This is the 2-hr. interval that has the highest calculated doses. ~~The dose that would be incurred over the first 2 hr. of the accident is well below the reported dose.~~