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

January 30, 2009

10 CFR 52.79

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

In the Matter of) Docket No. 52-014 and 52-015
Tennessee Valley Authority)

BELLEFONTE COMBINED LICENSE APPLICATION – RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION – SHORT TERM ATMOSPHERIC DISPERSION ESTIMATES FOR ACCIDENT RELEASES

Reference: 1) Letter from Joseph Sebrosky (NRC) to Andrea L. Sterdis (TVA), Request for Additional Information Letter No. 119 Related to SRP Section 02.03.04 for the Bellefonte Units 3 and 4 Combined License Application, dated August 08, 2008

2) Letter from Andrea L. Sterdis (TVA), to Document Control Desk (NRC) Response to Request for Additional Information Letter No. 119 Related to SRP Section 02.03.04 for the Bellefonte Units 3 and 4 Combined License Application, dated September 5, 2008

This letter provides the Tennessee Valley Authority's (TVA) supplemental response to the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) item included in the reference letter. This supplemental response results from internal review of the previous response and completely supersedes the previous response.

A response to the NRC request in the subject letter is addressed in the enclosure which does not identify any associated changes to be made in a future revision of the BLN application. Please note that this transmittal includes a CD data disk that contains input files necessary for the NRC Staff to perform confirmatory analyses.

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

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

Executed on this 30th day of Jan, 2009.

Jack A. Bailey
Vice President, Nuclear Generation Development

D085
NRO

Enclosure
cc: See Page 3

cc: (w/ Enclosures)
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Enclosure
TVA letter dated January 30, 2009
RAI Response

Responses to NRC Request for Additional Information letter No. 119 dated August 8, 2008
(6 pages, including this list)

Subject: Short Term Atmospheric Dispersion Estimates for Accident Releases in the Final Safety Analysis Report

RAI Number	Date of TVA Response
02.03.04-05	September 5, 2008 as supplemented by this letter – see following pages

Associated Additional Attachments / Enclosures	Pages Included
Attachment 02.03.04-05A	Electronic Files (1 page cover)

NRC Letter Dated: August 8, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 02.03.04-05

The applicant has taken a departure in FSAR Chapter 18, Human Factors Engineering, in that the Bellefonte TSC is not located in the control building as identified in the AP1000 DCD (Departure No. BNL DEP 18.8-1). Provide a description of the methodology, inputs, assumptions, and calculated atmospheric dispersion factors (χ/Q values) for releases from the Plant Vent, PCS Air Diffuser, Fuel Building Blowout Panel, Fuel Building Rail Bay Door, Steam Vent, PORV/Safety Valves, Condenser Air Removal Stack, and Containment Shell to the Technical Support Center (TSC). Information provided should be analogous to that provided for releases to the control room and include drawings to show relevant information graphically. Consider providing the computer input files as part of the response.

In accordance with SRP 15.0.3, SRP Acceptance Criteria 3, Technical Support Center Radiological Habitability, information regarding the TSC χ/Q values is needed to verify that Bellefonte meets Paragraph IV.E.8 of Appendix E to 10 CFR Part 50 concerning TSC habitability. Revise the Bellefonte FSAR so that it provides this information.

BLN RAI ID: 2393

BLN RESPONSE:

During recent revisions to incorporate changes from the AP1000 DCD Revision 17, the conservative release heights were also revised. The release height revision and the revised atmospheric dispersion factors (χ/Q values) are provided in the revised response below.

Standard Review Plan 15.0.3 states that the radiation protection design of the Technical Support Center (TSC) is acceptable if the total calculated radiological consequences for the postulated fission product release fall within the exposure acceptance criteria specified for the control room of 5 rem TEDE for the duration of the accident. Atmospheric dispersion factors (χ/Q) values are a required input to radiological evaluations. However, no specific regulatory guidance is provided as to where the TSC atmospheric dispersion and radiological evaluations should be placed in the FSAR. Therefore, this response provides the requested description of the methodology, inputs, assumptions, and calculated atmospheric dispersion factors (χ/Q values), but makes no combined license application changes.

The atmospheric dispersion estimates for the Bellefonte Nuclear Plant Units 3 and 4 (BLN) Technical Support Center (TSC) were calculated using the guidance provided in Regulatory Guide 1.194 and the ARCON96 computer code (NUREG/CR-6331). ARCON96 input files are provided in electronic format in Attachment 02.03.04-05A.

ARCON96 uses meteorological data in the form of hourly electronic meteorological data files including the day of the year, the hour of the day, the stability, the wind direction, and wind speed at the lower measurement level. The meteorological data used in the TSC calculation is the BLN onsite meteorological data for the year beginning April 1, 2006 and ending March 31, 2007. Atmospheric stability was determined by the vertical temperature difference (ΔT) measured over the difference in measurement height and the stability classes given in Regulatory Guide 1.23.

The TSC is located in the east end of the BLN maintenance building as shown in the Site Layout, FSAR Figure 1.1-202. Exact locations of the receptors of interest, the TSC HVAC intake and facility entrance, are not yet final; therefore, they are conservatively assumed to be located on the wall of the new maintenance building closest to Unit 3 at an elevation of 1.5 m (see Figure 02.03.04-05A below).

The AP1000 release locations are given on DCD Figure 15A-1 and Table 15A-7. When these locations are transposed onto the BLN Site Layout as shown in Figure 02.03.04-05A, it can be seen that the general

direction from the assumed TSC receptors to the majority of the release locations is very similar. The release locations that are closest to the TSC are the containment shell, the plant vent, the fuel building blowout panel, and the radwaste building truck staging area door. According to the AP1000 DCD Table 15A-6, the fuel building blowout panel and the radwaste building truck staging area door are release locations associated with spent fuel pool boiling and the fuel handling accident (FHA) occurring outside containment, respectively. Spent fuel pool boiling occurs as a result of loss of spent fuel pool cooling. The 30-day contribution of pool boiling to the dose at the low population zone boundary is less than 0.01 rem TEDE (see DCD Subsection 15.6.5.3). The duration of the FHA is two hours. In addition, the offsite doses are 25 percent or less than the dose guideline of 25 rem TEDE identified in 10 CFR 50.34 (see DCD Subsection 15.7.4.5). The limiting AP1000 offsite radiological consequences are associated with a LOCA with core melt scenario (see DCD Table 15.6.5-3). Therefore, since the distance and direction to the containment shell and plant vent are similar and the release height of the containment shell is lower, the containment shell is the most conservative LOCA release location to consider in the evaluation of TSC atmospheric dispersion values. Therefore, a LOCA release from the containment shell is conservatively assumed.

The containment shell is a diffuse area source. The height and width of the area source are taken as the maximum vertical and horizontal dimensions of the above grade shield building cross-sectional area perpendicular to the line of sight from the building center to the TSC receptor location. The area of the containment obscured by the radwaste and auxiliary building was determined and subtracted from the total projected area of the containment to determine a representative area of the diffuse source, i.e., 36.6 m (120.1 ft) high by 44.2 m (145 ft) wide. The release height is set at the vertical center of the projected plane. The source-to-receptor distance is measured from the shield building to the TSC intake. Based on this approach, the vertical and horizontal diffusion coefficients are determined to be 6.1 m (20.0 ft) and 7.4 m (24.2 ft), respectively. The release height is at elevation 64.7 m (212.3 ft) or 34.2 m (112.3 ft) above grade. The horizontal distance from the projected plane of the Unit 3 containment to the TSC HVAC inlet is 91 m and the horizontal distance from the projected plane of the Unit 4 containment to the TSC HVAC inlet is 224 m as given in Table 02.03.04-05A below.

The direction to the source is used to establish which range of wind directions should be used in the assessment of the χ/Q values. The direction must have the same point of reference as the wind directions reported in the meteorological data; therefore, the directions from the receptors to the sources obtained from the Site Layout, are measured relative to True North. The receptor distances and directions used in this analysis are reported in Table 02.03.04-05A, below.

Table 02.03.04-05A

TSC HVAC Intake (El. 1.5 m) Distances and Directions

Release Point	Distance (m)	Direction to Source (°)
Unit 3 Containment Shell	91	234
Unit 4 Containment Shell	224	157

The ARCON96 code uses the building area in determining the wake diffusion. The area of the building to be used in the determination of building wake effects is conservatively estimated as the above grade, cross-sectional area of the shield building which is determined to be 2842 m^2.

The releases are assumed to be ground level releases. Consistent with Regulatory Guide 1.194 guidance, a surface roughness of 0.2 and an averaging sector width constant of 4.3 are assumed for this application. A minimum wind speed of 0.45 m/s associated with Bellefonte met tower wind and direction instrumentation verification is assumed.

The site-specific TSC atmospheric dispersion values determined for Bellefonte Nuclear Plant Units 3 and 4 are given in Table 02.03.04-05B. The TSC atmospheric dispersion values determined for an accident at Unit 3 bound the values determined for an accident at Unit 4; therefore, the Unit 3 values are used to determine bounding radiological consequences for the TSC.

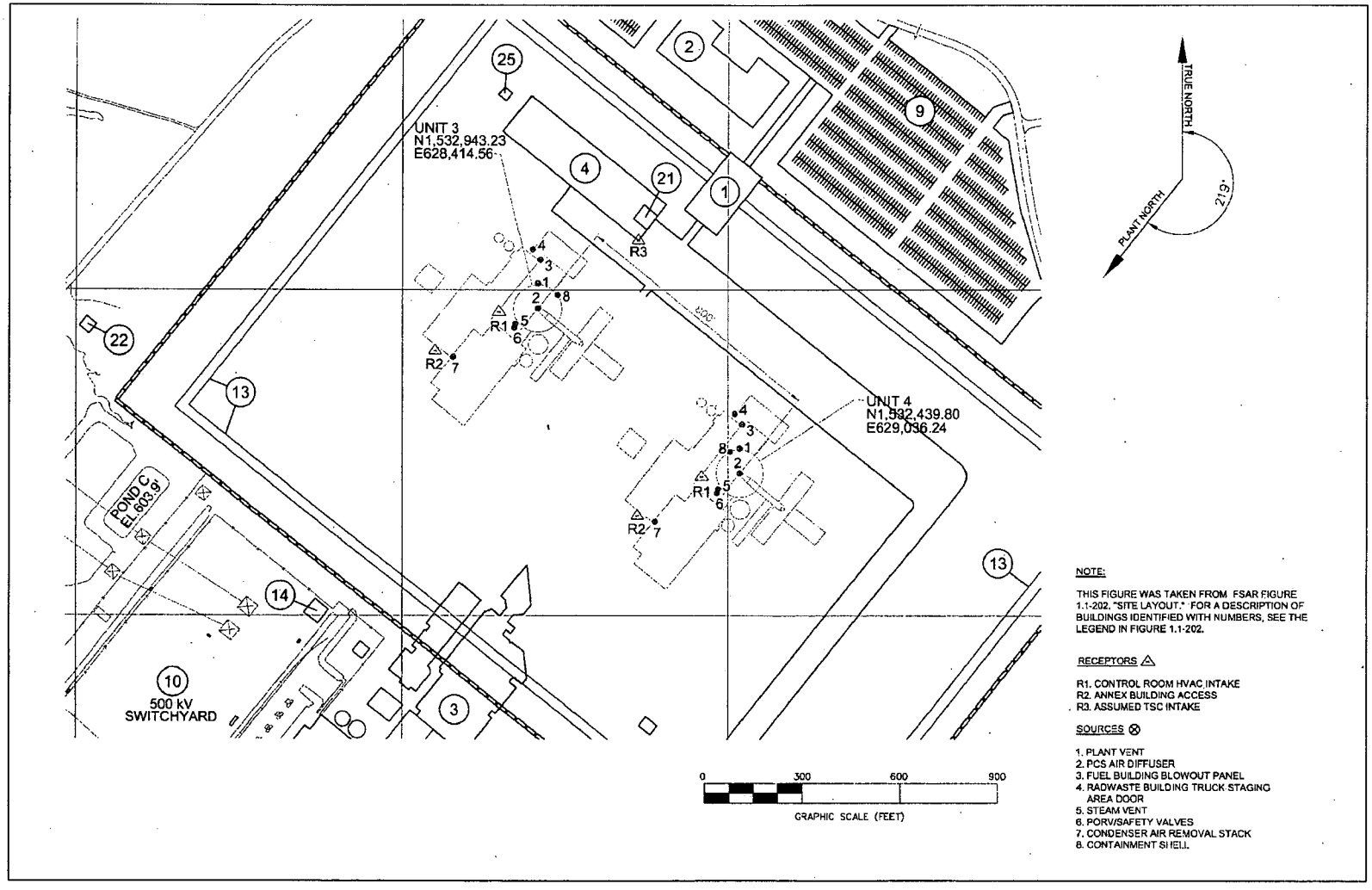
Table 02.03.04-05B

TSC Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis (s/m^3)

Time Interval	Unit 3 Containment Shell Release	Unit 4 Containment Shell Release
0 – 2 hours	4.05E-04	1.06E-04
2 – 8 hours	3.16E-04	7.18E-05
8 – 24 hours	1.44E-04	2.94E-05
1 – 4 days	1.09E-04	2.22E-05
4 – 30 days	8.43E-05	1.59E-05

Enclosure
TVA letter dated January 30, 2009
RAI Response

Figure 02.03.04-05A



This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

No COLA revisions have been identified associated with this response.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

Attachment 02.03.04-05A Revised ARCON96 Input Files on Compact Disk

Attachment 02.03.04-05A

(1 page and electronic files on CD)

ARCON96 BLN TSC Evaluation Input Files

Contained files:

Bellefonte Unit 3 TSC Evaluation	CNT3REV1.RSF (1 KB)
Bellefonte Unit 4 TSC Evaluation	CNT4REV1.RSF (1 KB)