



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

September 5, 2008

10 CFR 52.79

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

In the Matter of)
Tennessee Valley Authority)

Docket No. 52-014 and 52-015

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

Reference: 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
Belleville Units 3 and 4 Combined License Application, dated August 08, 2008

This letter provides the Tennessee Valley Authority's (TVA) response to the Nuclear Regulatory
Commission's (NRC) request for additional information (RAI) items included in the reference
letter.

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.

The attached CD-ROM provides the requested electronic data files identified in the BLN
responses. As discussed previously with NRC project management, the data provided on the CD-
ROM is of a nature that is not easily converted to PDF output files.

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 5th day of Sep, 2008.

Andrea L. Sterdis
Manager, New Nuclear Licensing and Industry Affairs
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Enclosure
cc: See Page 2

D085
NRO

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cc: (w/Enclosures)

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Enclosure
TVA letter dated September 5, 2008
RAI Response

Response 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

<u>RAI Number</u>	<u>Date of TVA Response</u>
02.03.04-05	This letter – see following pages

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

Enclosure
TVA letter dated September 5, 2008
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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: 1169

BLN RESPONSE:

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 60.0 m (196.7 ft) or 29.5 m (96.7 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 m².

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.

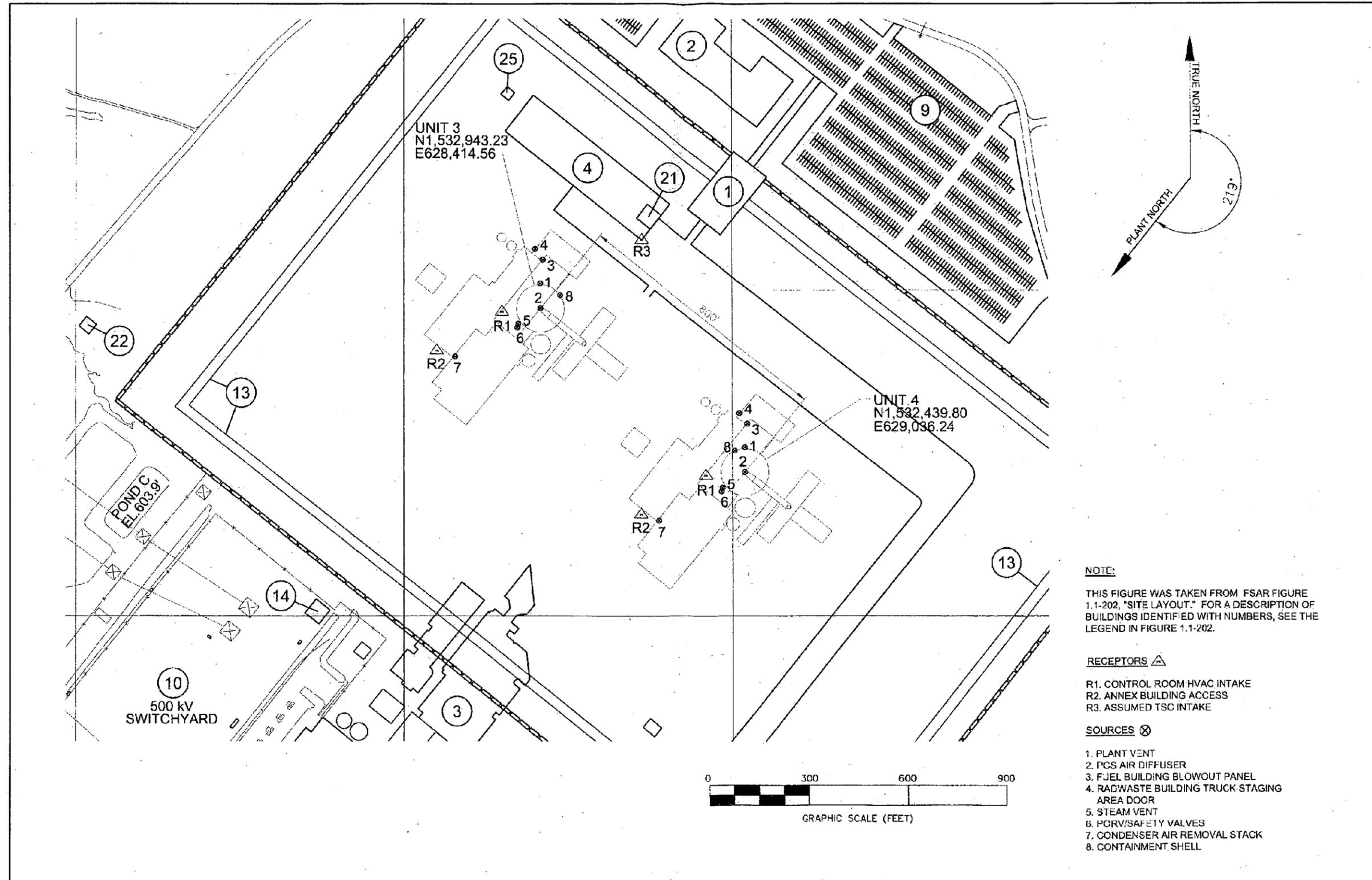
Enclosure
TVA letter dated September 5, 2008
RAI Response

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	4.1E-04	1.1E-04
2 – 8 hours	3.1E-04	7.0E-05
8 – 24 hours	1.4E-04	2.6E-05
1 – 4 days	1.1E-04	2.2E-05
4 – 30 days	9.2E-05	1.7E-05

Figure 02.03.04-05A



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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

ARCON96 Input Files on Compact Disk

Attachment 02.03.04-05A
TVA letter dated September 5, 2008
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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	TSC-CNT3.RSF (1 KB)
Bellefonte Unit 4 TSC Evaluation	TSC-CNT4.RSF (1 KB)