



Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802
Tel 501 858 5000

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U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Response to Request for Additional Information on Meteorological
Data Regarding the ANO-2 Power Uprate License Application

Gentlemen:

In a letter dated December 19, 2000 (2CAN120001), Entergy Operations, Inc. submitted a license application for Arkansas Nuclear One, Unit 2, (ANO-2) to increase the authorized power level from 2815 megawatts thermal to 3026 megawatts thermal. On August 14, 2001, personnel from the dose assessment branch asked six questions regarding the meteorological data supporting the application. The attachment contains the responses to the staff's questions. Also, a CD-ROM is enclosed that includes a Portable Data File (PDF) copy of this letter and meteorological data from 1995 through 1999. This meteorological data was used in determining the χ/Qs used in the power uprate effort. Consistent with the staff's request, the data is provided in the ARCON96 format described in NUREG/CR-6331, "Atmospheric Relative Concentrations in Building Wakes." This submittal contains no regulatory commitments.

I declare under penalty of perjury that the foregoing is true and accurate. Executed on October 1, 2001.

Very truly yours,

A handwritten signature in cursive script that reads "Glenn R. Ashley".

Glenn R. Ashley
Manager, Licensing

GRA/dwb
Attachment/enclosure

*A Po1
Rec'd w/
CD-ROM*

cc: Mr. Ellis W. Merschoff
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Arkansas Nuclear One
P.O. Box 310
London, AR 72847

Mr. Thomas W. Alexion
NRR Project Manager Region IV/ANO-2
U. S. Nuclear Regulatory Commission
NRR Mail Stop 04-D-03
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

**Response to NRC Staff Request for Additional Information on
Meteorological Data Regarding the ANO-2 Power Uprate License Application**

NRC Question 1 - Quality of meteorological data

Confirm that, overall, the meteorological data used in the assessment are of high quality and suitable for use in the assessment of the atmospheric dispersion to which it was applied. During the period of data collection, was the tower base area on the natural surface (e.g., short natural vegetation) and the tower free from obstructions (e.g., trees, structures) and micro-scale influences to ensure that the data were representative of the overall site area? Did the measurement program meet the guidelines of Regulatory Guide (RG) 1.23, "Onsite Meteorological Programs," including factors such as maintaining good siting, instruments within specifications, and adequate data recovery and quality assurance checks? If deviations occurred, describe such deviations from RG 1.23 guidance and why the data are still deemed to be adequate. What types of quality assurance checks were performed on the meteorological measurement systems prior to and during the periods of collection to assure that the data are of high quality? Were calibrations properly performed and systems found to be within guideline specifications for the use of the data? What additional checks and at what frequency were the checks performed on the data following collection and prior to input into the atmospheric dispersion calculations to assure identifying any problems in a timely manner and flagging data of questionable quality? Were the data compared with other site historical or regional data and, if so, what were the findings? The intent of these questions is to assess the overall quality of the meteorological data. A detailed response for each individual data point is not expected.

ANO Response

The ANO meteorological program meets the guidelines of Regulatory Guide (RG) 1.23, "Onsite Meteorological Programs." Compliance with RG 1.23 is documented in numerous NRC inspection reports. Quality and suitability of data has been assured since at least 1986 when a new meteorological tower was installed. One of the design requirements for the new tower/components was to comply with RG 1.23. The new tower was installed to improve the reliability of meteorological data. The upgrade included the installation of a new tower, new instruments and a SUM-X data recorder to facilitate a data validation program. Data validation of the new tower/components was performed following installation of the new tower.

Meteorological tower components are tested in accordance with a surveillance test procedure once every six months. This testing was initiated following installation of the tower and has continued since installation. This test procedure complies with RG 1.23 requirements. Calibration from the sensors through the output devices in the control rooms is conducted by Instrumentation and Controls Department personnel. Procedures used for this calibration include accuracy specifications to allow an evaluation of data quality and potential reportability to the NRC. The surveillance programs in effect are

adequate to ensure quality of data from the meteorological monitoring system. The tower components are verified to be operating correctly or are adjusted, repaired or replaced to assure continued compliance. Deficiencies found in tower equipment are promptly identified and resolved in accordance with the station corrective action program. Good siting has been maintained consistent with RG 1.23 guidance and instruments are maintained within specifications as discussed above. Adequate data recovery is also assured. During the period of data collection, the cumulative data recovery was 98%. Regarding data quality, a data validation process is in place to exclude inaccurate meteorological monitoring data from the performance reports. Occasionally, the data collection capability is lost due to failures, repair or calibration. When this occurs, data is manually invalidated for the time the meteorological tower was out of service. An "Out-of-Service Log" documents the length of time the component is unavailable and which parameter is affected.

During the period of data collection, there were no known obstacles placed or stored in the area surrounding the meteorological tower. Subsequent to the data collection period, in the summer of 2000, pine tree seedlings were planted in the area surrounding the meteorological tower. However, the seedlings were promptly removed when the individuals responsible for planting the trees were informed that trees or other obstructions were forbidden in the area because they could interfere with the wind flow distribution. The newly planted seedlings were approximately 1 foot tall when removed.

The ANO raw meteorological data files were formatted for use in ARCON96. They were then hand corrected to incorporate corrections for bad data and equipment outages identified in the semi-annual effluent reports. The files were also reviewed against the semi-annual effluent reports for accuracy and completeness. A limited comparison of offsite accident χ/Q 's resulting from historical ANO meteorological data (1972 - 1973) and more recent data (1995 and 1997) was performed. The results from the historical data and the new data were comparable.

NRC Question 2 - Provide meteorological data

Provide an electronic copy of the meteorological data used to calculate the relative concentration (χ/Q) values. Data should be provided either in the format specified in Appendix A to Section 2.7, "Meteorology and Air Quality," of draft NUREG-1555, "Environmental Standard Review Plan," or in the ARCON96 format described in NUREG/CR-6331, "Atmospheric Relative Concentrations in Building Wakes." Data may be provided in compressed form, but a method to decompress the data should be provided. If the ARCON96 format is selected when providing data, the atmospheric stability categorization should be based on the delta-T methodology. Any missing data should be designated by completely filling the field for that parameter with 9's.

ANO Response

The meteorological data from 1995 through 1999 is provided on a CD-ROM that is enclosed with this letter. This data was used in ARCON96 for the determination of the χ/Q s used in the power uprate effort. The data is provided in the ARCON96 format with the atmospheric stability categorization based on methods presented in RG 1.23 using temperature change with height assumptions. Missing data has been designated in the file by completely filling the fields with 9's.

NRC Question 3 - Describe inputs, assumptions and bases

From where are the emergency core cooling system (ECCS) releases assumed to occur? Also, for the fuel handling accident and ECCS releases, provide the release heights and distances and directions from the intake location to the release locations, and assumptions and bases used with the ARCON96 methodology so as to result in the limiting dose for the accident scenario. A copy of the ARCON96 printouts is acceptable to show inputs. Were the physical heights of the fuel building exhaust fan and ECCS release locations assumed? Are distances for these postulated releases the shortest distance from the postulated release location to the intake location?

ANO Response

Two locations were considered in determining the χ/Q s for the maximum hypothetical accident (MHA) analysis; containment surface and the penetration room ventilation system discharge to the containment flute. The penetration room ventilation system is assumed to collect the gaseous effluents from the ECCS leakage and discharge it to the containment flute. No credit is taken for processing by the penetration room ventilation system. The containment flute is closest to the control room intake locations for ECCS leakage considerations. The distance to the control room intake from containment was taken at the shortest distance to the surface rather than an average distance. The limiting χ/Q from these two locations was then used for all of the releases for the MHA event. The heights, distance and directions for these locations can be found in Section 7.3.10.4 of Enclosure 5 to our power uprate license application dated December 19, 2000 (2CAN120001). The physical heights of the release locations were assumed and modeled as a "ground release" type. Additional information with respect to the ARCON96 input assumptions assumed for the MHA analysis were described in the attachment to our letter dated August 4, 2000 (2CAN080004), except as modified by the information provided in the December 19, 2000, license application.

The ARCON96 input assumptions for the fuel handling accident are consistent with those presented in the attachment to the August 4, 2000, letter with the following clarifications:

- a. Even though the ventilation air from the fuel handling floor area is exhausted out a containment flute, the source is conservatively modeled as a "ground release". The

containment flute location results in a more conservative dispersion factor than the containment.

b. Release Data:

Release Source	Release Height above Grade (m)	Horizontal Distance to Intake (m)		Direction from Intake to Release Source (north is 0°)	
		VPH-1	VPH-2	VPH-1	VPH-2
Flute	54.53	56.5	68.01	332°	337°

NRC Question 4

Provide references to figures showing structures, dimensions, and distances helpful in describing the postulated transport of the effluent. Are all directional inputs defined in terms of true north? If the figures are drawn to plant or magnetic north, what is the relationship to true north? If more than one release to the environment/transport scenario could occur (e.g., loss of offsite power and non-loss of offsite power, single failure), were comparative χ/Q calculations made to ensure consideration of the limiting dose?

ANO Response

Yes, comparative χ/Q calculations were made to ensure consideration of the limiting dose. Figures 1 and 2 are schematics of the layout from the release locations to the control room intake locations. These schematics have been taken from the plant figures, which are drawn in relation to true north. The magnetic declination at the ANO-2 site is very small, less than 3 degrees. Consideration of various intake locations has been described in the attachment to the August 4, 2000, letter. These various intake locations and release points have taken into account the considerations of single failures of the redundant control room ventilation fans and loss/non-loss of offsite power. Ventilation Penthouse 1 (VPH-1) and VPH-2 located on top of the auxiliary building roof were determined to be the two most significant intake locations. The potential release locations have been identified above, in the attachment to the August 4, 2000, letter and in Section 7.3.10.4 of Enclosure 5 to the December 19, 2000, license application. The relative location from the release points to both intake locations has been provided and considered in determining the limiting dispersion factors.

NRC Question 5

Reference 7.3-8 of the enclosure to the December 19, 2000, letter states that the stability categorization is based upon methods described in Regulatory Guide 1.23. Does this mean that the delta-T method was used? Also, that reference notes that use of the ground level release option when using the ARCON96 computer code does not require input of

vertical velocity, stack flow or stack radius. However, if stack flow values were input, what values were used and what is the justification for assuming that the flows can be maintained during the course of the accident assuming the occurrence of problems such as loss of offsite power or single failure?

ANO Response

As indicated in the response to question 2, the atmospheric stability categorization is based on methods presented in Regulatory Guide 1.23 using temperature change with height assumptions. The ground level release option was assumed, hence, stack flows were not used.

NRC Question 6

Control room χ/Q values in Table 2.2-11B, p. 12, of Attachment 4 to the July 3, 2001, submittal do not match χ/Q values referenced in some other parts of the submittals provided to support the power uprate amendment. Were the χ/Q values cited in Attachment 4 used in the dose assessment? If so, how were they used and what are the inputs and assumptions upon which they are based?

ANO Response

No, the χ/Q values cited in Attachment 4 were not used in dose assessment. The χ/Q values in Table 2.2-11B were used in revision 0 of the calculation for consideration of control room doses. These χ/Q values were updated in later calculation revisions to the following values:

Time Period	From Atmospheric Dump Valves (s/m³)	From Main Steam Safety Valves (s/m³)	From Main Steam Line Break Pipe (s/m³)
0-2 hr	6.31E-04	8.05E-04	5.48E-04
2-8hr	3.65E-04	4.64E-04	3.23E-04

These newer χ/Q values were applied in Appendix D of the calculation. Appendix D was not included in the July 3, 2001 (2CAN070103) submittal. This appendix essentially repeated the control room dose calculations utilizing the updated dispersion factors. The results from Appendix D have been used to confirm that the MHA control room dose remains the bounding analysis. The updated χ/Q values were calculated based on the assumptions presented in the attachment to the August 4, 2000 letter.

Figure 1

**Position of the ANO-2 Fuel Handling Area
release duct in relation to VPH-1 and VPH-2**

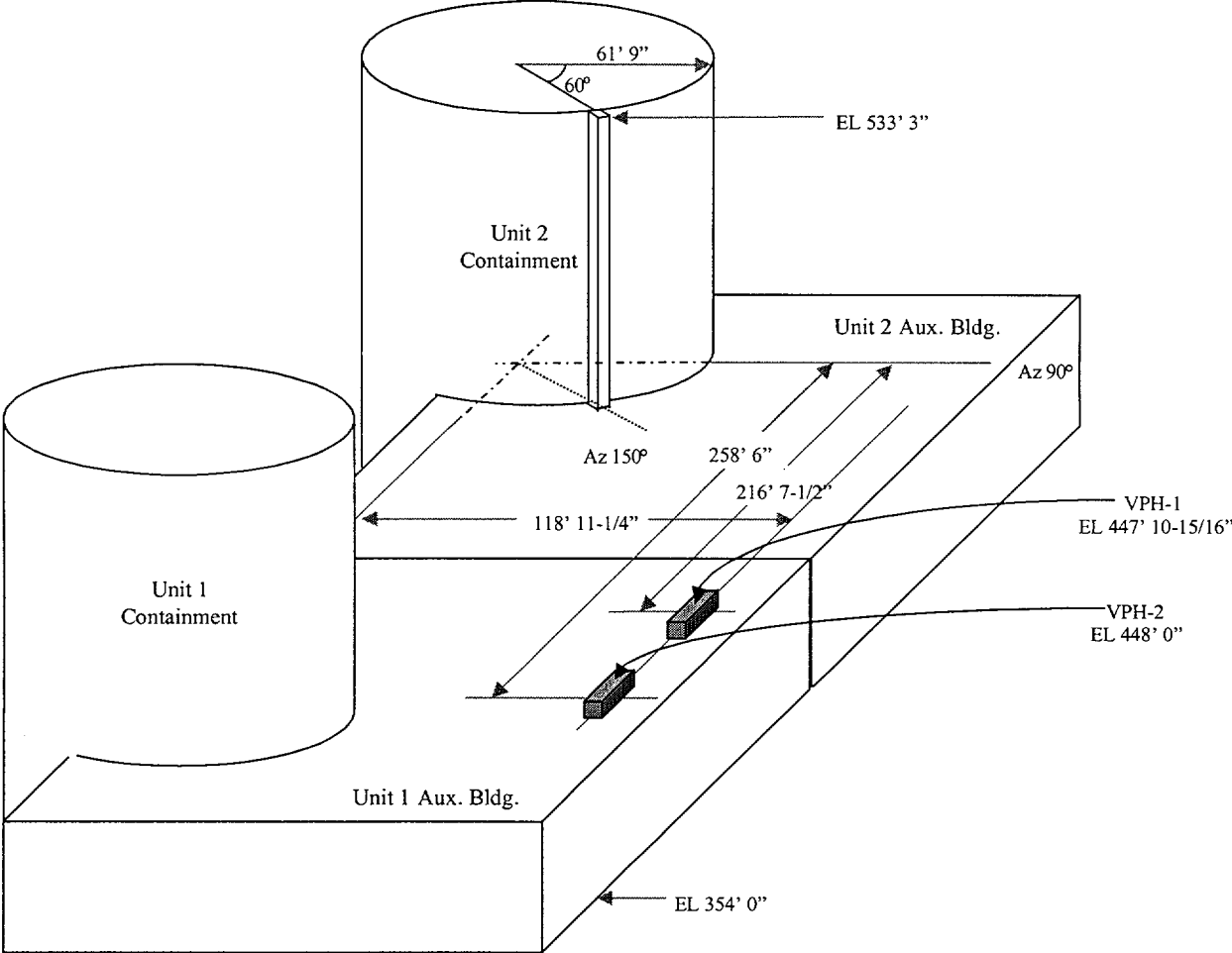


Figure 2

Typical configuration and dimensions between the
ANO-2 containment and intake structures VPH-1 & VPH-2

