Attachment 7

CALCULATION NO: H-1-ZZ-MDC-1879 Rev. 0IR2

Control Room Q/Qs for FRVS, RBTB, TBL, & SPV Using ARCON96 Code
The purpose of this calculation is to determine 95% atmospheric dispersion factors ($\chi/Q_s$) at the Hope Creek Generating Station (HCGS) control room (CR) air intake due to the post-accidental releases from the Filtration Recirculation and Ventilation System (FRVS) Vent, Reactor Building Truck Bay (RBTB), Turbine Building Louver (TBL), Turbine Building Roof Vent (TBV), South Plant Vent (SPV), and Technical Support Center (TSC) air intake due to FRVS vent and TBL.

The CR and TSC $\chi/Q_s$ are calculated using the NRC-Sponsored computer code ARCON96 and 7-year HCGS plant specific meteorological data. All releases are assumed to be ground-level releases (zero exit velocity) with proper elevations of the release points to take the credit of appropriate site-specific meteorological data.

Additionally, ARCON96 computer code is verified by running the code test cases and validated by comparing their results. The 10 CFR 50.59 evaluation for DCP 4EC-3513, Package No. 1, Rev 1, applies to this documentation, which is CD P605.

CONCLUSIONS:

The 95% CR atmospheric dispersion factors $\chi/Q_s$ for the FRVS, reactor building truck bay, turbine building louver, south plant vent, and technical support center are summarized in the Sections 8.1 through 8.4. The 95% TSC $\chi/Q_s$ for the FRVS vent and TBL are summarized in Sections 8.6 & 8.7. All releases are assumed to be ground-level releases and vent release mode (mixed mode) is not credited. These $\chi/Q_s$ should be used for the design basis accident analyses based on the potential release paths.

The verification & validation of ARCON96 computer code (Section 8.5) demonstrates that the ARCON96 code produces the consistent results for the test cases.
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REVISION HISTORY

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<td>Revised to include the $\chi/Q_s$ for Technical Support Center air intake due to releases from FRVS vent and TBL.</td>
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<td>Revised to include the correction for true north $V_s$ plant north, more conservative vertical and horizontal diffusion coefficients for TBL release, and added $\chi/Q_s$ values for turbine building roof vent release.</td>
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1.0 PURPOSE

The purpose of this calculation is to determine 95% atmospheric dispersion factors ($\chi/Q_s$) (relative concentrations) at the Hope Creek Generating Station (HCGS) control room (CR) air intake due to the post-accidental releases from the following locations:

1. Filtration Recirculation and Ventilation System (FRVS) Vent Release
2. Reactor Building Truck Bay (RBTB)
3. Turbine Building Louver (TBL)
4. South Plant Vent (SPV) (Non-Loss of offsite power (LOOP) event)
5. Turbine Building Roof Vent (TBV)

Additionally, the $\chi/Q_s$ for technical support center (TSC) air intake due to releases from FRVS vent and TBL are analyzed.

The control room air intake $\chi/Q_s$ are calculated using the NRC-sponsored computer code ARCON96 (Ref. 2) and 7-year HCNGS plant specific meteorological data (Ref. 1). The recommendation provided in the draft NEI 99-03 (Appendix D) for ARCON96 code to avoid use of the Vent Release Model (mixed mode release) in design basis accident applications is implemented. All releases are treated as ground-level releases (zero exit velocity) with the corresponding elevations of the release points to take the credit of appropriate site-specific wind speeds.

ARCON96 computer code is verified by running the code test cases and validated by comparing the results.
2.0 BACKGROUND

The proposed elimination of the MSIV sealing system involves additional release paths that are not considered in our current LOCA radiological consequence analysis. The post-LOCA MSIV leakage activity can potentially be either released to environment via SPV when the offsite power is available or TBL during the LOOP.

Similarly, the truck bay door is a release path during an FHA if a proposal to eliminate the requirement to maintain secondary containment integrity when irradiated fuel is being handled in the secondary containment and during core alterations and operations with a potential for draining the reactor vessel is implemented.

The atmospheric dispersion factors $\chi/Q$s for these additional release paths are not readily available. Therefore, they are calculated in the following section using the ARCON96 computer code. Since the ARCON96 code is used for the new release paths, the existing FRVS $\chi/Q$s are revised using the ARCON96 code to provide the consistent basis for the CR $\chi/Q$s from all release locations. Also, $\chi/Q$s for the technical support center are calculated.

3.0 ANALYTICAL APPROACH

The ARCON96 computer code (Ref. 10.2) was developed for the U.S. Nuclear Regulatory Commission Office Of Nuclear Reactor Regulation for use in control room habitability assessments. The ARCON96 code uses hourly meteorological data and recently developed methods for estimating dispersion in the vicinity of buildings to calculate relative concentrations at control room air intakes that would be exceeded no more than five percent of the time. These concentrations are calculated for averaging periods ranging from one hour to 30 days in duration.

The locations of release point of interest are configured with respect to the CR air intake location based on the dimensions given in the building arrangement drawings to establish the cross-section areas of structures, which control the downwind distance of building-wake (see Figures 1 through 5). Various receptor data (Ref. 10.2,
The meteorological data files were developed based on the 7-year site-specific meteorological measurements calculated for a period 1988 through 1994 (Ref. 10.1) and used for ARCON96 meteorological input (Ref. 10.2, pages 13 & 14). The required receptor and source input data are tabulated with Figures 1 through 5.
### 4.0 DESIGN INPUT PARAMETERS

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<td>Ref. 10.1 &amp; 10.22</td>
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<td>CR Air Intake Data</td>
<td>Figure 1</td>
<td>Ref. 10.5 thru 10.7</td>
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<td>FRVS Source Data</td>
<td>Figure 1</td>
<td>Ref. 10.10 thru 10.16, &amp; 10.19</td>
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<td>RBTB Source Data</td>
<td>Figure 2</td>
<td>Ref 10.8 &amp; 10.19</td>
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<td>TBL Source Data</td>
<td>Figure 3</td>
<td>Ref. 10.8, 10.10, 10.19, &amp; 10.21</td>
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<td>SPV Source Data</td>
<td>Figure 4</td>
<td>Ref. 10.8 thru 10.15, &amp; 10.19</td>
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<td>TSC Air Intake Data</td>
<td>Figure 5</td>
<td>Ref. 10.8, 10.24 thru 10.27</td>
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<tr>
<td>TBV Source Data</td>
<td>Figure 6</td>
<td>Ref. 10.28</td>
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</table>
5.0 ASSUMPTIONS

1. The FRVS vent release is assumed to be a ground-level point source release (equivalent to capped vent release with zero exit velocity) because the exhaust from the FRVS vent is disperse horizontally in downwind or upwind direction (Ref. 10.16) and it completely gets trapped in the building-wake.

2. The RBTB release is assumed to be a ground-level point source release (Ref. 10.8).

3. However, the release from the SPV is directly released to the environment with a high exit velocity (Ref. 10.7, 10.10, & 10.11), the SPV release is assumed to be ground-level point source release (equivalent to uncapped vent release with zero exit velocity) per guidance in the NEI 99-03 (Ref. 10.4, Appendix D).

4. The TBL release is assumed to be a ground-level release diffused source (equivalent to capped vent release with zero exit velocity) because the exhaust from the TBL is released through a large area (28’ x 6’) and dispersed horizontally in downwind direction (Ref. 10.13) and it completely gets trapped in the wake.

5. Minimum wind speed is assumed at 0.5 m/s. It is default value used in the ARCON96 code and is used for applying low wind speed correction for calm wind condition.
6.0 METHODOLOGY

6.1 Release Through FRVS Vent

During a Loss of Coolant Accident (LOCA), the containment leakage and ESF leakage take place in the reactor building, which mix with the RB volume and release to the environment via FRVS vent (Ref. 10.17) (Figure 1). The plant north is 5°-30′-01″ east of true north (Ref. 10.29), therefore, the orientations of the release points with respect to receptor locations are corrected accordingly.

6.1.1 Control Room Air Intake \( y/Q \) - Release Through TB

The cross-section areas of the turbine building (for east to west wind direction) and reactor building (for south to north wind direction) will contribute to the building-wake diffusion, which control the distance downwind of the FRVS release point. The cross-section areas of the south exterior wall (below EL 132′-0″) of reactor building, reactor building above EL 132′-0″, and east exterior wall of turbine building below EL 132′-0″ will contribute to the wake diffusion (Figure 1). The CR air intake is located at EL 155′-5″ (Ref. 10.7c) in the west wall of auxiliary building (Refs 10.6). The ARCON96 receptor and source parameters are calculated in Section 7.1. The ARCON96 input and output for the FRVS vent \( y/Qs \) are shown in Appendix A.

6.2 Release Through Reactor Building Truck Bay

The activity from the Fuel Handling Accident (FHA) directly releases to the environment when the truck bay door is opened during the refueling outage and FHA occurs in the reactor building (RB). The truck bay is located in the south wall of RB (Ref. 10.8) (see Figure 2).

6.2.1 Control Room Air Intake \( y/Q \) Release Through RBTB

The release from the RB truck bay will be affected by the building wake of the reactor building. The cross-sectional area of reactor building will contribute to the building wake diffusion. The rectangle RB area below
EL 132'-0' and cylindrical and dome of RB above EL 132'-0" will determine the building wake (Ref 10.8 & 10.16). The ARCON96 receptor and source parameters are calculated in Section 7.2. The ARCON96 input and output for the RBTB release $\chi/Q_s$ are shown in Appendix B.

6.3 Release Through Turbine Building Lover (TBL)

The post-LOCA Main Steam Isolation Valve (MSIV) leakage travels through the main steam line and enters the turbine building (TB) and then releases to the environment. The most limiting situation is a LOCA with Loss Of Offsite Power (LOOP). In this case, the leakage from the MSIV will seep through the TB and release to the environment through the openings (louvers) in the TB. However, these louvers supply the fresh air and equipped with the dampers, which close when the supply fans are not operating to eliminate the unmonitored release to environment, they provide the most conservative release path with respect to the control room (CR) air intake (see Figure 3). The most limiting release location is the center louver located between columns 21 & 23 at Raw H above elevation 171'-0" (Ref. 10.21). The center TBL is 28' wide x 6' high (Ref. 10.21). The release takes place over a large area, therefore, it is considered a diffused source in the following analysis.

6.3.1 Control Room Air Intake $\chi/Q$ – Release Through TBL

The release from the TB louvers will be affected by the building wake of the turbine building, reactor building, and auxiliary building. The cross-sectional area of auxiliary building and reactor building will contribute to the building wake diffusion. The full width of reactor building and auxiliary building are considered to determine the building wake (Ref. 10.10). The ARCON96 receptor and source parameters are calculated in Section 7.3. The ARCON96 input and output for the FRVS vent $\chi/Q_s$ are shown in Appendix C.

6.4 Release Through South Plant Vent (SPV)
The activity from the mechanical vacuum pumps (MVPs) discharge to the SPV during the Control Rod Drop Accident (Ref. 10.18, page 16). The SPV is located at Row H and center-line of reactor building (Refs 10.13 – 15 & 10.18) (see Figure 4) in vicinity of the TBL (see Figure 3).

6.4.1 Control Room Air Intake $\gamma/Q$ Release Through SPV

The SPV and TB release point are located in the same neighborhood with approximately same distance from the CR air intake (see Figures 3 & 4). Therefore, both release points will be affected by the same building wake. Contrary, the SPV located at EL 217’-0” (Refs 10.14 & 10.15), which is higher than TBL EL 171’-0” (Ref. 10.15). The activity from the SPV is directly released to environment with a high exit velocity, therefore, the exhaust from the SPV can rises above the building wake, which provide a better dilution and lower $\gamma/Q$s at the CR air intake. Reference 10.4 restricts the use vent release option of ARCON96 code in design basis accident application because the vent release model is appropriate for use in long term routine effluent calculations such as Offsite Dose Calculation Manual (ODCM) (Ref. 10.4, page D-6). Therefore, a ground-level point source release is used for the SPV with the proper elevation. The ARCON96 receptor and source parameters are calculated in Section 7.3. The ARCON96 input and output for the FRVS vent $\gamma/Q$s are shown in Appendix D.

6.5 V&V of ARCON96 Code

The test cases in Examples 1 through 4 and 5e are executed by DELL Computer Serial # FXQ9R, P.O. #B3-0951230 R33. The calculated results are compared with those in the ARCON96 User’s Manual to demonstrate the consistency of results and ability of the code to produce the same results in the different operating environment and configuration (see Section 8.5).

6.6 Technical Support Center Air Intake $\gamma/Q$s
6.6.1 TSC Air Intake $\chi/Q$ – Release Through FRVS Vent

During a Loss of Coolant Accident (LOCA), the containment leakage and ESF leakage take place in the reactor building, which mix with the RB volume and release to the environment via FRVS vent (Ref. 10.17) (Figure 5).

6.6.2 TSC Air Intake $\chi/Q$ – Release Through TBL

The release from the TB louvers will be affected by the building wake of the turbine building. The cross-sectional area of turbine building will contribute to the building wake diffusion. The full width of turbine building is considered to determine the building wake (Ref. 10.10). The ARCON96 receptor and source parameters are calculated in Section 7.5. The ARCON96 input and output for the FRVS vent $\chi/Q_s$ are shown in Appendix E.

6.7 Release Through Turbine Building Roof Vent (TBV)

The post-LOCA MSIV leakage could release through Turbine Building Roof Vents. This release path is additionally analyzed to determine the most conservative CR $\chi/Q_s$ for MSIV leakage release. There are four (4) vents located on the TB roof between Columns 17 and 25 and at Row E_k (Ref 10.28a). The north vent is closest to the CR air intake (Figure 6), therefore, the MSIV leakage release through north roof vent is analyzed.

6.7.1 Control Room Air Intake $\chi/Q$ – Release Through TBV

The release from the TBV will be affected by the turbine building, reactor building, and auxiliary building wakes, which are same as those for TBL release and are calculated in Section 7.3 and 7.7. The ARCON96 input and output for the FRVS vent $\chi/Q_s$ are shown in Appendix C.
**FIGURE 1: Relative Locations of FRVS Vent & CR Air Intake**

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Figure 2: Relative Locations RB Truck Bay Door & CR Air Intake

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FIGURE 3: Relative Locations of TBL & CR Air Intake
FIGURE 4: Relative Locations of SPV & CR Air Intake
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**CALCULATION CONTINUATION SHEET**

**CALC. NO.: H-1-ZZ-MDC-1879**

**ORIGINATOR, DATE**: G. Patel, 08/01/01

**REVIEWER/VERIFIER, DATE**: J. Duffy, 08/01/01
FIGURE 4: Relative Locations of TB Roof Vent & CR Air Intake
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<td>95</td>
<td>28.96</td>
<td>87.30</td>
</tr>
</tbody>
</table>
7.0 CALCULATIONS

The areas causing the wake diffusion are calculated in the following sections. The minor discrepancies exist in the various dimensions of the building. The conservative dimensions are used.

CR Air Intake

7.1 Wake Area For FRVS Vent Release \( \gamma/Q_s \) – CR Air Intake

The FRVS is located at the top of reactor building dome at elevation 300’-8” (Ref. 10.16).

For the wind direction from south to north, the south wall of reactor building will cause a wake diffusion for ground level wind (see Figure 1).

Reactor Building (RB) South Wall Surface Area

Width of Wall = 224’-0” (Ref. 10.10) (see Figure 1)

Top Elevation of Wall = 132’-0” (Ref. 10.14 & 10.15)

Horizontal Distance Between FRVS & CR Air Intake = 95’-0” (Ref. 10.10 & 11) + 16’-6” (Ref. 10.6b & 10.6c) - 1’-6” (Ref. 10.7C) = 110’-0”

Grade Elevation of Wall = 102’-0” (Ref. 10.14 & 10.15)

Height of Wall = (132’-0” – 102’-0”) = 30’-0”

Cross-Section Area of South Wall of RB = 224’-0” x 30’-0” = 6720 ft\(^2\) = 624.63 m\(^2\)

For the wind direction from south to north, the reactor building cylindrical section and dome cross-section areas above elevation 132’-0” will cause a wake diffusion for the wind above RB

Spring Line Elevation of Cylindrical Section = 250’-0” (Ref. 10.16)

Height of Cylindrical Section = 250’-0” – 132’-0” = 118’-0”

Diameter of Cylindrical Section = 2 x 85’-0” = 170’-0” (Ref. 10.16)

Cross-Section Area of Cylindrical Section = Diameter x Height
CALCULATION CONTINUATION SHEET

CALC. NO.: H-1-ZZ-MDC-1879
ORIGINATOR, DATE REV: G. Patel, 08/01/01
REVIEWER/VERIFIER, DATE J. Duffy, 08/01/01

\[
\begin{align*}
&= 170' - 0'' \times 118' - 0'' = 20060 \text{ ft}^2 = 1864.59 \text{ m}^2 \\
&\text{Top Elevation of Dome} = 300' - 8'' \text{ (Ref. 10.16)} \\
&\text{Dome Height Above Cylindrical Section} = 300' - 8'' - 250' - 0'' = 50' - 8'' \\
&\text{Cross-Section Area of Dome} \\
&= \pi/2 \times \text{Radius} \times \text{Height} = \pi/2 \times 85' - 0'' \times 50' - 8'' = 6765.34 \text{ ft}^2 = 628.84 \text{ m}^2 \\
&\text{Total Cross-Section Area of Cylindrical Section and Dome} \\
&= 1864.59 \text{ m}^2 + 628.84 \text{ m}^2 = 2493.43 \text{ m}^2
\]

For the wind direction from east to west, the east wall of turbine building will cause a wake for ground level wind (see Figure 3).

Turbine Building (TB) East Wall Surface Area:

\[
\begin{align*}
\text{Width of Wall} &= 137' - 6'' + 112' - 0'' = 249' - 6'' \text{ (Ref. 10.10)} \\
\text{Height of Wall Below EL} &= 132' - 0'' = (132' - 0'' - 102' - 0'') = 30' - 0'' \\
\text{Cross-Section Area of East Wall Below EL} &= 249' - 6'' \times 30' - 0'' = 7485 \text{ ft}^2 = 695.74 \text{ m}^2
\end{align*}
\]

FRVS Direction With Respect to CR Intake

\[
\tan \theta = 129/110 = 1.173, \text{ Therefore } \theta = \tan^{-1} 1.173 = 49.55^0
\]

Orientation of FRVS Release with Respect to CR Air Intake, Considering South Wind 180^0 and True North Wind 360^0 (Ref. 10.2, page 16).

\[
\text{FRVS Orientation} = 180^0 - 49.55^0 - 5.5^0 = 124.95^0
\]

Total Wake Cross-Section Area Perpendicular to Wind Direction to CR Air Intake

\[
= 624.63 \text{ m}^2 \times \cos 49.55^0 + 695.74 \text{ m}^2 \times \sin 49.55^0 + 2493.43 \text{ m}^2 = 3428.12 \text{ m}^2
\]
Straight Line Distance Between FRVS and CR Air Intake = \[\sqrt{(129)^2 + (110)^2}\] = 169.59 ft = 51.69 m

Elevation of CR Air Intake = 155'-5'' (Ref. 10.7c, Section C).
Height of CR Air Intake = 155'-5'' - 102'-0'' = 53'-5'' ft = 16.29 m

Elevation of FRVS Vent = 300'-8'' (Ref. 10.16).
Height of FRVS Vent = 300'-8'' - 102'-0'' = 198'-8'' ft = 60.6 m

### 7.2 Wake Area For Reactor Building Truck Bay Release $\chi/Qs$ – CR Air Intake

The location of reactor building truck bay (RBTB) with respect to CR air intake is shown in Figure 2 (Ref. 10.8 & 10.19). The RBTB location with respect to CR air intake is such that the wind from the south to north will predominantly carry effluent from the RBTB to the CR intake. Therefore, the wake diffusion effect for the wind from the east to west is not considered in the RBTB $\chi/Qs$. Only the cross-sectional area perpendicular to wind from south to north is considered for the wake diffusion.

**Total Cross-Section Area Perpendicular to Wind From South to North (see Section 7.1)**

= Half Area of South wall of RB
= \(129'-0'' \times (132'-0'' - 102'-0'') = 129\times 30\) = 3870 ft\(^2\) = 359.72 m\(^2\)

RBTB Direction With Respect to CR Intake

\[\tan \theta = 65/207 = 0.314, \text{ Therefore } \theta = \tan^{-1} 0.314 = 17.43^0\]

Orientation of RBTB Release with Respect to CR Air Intake, Considering South Wind 180\(^0\) and True North Wind 360\(^0\) (Ref. 10.2, page 16).

Orientation = 180\(^0\) - 17.43\(^0\) - 5.5\(^0\) = 157.07\(^0\)
Distance of RBTB From West Edge of RB = 65'-0" (Ref. 10.8)
Straight Line Distance Between RBTB and CR Air Intake = \[\sqrt{(65)^2 + (207)^2}\] = 216.96 ft = 66.15 m.
Height of CR Air Intake = 155'-5" - 102'-0" = 53'-5" ft = 16.29 m
Height of RBTB = Ground Release = 0 m

7.3 Wake Area For Turbine Building Lovers (TBL) Release $\chi/Qs$ – CR Air Intake

Three large louvers exist in the exterior wall at Row H to facilitate the normal air intake to TB (Ref. 10.13 & 10.21). The center TBL provides direct and shortest release path to the CR air intake therefore, the TBL $\chi/Qs$ are analyzed based on the center louver location (see Figure 4). The TBL is located in the side exterior wall at the row H at elevation 171'-0" (Ref. 10.13 & 10.21). The release from the TBL is downwind direction, which is categorized as a capped vent release (Ref. 20, page 29). The TBL is located in vicinity of the SPV (see Figures 3 & 4). Therefore, the TBL experience the same wake effect with only difference in the elevation.

For the wind direction from east to west, the east wall of turbine building will cause a wake for ground level wind (see Figure 3).
Turbine Bldg Roof Elevation = 197'-0" (Ref 10.15)
Height of Turbine Bldg = 197'-0" - 102'-0" = 95'-0"
Auxiliary Bldg Width = 165'-0" (Ref. 10.10) = 50.30 m
RB Width Below Elevation 132'-0" = 192'-0" (Ref. 10.8)
Cross-Section Area of TB & Auxiliary Bldg = (RB Width + Auxiliary Bldg Width) x Height
= (192'-0" + 165'-0") x 95'-0" = 33915 ft$^2$ = 3152.42 m$^2$
Elevation of Cylindrical Section = 250'-0" (Ref. 10.16)
Height of Cylindrical Section Above TB Elevation = 250'-0" - 197'-0" = 53'-0"

Diameter of Cylindrical Section = 2 x 85'-0" = 170'-0" (Ref. 10.16)

Cross-Section Area of Cylindrical Section Above TB Elevation

= Diameter x Height = 170'-0" x 53'-0" = 9010 ft² = 837.49 m²

Cross-Section Area of Dome = 628.84 m² (see Section 7.1)

Total Cross-Section Area Perpendicular to Wind From East to West

= 3152.42 m² + 837.49 m² + 628.84 m² = 4618.75 m²

Distance of Center of TBL From RB Center Line

= 6" + 18'-0" + 18'-0" + 4'-0" + 14'-0" = 54'-6"

Horizontal Distance Between TBL and CR Intake

= 110'-0" - 54'-6" = 55'-6"

TBL Direction With Respect to CR Intake

Tan θ = 312/55.5 = 5.621, Therefore θ = Tan⁻¹ 5.621 = 79.91°


TBL Orientation = 180° - 79.91° - 5.5° = 94.59°

Straight Line Distance Between TBL and CR Air Intake = [(312)² + (55.5)²]⁻¹/² = 316.9 ft = 96.62 m

Elevation of TBL = 171'-0" (Ref. 10.14 & 10.15).

Elevation of TBL Above Grade = 171'-0" - 102'-0" = 69'-0" = 21.04 m

Effective Height of TBL = 6' (Ref. 10.21) = 6 ft / 3.28 ft/m = 1.829 m

Effective Width of TBL = 28' (Ref. 10.21) = 28 ft / 3.28 ft/m = 8.537 m

Vertical Diffusion Coefficient σ₂ = Effective Height / 6 (Ref. 10.4, page D-6) = 1.829 m / 6 = 0.305 m
Horizontal Diffusion Coefficient $\sigma_y = \text{Effective Width} / 6$ (Ref. 10.4, page D-6)

$= 8.537 \text{ m} / 6 = 1.423 \text{ m}$.

7.4 Wake Area For South Plant Vent (SPV) Release $\gamma/Q_s$ – CR Air Intake

The SPV is located very close to the Row H at the centerline of RB and at elevation 217'-0" (Ref. 10.7, 10.9, & 10.10) (Figure 4). The SPV location with respect to CR air intake is such that the wind from the east to west will predominantly carry effluent from the SPV to the CR intake. Therefore, the wake diffusion effect from the east to west wind is considered in the SPV $\gamma/Q_s$. Only the cross-sectional area perpendicular to wind direction is considered for the wake diffusion. The SPV is located in vicinity of the TBL (see Figures 3 & 4). Therefore, the SPV experience the same wake effect with only difference in the release elevation.

For the wind direction from east to west, the east wall of turbine building will cause a wake for ground level wind (see Figure 4).

Total Cross-Section Area Perpendicular to Wind From East to West (Section 7.3)

$= 3152.42 \text{ m}^2 + 837.49 \text{ m}^2 + 628.84 \text{ m}^2 = 4618.75 \text{ m}^2$

SPV Direction With Respect to CR Intake

$\tan \theta = 312/110 = 2.836$, Therefore $\theta = \tan^{-1} 2.836 = 70.58^0$


SPV Orientation = 180° - 70.58° - 5.5° = 103.92°

Straight Line Distance Between SPV and CR Air Intake $= [(312)^2 + (110)^2]^{1/2} = 330.82 \text{ ft} = 100.86 \text{ m}$

Elevation of SPV = 217'-0" (Ref. 10.14 & 10.15).
CALCULATION CONTINUATION SHEET

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<tr>
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<td>REVIEWER/VERIFIER, DATE</td>
<td>J. Duffy, 08/01/01</td>
</tr>
</tbody>
</table>

Height of SPV = 217'-0" - 102'-0" = 115'-0" ft = 35.06 m

TSC Air Intake

7.5 *Wake Area For FRVS Vent Release $\gamma/Qs$ – TSC Air Intake*

For the wind direction from south to north, the south wall of reactor building will cause a wake diffusion for ground level wind (see Figure 5).

Reactor Building (RB) South Wall Surface Area (Section 7.1)

Cross-Section Area of South Wall of RB = 224'-0" x 30'-0" = 6720 ft$^2$ = 624.63 m$^2$

For the wind direction from west to east, the west wall of reactor building will cause a wake diffusion for ground level wind (see Figure 5).

RB West Wall Surface Area

Width of West Wall = 192'-6" (Ref. 10.10) (see Figure 1)

Top Elevation of Wall = 132'-0" (Ref. 10.14 & 10.15)

Grade Elevation of Wall = 102'-0" (Ref. 10.14 & 10.15)

Height of Wall = (132'-0" - 102'-0") = 30'-0"

Cross-Section Area of South Wall of RB = 192'-6" x 30'-0" = 5775 ft$^2$ = 536.79 m$^2$

For northeast wind direction, the reactor building cylindrical section and dome cross-section areas above elevation 132'-0" will cause a wake diffusion for the wind above RB.

Cross-Section Area of Cylindrical Section = Diameter x Height (Section 7.1)

= 170'-0" x 118'-0" = 20060 ft$^2$ = 1864.59 m$^2$

Cross-Section Area of Dome

= $\pi/2$ x Radius x Height = $\pi/2$ x 85'-0" x 50'-8" = 6765.34 ft$^2$ = 628.84 m$^2$

Total Cross-Section Area of Cylindrical Section and Dome
CALCULATION CONTINUATION SHEET

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<th>H-1-ZZ-MDC-1879</th>
<th>REFERENCE:</th>
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<td>0</td>
</tr>
<tr>
<td>REVIEWER/VERIFIER, DATE</td>
<td>J. Duffy, 08/01/01</td>
<td></td>
</tr>
</tbody>
</table>

\[
1864.59 \text{ m}^2 + 628.84 \text{ m}^2 = 2493.43 \text{ m}^2
\]

FRVS Vent Direction With Respect to TSC Intake

\[
\tan \theta = \frac{89.75}{71} = 1.264, \text{ Therefore } \theta = \tan^{-1} 1.264 = 51.65^0
\]

Orientation of FRVS Release with Respect to TSC Air Intake, Considering South Wind 180^0 and True North Wind 360^0 (Ref. 10.2, page 16).

FRVS Orientation = 180^0 + 51.65^0 - 5.50^0 = 226.15^0

Total Wake Cross-Section Area Perpendicular to Wind Direction to TSC Air Intake

\[
624.63 \text{ m}^2 \times \cos 51.65^0 + 536.79 \text{ m}^2 \times \sin 51.65^0 + 2493.43 \text{ m}^2 = 3301.95 \text{ m}^2
\]

Distance Between RB and TSC Air Intake Center Lines (south to north)

= Distance Between Columns 18.9 and 22R + Distance Between Column 22R and TSC Air Intake Center Line

\[
= (10'-0" + 18'-0" + 18'-0" + 18'-0") (\text{Ref. 10.8f & 10.26}) + (5'-10" + 1'-2") (\text{Ref. 10.26})
\]

= (64'-0") + (7'-0") = 71'-0"

Distance Between RB and TSC Air Intake Center Lines (west to east)

= Distance Between Rows S_4 and N

= (14'-0" + 20'-0" + 5-3" + 25'-3" + 25'-3") (Ref. 10.8c & 10.8h)

= 89'-9"

Straight Line Distance Between FRVS and TSC Air Intake = \([(89.75)^2 + (71)^2]^{1/2} = 114.44 \text{ ft} = 34.89 \text{ m}\)

Elevation of CR Air Intake = 164'10" (Ref. 10.25).

Height of CR Air Intake = 164'-10" - 102'-0" = 62'10"ft = 19.16 m

Elevation of FRVS Vent = 300'-8" (Ref. 10.16).
Height of FRVS Vent = 300'-8" - 102'-0" = 198'-8"ft = 60.6 m

7.6 **Wake Area For TBL Release $\gamma/Qs$ - TSC Air Intake**

For the wind direction from east to west, the east wall of turbine building will cause a wake for ground level wind (see Figure 5).

Turbine Bldg Roof Elevation = 197'-0" (Ref 10.15)

Height of Turbine Bldg = 197'-0" - 102'-0" = 95'-0"

Width of Turbine Bldg (assumed same as RB width) = 192'-6" (Ref. 10.10) = 58.69 m

Cross-Section Area of TB = (TB Width) x Height
= 192'-6" x 95'-0" = 18287.5 ft² = 1699.83 m²

Distance Between RB and TBL Center Lines (south to north) (Ref. 10.21a, 10.21c & 10.27)
= Distance Between Columns 18.9 and 21 + Distance Between Column 21 and TBL Center Line
= (6" + 18'-0" + 18'-0") (Ref. 10.27) + (4'-0" + 14'-0") (Ref. 10.21c & 10.27b)
= 54'-6"

Distance Between RB and TBL Center Lines (west to east) (Ref. 10.11)
= Distance Between RB & TB Center Lines – Distance Between TB and TBL (Column H) Center Lines
= (312'-0") (Ref. 10.11) – (59'-0" + 70'-0") (Ref. 10.11) = 183'-0"

Distance Between TBL and TSC Air Intake
= (Distance Between RB & TBL Center Lines) – (Distance Between RB & TSC Air Intake Center Lines)
= 183'-0" – 89'-9" = 93'-3"

TBL Direction With Respect to TSC Intake
\[ \tan \theta = \frac{93.25/(71'0" - 54'6")}{93.25/16.5} = 5.652, \text{ Therefore } \theta = \tan^{-1} 5.652 = 79.97^\circ \]
Orientation of TBL Release with Respect to TSC Air Intake, Considering South Wind 180° and True North Wind 360° (Ref. 10.2, page 16).

TBL Orientation = 180° - 79.97° - 5.5° = 94.53°

Straight Line Distance Between TBL and CR Air Intake = \(\sqrt{(93.25)^2 + (16.5)^2} = 94.70\) ft = 28.87 m

Vertical Diffusion Coefficient \(\sigma_z = \text{Effective Height} / 2\) (Ref. 10.2, page 39) = 1.829 m / 6 = 0.305 m (Section 7.3)

Horizontal Diffusion Coefficient \(\sigma_y = \text{Effective Width} / 4.3\) (Ref. 10.2, page 39) = 8.537 m / 6 = 1.423 m (Section 7.3).

7.7 Wake Area For Turbine Building Roof Vent (TBV) Release \(\gamma/\Omega_s\) – CR Air Intake

The TBV (Figure 5) experiences the same wake effect as the TBL due to its relative location and orientation with respect to CR air intake. Therefore, the building surface area causing the wake effect will be the same as that for the TBL.

Wake Area = 4618.75 m² (Section 7.3)

Distance between the center lines of RB and north TB roof vent

= 0'-6" + 18'-0" + 18'-0" + 9'-0" + 4'-0" + 39'-0" = 88'-6" (Ref. 10.28)

Distance between the center lines of RB and CR air intake = 110'-0" (Section 7.1)

North-South distance between north TB roof vent and CR air intake

= 110'-0" – 88'-6" = 21'-6"

East-West distance between north TB roof vent and CR air intake
= 224'-0" + 88'-0" (Ref. 10.10) + 68'-0" (distance between columns H & F) (Ref. 10.28b) + 59'-0" (distance between column F and center line of north TB roof vent) = 439'-0"

TBV Direction With Respect to CR Intake
Tan θ = 439'-0"/21'-6" = 20.42, Therefore θ = \( \tan^{-1} 20.42 \) = 87.20°

TBL Orientation = 180° - 87.20° - 5.5° = 87.3°

Straight Line Distance Between TBV and CR Air Intake = \( \sqrt{(439)^2 + (21.5)^2} \) = 439.53 ft = 134.00 m
Elevation of TBV = 197'-0" (Ref. 10.15).
Height of TBV = 197'-0" - 102'-0" = 95'-0" = 28.96 m
8.0 RESULTS SUMMARY

8.1 Control Room $\gamma$/Qs For FRVS Releases

95% $\gamma$/Qs for the control room air intake due to the FRVS releases are summarized in the following Table:

<table>
<thead>
<tr>
<th>Time Interval (hr)</th>
<th>CR X/Q (s/m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>1.25E-03</td>
</tr>
<tr>
<td>2-8</td>
<td>8.09E-04</td>
</tr>
<tr>
<td>8-24</td>
<td>3.04E-04</td>
</tr>
<tr>
<td>24-96</td>
<td>2.10E-04</td>
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<tr>
<td>96-720</td>
<td>1.59E-04</td>
</tr>
</tbody>
</table>

8.2 Control Room $\gamma$/Qs For Reactor Building Truck Bay Release

95% $\gamma$/Qs for the control room air intake due to the reactor building truck bay release are summarized in the following Table:

<table>
<thead>
<tr>
<th>Time Interval (hr)</th>
<th>CR X/Q (s/m$^3$)</th>
</tr>
</thead>
<tbody>
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<td>2-8</td>
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<tr>
<td>8-24</td>
<td>4.76E-04</td>
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<tr>
<td>24-96</td>
<td>3.20E-04</td>
</tr>
<tr>
<td>96-720</td>
<td>2.60E-04</td>
</tr>
</tbody>
</table>
8.3 Control Room $\chi$/Qs For Turbine Building Louver & Vent Releases

95% $\chi$/Qs for the control room air intake due to the TBL/TBV release are summarized in the following Table:

<table>
<thead>
<tr>
<th>Time Interval (hr)</th>
<th>CR X/Q TBL (s/m$^3$)</th>
<th>CR X/Q TBV (s/m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>6.17E-04</td>
<td>3.48E-04</td>
</tr>
<tr>
<td>2-8</td>
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<td>24-96</td>
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<tr>
<td>96-720</td>
<td>7.49E-05</td>
<td>3.82E-05</td>
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8.4 Control Room $\chi$/Qs For South Plant Vent Release

95% $\chi$/Qs for the control room air intake due to the SPV release are summarized in the following Table:

<table>
<thead>
<tr>
<th>Time Interval (hr)</th>
<th>CR X/Q (s/m$^3$)</th>
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<tr>
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Comparison of Results - ARCON96 Test Cases Vs V&V Cases

The ARCON96 test case examples are re-executed after ARCON96 have been installed on the network computer and the results are compared in the following Table with those in the ARCON96 User’s Manual to demonstrate the code ability to produce the consistent results. The ARCON96 V&V input/output files are included in Attachment 11.1:

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<tr>
<th>Example No.</th>
<th>Case Analyzed</th>
<th>Time Interval (Hr)</th>
<th>X/Q Values (s/m³)</th>
<th>Reference</th>
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<td>6.73E-04</td>
<td>4.43E-04</td>
<td>1.40E-04</td>
</tr>
</tbody>
</table>
8.6 TSC $\chi/Q$s For FRVS Releases

95% $\chi/Q$s for the technical support center air intake due to the FRVS releases are summarized in the following Table:

<table>
<thead>
<tr>
<th>Time Interval (hr)</th>
<th>CR X/Q (s/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>2.07E-03</td>
</tr>
<tr>
<td>2-8</td>
<td>1.54E-03</td>
</tr>
<tr>
<td>8-24</td>
<td>5.78E-04</td>
</tr>
<tr>
<td>24-96</td>
<td>4.35E-04</td>
</tr>
<tr>
<td>96-720</td>
<td>3.55E-04</td>
</tr>
</tbody>
</table>

8.7 TSC $\chi/Q$s For Turbine Building Louver Release

95% $\chi/Q$s for the technical support center air intake due to the TB release are summarized in the following Table:

<table>
<thead>
<tr>
<th>Time Interval (hr)</th>
<th>CR X/Q (s/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>5.79E-03</td>
</tr>
<tr>
<td>2-8</td>
<td>3.73E-03</td>
</tr>
<tr>
<td>8-24</td>
<td>1.35E-03</td>
</tr>
<tr>
<td>24-96</td>
<td>9.28E-04</td>
</tr>
<tr>
<td>96-720</td>
<td>6.96E-04</td>
</tr>
</tbody>
</table>
9.0 CONCLUSIONS/RECOMMENDATIONS

The walk down to confirm the as-built configuration of the plant indicates that the control room air intake location analyzed in this calculation provides the air for both the filtered air intake and unfiltered inleakage paths (Ref 10.23). The 95% atmospheric dispersion factors $\chi/Q_s$ for the FRVS, reactor building truck bay, turbine building louver, and south plant vent are summarized in the Sections 8.1 through 8.4. All releases are assumed to be ground-level releases and vent release (mixed mode) is not credited. These $\chi/Q_s$ should be used for the design basis accident analyses based on the potential release paths.

The results of verification & validation of ARCON96 computer code (Section 8.5) in Section 8.5 demonstrate that the ARCON96 code produces the consistent results for the test cases.

The TSC 95% atmospheric dispersion factors $\chi/Q_s$ for the FRVS and turbine building louver are summarized in the Sections 8.6 and 8.7. All releases are assumed to be ground-level releases and vent release (mixed mode) is not credited.

The comparison of CR $\chi/Q_s$ for the TB louver and TB roof vent releases are shown in Section 8.3, which demonstrates that the CR $\chi/Q_s$ for TBL release are conservative.
10.0 REFERENCES

1. Hope Creek Nuclear Generating Meteorological Date Files (Attached CD).


5. HCNGS HVAC Area Drawings
   a. P-9256-1, Rev 24, “Aux Bldg Area 25 Plan At EL 155’-3” & EL 175’-0”.
   b. P-9266-1, Rev 25, “Aux Bldg Area 26 Plan At EL 155’-3” & EL 175’-0”.
   c. P-9267-1, Rev 17, “Aux Bldg Area 25 & 26 Sections.”
   d. P-9268-1, Rev 16, “Aux Bldg Area 25 & 26 Sections and Plan At EL 178’-0”.

6. HCNGS Concrete Drawings – Auxiliary Bldg/Diesel Generator Area:
   a. C-1413-0, Rev 20, “Auxiliary Bldg – Diesel Generator Area Floor Plan, El 146’-0”, EL 150’-0” and EL 155’-3” Area 27.”
   b. C-1415-0, Rev 22, “Auxiliary Bldg – Diesel Generator Area Floor Plan, El 146’-0”, EL 150’-0” and EL 155’-3” Area 28.”
   c. C-1407-0, Rev 25, “Auxiliary Bldg – Diesel Generator Area Floor Plan, El 102’-0”, Area 28.”

7. HCNGS Concrete Drawings Auxiliary Bldg/Control Area:
### Reactor Building Floor Plan Drawings:

1. **C-0535-1, Rev 13, Elevation 102'-0" Area 19**
2. **C-0538-1, Rev 10, Elevation 102'-0" Area 22**
3. **C-0539-1, Rev 8, Elevation 102'-0" Area 23**
4. **C-0540-1, Rev 11, Elevation 102'-0" Area 22**
5. **C-0529-1, Rev 10, Elevation 102'-0" Area 13**
6. **C-0530-1, Rev 21, Elevation 102'-0" Area 14**
7. **C-0531-1, Rev 10, Elevation 102'-0" Area 15**
8. **C-0532-1, Rev 13, Elevation 102'-0" Area 16**

### Other Drawings:

9. **C-1077-0, Rev 6, "Aux Bldg, Radwaste & Service Area Roof Plan, El 172'-0" Area 32."**
10. **Drawing P-0000-0, Rev 9, Plant Design Drawing and Tag Index.**
11. **Drawing P-0003-0, Rev 9, General Arrangement Plan – EL 102'-0".**
12. **Drawing P-0006-0, Rev 7, General Arrangement Plan – EL 153'-0" and 162'-0".**
13. **Drawing P-0007-0, Rev 7, General Arrangement Plan – EL 171'-0" and 201'-0".**
14. **Drawing P-0010-0, Rev 6, General Arrangement Plan – Section A-A & B-B.**
15. **Drawing P-0011-0, Rev 5, General Arrangement Plan – Section C-C & D-D.**

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**NOTE:**

- **ORIGINATOR, DATE:** G. Patel, 08/01/01
- **REV:** 0
- **REVIEWER/VERIFIER, DATE:** J. Duffy, 08/01/01

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**CALCULATION CONTINUATION SHEET**

<table>
<thead>
<tr>
<th>CALC. NO.: H-1-ZZ-MDC-1879</th>
<th>SHEET 40 of 43</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>G. Patel, 08/01/01</td>
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<td>REVIEWER/VERIFIER, DATE</td>
<td>J. Duffy, 08/01/01</td>
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</tbody>
</table>
16. Drawing C-0738-0, Rev 6, Reactor Building Dome Reinforcement Plan Section & details.
19. Drawing C-1407-0, Rev 25, Auxiliary Bldg, Diesel Generator Area Floor Plan EL 102’-0” Area 28.
20. Salem Nuclear Generating Station Drawing No. 239850, Rev 12, Meteorological Tower.
21. HVAC Area/Section Drawings:
   a. P-9106-1, Rev 14, Turbine Bldg Area 10 Plan at EL 171’-0”
   b. P-9107-1, Rev 6, HVAC Drawing Section Turbine Bldg Area 10 EL 171’-0”
   c. P-9116-1, Rev 15, Turbine Bldg Area 11 Plan at EL 171’-0”
   d. P-9107-1, Rev 9, HVAC Drawing Section Turbine Bldg Area 11 EL 171’-0”
23. E-mail From Barkley, Barry L. to Patel, Gopal J., Sent: Friday, April 06, 2001 5:05 PM, Subject: Confirmation of Openings in CR Building Exterior Wall (Attachment 11.3).
24. General Plant Floor Plan Drawings:
   a. A-0204-0, Rev 16, Level 4, Elevations 120’-0”/137’-0”
   b. A-0205-0, Rev 14, Level 5, Elevations 137’-0”/145’-0”/155’-0”
25. HVAC Area Drawing No. P-9154-1, Sheet 2, Reactor Building TSC – Areas 15 & 73, Plans At ELs 137’-0”, 144’-10-1/2”, & 155’-0”.
<table>
<thead>
<tr>
<th>CALCULATION CONTINUATION SHEET</th>
<th>SHEET 42 of 43</th>
</tr>
</thead>
<tbody>
<tr>
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<td><strong>REFERENCE:</strong></td>
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<tr>
<td><strong>ORIGINATOR, DATE</strong></td>
<td><strong>REV:</strong></td>
</tr>
<tr>
<td><strong>REVIEWER/VERIFIER, DATE</strong></td>
<td><strong>J. Duffy, 08/01/01</strong></td>
</tr>
</tbody>
</table>

27. Equipment Location Turbine Building Drawings:
   a. P-0015-1, Rev 23, Plan EL 137'-0"
   b. P-0016-1, Rev 15, Plan EL 171'-0"

28. Architecture Drawings:
   a. A-0221-0, Rev 10, General Plant Roof Plan
   b. A-0560-0, Rev 1, Separation Criteria Turbine Building Plan – EL 171'-0"
   c. A-1616-1, Rev 12, Turbine Building Unit 1 Plan EL 171'-0"

29. Drawing No. C-0002-0, Rev 16, Plot Plan
ATTACHMENTS

11.1 Diskettes with the following electronic files (1 page):

HCCALC: H-1-ZZ-MDC-1879, Rev 1
ARCON96 Input Files
ARCON96 Input/Output File - Control Room χ/Qs For FRVS Vent
ARCON96 Input/Output File - Control Room χ/Qs For Reactor Building Truck Bay
ARCON96 Input/Output File - Control Room χ/Qs For Turbine Building Louvers
ARCON96 Input/Output File - Control Room χ/Qs For South Plant Vent
ARCON96 Input/Output File - TSC χ/Qs For FRVS Vent
ARCON96 Input/Output File - TSC χ/Qs For Turbine Building Louvers
ARCON96 Input/Output File - Control Room χ/Qs For Turbine Building Roof Vent
ARCON96 Input/Output File - ARCON96 Code Test Example 1 V&V Case
ARCON96 Input/Output File - ARCON96 Code Test Example 2 V&V Case
ARCON96 Input/Output File - ARCON96 Code Test Example 3 V&V Case
ARCON96 Input/Output File - ARCON96 Code Test Example 4 V&V Case
ARCON96 Input/Output File - ARCON96 Code Test Example 5e V&V Case
Met Data Files - 1988 through 1994
Design Verification Comments

11.2 Attachment B - Memo NRP-01-015, April 9, 2001 From Robert Yewdall To Gopal Patel Subject: Design Inputs ARCON96 Meteorological Data (4 pages).

11.3 Attachment C - E-Mail From Barkley, Barry L. Sent: Friday, April 06, 2001 5:05 PM To: Patel, Gopal J. Subject: Confirmation of Openings in CR Building Exterior Wall (1 page).
Diskettes With Various Electronic Files
TO: Gopal Patel  
Contract Engineer – Supporting PSEG Nuclear LLC

FROM: Robert F. Yewdall  (Signed Original)  
Radiological Protection Support

SUBJECT: Design Input ARCON96 Meteorological Data  
Calc H-1-ZZ-MDC-1979

DATE: April 9, 2001  
NRP-01-015

The purpose of this memorandum is to provide the Technical Basis Design Document information for the meteorological data used in the Hope Creek Control Room radiological design basis dispersion calculation. The Technical Basis document 2001-02 is attached.

If you have any questions please call me (x2469)
<table>
<thead>
<tr>
<th>Technical Basis ID</th>
<th>Title</th>
<th>Page _1 of _2</th>
</tr>
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<tbody>
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<td>2001-02</td>
<td>Design Input ARCON96 Met Data</td>
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<tr>
<td>Rev 0</td>
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<tr>
<td>Originator</td>
<td>Reviewer</td>
<td>Reference:</td>
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<tr>
<td>Robert Yewdall</td>
<td>Lucius Clark</td>
<td>Calc H-1-ZZ-MDC-1879</td>
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<td>Date 4/9/01</td>
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<tr>
<td>Approved</td>
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<td>Radiation Protection</td>
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<tr>
<td>Robert Gary</td>
<td></td>
<td>Correspondence ID NRP-01-15</td>
</tr>
<tr>
<td>4/10/01</td>
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<td></td>
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</tbody>
</table>
Purpose

The purpose of this Technical Basis Document is to provide required documentation for the meteorological data used to perform design basis calculation for Hope Creek Control Room dose analysis. Meteorological data files identified below are used in the computer program ARCON96 to produce relative concentration calculations (i.e. dispersion factors -EI/Qs). The dispersion factors will be used to calculate activity concentration at the Hope Creek control room emergency air intake (identified as the receptor) from various source release points.

Method

A seven year meteorological database was used to perform dispersion calculations for Salem Unit 1 and Unit 2 control room design basis accident dose assessment. That analysis is identified as vendor calculation number 321035. The seven year period consists of meteorological data from 1988 through 1994. The same database is used for the Hope Creek calculation H-1-ZZ-MDC-1879.

The seven year database consists of seven separate files as follows:

CONMET88.MET
CONMET89.MET
CONMET90.MET
CONMET91.MET
CONMET92.MET
CONMET93.MET
CONMET94.MET

The file format is consistent with specification contained in NUREG/CR-6331, Rev 1, Atmospheric Relative Concentrations in Building Wakes. The above files consist of hourly data in the following format: (Ix, A5, 3x, 13, I2, 2x, I3, I4, Ix, I2, 2x, I3, I4). The order of information in the record is the site ID, Julian day, hour of the day, wind direction @ 33', wind speed @ 33', stability class, wind direction @ 150' wind speed @ 150'. Wind data at 150' elevation is closest to the FRVS release point which is ~ 200'. As indicated in the above file format, all records are in integer values (e.g. wind speeds are times 10).

Wind speeds in the above files are in mile per hour (mph). The wind direction is from a bearing of north (i.e., 0 degrees are winds from the north).
Instrument levels on the on-site meteorological tower are: 33', 150' and 300'.
Documentation for tower instrumentation is contained on drawing 75602-12, rev 0 (PSPB 147007) and the Hope Creek UFSAR, Section 2.3. The stability class is determined by delta temperature measurement between 300' and 33' using the P-G stability index found in Reg. Guides 1.21 and 1.23.

All meteorological data is collected and validated by approved Q'd procedures (i.e., ND.RS-TI.MET-1203(Q) Meteorological Monitoring System Data Collection, and ND.RS-TI.MET-1204(Q) Meteorological Monitoring System Data Validation.

While ARCON96 will accept as many as 10 years of data, the seven year database is sufficient. Seven years is more than the three to five years recommended in the draft NEI 99-03 document. The seven year DB is also identical to that used for the Salem Control Room analysis as discussed above.

References:

NEI 99-03, Control Room Habitability Assessment Guidance
NUREG/CR 6331, Rev 1, Atmospheric Relative Concentrations in Building Wakes
ND.RS-TI.MET-1203(Q) Meteorological Monitoring System Data Collection
ND.RS-TI.MET-1204(Q) Meteorological Monitoring System Data Validation
VTD 321035, Accident values At The Salem Generating Station Control Room Fresh Air Intakes, Exclusion Area Boundary And Low Population Zone, MES, 4/12/96
From: Barkley, Barry L.
Sent: Friday, April 06, 2001 5:05 PM
To: Patel, Gopal J.
Cc: Cichello, John P.; DeNight, Robert W.; Duffy, John F.; Yewdall, Robert F.
Subject: Confirmation of Openings in CR Building Exterior Wall

This memo is to document the walk-down that John Cichello, you (Gopal Patel), and I (Barry Barkley) performed of the plant to confirm the subject matter as follows.

1. There is no opening in the south wall of the Aux Building (Control) which houses the control room. This south wall is the wall closest to the reactor building (& FRVS vent). All of the openings in the south wall of the Aux Building (Diesel/Control) are openings in the Aux Building (Diesel) which is a separate building (walls & doors) with respect to leakage into the control room.

2. The door that provides access to the roof above the Tech Support Area EL 155'-3" is reasonably airtight with weather stripping around the opening. There are 2 other doors before you reach the 137'EL hall that reaches the CREF Boundary door at Room 5502.

3. The door that provides access to the roof (EL 172'-0") of the Aux Building (Control) is a Security Door R6, which requires security permission to open. This door is reasonably airtight with weather stripping around the opening. There is 1 other door before you reach the CREF boundary door at Room 5512.

Based on the above walk down, we determined that the CREF air intake provides the air supply for both the CR filtered air intake and unfiltered inleakage for the Hope Creek Plant. The copy of this e-mail will be attached to Calculation H-1-ZZ-MDC-1879 to confirm the subject matter.