

2.7.6 Long-Term (Routine) Diffusion Estimates

For routine releases to the atmosphere, the concentration of radioactive material in the surrounding region depends on the amount of effluent released, the height of the release, the momentum and buoyancy of the emitted plume, the wind speed and direction, atmospheric stability, airflow patterns around the site, and various effluent removal mechanisms. Annual average relative concentration, X/Q , and annual average relative deposition, D/Q , for routine effluent releases to the atmosphere were calculated for the Clinch River Nuclear (CRN) Site. This subsection describes the development of the long-term diffusion and deposition estimates.

As required by Title 10 of the Code of Federal Regulations (10 CFR) 100 and 10 CFR 50, estimates of atmospheric relative concentrations, X/Q , and relative deposition values, D/Q , were calculated for routine releases from the CRN Site for long-term (annual) time intervals. The XOQDOQ-82 (XOQDOQ) modeling program is the U.S. Nuclear Regulatory Commission (NRC)-recommended dispersion model for evaluating routine releases (NUREG/CR-2919, *XOQDOQ: Computer Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations*) as it implements the assumptions outlined in NRC Regulatory Guide (RG) 1.111, *Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors*. Using Joint Frequency Distributions (JFDs) of wind speed, wind direction, and atmospheric stability class, the XOQDOQ program provides annual average X/Q and D/Q values at the required distances and sectors. Radioactive decay and dry deposition are considered, and a straight-line Gaussian trajectory is modeled between the point of release and receptors at distances for which X/Q and D/Q values are calculated.

2.7.6.1 Calculation Methodology and Assumptions

NRC RG 4.7, *General Site Suitability Criteria for Nuclear Power Stations*, states that for site approval, each applicant should collect at least one year of meteorological information that is representative of the site conditions for calculating radiation doses resulting from the release of fission products. NRC RG 1.23, *Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants*, recommends using meteorological data from a consecutive 24-month period. Site-specific, validated meteorological data covering the 2-year (yr) period of record from June 1, 2011 through May 31, 2013 was used to quantitatively evaluate routine-releases at the CRN Site. The meteorological data needed for the X/Q and D/Q calculations in XOQDOQ included wind speed, wind direction, and atmospheric stability as JFDs. A description of the methods used to determine the JFDs is provided in Subsection 2.7.5.2. Fourteen wind speed categories were defined in the JFDs and used in the XOQDOQ analyses.

Using the JFDs, XOQDOQ provides the X/Q values as a function of wind direction for various time periods at the exclusion area boundary (EAB), at points of maximum individual exposure, and at points within a radial grid of sixteen 22-1/2 degree sectors extending to a distance of 50

mile (mi). As discussed above, a circular, analytical EAB was defined at a fixed distance from an effluent release boundary (ERB) release zone.

The ERB was considered in calculating atmospheric dispersion factors at the analytical EAB. A distance of 1100 feet (ft; 335 meters [m]) was modeled from the ERB to the analytical EAB (Figure 2.7.5-1).

Both X/Q and D/Q estimates were also calculated for the nearest residence, the nearest vegetable garden, and the nearest meat animal at each of the 16 wind direction sectors. The locations of the sensitive receptors were determined from the land use surveys conducted in January and April 2014 (Figure 2.7.6-1).

Other plant specific data considered in the XOQDOQ model include building minimum cross-sectional area, building height, and meteorological tower height at which wind speed was measured. The building height and cross-sectional area are used in the calculation of building wake effects. NRC RG 1.111 identifies the tallest adjacent building as appropriate for use. Building area is defined as the smallest vertical-plane, cross-sectional area of the affected building, in square meters. The dose calculated at the EAB and the LPZ are located beyond the building wake influence zone, so the height and cross-sectional area have less effect on building wake X/Q values. Therefore, for conservatism, no building wake credit was used in the XOQDOQ model (e.g., cross-sectional area and building height were both set to zero).

As discussed for the PAVAN modeling in Subsection 2.7.5.2, a groundlevel release was also evaluated in the XOQDOQ model as this scenario provides the bounding case.

Other inputs to the model included a release height and a representative wind height. NUREG/CR-2919 indicates that for a ground level release, average vent velocity (EXIT) and stack diameter (DIAMTR) must be set to 0.0 m, and the wind release height (SLEV) must be set to 10 m. Therefore, the default values were used. Vent height is set to wind height in the XOQDOQ model. For a groundlevel release, the lower wind speed measurement height (9.78 m) was used. The inputs used in the XOQDOQ model are listed in Table 2.7.6-1.

Consistent with NRC RG 1.111 in regard to the radiological impact evaluations, radioactive decay and deposition were considered. For conservative estimates of radioactive decay, a half-life of 2.26 days for short-lived noble gases, a half-life of 101 days for long-lived noble gases, and a half-life of 8 days for iodines are acceptable for releases to the atmosphere. At sites where there is not a well-defined rainy season associated with a local grazing season, wet deposition does not have a significant impact. In addition, the dry deposition rate of noble gases is such that depletion is negligible within 50 mi (RG 1.111). Therefore, in this analysis, only the effects of dry deposition of iodines were considered. The calculations considering "dry deposition" and "no deposition" are identified in the output as "depleted" and "undepleted."

2.7.6.2 Complex Terrain Modeling Analysis

As discussed in Subsection 2.7.4.2, the CRN Site is surrounded by complex terrain, with alternating ridges and valleys oriented along a SW to NE axis. The local wind patterns are influenced by the complex terrain, with up-valley (SW-WSW) and down-valley flow (NE-ENE) patterns common, and stable conditions with light winds frequently observed, especially during the summer and fall seasons. There are also potential local influences associated with the terrain that follows the Clinch River arm of the Watts Bar Reservoir. These terrain features along with light, variable winds can produce nonlinear flows as the trajectory of a plume changes in speed and direction with distance from its release point. These nonlinear flow patterns can influence the dispersion around the CRN Site (Reference 2.7.6-1).

For complex terrain sites where these nonlinear dispersion effects are apparent, adjustments to a straight-line model (as XOQDOQ) are possibly warranted. Specifically, adjustment factors for terrain confinement and recirculation effects on annual average dispersion concentrations at boundary locations must be considered. In the XOQDOQ model (NUREG/CR-2919), the computed groundlevel concentrations can be adjusted to account for nonlinear trajectories (plume recirculation or stagnation). As outlined in NUREG/CR-2919, the adjustments can be accomplished in two ways. First, a standard default correction factor that is a function of distance can be applied to the X/Q and D/Q values for each of the directional sectors. Second, adjustments can be made by a comparison of results with a variable trajectory model. If the variable trajectory model produces higher concentrations than the straight-line model, the concentration ratio, or adjustment factor, is used in the straight-line model to correct for non-linear dispersion effects.

This evaluation involved a comparison of estimated long-term X/Q values between the CALPUFF variable trajectory model system and the XOQDOQ model at the LPZ and an analytical EAB. The CALPUFF Version 6.42 dispersion modeling system is an advanced, non-steady-state, meteorological and air quality modeling system listed by the U.S. Environmental Protection Agency in its Guideline on Air Quality Models that can be applied in near-field applications involving complex meteorological conditions (Reference 2.7.6-2; Reference 2.7.6-3). The modeling system is comprised of a meteorological processor, CALMET, Version 6.334, which develops hourly wind and temperature fields on a three-dimensional gridded modeling domain, with two-dimensional fields of mixing height, surface characteristics, and dispersion properties (Reference 2.7.6-4). The CALPUFF model is a multi-layer, multi-species, non-steady-state puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on pollution transport, transformation and removal. The concentrations and deposition files produced from CALPUFF are post-processed by the CALPOST, Version 6.292, processor program into tables and plot files of concentrations at given receptors. The latest version of CALPUFF was used in order to incorporate the latest chemistry mechanisms and modeling updates.

Both the CALPUFF modeling system and the XOQDOQ model were used to simulate the meteorological data encompassing the June 1, 2011 through May 31, 2013 period in which the

CRN meteorological tower was in operation. For the meteorological processing, CALMET requires comprehensive surface, precipitation, and upper air data. The surface data was processed from the CRN meteorological tower. Because of repeated problems with the CRN Site rain gauge measurements, hourly data collected from the Oak Ridge Automated Surface Observing System (ASOS) (approximately 12 mi northeast of the CRN Site) were used as an alternative. (Subsection 6.4.2.4 provides details regarding the problems related with the onsite rain gauge, required data capture, and justification for using the Oak Ridge ASOS data.) Upper air data were taken from the Nashville National Weather Service (NWS) Station. Finally, 22 vertical layers were used in the CALMET model to provide enhanced stratification of the upper air field. For the XOQDOQ model, JFDs of CRN onsite meteorological wind and stability data during the same period were used as input.

The CALPUFF modeling system, Version 6.42, has the ability to model up to 23 radioactive species, each with a default-assigned decay half-life. It also allows the user to assign the associated mass lost to one or more other modeled species using a mass yield factor. As XOQDOQ provides default estimates of radioactive decay using a half-life of 2.26 days for short-lived noble gases, 8 days for iodines, and up to 101 days for long-lived noble gases; the following three radioactive species were modeled in CALPUFF: xenon-133M (Xe-133M), iodine-131 (I-131), and krypton-85 (Kr-85). Xe-133M has a half-life of 2.16 days, I-131 has a half-life of 8 days, and Kr-85 has a half-life of 11 yr. Kr-85 was selected as the long-lived noble gas because its long half-life and resistance to dry and wet deposition would provide a more conservative estimate of undepleted decay. Furthermore, wet and dry deposition of I-131 was not considered in CALPUFF, which also allowed for a more conservative estimate of final concentrations from the CALPUFF model.

Both the CALPUFF and XOQDOQ models used a single groundlevel point source located at the center point of the site with no building wake credit. To model a groundlevel release in CALPUFF, stack parameters must be set to nonzero values, with the exception of stack height. Therefore, to closely simulate a groundlevel release that would be dominated by plume momentum, a stack diameter of 1.0 m and an exit velocity of 0.1 meter per second (m/s) was assumed. A stack height of 10 m was used to maintain consistency with the XOQDOQ default stack height for groundlevel releases. As indicated in NUREG/CR-2919, nuclear power vents generally have ambient temperature plumes, so the source exit temperature in CALPUFF was set to 68 degrees Fahrenheit (°F; 293 K). With the center point of the site as the source location, both models included discrete receptors at an analytical EAB with radius equal to the shorter distance of the EAB ellipse (0.326 mi (524 m)) and at the 1.0 mi (1609 m) LPZ distance for each of the 16 wind direction sectors (Figure 2.7.6-2). The CALPUFF input options are summarized in Table 2.7.6-2.

The multiple-year average X/Q values¹ for the undepleted case, the 2-day decay case, and the 8-day decay case at the LPZ and analytical EAB were compared between the two models, and the results are summarized in Tables 2.7.6-3 and 2.7.6-4, respectively. The X/Q values at both distances demonstrated that the highest X/Q values were estimated by the XOQDOQ model for the 16 wind direction sectors. Therefore, it was concluded that the XOQDOQ model did not underestimate the annual average X/Q values, and no nonlinear adjustment factors were applied to the XOQDOQ annual average X/Q and D/Q values at the CRN Site.

2.7.6.3 Summary of XOQDOQ Results and Conclusions

Consistent with NRC RG 1.111, the long-term, routine-release X/Q and D/Q values were evaluated with the XOQDOQ model for the analytical EAB, at receptor points of maximum individual exposure, and at points within a radial grid of sixteen 22½ degree sectors extending to a distance of 50 mi from the CRN Site. The offsite receptor locations and distances for the sensitive receptors at the nearest residences, nearest gardens, and nearest meat animals included in the evaluation are given in Table 2.7.6-5. For the sector-based receptors out to 50 mi, these were located at increments of 0.25 mi to a distance of 1 mi from the CRN Site; at increments of 0.5 mi from a distance of 1 mi to 5 mi; at increments of 2.5 mi from a distance of 5 mi to 10 mi; and at increments of 5 mi out to a distance of 50 mi. Estimates of X/Q (undecayed and undepleted; depleted for radioiodines) and D/Q are provided at each of these points. The results of the modeling analysis, based on two years of onsite meteorological data, are presented in Table 2.7.6-6 through Table 2.7.6-10.

As seen from the results, the highest concentrations at the site boundaries, nearest garden, and nearest residence, are found in the sectors that lie to the WNW of the plant. Highest relative deposition is generally to the east-southeast (ESE).

The two complete years of onsite meteorological data used for the long-term (routine) release calculations were representative of the overall site conditions and long-term trends for the CRN Site. As documented in Subsection 2.7.4, the location of the CRN Site meteorological tower was sufficiently removed from any structures or significant topographic features to ensure that adequate data were provided to represent onsite meteorological conditions and to describe the local and regional atmospheric transport and diffusion characteristics. The representativeness of observed meteorology at the site was assessed, and no long-term trends were observed which would bias the X/Q and D/Q estimates.

¹ The long-term average values reflect the CRN June 2011 through May 2013 meteorological monitoring period.

2.7.6.4 References

Reference 2.7.6-1. Project Management Corporation, "Clinch River Breeder Reactor Plant Environmental Report Volume I," April, 1982.

Reference 2.7.6-2. Scire, Joseph S., Strimaitis, David G., and Yamartino, Robert J., "A User's Guide for the CALPUFF Dispersion Model (Version 5)," Earth Tech, Inc., January, 2000.

Reference 2.7.6-3. Scire, J., Strimaitis, D., Robe, F., Phadnis, M., and Popovic, J., "CALPUFF Modeling System Version 6 User Instructions," Earth Tech, Inc., April, 2011.

Reference 2.7.6-4. Scire, Joseph S., Robe, Francoise R., Fernau, Mark E., and Yamartino, Robert J., "A User's Guide for the CALMET Meteorological Model (Version 5)," Earth Tech, Inc., January, 2000.

Reference 2.7.6-5. Paynter, Dale, "XOQDOQ Calculation - Method, Tools and Pitfalls," Operations Management Group, October 13, 2006.

**Table 2.7.6-1
 List of Inputs used in the XOQDOQ Modeling**

XOQDOQ Input Variable	Value
Wind Sensor Height (PLEV)	9.78 m
Conversion Correction Factor (UCOR)	150
Lower-T Sensor Height	8.44 m
Upper-T sensor Height	59.22 m
Type of Release	Ground
Vent Average Velocity (EXIT)	0.0 m/s
Vent Inside Diameter (DIAMTR)	0.0 m
Vent Release Height (HSTACK)	10.0 m
Containment Building Height (HBLDG)	0.0 m
Building Min. Cross Sectional Area (CRSEC)	0.0 m ²
Wind Height (SLEV)	10.0 m

Notes:

1. No building wake credit was used in the modeling. Therefore, the building height and cross-sectional area were set to zero.
2. According to NUREG/CR-2919, for a groundlevel release, the exit velocity and diameter are set to zero, while the wind height is set to 10 m.
3. Vent height should be equal to wind height (Reference 2.7.6-5).
4. For the complex terrain modeling, radial receptors were modeled at 524 m and 1609 m consistent with the CALPUFF modeling (see Table 2.7.6-2). For the routine release modeling of actual CRN Site conditions, the analytical EAB of 1100 ft was modeled, along with sector based sensitive receptors (at the nearest residences, nearest gardens, and nearest meat animals) and sector based receptors out to 50 mi.

**Table 2.7.6-2
 CALPUFF Model Input Configuration for Complex Terrain Analysis**

CALPUFF Parameter	Input Value
Episode Modeled	June 1, 2011 to May 31, 2013
Domain Size	10-mile radius
No. of Grid Cells	111 x 111
Grid Spacing	350 m
# of Vertical (Height) Levels	22
Upper Air Data	Nashville NWS
Precipitation Data	Oak Ridge ASOS
Surface Data	CRN Met Tower
Source Location	Site Center Coordinates (NAD27)
Base Elevation	250.2 m
Distance to Analytical EAB	524 m radius
Distance to LPZ	1609 m radius
# of Stacks (Vents)	1
Stack #1 Height	10.0 m
Stack #1 Diameter	1.0 m
Stack #1 Exit Velocity	0.1 m/s
Stack #1 Exit Temperature	293 K (68°F)

Note: For the complex terrain modeling, the analytical EAB was defined as an area with a 0.326-mi (524-m) radius from the center point of the CRN Site. The LPZ was defined as an area with a 1-mi (1609-m) radius from the center point of the CRN Site.

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**Table 2.7.6-3
Long-Term Average X/Q Values Estimated from XOQDOQ and CALPUFF at the EAB**

Long-Term Average X/Q Values (sec/m ³)									
EAB Sector	Undepleted			2-Day Decay			8-Day Decay		
	XOQDOQ	CALPUFF	Ratio	XOQDOQ	CALPUFF	Ratio	XOQDOQ	CALPUFF	Ratio
S	2.70E-05	2.01E-06	0.07	2.70E-05	2.01E-06	0.07	2.50E-05	2.01E-06	0.08
SSW	2.40E-05	1.95E-06	0.08	2.40E-05	1.95E-06	0.08	2.30E-05	1.95E-06	0.08
SW	2.80E-05	1.32E-06	0.05	2.80E-05	1.32E-06	0.05	2.60E-05	1.32E-06	0.05
WSW	4.20E-05	1.17E-06	0.03	4.10E-05	1.17E-06	0.03	3.80E-05	1.17E-06	0.03
W	6.70E-05	1.15E-06	0.02	6.60E-05	1.14E-06	0.02	6.10E-05	1.15E-06	0.02
WNW	9.10E-05	6.51E-07	0.01	9.10E-05	6.49E-07	0.01	8.40E-05	6.51E-07	0.01
NW	7.80E-05	1.38E-06	0.02	7.70E-05	1.38E-06	0.02	7.20E-05	1.38E-06	0.02
NNW	4.60E-05	3.01E-06	0.07	4.50E-05	3.01E-06	0.07	4.20E-05	3.01E-06	0.07
N	3.10E-05	2.93E-06	0.09	3.10E-05	2.92E-06	0.09	2.90E-05	2.92E-06	0.10
NNE	2.20E-05	3.75E-06	0.17	2.20E-05	3.74E-06	0.17	2.00E-05	3.75E-06	0.19
NE	2.20E-05	2.11E-06	0.10	2.20E-05	2.11E-06	0.10	2.00E-05	2.11E-06	0.11
ENE	3.30E-05	2.26E-06	0.07	3.30E-05	2.26E-06	0.07	3.10E-05	2.26E-06	0.07
E	4.10E-05	2.78E-06	0.07	4.10E-05	2.77E-06	0.07	3.80E-05	2.78E-06	0.07
ESE	5.70E-05	3.68E-06	0.06	5.60E-05	3.67E-06	0.07	5.20E-05	3.68E-06	0.07
SE	4.60E-05	2.23E-06	0.05	4.60E-05	2.23E-06	0.05	4.20E-05	2.23E-06	0.05
SSE	2.90E-05	2.57E-06	0.09	2.90E-05	2.57E-06	0.09	2.70E-05	2.57E-06	0.10

Notes:

1. Long-term average values are reflective of a multi-year average from the CRN June 1, 2011 - May 31, 2013 meteorological episode. Both the XOQDOQ and CALPUFF X/Q values reflect the undepleted, 2-day decay, and 8-day decay cases.
2. For the complex terrain analysis, the analytical EAB was defined as an area with a 0.326-mi (524-m) radius from the center point of the CRN Site.
3. The ratio is determined by the CALPUFF concentration divided by the XOQDOQ concentration.

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**Table 2.7.6-4
Long-Term Average X/Q Values Estimated from XOQDOQ and CALPUFF at the Low Population Zone (LPZ)**

Long-Term Average X/Q Values (sec/m ³)									
LPZ Sector	Undepleted			2-Day Decay			8-Day Decay		
	XOQDOQ	CALPUFF	Ratio	XOQDOQ	CALPUFF	Ratio	XOQDOQ	CALPUFF	Ratio
S	3.80E-06	4.52E-07	0.12	3.70E-06	4.50E-07	0.12	3.30E-06	4.52E-07	0.14
SSW	3.40E-06	6.31E-07	0.19	3.40E-06	6.28E-07	0.19	3.00E-06	6.30E-07	0.21
SW	4.00E-06	6.86E-07	0.17	3.90E-06	6.82E-07	0.18	3.50E-06	6.85E-07	0.19
WSW	5.80E-06	3.71E-07	0.06	5.70E-06	3.68E-07	0.06	5.10E-06	3.70E-07	0.07
W	9.30E-06	3.38E-07	0.04	9.10E-06	3.36E-07	0.04	8.10E-06	3.38E-07	0.04
WNW	1.30E-05	2.28E-07	0.02	1.20E-05	2.26E-07	0.02	1.10E-05	2.28E-07	0.02
NW	1.10E-05	2.35E-07	0.02	1.10E-05	2.33E-07	0.02	9.40E-06	2.34E-07	0.02
NNW	6.30E-06	5.51E-07	0.09	6.20E-06	5.48E-07	0.09	5.50E-06	5.50E-07	0.10
N	4.40E-06	8.74E-07	0.20	4.30E-06	8.69E-07	0.20	3.80E-06	8.72E-07	0.23
NNE	3.10E-06	4.92E-07	0.16	3.00E-06	4.90E-07	0.16	2.70E-06	4.91E-07	0.18
NE	3.10E-06	6.10E-07	0.20	3.00E-06	6.08E-07	0.20	2.70E-06	6.09E-07	0.23
ENE	4.60E-06	6.05E-07	0.13	4.60E-06	6.03E-07	0.13	4.00E-06	6.05E-07	0.15
E	5.80E-06	6.55E-07	0.11	5.70E-06	6.52E-07	0.11	5.00E-06	6.54E-07	0.13
ESE	7.90E-06	5.65E-07	0.07	7.80E-06	5.62E-07	0.07	6.90E-06	5.64E-07	0.08
SE	6.50E-06	8.66E-07	0.13	6.40E-06	8.63E-07	0.14	5.60E-06	8.65E-07	0.15
SSE	4.20E-06	5.96E-07	0.14	4.10E-06	5.94E-07	0.15	3.60E-06	5.95E-07	0.16

Notes:

1. Long-term average values are reflective of a multi-year average from the CRN June 1, 2011 - May 31, 2013 meteorological episode. Both the XOQDOQ and CALPUFF X/Q values reflect the undepleted, 2-day depletion, and 8-day depletion cases.
2. For the complex terrain analysis, the LPZ was defined as an area with a 1.0-mile (1609-m) radius from the center point of the CRN Site.
3. The ratio is determined by the CALPUFF concentration divided by the XOQDOQ concentration.

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**Table 2.7.6-5
 CRN OffSite Receptor Locations**

Sector	Nearest Residence		Nearest Garden		Nearest Meat Animal	
	Distance (m)	Elevation (m)	Distance (m)	Elevation (m)	Distance (m)	Elevation (m)
S	1359	283	4254	259	3144	254
SSW	1113	240	1113	240	4488	250
SW	995	240	1522	230	4695	264
WSW	1136	246	2203	297	1138	246
W	1470	301	2861	255	4984	250
WNW	1066	285	1848	253	1120	298
NW	992	273	1978	233	1627	239
NNW	6997	312	7833	233	7833	233
N	7814	236	none	none	none	none
NNE	none	none	none	none	none	none
NE	1072	239	1072	239	none	none
ENE	1149	243	none	none	none	none
E	1118	249	3802	259	4629	245
ESE	1117	253	1482	249	4492	254
SE	1288	252	3111	347	4171	303
SSE	1304	250	1486	241	3106	313

Note: Distances and elevations, in meters, from the CRN Site center point to the nearest receptor of each type for a given sector.

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Table 2.7.6-6 (Sheet 1 of 3)
Annual Average X/Q for No Decay, Undepleted for Specified Distances at Each Sector

Annual Average X/Q (sec/m ³) for No Decay, Undepleted											
Sector	Distance (miles)										
	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
S	4.31E-05	1.26E-05	6.14E-06	3.79E-06	1.99E-06	1.29E-06	9.23E-07	7.08E-07	5.67E-07	4.69E-07	3.97E-07
SSW	3.91E-05	1.14E-05	5.58E-06	3.44E-06	1.81E-06	1.16E-06	8.34E-07	6.38E-07	5.11E-07	4.22E-07	3.57E-07
SW	4.53E-05	1.32E-05	6.45E-06	3.98E-06	2.08E-06	1.34E-06	9.60E-07	7.34E-07	5.87E-07	4.84E-07	4.09E-07
WSW	6.66E-05	1.94E-05	9.41E-06	5.82E-06	3.07E-06	1.99E-06	1.43E-06	1.10E-06	8.84E-07	7.33E-07	6.22E-07
W	1.07E-04	3.10E-05	1.50E-05	9.26E-06	4.91E-06	3.20E-06	2.32E-06	1.79E-06	1.44E-06	1.20E-06	1.02E-06
WNW	1.47E-04	4.25E-05	2.04E-05	1.27E-05	6.73E-06	4.39E-06	3.19E-06	2.47E-06	1.99E-06	1.66E-06	1.41E-06
NW	1.25E-04	3.61E-05	1.74E-05	1.08E-05	5.73E-06	3.74E-06	2.71E-06	2.10E-06	1.69E-06	1.41E-06	1.20E-06
NNW	7.30E-05	2.12E-05	1.02E-05	6.30E-06	3.35E-06	2.19E-06	1.59E-06	1.23E-06	9.89E-07	8.23E-07	7.01E-07
N	5.03E-05	1.46E-05	7.06E-06	4.37E-06	2.31E-06	1.50E-06	1.09E-06	8.37E-07	6.73E-07	5.59E-07	4.75E-07
NNE	3.53E-05	1.03E-05	4.96E-06	3.07E-06	1.62E-06	1.05E-06	7.59E-07	5.84E-07	4.69E-07	3.89E-07	3.30E-07
NE	3.53E-05	1.03E-05	4.98E-06	3.08E-06	1.62E-06	1.04E-06	7.49E-07	5.75E-07	4.60E-07	3.80E-07	3.22E-07
ENE	5.33E-05	1.55E-05	7.51E-06	4.64E-06	2.44E-06	1.57E-06	1.13E-06	8.64E-07	6.92E-07	5.72E-07	4.84E-07
E	6.60E-05	1.92E-05	9.32E-06	5.76E-06	3.03E-06	1.96E-06	1.41E-06	1.08E-06	8.70E-07	7.20E-07	6.11E-07
ESE	9.08E-05	2.65E-05	1.29E-05	7.94E-06	4.19E-06	2.71E-06	1.96E-06	1.50E-06	1.21E-06	1.00E-06	8.48E-07
SE	7.34E-05	2.15E-05	1.05E-05	6.46E-06	3.40E-06	2.19E-06	1.58E-06	1.21E-06	9.68E-07	8.00E-07	6.77E-07
SSE	4.72E-05	1.38E-05	6.72E-06	4.15E-06	2.19E-06	1.41E-06	1.02E-06	7.79E-07	6.24E-07	5.17E-07	4.38E-07

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Table 2.7.6-6 (Sheet 2 of 3)
Annual Average X/Q for No Decay, Undepleted for Specified Distances at Each Sector

Annual Average X/Q (sec/m ³) for No Decay, Undepleted											
Sector	Distance (miles)										
	5	7.5	10	15	20	25	30	35	40	45	50
S	3.42E-07	1.95E-07	1.32E-07	7.67E-08	5.25E-08	3.92E-08	3.09E-08	2.53E-08	2.13E-08	1.83E-08	1.60E-08
SSW	3.07E-07	1.75E-07	1.18E-07	6.81E-08	4.65E-08	3.46E-08	2.73E-08	2.23E-08	1.88E-08	1.61E-08	1.41E-08
SW	3.53E-07	2.00E-07	1.35E-07	7.80E-08	5.32E-08	3.96E-08	3.12E-08	2.55E-08	2.15E-08	1.84E-08	1.61E-08
WSW	5.37E-07	3.09E-07	2.10E-07	1.23E-07	8.46E-08	6.35E-08	5.03E-08	4.13E-08	3.49E-08	3.01E-08	2.63E-08
W	8.82E-07	5.12E-07	3.51E-07	2.08E-07	1.44E-07	1.09E-07	8.64E-08	7.13E-08	6.04E-08	5.22E-08	4.59E-08
WNW	1.23E-06	7.15E-07	4.92E-07	2.93E-07	2.04E-07	1.54E-07	1.23E-07	1.02E-07	8.63E-08	7.47E-08	6.57E-08
NW	1.04E-06	6.08E-07	4.18E-07	2.49E-07	1.73E-07	1.31E-07	1.05E-07	8.64E-08	7.33E-08	6.35E-08	5.58E-08
NNW	6.08E-07	3.55E-07	2.44E-07	1.45E-07	1.01E-07	7.62E-08	6.08E-08	5.03E-08	4.26E-08	3.69E-08	3.25E-08
N	4.11E-07	2.38E-07	1.63E-07	9.60E-08	6.64E-08	5.00E-08	3.97E-08	3.28E-08	2.77E-08	2.40E-08	2.10E-08
NNE	2.86E-07	1.65E-07	1.12E-07	6.59E-08	4.55E-08	3.42E-08	2.71E-08	2.23E-08	1.89E-08	1.63E-08	1.43E-08
NE	2.78E-07	1.59E-07	1.08E-07	6.26E-08	4.29E-08	3.21E-08	2.54E-08	2.09E-08	1.76E-08	1.51E-08	1.33E-08
ENE	4.18E-07	2.39E-07	1.62E-07	9.41E-08	6.45E-08	4.83E-08	3.82E-08	3.14E-08	2.65E-08	2.28E-08	2.00E-08
E	5.27E-07	3.03E-07	2.05E-07	1.20E-07	8.26E-08	6.19E-08	4.90E-08	4.03E-08	3.40E-08	2.93E-08	2.57E-08
ESE	7.33E-07	4.21E-07	2.86E-07	1.68E-07	1.15E-07	8.66E-08	6.86E-08	5.64E-08	4.76E-08	4.10E-08	3.59E-08
SE	5.84E-07	3.34E-07	2.26E-07	1.31E-07	8.98E-08	6.71E-08	5.30E-08	4.34E-08	3.66E-08	3.14E-08	2.75E-08
SSE	3.78E-07	2.16E-07	1.46E-07	8.51E-08	5.83E-08	4.36E-08	3.44E-08	2.82E-08	2.38E-08	2.05E-08	1.79E-08

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Table 2.7.6-6 (Sheet 3 of 3)
Annual Average X/Q for No Decay, Undepleted for Specified Distances at Each Sector

Annual Average X/Q (sec/m ³) for No Decay, Undepleted										
Sector	Distance (miles)									
	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	6.53E-06	2.08E-06	9.34E-07	5.70E-07	3.98E-07	2.00E-07	7.82E-08	3.94E-08	2.54E-08	1.84E-08
SSW	5.93E-06	1.88E-06	8.44E-07	5.13E-07	3.58E-07	1.79E-07	6.95E-08	3.48E-08	2.24E-08	1.61E-08
SW	6.85E-06	2.17E-06	9.71E-07	5.90E-07	4.11E-07	2.05E-07	7.96E-08	3.99E-08	2.56E-08	1.85E-08
WSW	1.00E-05	3.20E-06	1.45E-06	8.89E-07	6.23E-07	3.16E-07	1.25E-07	6.38E-08	4.14E-08	3.01E-08
W	1.60E-05	5.12E-06	2.34E-06	1.45E-06	1.02E-06	5.23E-07	2.11E-07	1.09E-07	7.15E-08	5.23E-08
WNW	2.19E-05	7.01E-06	3.22E-06	2.00E-06	1.42E-06	7.29E-07	2.97E-07	1.55E-07	1.02E-07	7.48E-08
NW	1.86E-05	5.96E-06	2.74E-06	1.70E-06	1.20E-06	6.20E-07	2.53E-07	1.32E-07	8.66E-08	6.36E-08
NNW	1.09E-05	3.49E-06	1.60E-06	9.94E-07	7.03E-07	3.62E-07	1.47E-07	7.66E-08	5.04E-08	3.70E-08
N	7.54E-06	2.41E-06	1.10E-06	6.76E-07	4.76E-07	2.43E-07	9.76E-08	5.03E-08	3.28E-08	2.40E-08
NNE	5.30E-06	1.69E-06	7.67E-07	4.71E-07	3.31E-07	1.68E-07	6.71E-08	3.44E-08	2.24E-08	1.63E-08
NE	5.31E-06	1.69E-06	7.58E-07	4.62E-07	3.23E-07	1.62E-07	6.38E-08	3.23E-08	2.09E-08	1.52E-08
ENE	8.00E-06	2.54E-06	1.14E-06	6.95E-07	4.85E-07	2.44E-07	9.59E-08	4.86E-08	3.15E-08	2.28E-08
E	9.93E-06	3.16E-06	1.43E-06	8.74E-07	6.12E-07	3.09E-07	1.22E-07	6.23E-08	4.04E-08	2.94E-08
ESE	1.37E-05	4.37E-06	1.98E-06	1.21E-06	8.50E-07	4.31E-07	1.71E-07	8.71E-08	5.65E-08	4.11E-08
SE	1.11E-05	3.54E-06	1.59E-06	9.72E-07	6.79E-07	3.41E-07	1.34E-07	6.75E-08	4.35E-08	3.15E-08
SSE	7.15E-06	2.28E-06	1.03E-06	6.28E-07	4.39E-07	2.21E-07	8.68E-08	4.39E-08	2.83E-08	2.05E-08

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Table 2.7.6-7 (Sheet 1 of 3)
Annual Average X/Q for 2.26 Day Decay, Undepleted for Specified Distances at Each Sector

Annual Average X/Q (sec/m ³) for 2.26 Day Decay, Undepleted											
Sector	Distance (miles)										
	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
S	4.29E-05	1.25E-05	6.05E-06	3.72E-06	1.93E-06	1.24E-06	8.79E-07	6.67E-07	5.29E-07	4.33E-07	3.63E-07
SSW	3.89E-05	1.13E-05	5.50E-06	3.38E-06	1.76E-06	1.12E-06	7.96E-07	6.03E-07	4.78E-07	3.91E-07	3.28E-07
SW	4.51E-05	1.31E-05	6.36E-06	3.91E-06	2.03E-06	1.30E-06	9.19E-07	6.97E-07	5.52E-07	4.52E-07	3.78E-07
WSW	6.63E-05	1.92E-05	9.29E-06	5.72E-06	2.99E-06	1.92E-06	1.37E-06	1.04E-06	8.30E-07	6.82E-07	5.73E-07
W	1.06E-04	3.07E-05	1.47E-05	9.09E-06	4.77E-06	3.08E-06	2.21E-06	1.69E-06	1.35E-06	1.11E-06	9.35E-07
WNW	1.46E-04	4.21E-05	2.01E-05	1.24E-05	6.55E-06	4.24E-06	3.05E-06	2.34E-06	1.87E-06	1.54E-06	1.30E-06
NW	1.24E-04	3.58E-05	1.71E-05	1.06E-05	5.58E-06	3.61E-06	2.60E-06	1.99E-06	1.59E-06	1.32E-06	1.11E-06
NNW	7.27E-05	2.10E-05	1.00E-05	6.19E-06	3.26E-06	2.11E-06	1.52E-06	1.16E-06	9.28E-07	7.66E-07	6.46E-07
N	5.01E-05	1.45E-05	6.96E-06	4.28E-06	2.25E-06	1.45E-06	1.03E-06	7.89E-07	6.29E-07	5.17E-07	4.35E-07
NNE	3.52E-05	1.02E-05	4.90E-06	3.02E-06	1.58E-06	1.02E-06	7.28E-07	5.55E-07	4.43E-07	3.64E-07	3.06E-07
NE	3.51E-05	1.02E-05	4.92E-06	3.03E-06	1.58E-06	1.01E-06	7.20E-07	5.48E-07	4.35E-07	3.57E-07	3.00E-07
ENE	5.31E-05	1.54E-05	7.43E-06	4.57E-06	2.38E-06	1.53E-06	1.09E-06	8.27E-07	6.58E-07	5.40E-07	4.53E-07
E	6.58E-05	1.91E-05	9.22E-06	5.68E-06	2.97E-06	1.91E-06	1.36E-06	1.04E-06	8.28E-07	6.81E-07	5.73E-07
ESE	9.04E-05	2.63E-05	1.27E-05	7.82E-06	4.09E-06	2.63E-06	1.88E-06	1.43E-06	1.14E-06	9.39E-07	7.90E-07
SE	7.31E-05	2.13E-05	1.03E-05	6.35E-06	3.31E-06	2.12E-06	1.51E-06	1.15E-06	9.13E-07	7.48E-07	6.28E-07
SSE	4.70E-05	1.37E-05	6.62E-06	4.07E-06	2.12E-06	1.36E-06	9.66E-07	7.34E-07	5.82E-07	4.77E-07	4.00E-07

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Table 2.7.6-7 (Sheet 2 of 3)
Annual Average X/Q for 2.26 Day Decay, Undepleted for Specified Distances at Each Sector

Annual Average X/Q (sec/m ³) for 2.26 Day Decay, Undepleted											
Sector	Distance (miles)										
	5	7.5	10	15	20	25	30	35	40	45	50
S	3.10E-07	1.68E-07	1.08E-07	5.71E-08	3.55E-08	2.42E-08	1.75E-08	1.31E-08	1.02E-08	8.06E-09	6.50E-09
SSW	2.80E-07	1.52E-07	9.76E-08	5.16E-08	3.22E-08	2.20E-08	1.60E-08	1.20E-08	9.35E-09	7.43E-09	6.01E-09
SW	3.23E-07	1.76E-07	1.13E-07	6.02E-08	3.78E-08	2.60E-08	1.89E-08	1.43E-08	1.12E-08	8.94E-09	7.27E-09
WSW	4.91E-07	2.70E-07	1.76E-07	9.42E-08	5.96E-08	4.12E-08	3.01E-08	2.29E-08	1.79E-08	1.43E-08	1.16E-08
W	8.02E-07	4.45E-07	2.91E-07	1.57E-07	9.99E-08	6.92E-08	5.06E-08	3.85E-08	3.01E-08	2.41E-08	1.96E-08
WNW	1.12E-06	6.25E-07	4.11E-07	2.25E-07	1.44E-07	1.00E-07	7.38E-08	5.64E-08	4.43E-08	3.56E-08	2.90E-08
NW	9.55E-07	5.34E-07	3.52E-07	1.93E-07	1.24E-07	8.65E-08	6.38E-08	4.88E-08	3.84E-08	3.09E-08	2.52E-08
NNW	5.56E-07	3.10E-07	2.04E-07	1.11E-07	7.09E-08	4.93E-08	3.62E-08	2.76E-08	2.17E-08	1.74E-08	1.41E-08
N	3.73E-07	2.06E-07	1.34E-07	7.20E-08	4.55E-08	3.14E-08	2.30E-08	1.74E-08	1.36E-08	1.09E-08	8.85E-09
NNE	2.63E-07	1.45E-07	9.51E-08	5.16E-08	3.29E-08	2.29E-08	1.69E-08	1.29E-08	1.02E-08	8.17E-09	6.69E-09
NE	2.56E-07	1.41E-07	9.15E-08	4.92E-08	3.13E-08	2.17E-08	1.60E-08	1.22E-08	9.61E-09	7.74E-09	6.35E-09
ENE	3.88E-07	2.14E-07	1.40E-07	7.56E-08	4.83E-08	3.37E-08	2.49E-08	1.92E-08	1.52E-08	1.22E-08	1.01E-08
E	4.91E-07	2.72E-07	1.78E-07	9.72E-08	6.24E-08	4.37E-08	3.24E-08	2.50E-08	1.98E-08	1.60E-08	1.32E-08
ESE	6.77E-07	3.74E-07	2.45E-07	1.33E-07	8.48E-08	5.92E-08	4.37E-08	3.35E-08	2.64E-08	2.13E-08	1.75E-08
SE	5.37E-07	2.94E-07	1.91E-07	1.02E-07	6.47E-08	4.48E-08	3.28E-08	2.49E-08	1.96E-08	1.57E-08	1.28E-08
SSE	3.42E-07	1.86E-07	1.20E-07	6.33E-08	3.94E-08	2.69E-08	1.95E-08	1.46E-08	1.13E-08	8.99E-09	7.26E-09

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Table 2.7.6-7 (Sheet 3 of 3)
Annual Average X/Q for 2.26 Day Decay, Undepleted for Specified Distances at Each Sector

Annual Average X/Q (sec/m ³) for 2.26 Day Decay, Undepleted										
Sector	Distance (miles)									
	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	6.44E-06	2.02E-06	8.89E-07	5.31E-07	3.64E-07	1.73E-07	5.88E-08	2.45E-08	1.33E-08	8.11E-09
SSW	5.85E-06	1.84E-06	8.06E-07	4.81E-07	3.29E-07	1.56E-07	5.32E-08	2.23E-08	1.21E-08	7.47E-09
SW	6.77E-06	2.12E-06	9.31E-07	5.55E-07	3.80E-07	1.81E-07	6.20E-08	2.63E-08	1.44E-08	8.99E-09
WSW	9.91E-06	3.12E-06	1.39E-06	8.35E-07	5.75E-07	2.77E-07	9.69E-08	4.16E-08	2.30E-08	1.44E-08
W	1.58E-05	4.98E-06	2.23E-06	1.35E-06	9.38E-07	4.56E-07	1.62E-07	7.00E-08	3.88E-08	2.42E-08
WNW	2.16E-05	6.83E-06	3.08E-06	1.88E-06	1.31E-06	6.40E-07	2.30E-07	1.01E-07	5.68E-08	3.57E-08
NW	1.84E-05	5.82E-06	2.63E-06	1.60E-06	1.11E-06	5.47E-07	1.98E-07	8.73E-08	4.91E-08	3.10E-08
NNW	1.08E-05	3.40E-06	1.53E-06	9.33E-07	6.48E-07	3.17E-07	1.14E-07	4.98E-08	2.78E-08	1.74E-08
N	7.44E-06	2.34E-06	1.05E-06	6.32E-07	4.36E-07	2.11E-07	7.40E-08	3.18E-08	1.76E-08	1.09E-08
NNE	5.24E-06	1.65E-06	7.36E-07	4.45E-07	3.07E-07	1.49E-07	5.29E-08	2.32E-08	1.30E-08	8.21E-09
NE	5.25E-06	1.65E-06	7.29E-07	4.38E-07	3.01E-07	1.45E-07	5.06E-08	2.20E-08	1.23E-08	7.78E-09
ENE	7.92E-06	2.49E-06	1.10E-06	6.61E-07	4.55E-07	2.20E-07	7.76E-08	3.41E-08	1.93E-08	1.23E-08
E	9.84E-06	3.10E-06	1.38E-06	8.33E-07	5.75E-07	2.79E-07	9.98E-08	4.42E-08	2.51E-08	1.61E-08
ESE	1.35E-05	4.27E-06	1.90E-06	1.15E-06	7.92E-07	3.84E-07	1.36E-07	5.98E-08	3.37E-08	2.14E-08
SE	1.10E-05	3.46E-06	1.53E-06	9.17E-07	6.30E-07	3.02E-07	1.05E-07	4.53E-08	2.51E-08	1.58E-08
SSE	7.05E-06	2.22E-06	9.77E-07	5.85E-07	4.01E-07	1.91E-07	6.52E-08	2.73E-08	1.48E-08	9.04E-09

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Table 2.7.6-8 (Sheet 1 of 3)
Annual Average X/Q for 8 Day Decay, Depleted for Specified Distances at Each Sector

Annual Average X/Q (sec/m ³) for 8 Day Decay, Depleted											
Sector	Distance (miles)										
	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
S	4.00E-05	1.14E-05	5.45E-06	3.30E-06	1.68E-06	1.05E-06	7.38E-07	5.53E-07	4.34E-07	3.52E-07	2.92E-07
SSW	3.63E-05	1.04E-05	4.95E-06	3.00E-06	1.52E-06	9.53E-07	6.67E-07	4.99E-07	3.91E-07	3.17E-07	2.63E-07
SW	4.21E-05	1.20E-05	5.72E-06	3.46E-06	1.76E-06	1.10E-06	7.68E-07	5.75E-07	4.50E-07	3.64E-07	3.03E-07
WSW	6.19E-05	1.76E-05	8.36E-06	5.07E-06	2.59E-06	1.63E-06	1.15E-06	8.62E-07	6.78E-07	5.51E-07	4.59E-07
W	9.92E-05	2.81E-05	1.33E-05	8.06E-06	4.14E-06	2.62E-06	1.85E-06	1.40E-06	1.10E-06	8.99E-07	7.51E-07
WNW	1.36E-04	3.85E-05	1.81E-05	1.10E-05	5.67E-06	3.60E-06	2.55E-06	1.93E-06	1.53E-06	1.25E-06	1.04E-06
NW	1.16E-04	3.28E-05	1.54E-05	9.38E-06	4.83E-06	3.07E-06	2.17E-06	1.64E-06	1.30E-06	1.06E-06	8.88E-07
NNW	6.79E-05	1.92E-05	9.03E-06	5.49E-06	2.82E-06	1.79E-06	1.27E-06	9.59E-07	7.58E-07	6.19E-07	5.18E-07
N	4.68E-05	1.33E-05	6.26E-06	3.80E-06	1.95E-06	1.23E-06	8.67E-07	6.54E-07	5.15E-07	4.20E-07	3.50E-07
NNE	3.28E-05	9.31E-06	4.41E-06	2.68E-06	1.37E-06	8.63E-07	6.07E-07	4.57E-07	3.60E-07	2.93E-07	2.44E-07
NE	3.28E-05	9.31E-06	4.43E-06	2.68E-06	1.36E-06	8.57E-07	6.00E-07	4.50E-07	3.53E-07	2.87E-07	2.39E-07
ENE	4.96E-05	1.41E-05	6.67E-06	4.04E-06	2.06E-06	1.29E-06	9.04E-07	6.78E-07	5.32E-07	4.32E-07	3.59E-07
E	6.13E-05	1.74E-05	8.28E-06	5.02E-06	2.56E-06	1.61E-06	1.13E-06	8.51E-07	6.69E-07	5.44E-07	4.53E-07
ESE	8.44E-05	2.40E-05	1.14E-05	6.92E-06	3.54E-06	2.23E-06	1.57E-06	1.18E-06	9.27E-07	7.54E-07	6.28E-07
SE	6.83E-05	1.95E-05	9.29E-06	5.63E-06	2.86E-06	1.80E-06	1.26E-06	9.46E-07	7.43E-07	6.03E-07	5.01E-07
SSE	4.39E-05	1.25E-05	5.97E-06	3.62E-06	1.84E-06	1.16E-06	8.11E-07	6.08E-07	4.78E-07	3.88E-07	3.22E-07

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Table 2.7.6-8 (Sheet 2 of 3)
Annual Average X/Q for 8 Day Decay, Depleted for Specified Distances at Each Sector

Annual Average X/Q (sec/m ³) for 8 Day Decay, Depleted											
Sector	Distance (miles)										
	5	7.5	10	15	20	25	30	35	40	45	50
S	2.48E-07	1.32E-07	8.37E-08	4.37E-08	2.73E-08	1.88E-08	1.37E-08	1.04E-08	8.21E-09	6.61E-09	5.42E-09
SSW	2.23E-07	1.18E-07	7.49E-08	3.90E-08	2.43E-08	1.67E-08	1.22E-08	9.31E-09	7.33E-09	5.90E-09	4.84E-09
SW	2.56E-07	1.36E-07	8.61E-08	4.49E-08	2.80E-08	1.93E-08	1.41E-08	1.08E-08	8.49E-09	6.85E-09	5.63E-09
WSW	3.90E-07	2.09E-07	1.34E-07	7.07E-08	4.45E-08	3.09E-08	2.27E-08	1.74E-08	1.38E-08	1.12E-08	9.20E-09
W	6.40E-07	3.47E-07	2.23E-07	1.19E-07	7.55E-08	5.25E-08	3.88E-08	2.99E-08	2.37E-08	1.92E-08	1.59E-08
WNW	8.90E-07	4.85E-07	3.14E-07	1.69E-07	1.07E-07	7.51E-08	5.57E-08	4.30E-08	3.42E-08	2.78E-08	2.30E-08
NW	7.58E-07	4.13E-07	2.67E-07	1.44E-07	9.17E-08	6.41E-08	4.76E-08	3.68E-08	2.93E-08	2.39E-08	1.98E-08
NNW	4.42E-07	2.41E-07	1.56E-07	8.34E-08	5.31E-08	3.71E-08	2.75E-08	2.12E-08	1.69E-08	1.37E-08	1.14E-08
N	2.98E-07	1.61E-07	1.03E-07	5.48E-08	3.46E-08	2.40E-08	1.77E-08	1.36E-08	1.08E-08	8.72E-09	7.19E-09
NNE	2.08E-07	1.12E-07	7.18E-08	3.81E-08	2.41E-08	1.68E-08	1.24E-08	9.54E-09	7.57E-09	6.15E-09	5.08E-09
NE	2.02E-07	1.08E-07	6.89E-08	3.63E-08	2.28E-08	1.58E-08	1.16E-08	8.91E-09	7.05E-09	5.71E-09	4.71E-09
ENE	3.05E-07	1.63E-07	1.04E-07	5.49E-08	3.46E-08	2.40E-08	1.77E-08	1.36E-08	1.08E-08	8.77E-09	7.25E-09
E	3.85E-07	2.07E-07	1.33E-07	7.02E-08	4.44E-08	3.09E-08	2.29E-08	1.76E-08	1.40E-08	1.14E-08	9.42E-09
ESE	5.34E-07	2.87E-07	1.84E-07	9.74E-08	6.15E-08	4.27E-08	3.15E-08	2.43E-08	1.93E-08	1.56E-08	1.29E-08
SE	4.25E-07	2.27E-07	1.45E-07	7.59E-08	4.76E-08	3.29E-08	2.42E-08	1.85E-08	1.46E-08	1.18E-08	9.74E-09
SSE	2.73E-07	1.46E-07	9.27E-08	4.85E-08	3.03E-08	2.09E-08	1.53E-08	1.16E-08	9.15E-09	7.37E-09	6.05E-09

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Table 2.7.6-8 (Sheet 3 of 3)
Annual Average X/Q for 8 Day Decay, Depleted for Specified Distances at Each Sector

Annual Average X/Q (sec/m ³) for 8 Day Decay, Depleted										
Sector	Distance (miles)									
	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	5.82E-06	1.76E-06	7.48E-07	4.36E-07	2.93E-07	1.36E-07	4.53E-08	1.90E-08	1.05E-08	6.64E-09
SSW	5.29E-06	1.60E-06	6.76E-07	3.94E-07	2.64E-07	1.22E-07	4.05E-08	1.70E-08	9.39E-09	5.93E-09
SW	6.11E-06	1.84E-06	7.79E-07	4.53E-07	3.04E-07	1.41E-07	4.66E-08	1.96E-08	1.09E-08	6.89E-09
WSW	8.95E-06	2.71E-06	1.16E-06	6.82E-07	4.61E-07	2.16E-07	7.31E-08	3.12E-08	1.75E-08	1.12E-08
W	1.43E-05	4.34E-06	1.87E-06	1.11E-06	7.54E-07	3.57E-07	1.23E-07	5.32E-08	3.01E-08	1.93E-08
WNW	1.95E-05	5.94E-06	2.58E-06	1.53E-06	1.05E-06	4.99E-07	1.74E-07	7.59E-08	4.33E-08	2.79E-08
NW	1.66E-05	5.06E-06	2.20E-06	1.31E-06	8.91E-07	4.25E-07	1.48E-07	6.49E-08	3.70E-08	2.40E-08
NNW	9.71E-06	2.96E-06	1.28E-06	7.62E-07	5.20E-07	2.48E-07	8.60E-08	3.75E-08	2.14E-08	1.38E-08
N	6.72E-06	2.04E-06	8.79E-07	5.18E-07	3.52E-07	1.66E-07	5.66E-08	2.43E-08	1.37E-08	8.76E-09
NNE	4.73E-06	1.43E-06	6.15E-07	3.62E-07	2.45E-07	1.15E-07	3.94E-08	1.70E-08	9.61E-09	6.18E-09
NE	4.74E-06	1.43E-06	6.09E-07	3.56E-07	2.39E-07	1.12E-07	3.75E-08	1.60E-08	8.97E-09	5.74E-09
ENE	7.14E-06	2.16E-06	9.16E-07	5.36E-07	3.61E-07	1.68E-07	5.68E-08	2.43E-08	1.37E-08	8.81E-09
E	8.87E-06	2.69E-06	1.15E-06	6.74E-07	4.55E-07	2.13E-07	7.26E-08	3.13E-08	1.77E-08	1.14E-08
ESE	1.22E-05	3.71E-06	1.59E-06	9.33E-07	6.31E-07	2.96E-07	1.01E-07	4.33E-08	2.44E-08	1.57E-08
SE	9.93E-06	3.01E-06	1.28E-06	7.47E-07	5.03E-07	2.34E-07	7.86E-08	3.33E-08	1.86E-08	1.19E-08
SSE	6.38E-06	1.93E-06	8.22E-07	4.81E-07	3.24E-07	1.51E-07	5.02E-08	2.11E-08	1.17E-08	7.41E-09

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Table 2.7.6-9 (Sheet 1 of 3)
Annual Average D/Q at Specified Distances for Each Sector

Annual Average D/Q (m ⁻²)											
Sector	Distance (miles)										
	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
S	2.28E-08	7.71E-09	3.96E-09	2.43E-09	1.21E-09	7.35E-10	4.97E-10	3.60E-10	2.74E-10	2.16E-10	1.75E-10
SSW	2.44E-08	8.26E-09	4.24E-09	2.60E-09	1.30E-09	7.87E-10	5.32E-10	3.86E-10	2.93E-10	2.31E-10	1.87E-10
SW	3.61E-08	1.22E-08	6.27E-09	3.85E-09	1.92E-09	1.16E-09	7.87E-10	5.70E-10	4.34E-10	3.42E-10	2.77E-10
WSW	3.60E-08	1.22E-08	6.25E-09	3.84E-09	1.91E-09	1.16E-09	7.85E-10	5.69E-10	4.33E-10	3.41E-10	2.76E-10
W	3.52E-08	1.19E-08	6.11E-09	3.75E-09	1.87E-09	1.13E-09	7.67E-10	5.56E-10	4.23E-10	3.33E-10	2.70E-10
WNW	3.95E-08	1.34E-08	6.87E-09	4.22E-09	2.10E-09	1.28E-09	8.62E-10	6.25E-10	4.75E-10	3.74E-10	3.03E-10
NW	3.46E-08	1.17E-08	6.00E-09	3.68E-09	1.84E-09	1.11E-09	7.53E-10	5.46E-10	4.15E-10	3.27E-10	2.65E-10
NNW	2.31E-08	7.82E-09	4.01E-09	2.47E-09	1.23E-09	7.45E-10	5.04E-10	3.65E-10	2.78E-10	2.19E-10	1.77E-10
N	2.60E-08	8.79E-09	4.51E-09	2.77E-09	1.38E-09	8.38E-10	5.66E-10	4.10E-10	3.12E-10	2.46E-10	1.99E-10
NNE	2.02E-08	6.84E-09	3.51E-09	2.16E-09	1.08E-09	6.52E-10	4.41E-10	3.19E-10	2.43E-10	1.91E-10	1.55E-10
NE	3.21E-08	1.09E-08	5.57E-09	3.42E-09	1.71E-09	1.03E-09	6.99E-10	5.07E-10	3.85E-10	3.04E-10	2.46E-10
ENE	5.80E-08	1.96E-08	1.01E-08	6.18E-09	3.08E-09	1.87E-09	1.26E-09	9.16E-10	6.97E-10	5.49E-10	4.44E-10
E	5.17E-08	1.75E-08	8.98E-09	5.52E-09	2.75E-09	1.67E-09	1.13E-09	8.17E-10	6.21E-10	4.90E-10	3.96E-10
ESE	5.98E-08	2.02E-08	1.04E-08	6.38E-09	3.18E-09	1.93E-09	1.30E-09	9.45E-10	7.19E-10	5.66E-10	4.58E-10
SE	5.49E-08	1.86E-08	9.53E-09	5.85E-09	2.92E-09	1.77E-09	1.20E-09	8.67E-10	6.59E-10	5.19E-10	4.21E-10
SSE	2.45E-08	8.29E-09	4.26E-09	2.61E-09	1.30E-09	7.90E-10	5.34E-10	3.87E-10	2.95E-10	2.32E-10	1.88E-10

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Table 2.7.6-9 (Sheet 2 of 3)
Annual Average D/Q at Specified Distances for Each Sector

Annual Average D/Q (m ⁻²)											
Sector	Distance (miles)										
	5	7.5	10	15	20	25	30	35	40	45	50
S	1.44E-10	7.08E-11	4.44E-11	2.24E-11	1.36E-11	9.11E-12	6.53E-12	4.90E-12	3.81E-12	3.04E-12	2.48E-12
SSW	1.55E-10	7.58E-11	4.76E-11	2.41E-11	1.46E-11	9.76E-12	6.99E-12	5.25E-12	4.08E-12	3.26E-12	2.66E-12
SW	2.29E-10	1.12E-10	7.04E-11	3.56E-11	2.15E-11	1.44E-11	1.03E-11	7.76E-12	6.04E-12	4.82E-12	3.94E-12
WSW	2.28E-10	1.12E-10	7.02E-11	3.55E-11	2.15E-11	1.44E-11	1.03E-11	7.74E-12	6.02E-12	4.81E-12	3.93E-12
W	2.23E-10	1.09E-10	6.85E-11	3.46E-11	2.10E-11	1.41E-11	1.01E-11	7.56E-12	5.88E-12	4.70E-12	3.84E-12
WNW	2.51E-10	1.23E-10	7.70E-11	3.89E-11	2.36E-11	1.58E-11	1.13E-11	8.50E-12	6.61E-12	5.28E-12	4.31E-12
NW	2.19E-10	1.07E-10	6.73E-11	3.40E-11	2.06E-11	1.38E-11	9.89E-12	7.43E-12	5.78E-12	4.61E-12	3.77E-12
NNW	1.47E-10	7.18E-11	4.50E-11	2.28E-11	1.38E-11	9.24E-12	6.62E-12	4.97E-12	3.87E-12	3.09E-12	2.52E-12
N	1.65E-10	8.07E-11	5.06E-11	2.56E-11	1.55E-11	1.04E-11	7.44E-12	5.59E-12	4.34E-12	3.47E-12	2.83E-12
NNE	1.28E-10	6.28E-11	3.94E-11	1.99E-11	1.21E-11	8.08E-12	5.79E-12	4.35E-12	3.38E-12	2.70E-12	2.20E-12
NE	2.03E-10	9.96E-11	6.25E-11	3.16E-11	1.91E-11	1.28E-11	9.19E-12	6.90E-12	5.36E-12	4.28E-12	3.50E-12
ENE	3.68E-10	1.80E-10	1.13E-10	5.71E-11	3.46E-11	2.32E-11	1.66E-11	1.25E-11	9.70E-12	7.75E-12	6.32E-12
E	3.28E-10	1.61E-10	1.01E-10	5.10E-11	3.08E-11	2.07E-11	1.48E-11	1.11E-11	8.65E-12	6.91E-12	5.64E-12
ESE	3.79E-10	1.86E-10	1.17E-10	5.89E-11	3.57E-11	2.39E-11	1.71E-11	1.29E-11	1.00E-11	7.99E-12	6.52E-12
SE	3.48E-10	1.71E-10	1.07E-10	5.41E-11	3.27E-11	2.19E-11	1.57E-11	1.18E-11	9.18E-12	7.33E-12	5.98E-12
SSE	1.55E-10	7.61E-11	4.78E-11	2.41E-11	1.46E-11	9.80E-12	7.02E-12	5.27E-12	4.10E-12	3.27E-12	2.67E-12

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Table 2.7.6-9 (Sheet 3 of 3)
Annual Average D/Q at Specified Distances for Each Sector

Sector	Annual Average D/Q (m ⁻²)									
	Distance (miles)									
	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	4.11E-09	1.27E-09	5.05E-10	2.76E-10	1.76E-10	7.54E-11	2.34E-11	9.27E-12	4.95E-12	3.06E-12
SSW	4.41E-09	1.36E-09	5.42E-10	2.96E-10	1.88E-10	8.08E-11	2.51E-11	9.93E-12	5.30E-12	3.28E-12
SW	6.52E-09	2.01E-09	8.01E-10	4.38E-10	2.78E-10	1.20E-10	3.71E-11	1.47E-11	7.84E-12	4.85E-12
WSW	6.50E-09	2.01E-09	7.99E-10	4.37E-10	2.77E-10	1.19E-10	3.70E-11	1.47E-11	7.82E-12	4.84E-12
W	6.35E-09	1.96E-09	7.80E-10	4.26E-10	2.71E-10	1.16E-10	3.61E-11	1.43E-11	7.64E-12	4.73E-12
WNW	7.13E-09	2.20E-09	8.77E-10	4.79E-10	3.05E-10	1.31E-10	4.06E-11	1.61E-11	8.59E-12	5.32E-12
NW	6.23E-09	1.93E-09	7.66E-10	4.19E-10	2.66E-10	1.14E-10	3.55E-11	1.41E-11	7.50E-12	4.64E-12
NNW	4.17E-09	1.29E-09	5.13E-10	2.80E-10	1.78E-10	7.65E-11	2.37E-11	9.40E-12	5.02E-12	3.11E-12
N	4.69E-09	1.45E-09	5.76E-10	3.15E-10	2.00E-10	8.60E-11	2.67E-11	1.06E-11	5.64E-12	3.49E-12
NNE	3.65E-09	1.13E-09	4.49E-10	2.45E-10	1.56E-10	6.69E-11	2.08E-11	8.22E-12	4.39E-12	2.72E-12
NE	5.79E-09	1.79E-09	7.12E-10	3.89E-10	2.47E-10	1.06E-10	3.29E-11	1.31E-11	6.97E-12	4.31E-12
ENE	1.05E-08	3.23E-09	1.29E-09	7.03E-10	4.47E-10	1.92E-10	5.95E-11	2.36E-11	1.26E-11	7.80E-12
E	9.33E-09	2.88E-09	1.15E-09	6.27E-10	3.99E-10	1.71E-10	5.31E-11	2.10E-11	1.12E-11	6.95E-12
ESE	1.08E-08	3.34E-09	1.33E-09	7.25E-10	4.61E-10	1.98E-10	6.14E-11	2.43E-11	1.30E-11	8.04E-12
SE	9.91E-09	3.06E-09	1.22E-09	6.65E-10	4.23E-10	1.82E-10	5.63E-11	2.23E-11	1.19E-11	7.38E-12
SSE	4.42E-09	1.37E-09	5.44E-10	2.97E-10	1.89E-10	8.11E-11	2.52E-11	9.97E-12	5.33E-12	3.30E-12

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Table 2.7.6-10 (Sheet 1 of 4)
X/Q and D/Q Values for No Decay, Decay, and Undepleted, at Each Receptor Location

RECEPTOR	SECTOR	DISTANCE		X/Q Values			D/Q
				(sec/m ³)			
				No Decay	2.26 Day Decay	8.00 Day Decay	
(Miles)	(Meters)	Undepleted	Undepleted	Depleted	(m ²)		
Analytical EAB	S	0.21	335	6.0E-05	5.9E-05	5.6E-05	3.0E-08
Analytical EAB	SSW	0.21	335	5.4E-05	5.4E-05	5.1E-05	3.2E-08
Analytical EAB	SW	0.21	335	6.3E-05	6.3E-05	5.9E-05	4.7E-08
Analytical EAB	WSW	0.21	335	9.2E-05	9.2E-05	8.6E-05	4.7E-08
Analytical EAB	W	0.21	335	1.5E-04	1.5E-04	1.4E-04	4.6E-08
Analytical EAB	WNW	0.21	335	2.0E-04	2.0E-04	1.9E-04	5.2E-08
Analytical EAB	NW	0.21	335	1.7E-04	1.7E-04	1.6E-04	4.5E-08
Analytical EAB	NNW	0.21	335	1.0E-04	1.0E-04	9.5E-05	3.0E-08
Analytical EAB	N	0.21	335	7.0E-05	7.0E-05	6.5E-05	3.4E-08
Analytical EAB	NNE	0.21	335	4.9E-05	4.9E-05	4.6E-05	2.7E-08
Analytical EAB	NE	0.21	335	4.9E-05	4.9E-05	4.6E-05	4.2E-08
Analytical EAB	ENE	0.21	335	7.4E-05	7.4E-05	6.9E-05	7.6E-08
Analytical EAB	E	0.21	335	9.2E-05	9.1E-05	8.5E-05	6.8E-08
Analytical EAB	ESE	0.21	335	1.3E-04	1.3E-04	1.2E-04	7.9E-08
Analytical EAB	SE	0.21	335	1.0E-04	1.0E-04	9.5E-05	7.2E-08
Analytical EAB	SSE	0.21	335	6.5E-05	6.5E-05	6.1E-05	3.2E-08

Note: A circular, analytical EAB was defined at a fixed distance from the effluent release boundary. The distance used from the effluent release boundary to the analytical EAB was 1100 ft (335 m).

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Table 2.7.6-10 (Sheet 2 of 4)
X/Q and D/Q Values for No Decay, Decay, and Undepleted, at Each Receptor Location

RECEPTOR	SECTOR	DISTANCE		X/Q Values			D/Q
				(sec/m ³)			
				No Decay	2.26 Day Decay	8.00 Day Decay	
		(Miles)	(Meters)	Undepleted	Undepleted	Depleted	(m ⁻²)
GARDEN	S	2.64	4254	8.5E-07	8.1E-07	6.8E-07	4.5E-10
GARDEN	SSW	0.69	1113	6.4E-06	6.3E-06	5.7E-06	4.9E-09
GARDEN	SW	0.95	1522	4.4E-06	4.3E-06	3.8E-06	4.2E-09
GARDEN	WSW	1.37	2203	3.5E-06	3.4E-06	3.0E-06	2.2E-09
GARDEN	W	1.78	2861	3.8E-06	3.7E-06	3.2E-06	1.4E-09
GARDEN	WNW	1.15	1848	1.0E-05	9.9E-06	8.7E-06	3.3E-09
GARDEN	NW	1.23	1978	7.8E-06	7.6E-06	6.7E-06	2.6E-09
GARDEN	NNW	4.87	7833	6.3E-07	5.8E-07	4.6E-07	1.5E-10
GARDEN	NE	0.67	1072	6.1E-06	6.1E-06	5.5E-06	6.8E-09
GARDEN	E	2.36	3802	1.5E-06	1.5E-06	1.2E-06	1.2E-09
GARDEN	ESE	0.92	1482	9.1E-06	9.0E-06	8.0E-06	7.3E-09
GARDEN	SE	1.93	3111	2.3E-06	2.2E-06	1.9E-06	1.9E-09
GARDEN	SSE	0.92	1486	4.7E-06	4.6E-06	4.1E-06	3.0E-09

Note: The nearest garden is defined as the minimum distance from the center point of the CRN Site.

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Table 2.7.6-10 (Sheet 3 of 4)
X/Q and D/Q Values for No Decay, Decay, and Undepleted, at Each Receptor Location

RECEPTOR	SECTOR	DISTANCE		X/Q Values			D/Q (m-2)
				(sec/m3)			
		(Miles)	(Meters)	No Decay	2.26 Day Decay	8.00 Day Decay	
				Undepleted	Undepleted	Depleted	
RESIDENCE	S	0.84	1359	5.0E-06	4.9E-06	4.4E-06	3.2E-09
RESIDENCE	SSW	0.69	1113	6.4E-06	6.3E-06	5.7E-06	4.9E-09
RESIDENCE	SW	0.62	995	9.1E-06	9.0E-06	8.2E-06	8.6E-09
RESIDENCE	WSW	0.71	1136	1.0E-05	1.0E-05	9.3E-06	6.9E-09
RESIDENCE	W	0.91	1470	1.1E-05	1.1E-05	9.4E-06	4.4E-09
RESIDENCE	WNW	0.66	1066	2.5E-05	2.5E-05	2.3E-05	8.5E-09
RESIDENCE	NW	0.62	992	2.5E-05	2.5E-05	2.2E-05	8.3E-09
RESIDENCE	NNW	4.35	6997	7.3E-07	6.8E-07	5.5E-07	1.9E-10
RESIDENCE	N	4.86	7814	4.3E-07	3.9E-07	3.1E-07	1.7E-10
RESIDENCE	NE	0.67	1072	6.1E-06	6.1E-06	5.5E-06	6.8E-09
RESIDENCE	ENE	0.71	1149	8.2E-06	8.1E-06	7.3E-06	1.1E-08
RESIDENCE	E	0.69	1118	1.1E-05	1.1E-05	9.5E-06	1.0E-08
RESIDENCE	ESE	0.69	1117	1.5E-05	1.5E-05	1.3E-05	1.2E-08
RESIDENCE	SE	0.8	1288	9.4E-06	9.2E-06	8.3E-06	8.5E-09
RESIDENCE	SSE	0.81	1304	5.9E-06	5.8E-06	5.2E-06	3.7E-09

Note: The nearest residence is defined as the minimum distance from the center of the reactor containment building.

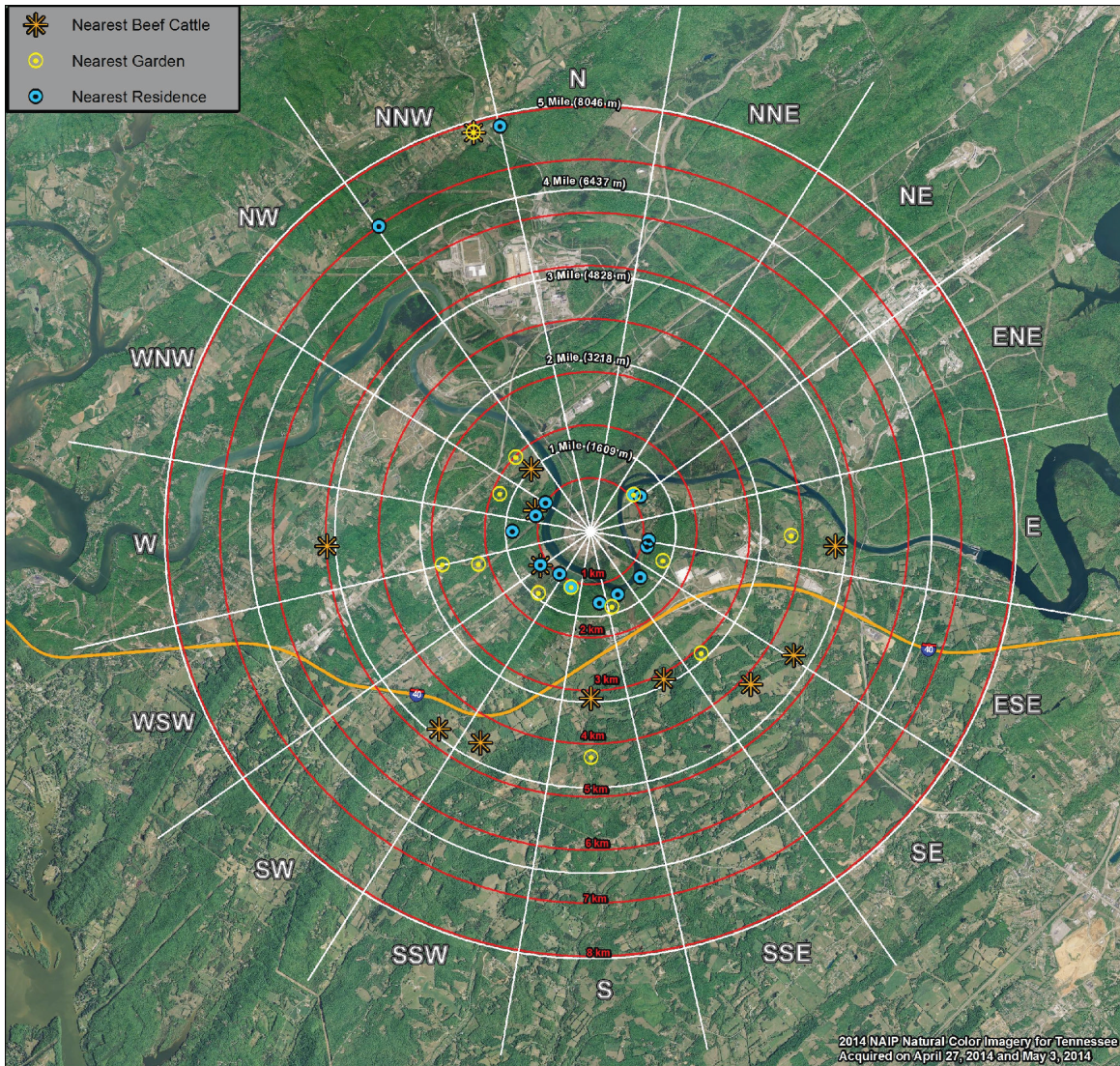
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Table 2.7.6-10 (Sheet 4 of 4)
X/Q and D/Q Values for No Decay, Decay, and Undepleted, at Each Receptor Location

RECEPTOR	SECTOR	DISTANCE		X/Q Values			D/Q
				(sec/m ³)			
				No Decay	2.26 Day Decay	8.00 Day Decay	
		(Miles)	(Meters)	Undepleted	Undepleted	Depleted	(m ²)
BEEF ANIMAL	S	1.95	3144	1.3E-06	1.3E-06	1.1E-06	7.7E-10
BEEF ANIMAL	SSW	2.79	4488	7.1E-07	6.7E-07	5.6E-07	4.4E-10
BEEF ANIMAL	SW	2.92	4695	7.6E-07	7.3E-07	6.0E-07	6.0E-10
BEEF ANIMAL	WSW	0.71	1138	1.0E-05	1.0E-05	9.3E-06	6.9E-09
BEEF ANIMAL	W	3.1	4984	1.7E-06	1.6E-06	1.3E-06	5.3E-10
BEEF ANIMAL	WNW	0.7	1120	2.3E-05	2.3E-05	2.1E-05	7.8E-09
BEEF ANIMAL	NW	1.01	1627	1.1E-05	1.0E-05	9.2E-06	3.6E-09
BEEF ANIMAL	NNW	4.87	7833	6.3E-07	5.8E-07	4.6E-07	1.5E-10
BEEF ANIMAL	E	2.88	4629	1.2E-06	1.1E-06	9.1E-07	8.8E-10
BEEF ANIMAL	ESE	2.79	4492	1.7E-06	1.6E-06	1.3E-06	1.1E-09
BEEF ANIMAL	SE	2.59	4171	1.5E-06	1.4E-06	1.2E-06	1.1E-09
BEEF ANIMAL	SSE	1.93	3106	1.5E-06	1.4E-06	1.2E-06	8.4E-10

Note: There were no milk-producing animals within 5 miles of the CRN Site. Therefore, the nearest beef animal was analyzed.

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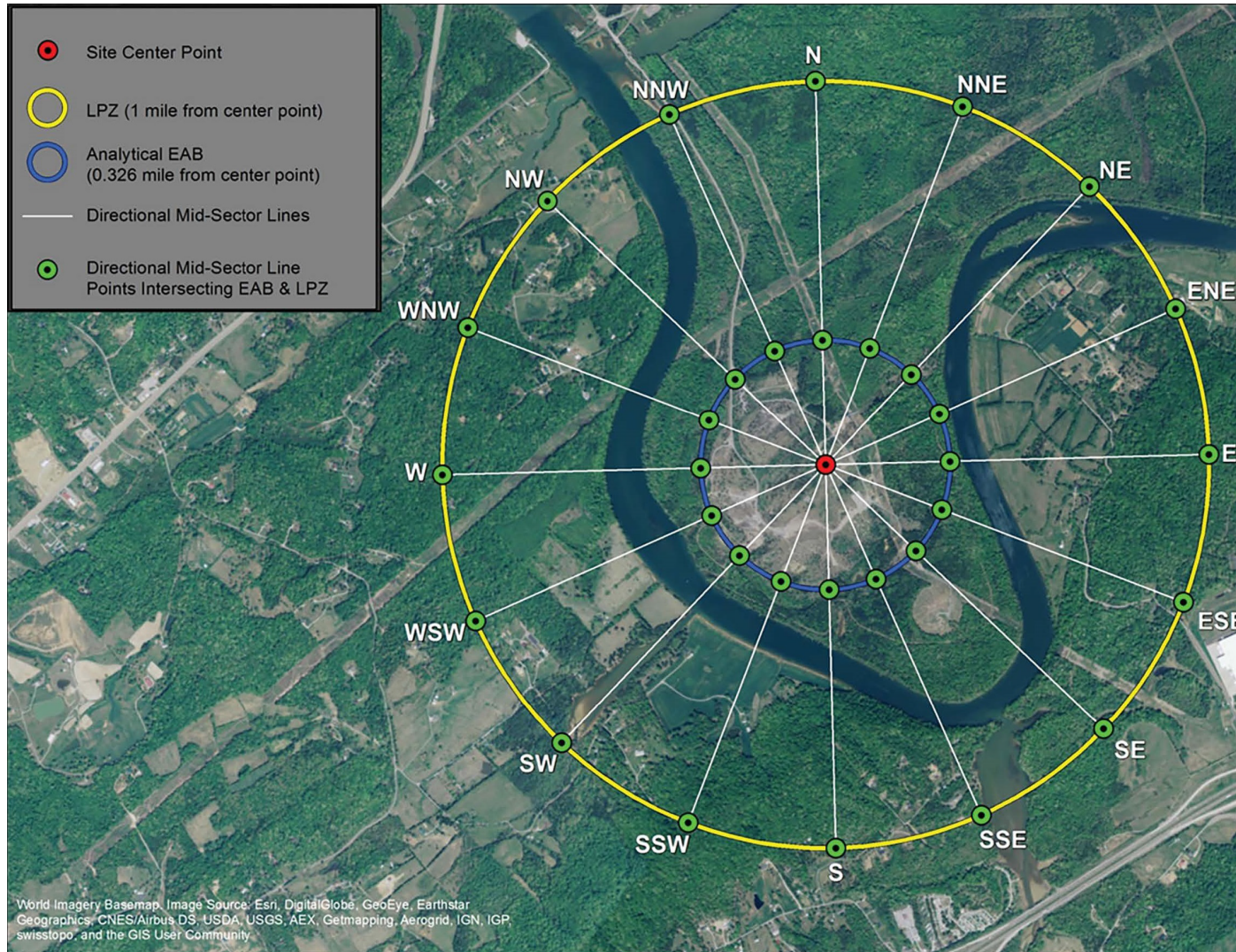


Notes:

The ArcGIS software package (www.esri.com) was used to plot the locations of the sensitive receptors determined by the land use survey.

The distances were measured from the centerpoint of the site.

Figure 2.7.6-1. Location of Sensitive Receptors (Land Use Survey)



Notes:

The ArcGIS software package (www.esri.com) was used to determine the coordinates of the EAB and LPZ for each of the 16 directional sectors.

Figure 2.7.6-2. LPZ and Analytical EAB Distances Used for the Complex Terrain Analysis