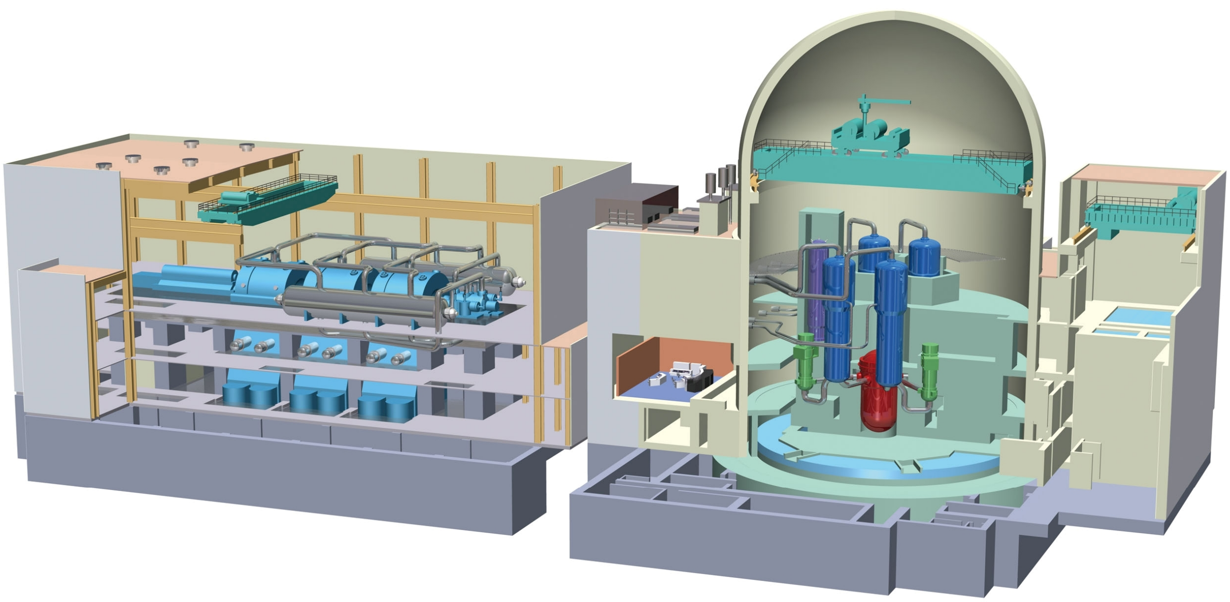
DESIGN CONTROL DOCUMENT FOR THE
US-APWR
Chapter 2
Site Characteristics

MUAP- DC002
REVISION 2
OCTOBER 2009



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ACRONYMS AND ABBREVIATIONS

A/B	auxiliary building
CFR	Code of Federal Regulations
COL	Combined License
COLA	Combined License Application
CSDRS	certified seismic design response spectra
DBE	design basis event
EAB	exclusion area boundary
FSAR	Final Safety Analysis Report
GMRS	ground motion response spectrum
HVAC	heating, ventilation, and air conditioning
LOCA	loss-of-coolant accident
LPZ	low-population zone
MCR	main control room
NUREG	NRC Nuclear Regulatory Commission
PGA	peak ground acceleration
PMF	probable maximum flood
PMP	probable maximum precipitation
PMWP	probable maximum winter precipitation
R/B	reactor building
RG	Regulatory Guide
SRP	Standard Review Plan
SSE	safe-shutdown earthquake
T/B	turbine building
TS	technical specification
TSC	technical support center
UHS	ultimate heat sink
US	United States

2.0 SITE CHARACTERISTICS

This chapter contains site-related parameters for the US-APWR. These parameters bound an estimated 75% to 80% of the United States (US) landmass, including all sites under current consideration.

For the purposes of the US-APWR, the site is the contiguous real estate on which nuclear facilities are located and for which one or more licensees has the legal right to control access by individuals and to restrict land use for purposes of limiting potential doses from radiation or radioactive material during normal operation of the facilities.

Chapter 2 of the Combined License Application (COLA) and Final Safety Analysis Report (FSAR) provide information concerning the geological, seismological, hydrological, environmental, and meteorological characteristics of the site and vicinity, in conjunction with present and projected population distribution including land use relative to site activities and controls. Table 2.0-1 is a summary table identifying specific site parameters for the US-APWR.

Table 2.0-1 Key Site Parameters
(Sheet 1 of 8)

Meteorology	
Parameter Description	**Parameter Value**
Normal winter precipitation roof load (11)	50 lb/ft^2
Extreme winter precipitation roof load(12) (100-year snowpack maximum snow weight including contributing portion of either extreme frozen winter precipitation event or extreme liquid winter precipitation event)	75 lb/ft^2
48-hr probable maximum winter precipitation(13) (PMWP)	36 in.
Tornado maximum wind speed	230 mph
	184 mph maximum rotational
	46 mph maximum translational
Radius of maximum rotational speed	150 ft
Tornado maximum pressure drop	1.2 psi
Rate of Pressure drop	0.5 psi/s
Tornado-generated missile spectrum and associated velocities	15 ft long schedule 40 steel pipe moving horizontally at 135 ft/s(1)
	4,000 lb automobile moving horizontally at 135 ft/s(1)
	1 in diameter steel sphere moving horizontally at 26 ft/s(1)
Extreme wind speed (other than in tornado)	155 mph for 3-second gusts at 33 ft above ground level based on 100-year return period, with importance factor of 1.15 for seismic category I/II structures
Ambient design air temperature (1% annual exceedance maximum)	100°F dry bulb, 77°F coincident wet bulb, 81°F non-coincident wet bulb
Ambient design air temperature (0% annual exceedance maximum)	115°F dry bulb, 80°F coincident wet bulb, 86°F non-coincident wet bulb, historical limit excluding peaks <2 hr
Ambient design air temperature (1% annual exceedance minimum)	-10°F dry bulb
Ambient design air temperature (0% annual exceedance minimum)	-40°F dry bulb, historical limit excluding peaks <2 hr
Atmospheric dispersion factors (χ/Q values) for onsite locations:	
Exclusion area boundary (EAB) 0-2 hrs	 5.0×10^{-4} s/m^3
EAB annual average	1.6×10^{-5} s/m^3

Table 2.0-1 Key Site Parameters
(Sheet 2 of 8)

Atmospheric dispersion factors (χ/Q values) for offsite locations:	
Low-population zone (LPZ) boundary	
0-8 hrs	2.1×10^{-4} s/m^3
8-24 hrs	1.3×10^{-4} s/m^3
1-4 days	6.9×10^{-5} s/m^3
4-30 days	2.8×10^{-5} s/m^3
Food production area annual average	5.0×10^{-6} s/m^3
Deposition factor (D/Q value) for onsite and offsite locations:	
EAB annual average	4.0 x 10^{-8} 1/m^2
Atmospheric dispersion factors (χ/Q values) for main control room (MCR) heating, ventilation, and air conditioning (HVAC) intake for specified release points(2):	
Plant vent (5)	
0-8 hrs	1.1×10^{-3} s/m^3
8-24 hrs	6.6×10^{-4} s/m^3
1-4 days	4.2×10^{-4} s/m^3
4-30 days	1.9×10^{-4} s/m^3
Ground-level containment releases(4)	
0-8 hrs	2.2×10^{-3} s/m^3
8-24 hrs	1.3×10^{-3} s/m^3
1-4 days	8.3×10^{-4} s/m^3
4-30 days	3.6×10^{-4} s/m^3
Main steam relief valve and safety valve releases(6)	
0-8 hrs	5.3×10^{-3} s/m^3
8-24 hrs	3.1×10^{-3} s/m^3
1-4 days	2.0×10^{-3} s/m^3
4-30 days	8.7×10^{-4} s/m^3
Steam line break releases(8)	
0-8 hrs	1.9×10^{-2} s/m^3
8-24 hrs	1.1×10^{-2} s/m^3
1-4 days	7.1×10^{-3} s/m^3
4-30 days	3.1×10^{-3} s/m^3

Table 2.0-1 Key Site Parameters (Sheet 3 of 8)

Fuel handling area releases [7]	
0-8 hrs	1.1×10^{-3} s/m^3
8-24 hrs	6.4×10^{-4} s/m^3
1-4 days	4.1×10^{-4} s/m^3
4-30 days	1.8×10^{-4} s/m^3
Atmospheric dispersion factors (χ/Q values) for MCR inleak for specified release points[3]:	
Plant vent[9]	
0-8 hrs	1.3×10^{-3} s/m^3
8-24 hrs	7.8×10^{-4} s/m^3
1-4 days	4.9×10^{-4} s/m^3
4-30 days	2.2×10^{-4} s/m^3
Plant vent[10]	
0-8 hrs	1.4×10^{-3} s/m^3
8-24 hrs	8.0×10^{-4} s/m^3
1-4 days	5.1×10^{-4} s/m^3
4-30 days	2.2×10^{-4} s/m^3
Ground-level containment releases to Class 1E electrical room HVAC intake [4]	
0-8 hrs	2.4×10^{-3} s/m^3
8-24 hrs	1.4×10^{-3} s/m^3
1-4 days	9.1×10^{-4} s/m^3
4-30 days	4.0×10^{-4} s/m^3

**Table 2.0-1 Key Site Parameters
(Sheet 4 of 8)**

Main steam relief valve and safety valve releases (6)	
0-8 hrs	5.3×10^{-3} s/m^3
8-24 hrs	3.1×10^{-3} s/m^3
1-4 days	2.0×10^{-3} s/m^3
4-30 days	8.7×10^{-4} s/m^3
Steam line break releases (8)	
0-8 hrs	1.9×10^{-2} s/m^3
8-24 hrs	1.1×10^{-2} s/m^3
1-4 days	7.1×10^{-3} s/m^3
4-30 days	3.1×10^{-3} s/m^3
Fuel handling area releases (7)	
0-8 hrs	1.1×10^{-3} s/m^3
8-24 hrs	6.7×10^{-4} s/m^3
1-4 days	4.3×10^{-4} s/m^3
4-30 days	1.9×10^{-4} s/m^3
Atmospheric dispersion factors (χ/Q values) for Technical Support Center (TSC) HVAC intake for specified release points(2):	
Plant vent (5)	
0-8 hrs	1.4×10^{-3} s/m^3
8-24 hrs	8.0×10^{-4} s/m^3
1-4 days	5.1×10^{-4} s/m^3
4-30 days	2.2×10^{-4} s/m^3

Table 2.0-1 Key Site Parameters
(Sheet 5 of 8)

Ground-level containment releases(4)	
0-8 hrs	1.9×10^{-3} s/m^3
8-24 hrs	1.1×10^{-3} s/m^3
1-4 days	7.2×10^{-4} s/m^3
4-30 days	3.2×10^{-4} s/m^3
Main steam relief valve and safety valve releases(6)	
0-8 hrs	1.7×10^{-3} s/m^3
8-24 hrs	9.9×10^{-4} s/m^3
1-4 days	6.3×10^{-4} s/m^3
4-30 days	2.8×10^{-4} s/m^3
Steam line break releases (8)	
0-8 hrs	1.4×10^{-3} s/m^3
8-24 hrs	8.4×10^{-4} s/m^3
1-4 days	5.3×10^{-4} s/m^3
4-30 days	2.3×10^{-4} s/m^3
Fuel handling area releases (7)	
0-8 hrs	6.7×10^{-4} s/m^3
8-24 hrs	3.9×10^{-4} s/m^3
1-4 days	2.5×10^{-4} s/m^3
4-30 days	1.1×10^{-4} s/m^3

Table 2.0-1 Key Site Parameters
(Sheet 6 of 8)

Atmospheric dispersion factors (χ/Q values) for TSC inleak for specified release points[(3)]:	
Plant vent [(5)]	
0-8 hrs	1.4×10^{-3} s/m^3
8-24 hrs	8.0×10^{-4} s/m^3
1-4 days	5.1×10^{-4} s/m^3
4-30 days	2.2×10^{-4} s/m^3
Ground-level containment releases [(4)]	
0-8 hrs	1.9×10^{-3} s/m^3
8-24 hrs	1.1×10^{-3} s/m^3
1-4 days	7.2×10^{-4} s/m^3
4-30 days	3.2×10^{-4} s/m^3
Main steam relief valve and safety valve releases [(6)]	
0-8 hrs	1.7×10^{-3} s/m^3
8-24 hrs	9.9×10^{-4} s/m^3
1-4 days	6.3×10^{-4} s/m^3
4-30 days	2.8×10^{-4} s/m^3
Steam line break releases [(8)]	
0-8 hrs	1.4×10^{-3} s/m^3
8-24 hrs	8.4×10^{-4} s/m^3
1-4 days	5.3×10^{-4} s/m^3
4-30 days	2.3×10^{-4} s/m^3
Fuel handling area releases [(7)]	
0-8 hrs	6.7×10^{-4} s/m^3
8-24 hrs	3.9×10^{-4} s/m^3
1-4 days	2.5×10^{-4} s/m^3
4-30 days	1.1×10^{-4} s/m^3

Table 2.0-1 Key Site Parameters
(Sheet 7 of 8)

Hydrologic Engineering	
Parameter Description	**Parameter Value**
Maximum flood (or tsunami) level	1 ft below plant grade
Maximum rainfall rate (hourly)	19.4 in/hr for seismic category I/II structures
Maximum rainfall rate (short-term)	6.3 in/5 min for seismic category I/II structures
Maximum groundwater level	1 ft. below plant grade
Geology, Seismology, and Geotechnical Engineering	
Parameter Description	**Parameter Value**
Maximum slope for foundation-bearing stratum	20° from horizontal in untruncated strata
Safe-shutdown earthquake (SSE) ground motion	0.3 g peak ground acceleration
SSE (certified seismic design) horizontal ground response spectra	Regulatory Guide (RG) 1.60, enhanced spectra in high frequency range (see Figure 3.7.1-1)
SSE (certified seismic design) vertical ground response spectra	RG 1.60, enhanced spectra in high frequency range (see Figure 3.7.1-2)
Potential for surface tectonic deformation at site	None within the exclusion area boundary
Subsurface stability – minimum allowable static bearing capacity	15,000 lb/ft^2
Subsurface stability – minimum allowable dynamic bearing capacity, normal conditions plus SSE	60,000 lb/ft^2
Subsurface stability – minimum shear wave velocity at SSE input at ground surface	1,000 ft/s
Subsurface stability – shear wave velocity for defining firm rock	3,500 ft/s
Subsurface stability – shear wave velocity for defining firm to hard rock	6,500 ft/s
Subsurface stability – shear wave velocity for defining hard rock	8,000 ft/s
Subsurface stability – liquefaction potential	None (for seismic category I structures)

Table 2.0-1 Key Site Parameters
(Sheet 8 of 8)

Total settlement of R/B complex foundation(14)	6.0 in.
Differential settlement across R/B complex foundation(14)	2.0 in.
Maximum differential settlement between buildings(14)	0.5 in.
Maximum tilt of R/B complex foundation generated during operational life of the plant(14)	1/2000

NOTES:

1. The specified missiles are assumed to have a vertical speed component equal to 2/3 of the horizontal speed.
2. These dispersion factors are chosen as the maximum values at all intake points.
3. These dispersion factors are chosen as the maximum values at all inleak points.
4. These dispersion factors are used for a loss-of-coolant accident (LOCA) and a rod ejection accident.
5. These dispersion factors are used for a LOCA, a rod ejection accident, a failure of small lines carrying primary coolant outside containment and a fuel-handling accident inside the containment.
6. These dispersion factors are used for a steam generator tube rupture, a steam system piping failure, a reactor coolant pump rotor seizure and a rod ejection accident.
7. These dispersion factors are used for a fuel handling accident occurring in the fuel storage and handling area.
8. These dispersion factors are used for a steam system piping failure.
9. These dispersion factors are used for a LOCA.
10. These dispersion factors are used for a rod ejection accident, a failure of small lines carrying primary coolant outside containment and a fuel-handling accident inside the containment.
11. Normal winter precipitation roof load is determined by converting ground snow load p_g in accordance with ASCE 7-05. The ground snow load p_g is based on the highest ground-level weight of:
    - the 100-year return period snowpack,
    - the historical maximum snowpack,
    - the 100-year return period snowfall event, or
    - the historical maximum snowfall event in the site region.
12. The extreme winter precipitation roof load is based on the sum of the normal ground level winter precipitation plus the highest weight at ground level resulting from either the extreme frozen winter precipitation event or the extreme liquid winter precipitation event. The extreme frozen winter precipitation event is assumed to accumulate on the roof on top of the antecedent normal winter precipitation event. The extreme liquid winter precipitation event may not accumulate on the roof, depending on the geometry of the roof and the type of drainage provided. The extreme winter precipitation roof load is included as live load in extreme loading combinations using the applicable load factor indicated in DCD Section 3.8.
13. The 48-hour PMWP is based on interpolation of 24-hour PMP and 72-hour PMP data for the month of March in HMR-53 (Reference: Hydrometeorological Report No. 53, Seasonal Variation of 10-Square-Mile Probable Maximum Precipitation Estimates, United States East of the 105th Meridian, Figures 27 and 37)
14. Acceptable parameters for settlement without further evaluation.

2.1 Geography and Demography

The Combined License (COL) Applicant is to describe the site geography and demography including the site parameters identified below.

2.1.1 Site Location and Description

Site-specific information of the site location and description includes:

- Plant and site property lines
- Location and orientation of principal plant structures within the site area
- Location of any industrial, military, or transportation facilities and commercial, institutional, recreational, or residential structures within the site area
- Highways, railroads, and waterways that traverse or are adjacent to the site
- Prominent natural and manmade features in the site area.

2.1.2 Exclusion Area Authority and Control

Site-specific information on the exclusion area includes the size of the area, and the exclusion area authority and control. If the EAB extends into a body of water, a discussion is provided with the bases upon which it has been determined that the applicant holds (or will hold) the authority required by 10 Code of Federal Regulations (CFR) 100.21(a), Non-Seismic Siting Criteria (Reference 2.1-1).

Non-related plant activities that occur, or could potentially occur, within the EAB, if any, are to be described, and their effects evaluated on plant operations and safety considered.

2.1.3 Population Distribution

Site-specific information regarding population distribution is based on the latest census data. The population is also projected through the anticipated life of the plant, and is to include the bases of the projections including methodology and sources used to obtain the data.

2.1.4 Combined License Information

COL 2.1(1) Applicant is to describe the site geography and demography including the specified site parameters.

2.1.5 References

2.1-1 Non-seismic Siting Criteria, Reactor Site Criteria, Energy. Title 10, Code of Federal Regulations, Part 100.21(a), U.S. Nuclear Regulatory Commission, Washington, DC.

2.2 Nearby Industrial, Transportation, and Military Facilities

The COL Applicant is to describe nearby industrial, transportation, and military facilities within 5 miles of the site, or at greater distances as appropriate based on their significance. The COL Applicant is to establish the presence of potential hazards, determine whether these accidents are to be considered as design basis events (DBEs), and the design parameters related to the accidents determined as DBEs. The information is to be presented as outlined below.

2.2.1 Locations and Routes

Site-specific maps include the location and distance from the US-APWR of all significant facilities.

2.2.2 Descriptions

The facilities identified in Section 2.2.1 are described in detail, including its primary function and major products as well as the number of persons employed.

Site-specific information is provided for any navigable waterways adjacent to the site, including the location of the intake structure(s) in relation to the shipping channel, the depth of channel, the locations of locks, the types of ships and barges using the waterway, and any nearby docks and anchorages.

Nearby major highways or other roadways are described, as appropriate, in terms of frequency and quantities of hazardous substances that may be transported by truck in the vicinity of the plant site.

Nearby railroads are to be identified, and information provided on the frequency and quantities of hazardous materials that may be transported in the vicinity of the plant site.

Site-specific information describes the length and orientation of airport runways, types of aircraft using the facility, number of operations per year by aircraft type, and the flying patterns associated with the airport. Equivalent site-specific information is provided for any other aircraft activities in the vicinity of the plant, including aviation routes, pilot training areas, and landing and approach paths to airports and military facilities.

2.2.3 Evaluation of Potential Accidents

The determination of DBEs follows a probabilistic and predictive approach to identify a 10^{-7} per year or greater occurrence rate with potential consequences serious enough to affect the safety of the plant. Where data may not be available to permit accurate calculations, a 10^{-6} per year occurrence rate can be utilized when combined with reasonable qualitative arguments.

A site-specific analysis of the effects of the above DBEs on the safety-related components of the nuclear plant is provided. Site-specific steps taken to mitigate the consequences of the accidents may include the addition of engineered safety features, reinforcing of plant structures, and/or the provisions to lessen the likelihood and severity of the accidents.

2.2.4 Combined License Information

COL 2.2(1) *The COL Applicant is to describe nearby industrial, transportation, and military facilities within 5 miles of the site, or at greater distances as appropriate based on their significance. The COL Applicant is to establish the presence of potential hazards, determine whether these accidents are to be considered as DBEs, and the design parameters related to the accidents determined as DBEs.*

2.3 Meteorology

The US-APWR is designed for meteorological information as specified in Table 2.0-1. The COL Applicant, whether the plant is to be sited inside or outside the continental US, is to provide site-specific pre-operational and operational programs for meteorological measurements, and is to verify the site-specific regional climatology and local meteorology are bounded by the site parameters for the standard US-APWR design or demonstrate by some other means that the proposed facility and associated site-specific characteristics are acceptable at the proposed site.

2.3.1 Regional Climatology

Site-specific information is provided for regional climatology, including general climate conditions and frequency of severe weather phenomena as discussed in SRP 2.3.1 (Reference 2.3-6). Refer to Subsection 3.3.2.1 for a complete summary of design basis tornado parameters, including maximum wind speed, maximum rotational speed, maximum translational speed, radius of maximum rotational wind from center of tornado, atmospheric drop, and rate of pressure change. The extreme wind speed as stated in Table 2.0-1 corresponds to the criteria described in Subsection 3.3.1.1. Ultimate heat sink (UHS) meteorological conditions are dependent on the site-specific climatology and selection of UHS type, as discussed in Subsection 9.2.5. Annual exceedance values of zero and one percent are based on the EPRI Advanced Light Water Reactor Utility Requirements Document (Reference 2.3-8) and conservative estimates of historical high and low values for potential US-APWR sites. These values are considered to bound approximately 75% to 80% of the continental US (excluding Alaska).

2.3.2 Local Meteorology

Site-specific information on local meteorology is based on long-term data from nearby reasonably representative locations and shorter-term onsite data as discussed in SRP 2.3.2 (Reference 2.3-7).

2.3.3 Onsite Meteorological Measurements Program

The site-specific pre-operational and operational programs for meteorological measurements are to be provided, which may include offsite satellite facilities. RG 1.23 (Reference 2.3-1) contains guidance on acceptable onsite meteorological programs, and any deviations from RG 1.23 guidance are to be identified and justified on a site-specific basis.

Additional sources of meteorological data is to be obtained from National Weather Service stations and other meteorological programs such as other nuclear facilities, university and private meteorological programs. These sources may be used in the description of airflow trajectories from the site to a distance of 50 miles, particularly measurements made, locations and elevations of measurements, exposure of instruments, descriptions of instruments used, and instrument performance specifications.

2.3.4 Short-Term Atmospheric Dispersion Estimates for Accident Releases

For appropriate time periods up to 30 days after an accident, conservative estimates are provided of atmospheric dispersion factors (χ/Q values) at the site's EAB, at the outer boundary of the LPZ, and at the MCR for postulated accidental radioactive airborne releases.

The short-term χ/Q values are site-specific parameters. The χ/Q values listed in Table 2.0-1 are bounding factors for a typical US-APWR sited in most areas of the US and can be used to calculate radiological consequences of design basis accidents. There is no site-specific meteorological data in the stage of the DCD. The atmospheric dispersion factors (χ/Q values) are determined as follows.

The US-APWR χ/Q value of EAB should be determined as the representative of the US plants. Therefore, the US-APWR χ/Q value of EAB is selected to envelop most values at the corresponding EAB distance (0.5 miles) of the many existing plants. This value is reasonable in comparison with the existing plants values with different EAB distances.

The χ/Q values of LPZ are also determined by using the same method as EAB at every time interval. However, the LPZ distance of US-APWR can not be specified in the stage of the DCD. Therefore, the US-APWR χ/Q values of LPZ are determined to envelop most χ/Q values of many existing plants with LPZ distance of more than 1 mile.

The 0-8 hrs χ/Q values of MCR and TSC are calculated by some formula based on both the diffusion equations used in ARCON96 (Reference 2.3-10) and the meteorological condition referred to RG 1.194 (Reference 2.3-9) (e.g. F stability and wind speeds of 1.0 m/s), not directly by ARCON96 itself. In this calculation formula, a multiplier is introduced to envelop the most χ/Q values of MCR and TSC of many existing plants.

By using the χ/Q values of MCR and TSC at various source-receptor distances of many existing plants, it is ensured that the above calculation formula envelops the most χ/Q values of the existing plants at any source-receptor distance, and then the US-APWR χ/Q value of MCR and TSC is determined by this calculation formula.

The other time interval χ/Q values (8-24 hrs, 24-96 hrs, 96-720 hrs) of MCR and TSC are calculated by using both the above formula of 0-8 hrs χ/Q values and the time interval factors described in RG 1.194 regulatory position 4.4. These calculated χ/Q values also envelop most existing plants values.

As a result, the US-APWR χ/Q values of EAB, LPZ, MCR and TSC in DCD Tier 2 Table 2.0-1 are representative of a reasonable number of the existing plants values. The COL Applicant is to provide conservative factors as described in SRP 2.3.4 (Reference 2.3-2). If a selected site will cause excess to the bounding χ/Q values, then the COL Applicant is to demonstrate how the dose reference values in 10 CFR 52.79(a)(1)(vi) (Reference 2.3-3) and the control room dose limits in 10 CFR 50, Appendix A, General Design Criteria 19 (Reference 2.3-4) are met using site-specific χ/Q values.

The necessary data to calculate χ/Q values of MCR and TSC by using ARCON96 are shown in Table 2.3-1 to 2.3-4.

2.3.5 Long-Term Atmospheric Dispersion Estimates for Routine Releases

For annual average release, bounding limits of annual χ/Q values and deposition factors (*D/Q* values) are provided at the onsite (EAB) and offsite to evaluate individual dose.

The long-term χ/Q values at the US-APWR EAB are site-specific. There is no site-specific meteorological data and the food production area in the stage of the DCD.

The Depleted/Undepleted/Decayed χ/Q value of EAB should be determined to envelop the most existing plant values. The US-APWR χ/Q value of EAB (0.5 miles) is selected as representative of US-plants, to be around 70% of the highest value at the corresponding EAB distance of many existing plants. This US-APWR χ/Q value of EAB envelopes most values at the corresponding EAB distance of many existing plants.

The long-term offsite χ/Q value should be determined for the food production area. The offsite χ/Q value is defined almost to envelop the χ/Q values at locations more than the EAB distance of the US-APWR.

The *D/Q* values should be determined in a similar way as to how to determine the χ/Q values. The US-APWR *D/Q* value of the offsite boundary is conservatively assumed to be equal to the *D/Q* value of EAB. Therefore, the *D/Q* values of EAB are determined to envelop most values of some existing plants.

Therefore, it is ensured that the χ/Q values and the *D/Q* values of the US-APWR bound a reasonable number of existing plant values. The COL Applicant is to characterize the atmospheric transport and diffusion conditions necessary for estimating radiological consequences of the routine release of radioactive materials to the atmosphere, and provide realistic estimates of annual average χ/Q values and *D/Q* values as described in SRP 2.3.5 (Reference 2.3-5).

2.3.6 Combined License Information

COL 2.3(1) *The COL Applicant, whether the plant is to be sited inside or outside the continental US, is to provide site-specific pre-operational and operational programs for meteorological measurements, and is to verify the site-specific regional climatology and local meteorology are bounded by the site parameters for the standard US-APWR design or demonstrate by some other means that the proposed facility and associated site-specific characteristics are acceptable at the proposed site.*

COL 2.3(2) *The COL Applicant is to provide conservative factors as described in SRP 2.3.4 (Reference 2.3-2). If a selected site will cause excess to the bounding* χ/Q *values, then the COL Applicant is to demonstrate how the dose reference values in 10 CFR 52.79(a)(1)(vi) (Reference 2.3-3) and the control room dose limits in 10 CFR 50, Appendix A, General Design Criteria 19 (Reference 2.3-4) are met using site-specific* χ/Q *values.*

COL 2.3(3) *The COL Applicant is to characterize the atmospheric transport and diffusion conditions necessary for estimating radiological consequences* *of the routine release of radioactive materials to the atmosphere, and provide realistic estimates of annual average χ/Q values and D/Q values as described in SRP 2.3.5 (Reference 2.3-5).*

2.3.7 References

2.3-1 Meteorological Monitoring Programs for Nuclear Power Plants. Regulatory Guide 1.23, Rev.1, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

2.3-2 Short-Term Atmospheric Dispersion Estimates for Accident Releases, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants. NUREG-0800, SRP 2.3.4, Rev.3, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

2.3-3 Contents of Applications: Technical Information in the Final Safety Analysis Report, Title 10, Code of Federal Regulations, Part 52.79, U.S. Nuclear Regulatory Commission, Washington, DC.

2.3-4 Criterion 19 - Control Room, General Design Criteria for Nuclear Power Plants, Energy. Title 10, Code of Federal Regulations Part 50, Appendix A, U.S. Nuclear Regulatory Commission, Washington, DC.

2.3-5 Long-Term Atmospheric Dispersion Estimates for Accident Releases, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants. NUREG-0800, SRP 2.3.5, Rev.3, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

2.3-6 Regional Meteorology. NUREG-0800, SRP 2.3.1, Rev. 3, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

2.3-7 Local Meteorology. NUREG-0800, SRP 2.3.2, Rev. 3, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

2.3-8 Advanced Light Water Reactor Utility Requirements Document. Rev. 8, Electric Power Research Institute, Palo Alto, CA, March 1999.

2.3-9 Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants, Regulatory Guide 1.194, Rev.0, US Nuclear Regulatory Commission, Washington, DC, June, 2003.

2.3-10 Atmospheric Relative Concentrations in Building Wakes, NUREG/CR-6331, PNNL-10521, Rev. 1. U.S. Nuclear Regulatory Commission, Washington, DC. May 1997.

Table 2.3-1 Common Input Parameters for χ/Q Calculation of MCR and TSC

Common parameter for ARCON96	
Building area (m^2)	2000 [(1)]
Plant vent vertical velocity (m/s)	NA [(2)]
Stack flow (m^3/s)	0 [(3)]
Stack radius (m)	0 [(4)]
Elevation difference (m)	0

NOTES:

(1) According to the RG 1.194, the default value (2000 m^2) is used to reasonably calculate.

(2) The plant vent vertical velocity is not used due to ground release.

(3) The stack flow is conservatively set to zero. (See the RG 1.194.)

(4) The stack radius is set to zero according to the RG 1.194 due to zero stack flow.

Table 2.3-2 Source Heights

Source	Height [(1)](m)
Containment	49.5
Plant Vent	69.9
Main Steam Line (East)	12.8
Main Steam Line (West)	26.3
Main Steam Relief Valve	40.7
Main Steam Safety Valve	38.8
Fuel Handling Area	5.9

NOTE:

(1) The distance is from the ground level (El. = 2’-7”)

Table 2.3-3 Receptor Heights

Receptors	The height to the lower limit[1](m)	The height to the upper limit[1](m)
Main Control Room HVAC Intake (East and west are same altitude Level)[2]	13.9	13.9
Reactor Building Door (West)	10.0	7.4
Class 1E electrical room HVAC intake (South-east and South-west are same altitude Level) [2]	13.9	13.9
Class 1E electrical room HVAC intake (North-east and North-west are same altitude Level) [2]	13.9	13.9
Auxiliary Building HVAC intake and Technical Support Center HVAC intake (North and South) [3]	25.4	23.3

NOTES

(1) The distances are from the ground level (El. = 2'-7")

(2) The height to the upper and lower limit are same because the opening area are only located on the under side of receptors.

(3) A/B and TSC HVAC intakes are treated as the same receptors, because their louvers are integrated.

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 1 of 12)

Accidents		Steam system piping failure						
		MCR						
Sources		Main steam line break releases						
	Locations (1)	5 of the East	5 of the West	5 of the East		5 of the West		
	Release heights (m) (2)	12.8	26.3	12.8		26.3		
Receptors		Intake		Inleak				
	Locations (1)	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake (7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake (8)	Reactor building door
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	b
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)(3)		17	25	20	17	26	25	33
Vertical distance (m) (3)		0	-12	0	0	-12	-12	-16
Straight distance (m) (3)		17	28	20	17	29	28	37
Direction Receptor to Source (degree) (4)		252	95	237	252	107	95	132
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.9×10^{-2}		1.9×10^{-2}				
	8-24 hr	1.1×10^{-2}		1.1×10^{-2}				
	24-96 hr	7.1×10^{-3}		7.1×10^{-3}				
	96-720 hr	3.1×10^{-3}		3.1×10^{-3}				

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 2 of 12)

Accidents		Steam system piping failure						
		MCR						
Sources		Main steam line break releases						
	Locations (1)	5 of the West	5 of the East	5 of the West		5 of the East		
	Release heights (m) (2)	26.3	12.8	26.3		12.8		
Receptors		Intake		Inleak				
	Locations (1)	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake (7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake (8)	Reactor building door
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	b
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)(3)		40	49	41	40	50	49	55
Vertical distance (m) (3)		-12	0	-12	-12	0	0	-2.7
Straight distance (m) (3)		42	49	43	42	50	49	55
Direction Receptor to Source (degree) (4)		267	96	259	267	103	96	118
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.9×10^{-2}		1.9×10^{-2}				
	8-24 hr	1.1×10^{-2}		1.1×10^{-2}				
	24-96 hr	7.1×10^{-3}		7.1×10^{-3}				
	96-720 hr	3.1×10^{-3}		3.1×10^{-3}				

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 3 of 12)

Accidents		Steam system piping failure			
		MCR			
Sources		Main steam relief valve and safety valve releases			
	Locations (1)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)
	Release heights (m) (2)	40.7	38.8	40.7	38.8
Receptors		Intake			
	Locations (1)	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake
		a of the East	a of the East	a of the West	a of the West
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		29	24	29	24
Vertical distance (m) (3)		-27	-25	-27	-25
Straight distance (m) (3)		39	35	39	35
Direction Receptor to Source (degree) (4)		303	283	57	77
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 4 of 12)

Accidents		Steam system piping failure			
		MCR			
Sources		Main steam relief valve and safety valve releases			
	Locations (1)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)
	Release heights (m) (2)	40.7	38.8	40.7	38.8
Receptors		Intake			
	Locations (1)	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake
		a of the East	a of the East	a of the West	a of the West
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		43	41	43	41
Vertical distance (m) (3)		-27	-25	-27	-25
Straight distance (m) (3)		51	48	51	48
Direction Receptor to Source (degree) (4)		291	278	69	82
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 5 of 12)

Accidents		Steam system piping failure			
		MCR			
Sources	Locations (1)	Main steam relief valve and safety valve releases			
		6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8	
Receptors	Locations (1)	Inleak			
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)
		d of the North-East	d of the South-East	d of the North-East	d of the South-East
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		27	29	24	24
Vertical distance (m) (3)		-27	-27	-25	-25
Straight distance (m) (3)		38	39	35	35
Direction Receptor to Source (degree) (4)		299	303	277	283
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 6 of 12)

Accidents		Steam system piping failure					
		MCR					
Sources	Locations (1)	Main steam relief valve and safety valve releases					
		6 of the West (Main steam relief valve)			7 of the West (Main steam safety valve)		
	Release heights (m) (2)	40.7			38.8		
Receptors	Locations (1)	Inleak					
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b
	Receptor heights (m) (2)	13.9	13.9	10.0	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)(3)		27	29	24	24	24	24
Vertical distance (m) (3)		-27	-27	-30	-25	-25	-29
Straight distance (m) (3)		38	39	39	35	35	38
Direction Receptor to Source (degree) (4)		61	57	88	83	77	101
Lateral diffusion coefficient (m)		0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}					
	8-24 hr	3.1×10^{-3}					
	24-96 hr	2.0×10^{-3}					
	96-720 hr	8.7×10^{-4}					

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 7 of 12)

Accidents		Steam system piping failure			
		MCR			
Sources	Locations (1)	Main steam relief valve and safety valve releases			
		6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8	
Receptors	Locations (1)	Inleak			
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)
		d of the North-East	d of the South-East	d of the North-East	d of the South-East
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		42	43	41	41
Vertical distance (m) (3)		-27	-27	-25	-25
Straight distance (m) (3)		50	51	47	48
Direction Receptor to Source (degree) (4)		288	291	274	278
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 8 of 12)

Accidents		Steam system piping failure					
		MCR					
Sources		Main steam relief valve and safety valve releases					
	Locations (1)	6 of the East (Main steam relief valve)			7 of the East (Main steam safety valve)		
	Release heights (m) (2)	40.7			38.8		
Receptors		Inleak					
	Locations (1)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b
	Receptor heights (m) (2)	13.9	13.9	10.0	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)(3)		42	43	41	41	41	41
Vertical distance (m) (3)		-27	-27	-30	-25	-25	-29
Straight distance (m) (3)		50	51	51	47	48	50
Direction Receptor to Source (degree) (4)		72	69	89	86	82	96
Lateral diffusion coefficient (m)		0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}					
	8-24 hr	3.1×10^{-3}					
	24-96 hr	2.0×10^{-3}					
	96-720 hr	8.7×10^{-4}					

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 9 of 12)

Accidents		Steam system piping failure			
		TSC			
Sources	Locations (1)	Main steam line break releases 5 of the West			
	Release heights (m) (2)	26.3			
Receptors	Locations (1)	Intake		Inleak	
		TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4
Horizontal distance to Intake (m)(3)		80	70	80	70
Vertical distance (m) (3)		-1	-1	-1	-1
Straight distance (m) (3)		80	70	80	70
Direction Receptor to Source (degree) (4)		129	117	129	117
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.4×10^{-3}		1.4×10^{-3}	
	8-24 hr	8.4×10^{-4}		8.4×10^{-4}	
	24-96 hr	5.3×10^{-4}		5.3×10^{-4}	
	96-720 hr	2.3×10^{-4}		2.3×10^{-4}	

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 10 of 12)

Accidents		Steam system piping failure			
		TSC			
Sources	Locations (1)	Main steam line break releases 5 of the East			
	Release heights (m) (2)	12.8			
Receptors	Locations (1)	Intake		Inleak	
		TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	23.3	23.3	23.3	23.3
Horizontal distance to Intake (m)(3)		101	93	101	93
Vertical distance (m) (3)		10	10	10	10
Straight distance (m) (3)		102	94	102	94
Direction Receptor to Source (degree) (4)		122	112	122	112
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.4×10^{-3}		1.4×10^{-3}	
	8-24 hr	8.4×10^{-4}		8.4×10^{-4}	
	24-96 hr	5.3×10^{-4}		5.3×10^{-4}	
	96-720 hr	2.3×10^{-4}		2.3×10^{-4}	

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 11 of 12)

Accidents		Steam system piping failure							
		TSC							
Sources		Main steam relief valve and safety valve releases							
	Locations (1)	6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)		6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8		40.7		38.8	
Receptors		Intake				Inleak			
	Locations (1)	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)(3)		67	63	70	63	67	63	70	63
Vertical distance (m) (3)		-15	-15	-13	-13	-15	-15	-13	-13
Straight distance (m) (3)		69	64	71	65	69	64	71	65
Direction Receptor to Source (degree) (4)		113	97	117	102	113	97	117	102
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.7×10^{-3}				1.7×10^{-3}			
	8-24 hr	9.9×10^{-4}				9.9×10^{-4}			
	24-96 hr	6.3×10^{-4}				6.3×10^{-4}			
	96-720 hr	2.8×10^{-4}				2.8×10^{-4}			

Table 2.3.4-1 Combination of Sources and Receptors for Steam System Piping Failure Analysis (Sheet 12 of 12)

Accidents		Steam system piping failure							
		TSC							
Sources		Main steam relief valve and safety valve releases							
	Locations (1)	6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)		6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8		40.7		38.8	
Receptors		Intake				Inleak			
	Locations (1)	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)(3)		83	79	85	80	83	79	85	80
Vertical distance (m) (3)		-15	-15	-13	-13	-15	-15	-13	-13
Straight distance (m) (3)		84	80	86	81	84	80	86	81
Direction Receptor to Source (degree) (4)		109	96	112	100	109	96	112	100
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.7×10^{-3}				1.7×10^{-3}			
	8-24 hr	9.9×10^{-4}				9.9×10^{-4}			
	24-96 hr	6.3×10^{-4}				6.3×10^{-4}			
	96-720 hr	2.8×10^{-4}				2.8×10^{-4}			

Table 2.3.4-2 Combination of Sources and Receptors for RCP Rotor Seizure Analysis (Sheet 1 of 8)

Accidents		RCP rotor seizure accident			
		MCR			
Sources		Main steam relief valve and safety valve releases			
Sources	Locations (1)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)
Sources	Release heights (m) (2)	40.7	38.8	40.7	38.8
Receptors	Locations (1)	Intake			
Receptors	Locations (1)	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake
Receptors	Locations (1)	a of the East	a of the East	a of the West	a of the West
Receptors	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		29	24	29	24
Vertical distance (m) (3)		-27	-25	-27	-25
Straight distance (m) (3)		39	35	39	35
Direction Receptor to Source (degree) (4)		303	283	57	77
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-2 Combination of Sources and Receptors for RCP Rotor Seizure Analysis (Sheet 2 of 8)

Accidents		RCP rotor seizure accident			
		MCR			
Sources		Main steam relief valve and safety valve releases			
	Locations (1)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)
	Release heights (m) (2)	40.7	38.8	40.7	38.8
Receptors		Intake			
	Locations (1)	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake
		a of the East	a of the East	a of the West	a of the West
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		43	41	43	41
Vertical distance (m) (3)		-27	-25	-27	-25
Straight distance (m) (3)		51	48	51	48
Direction Receptor to Source (degree) (4)		291	278	69	82
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-2 Combination of Sources and Receptors for RCP Rotor Seizure Analysis (Sheet 3 of 8)

Accidents		RCP rotor seizure accident			
		MCR			
Sources	Locations (1)	Main steam relief valve and safety valve releases			
		6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8	
Receptors	Locations (1)	Inleak			
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)
		d of the North-East	d of the South-East	d of the North-East	d of the South-East
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		27	29	24	24
Vertical distance (m) (3)		-27	-27	-25	-25
Straight distance (m) (3)		38	39	35	35
Direction Receptor to Source (degree) (4)		299	303	277	283
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-2 Combination of Sources and Receptors for RCP Rotor Seizure Analysis (Sheet 4 of 8)

Accidents		RCP rotor seizure accident					
		MCR					
Sources	Locations (1)	Main steam relief valve and safety valve releases					
		6 of the West (Main steam relief valve)			7 of the West (Main steam safety valve)		
	Release heights (m) (2)	40.7			38.8		
Receptors	Locations (1)	Inleak					
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b
	Receptor heights (m) (2)	13.9	13.9	10.0	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)(3)		27	29	24	24	24	24
Vertical distance (m) (3)		-27	-27	-30	-25	-25	-29
Straight distance (m) (3)		38	39	39	35	35	38
Direction Receptor to Source (degree) (4)		61	57	88	83	77	101
Lateral diffusion coefficient (m)		0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}					
	8-24 hr	3.1×10^{-3}					
	24-96 hr	2.0×10^{-3}					
	96-720 hr	8.7×10^{-4}					

Table 2.3.4-2 Combination of Sources and Receptors for RCP Rotor Seizure Analysis (Sheet 5 of 8)

Accidents		RCP rotor seizure accident			
		MCR			
Sources	Locations (1)	Main steam relief valve and safety valve releases			
		6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8	
Receptors	Locations (1)	Inleak			
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)
		d of the North-East	d of the South-East	d of the North-East	d of the South-East
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		42	43	41	41
Vertical distance (m) (3)		-27	-27	-25	-25
Straight distance (m) (3)		50	51	47	48
Direction Receptor to Source (degree) (4)		288	291	274	278
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-2 Combination of Sources and Receptors for RCP Rotor Seizure Analysis (Sheet 6 of 8)

Accidents		RCP rotor seizure accident					
		MCR					
Sources	Locations (1)	Main steam relief valve and safety valve releases					
		6 of the East (Main steam relief valve)			7 of the East (Main steam safety valve)		
	Release heights (m) (2)	40.7			38.8		
Receptors	Locations (1)	Inleak					
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b
	Receptor heights (m) (2)	13.9	13.9	10.0	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)(3)		42	43	41	41	41	41
Vertical distance (m) (3)		-27	-27	-30	-25	-25	-29
Straight distance (m) (3)		50	51	51	47	48	50
Direction Receptor to Source (degree) (4)		72	69	89	86	82	96
Lateral diffusion coefficient (m)		0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}					
	8-24 hr	3.1×10^{-3}					
	24-96 hr	2.0×10^{-3}					
	96-720 hr	8.7×10^{-4}					

Table 2.3.4-2 Combination of Sources and Receptors for RCP Rotor Seizure Analysis (Sheet 7 of 8)

Accidents		RCP rotor seizure accident							
		TSC							
Sources		Main steam relief valve and safety valve releas							
	Locations (1)	6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)		6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8		40.7		38.8	
Receptors		Intake				Inleak			
	Locations (1)	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)(3)		67	62	70	63	67	62	70	63
Vertical distance (m) (3)		-15	-15	-13	-13	-15	-15	-13	-13
Straight distance (m) (3)		69	64	71	65	69	64	71	65
Direction Receptor to Source (degree) (4)		113	97	117	102	113	97	117	102
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.7×10^{-3}				1.7×10^{-3}			
	8-24 hr	9.9×10^{-4}				9.9×10^{-4}			
	24-96 hr	6.3×10^{-4}				6.3×10^{-4}			
	96-720 hr	2.8×10^{-4}				2.8×10^{-4}			

Table 2.3.4-2 Combination of Sources and Receptors for RCP Rotor Seizure Analysis (Sheet 8 of 8)

Accidents		RCP rotor seizure accident							
		TSC							
Sources		Main steam relief valve and safety valve releases							
	Locations (1)	6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)		6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8		40.7		38.8	
Receptors		Intake				Inleak			
	Locations (1)	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)(3)		83	79	85	80	83	79	85	80
Vertical distance (m) (3)		-15	-15	-13	-13	-15	-15	-13	-13
Straight distance (m) (3)		84	80	86	81	84	80	86	81
Direction Receptor to Source (degree) (4)		109	96	112	100	109	96	112	100
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.7×10^{-3}				1.7×10^{-3}			
	8-24 hr	9.9×10^{-4}				9.9×10^{-4}			
	24-96 hr	6.3×10^{-4}				6.3×10^{-4}			
	96-720 hr	2.8×10^{-4}				2.8×10^{-4}			

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis (Sheet 1 of 11)

Accidents		Rod Ejection Accident								
		MCR								
Sources	Locations (1)	Plant vent								
		9								
	Release heights (m) (2)	69.9								
Receptors	Locations (1)	Intake		Inleak						
		MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	c of the North	c of the South	b
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9	13.9	13.9	25.4	25.4	10.0
Horizontal distance Source to Receptor (m)(3)		68	53	66	68	51	53	55	61	37
Vertical distance (m) (3)		-56	-56	-56	-56	-56	-56	-45	-45	-60
Straight distance (m) (3)		88	77	87	88	76	77	71	76	70
Direction Receptor to Source (degree) (4)		318	19	316	318	20	19	81	64	28
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.1×10^{-3}		1.4×10^{-3}						
	8-24 hr	6.6×10^{-4}		8.0×10^{-4}						
	24-96 hr	4.2×10^{-4}		5.1×10^{-4}						
	96-720 hr	1.9×10^{-4}		2.2×10^{-4}						

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis (Sheet 2 of 11)

Accidents		Rod Ejection Accident								
		MCR								
Sources		Ground level containment release point (5)								
	Locations (1)	2 of the East	2 of the West	1 of the East	2 of the East	1 of the West	2 of the West	3 of the North	3 of the South	4
	Release heights (m) (2)	49.5								
Receptors		Intake		Inleak						
	Locations (1)	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	c of the North	c of the South	b
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9	13.9	13.9	25.4	25.4	10.0
Horizontal distance Source to Receptor (m)(3)		29	29	27	29	27	29	46	48	16
Vertical distance (m) (3)		-35	-35	-35	-35	-35	-35	-24	-24	-39
Straight distance (m) (3)		46	46	44	46	44	46	52	54	43
Direction Receptor to Source (degree) (4)		322	38	320	322	40	38	91	76	53
Lateral diffusion coefficient (m)		7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98
Vertical diffusion coefficient (m)		5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03
χ/Q (s/m^3) (6)	0-8 hr	2.2×10^{-3}		2.4×10^{-3}						
	8-24 hr	1.3×10^{-3}		1.4×10^{-3}						
	24-96 hr	8.3×10^{-4}		9.1×10^{-4}						
	96-720 hr	3.6×10^{-4}		4.0×10^{-4}						

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis (Sheet 3 of 11)

Accidents		Rod Ejection Accident			
		MCR			
Sources		Main steam relief valve and safety valve releases			
Sources	Locations (1)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)
Sources	Release heights (m) (2)	40.7	38.8	40.7	38.8
Receptors		Intake			
Receptors	Locations (1)	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake
Receptors	Locations (1)	a of the East	a of the East	a of the West	a of the West
Receptors	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		29	24	29	24
Vertical distance (m) (3)		-27	-25	-27	-25
Straight distance (m) (3)		39	35	39	35
Direction Receptor to Source (degree) (4)		303	283	57	77
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis (Sheet 4 of 11)

Accidents		Rod Ejection Accident			
		MCR			
Sources		Main steam relief valve and safety valve releases			
	Locations (1)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)
	Release heights (m) (2)	40.7	38.8	40.7	38.8
Receptors		Intake			
	Locations (1)	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake
		a of the East	a of the East	a of the West	a of the West
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		43	41	43	41
Vertical distance (m) (3)		-27	-25	-27	-25
Straight distance (m) (3)		51	48	51	48
Direction Receptor to Source (degree) (4)		291	278	69	82
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis (Sheet 5 of 11)

Accidents		Rod Ejection Accident			
		MCR			
Sources		Main steam relief valve and safety valve releases			
	Locations (1)	6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8	
Receptors		Inleak			
	Locations (1)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)
		d of the North-East	d of the South-East	d of the North-East	d of the South-East
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		27	29	24	24
Vertical distance (m) (3)		-27	-27	-25	-25
Straight distance (m) (3)		38	39	35	35
Direction Receptor to Source (degree) (4)		299	303	277	283
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis (Sheet 6 of 11)

Accidents		Rod Ejection Accident					
		MCR					
Sources		Main steam relief valve and safety valve releases					
	Locations (1)	6 of the West (Main steam relief valve)			7 of the West (Main steam safety valve)		
	Release heights (m) (2)	40.7			38.8		
Receptors		Inleak					
	Locations (1)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b
	Receptor heights (m) (2)	13.9	13.9	10.0	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)(3)		27	29	24	24	24	24
Vertical distance (m) (3)		-27	-27	-30	-25	-25	-29
Straight distance (m) (3)		38	39	39	35	35	38
Direction Receptor to Source (degree) (4)		61	57	88	83	77	101
Lateral diffusion coefficient (m)		0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}					
	8-24 hr	3.1×10^{-3}					
	24-96 hr	2.0×10^{-3}					
	96-720 hr	8.7×10^{-4}					

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis (Sheet 7 of 11)

Accidents		Rod Ejection Accident			
		MCR			
Sources	Locations (1)	Main steam relief valve and safety valve releases			
		6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8	
Receptors	Locations (1)	Inleak			
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)
		d of the North-East	d of the South-East	d of the North-East	d of the South-East
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		42	43	41	41
Vertical distance (m) (3)		-27	-27	-25	-25
Straight distance (m) (3)		50	51	47	48
Direction Receptor to Source (degree) (4)		288	291	274	278
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis (Sheet 8 of 11)

Accidents		Rod Ejection Accident					
		MCR					
Sources	Locations (1)	Main steam relief valve and safety valve releases					
		6 of the East (Main steam relief valve)			7 of the East (Main steam safety valve)		
	Release heights (m) (2)	40.7			38.8		
Receptors	Locations (1)	Inleak					
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b
	Receptor heights (m) (2)	13.9	13.9	10.0	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)(3)		42	43	41	41	41	41
Vertical distance (m) (3)		-27	-27	-30	-25	-25	-29
Straight distance (m) (3)		50	51	51	47	48	50
Direction Receptor to Source (degree) (4)		72	69	89	86	82	96
Lateral diffusion coefficient (m)		0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}					
	8-24 hr	3.1×10^{-3}					
	24-96 hr	2.0×10^{-3}					
	96-720 hr	8.7×10^{-4}					

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis in the (Sheet 9 of 11)

Accidents		Rod Ejection Accident							
		TSC							
Sources	Locations (1)	Plant vent		Ground level containment release point (5)		Plant vent		Ground level containment release point (5)	
		9		3 of the North	3 of the South	9		3 of the North	3 of the South
	Release heights (m) (2)	69.9		49.5		69.9		49.5	
Receptors	Locations (1)	Intake				inleak			
		TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)(3)		55	61	46	48	55	61	46	48
Vertical distance (m) (3)		-45	-45	-24	-24	-45	-45	-24	-24
Straight distance (m) (3)		71	76	52	54	71	76	52	54
Direction Receptor to Source (degree) (4)		81	64	91	76	81	64	91	76
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.4×10^{-3}		1.9×10^{-3}		1.4×10^{-3}		1.9×10^{-3}	
	8-24 hr	8.0×10^{-4}		1.1×10^{-3}		8.0×10^{-4}		1.1×10^{-3}	
	24-96 hr	5.1×10^{-4}		7.2×10^{-4}		5.1×10^{-4}		7.2×10^{-4}	
	96-720 hr	2.2×10^{-4}		3.2×10^{-4}		2.2×10^{-4}		3.2×10^{-4}	

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis (Sheet 10 of 11)

Accidents		Rod Ejection Accident							
		TSC							
Sources	Locations (1)	Main steam relief valve and safety valve releases							
		6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)		6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8		40.7		38.8	
Receptors	Locations (1)	Intake				Inleak			
		TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)(3)		67	62	70	63	67	62	70	63
Vertical distance (m) (3)		-15	-15	-13	-13	-15	-15	-13	-13
Straight distance (m) (3)		69	64	71	65	69	64	71	65
Direction Receptor to Source (degree) (4)		113	97	117	102	113	97	117	102
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.7×10^{-3}				1.7×10^{-3}			
	8-24 hr	9.9×10^{-4}				9.9×10^{-4}			
	24-96 hr	6.3×10^{-4}				6.3×10^{-4}			
	96-720 hr	2.8×10^{-4}				2.8×10^{-4}			

Table 2.3.4-3 Combination of Sources and Receptors for Rod Ejection Accident Analysis (Sheet 11 of 11)

Accidents		Rod Ejection Accident							
		TSC							
Sources	Locations (1)	Main steam relief valve and safety valve releases							
		6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)		6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8		40.7		38.8	
Receptors	Locations (1)	Intake				Inleak			
		TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)(3)		83	79	85	80	83	79	85	80
Vertical distance (m) (3)		-15	-15	-13	-13	-15	-15	-13	-13
Straight distance (m) (3)		84	80	86	81	84	80	86	81
Direction Receptor to Source (degree) (4)		109	96	112	100	109	96	112	100
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.7×10^{-3}				1.7×10^{-3}			
	8-24 hr	9.9×10^{-4}				9.9×10^{-4}			
	24-96 hr	6.3×10^{-4}				6.3×10^{-4}			
	96-720 hr	2.8×10^{-4}				2.8×10^{-4}			

Table 2.3.4-4 Combination of Sources and Receptors

for Failure of Small Lines Carrying Primary Coolant Outside Containment Analyses (Sheet 1 of 2)

Accidents		Failure of Small Lines Carrying Primary Coolant Outside Containment					
		MCR					
Sources	Locations [1]	Plant vent					
		9					
	Release heights (m) [2]	69.9					
Receptors	Locations [1]	Intake		Inleak			
		MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake[7]	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake[8]
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West
	Receptor heights (m) [2]	13.9	13.9	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)[3]		68	53	66	68	51	53
Vertical distance (m) [3]		-56	-56	-56	-56	-56	-56
Straight distance (m) [3]		88	77	87	88	76	77
Direction Receptor to Source (degree) [4]		318	19	316	318	20	19
Lateral diffusion coefficient (m)		0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0
χ/Q (s/m^3) [6]	0-8 hr	1.1×10^{-3}		1.4×10^{-3}			
	8-24 hr	6.6×10^{-4}		8.0×10^{-4}			
	24-96 hr	4.2×10^{-4}		5.1×10^{-4}			
	96-720 hr	1.9×10^{-4}		2.2×10^{-4}			

Table 2.3.4-4 Combination of Sources and Receptors

for Failure of Small Lines Carrying Primary Coolant Outside Containment Analyses (Sheet 2 of 2)

Accidents		Failure of Small Lines Carrying Primary Coolant Outside Containment						
		MCR			TSC			
Sources	Locations [1]	Plant vent			Plant vent			
		9			9			
	Release heights (m) [2]	69.9			69.9			
Receptors	Locations [1]	Inleak			Intake		inleak	
		Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake
		c of the North	c of the South	b	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) [2]	25.4	25.4	10.0	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)[3]		55	61	37	55	61	55	61
Vertical distance (m) [3]		-45	-45	-60	-45	-45	-45	-45
Straight distance (m) [3]		71	76	70	71	76	71	76
Direction Receptor to Source (degree) [4]		81	64	28	81	64	81	64
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0
χ/Q (s/m^3) [6]	0-8 hr	1.4×10^{-3}			1.4×10^{-3}		1.4×10^{-3}	
	8-24 hr	8.0×10^{-4}			8.0×10^{-4}		8.0×10^{-4}	
	24-96 hr	5.1×10^{-4}			5.1×10^{-4}		5.1×10^{-4}	
	96-720 hr	2.2×10^{-4}			2.2×10^{-4}		2.2×10^{-4}	

Table 2.3.4-5 Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) Analyses (Sheet 1 of 8)

Accidents		SGTR			
		MCR			
Sources	Locations (1)	Main steam relief valve and safety valve releases			
		6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)
	Release heights (m) (2)	40.7	38.8	40.7	38.8
Receptors	Locations (1)	Intake			
		MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake
		a of the East	a of the East	a of the West	a of the West
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		29	24	29	24
Vertical distance (m) (3)		-27	-25	-27	-25
Straight distance (m) (3)		39	35	39	35
Direction Receptor to Source (degree) (4)		303	283	57	77
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-5 Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) Analyses (Sheet 2 of 8)

Accidents		SGTR			
		MCR			
Sources	Locations (1)	Main steam relief valve and safety valve releases			
		6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)
	Release heights (m) (2)	40.7	38.8	40.7	38.8
Receptors	Locations (1)	Intake			
		MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake
		a of the East	a of the East	a of the West	a of the West
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		43	41	43	41
Vertical distance (m) (3)		-27	-25	-27	-25
Straight distance (m) (3)		51	48	51	48
Direction Receptor to Source (degree) (4)		291	278	69	82
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-5 Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) Analyses (Sheet 3 of 8)

Accidents		SGTR			
		MCR			
Sources	Locations (1)	Main steam relief valve and safety valve releases			
		6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8	
Receptors	Locations (1)	Inleak			
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)
		d of the North-East	d of the South-East	d of the North-East	d of the South-East
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		27	29	24	24
Vertical distance (m) (3)		-27	-27	-25	-25
Straight distance (m) (3)		38	39	35	35
Direction Receptor to Source (degree) (4)		299	303	277	283
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-5 Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) Analyses (Sheet 4 of 8)

Accidents		SGTR					
		MCR					
Sources	Locations [1]	Main steam relief valve and safety valve releases					
		6 of the West (Main steam relief valve)			7 of the West (Main steam safety valve)		
	Release heights (m) [2]	40.7			38.8		
Receptors	Locations [1]	Inleak					
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake[8]	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake[8]	Reactor building door
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b
	Receptor heights (m) [2]	13.9	13.9	10.0	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)[3]		27	29	24	24	24	24
Vertical distance (m) [3]		-27	-27	-30	-25	-25	-29
Straight distance (m) [3]		38	39	39	35	35	38
Direction Receptor to Source (degree) [4]		61	57	88	83	77	101
Lateral diffusion coefficient (m)		0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0
χ/Q (s/m^3) [6]	0-8 hr	5.3×10^{-3}					
	8-24 hr	3.1×10^{-3}					
	24-96 hr	2.0×10^{-3}					
	96-720 hr	8.7×10^{-4}					

Table 2.3.4-5 Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) Analyses (Sheet 5 of 8)

Accidents		SGTR			
		MCR			
Sources	Locations (1)	Main steam relief valve and safety valve releases			
		6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8	
Receptors	Locations (1)	Inleak			
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)
		d of the North-East	d of the South-East	d of the North-East	d of the South-East
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9
Horizontal distance Source to Receptor (m)(3)		42	43	41	41
Vertical distance (m) (3)		-27	-27	-25	-25
Straight distance (m) (3)		50	51	47	48
Direction Receptor to Source (degree) (4)		288	291	274	278
Lateral diffusion coefficient (m)		0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}			
	8-24 hr	3.1×10^{-3}			
	24-96 hr	2.0×10^{-3}			
	96-720 hr	8.7×10^{-4}			

Table 2.3.4-5 Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) Analyses (Sheet 6 of 8)

Accidents		SGTR MCR					
Sources	Locations (1)	6 of the East (Main steam relief valve)			7 of the East (Main steam safety valve)		
	Release heights (m) (2)	40.7			38.8		
Receptors	Locations (1)	Inleak					
		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b
	Receptor heights (m) (2)	13.9	13.9	10.0	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)(3)		42	43	41	41	41	41
Vertical distance (m) (3)		-27	-27	-30	-25	-25	-29
Straight distance (m) (3)		50	51	51	47	48	50
Direction Receptor to Source (degree) (4)		72	69	89	86	82	96
Lateral diffusion coefficient (m)		0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	5.3×10^{-3}					
	8-24 hr	3.1×10^{-3}					
	24-96 hr	2.0×10^{-3}					
	96-720 hr	8.7×10^{-4}					

Table 2.3.4-5 Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) Analyses (Sheet 7 of 8)

Accidents		SGTR							
		TSC							
Sources	Locations (1)	Main steam relief valve and safety valve releases							
		6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)		6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8		40.7		38.8	
Receptors	Locations (1)	Intake				Inleak			
		TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)(3)		67	63	70	63	67	63	70	63
Vertical distance (m) (3)		-15	-15	-13	-13	-15	-15	-13	-13
Straight distance (m) (3)		69	64	71	65	69	64	71	65
Direction Receptor to Source (degree) (4)		113	97	117	102	113	97	117	102
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.7×10^{-3}				1.7×10^{-3}			
	8-24 hr	9.9×10^{-4}				9.9×10^{-4}			
	24-96 hr	6.3×10^{-4}				6.3×10^{-4}			
	96-720 hr	2.8×10^{-4}				2.8×10^{-4}			

Table 2.3.4-5 Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) Analyses (Sheet 8 of 8)

Accidents		SGTR							
		TSC							
Sources	Locations (1)	Main steam relief valve and safety valve releases							
		6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)		6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)	
	Release heights (m) (2)	40.7		38.8		40.7		38.8	
Receptors	Locations (1)	Intake				Inleak			
		TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)(3)		83	79	85	80	83	79	85	80
Vertical distance (m) (3)		-15	-15	-13	-13	-15	-15	-13	-13
Straight distance (m) (3)		84	80	86	81	84	80	86	81
Direction Receptor to Source (degree) (4)		109	96	112	100	109	96	112	100
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.7×10^{-3}				1.7×10^{-3}			
	8-24 hr	9.9×10^{-4}				9.9×10^{-4}			
	24-96 hr	6.3×10^{-4}				6.3×10^{-4}			
	96-720 hr	2.8×10^{-4}				2.8×10^{-4}			

Table 2.3.4-6 Combination of Sources and Receptors for LOCA Analysis (Sheet 1 of 3)

Accidents		LOCA						
		MCR						
Sources	Locations (1)	Plant vent						
		9						
	Release heights (m) (2)	69.9						
Receptors	Locations (1)	intake		Inleak				
		MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Reactor building door
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	b
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)(3)		68	53	66	68	51	53	37
Vertical distance (m) (3)		-56	-56	-56	-56	-56	-56	-60
Straight distance (m) (3)		88	77	87	88	76	77	70
Direction Receptor to Source (degree) (4)		318	19	316	318	20	19	28
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.1×10^{-3}		1.3×10^{-3}				
	8-24 hr	6.6×10^{-4}		7.8×10^{-4}				
	24-96 hr	4.2×10^{-4}		4.9×10^{-4}				
	96-720 hr	1.9×10^{-4}		2.2×10^{-4}				

Table 2.3.4-6 Combination of Sources and Receptors for LOCA Analysis (Sheet 2 of 3)

Accidents		LOCA						
		MCR						
Sources	Locations [1]	Ground level containment release point [5]						
		2 of the East	2 of the West	1 of the East	2 of the East	1 of the West	2 of the West	4
	Release heights (m) [2]	49.5						
Receptors	Locations [1]	Intake		Inleak				
		MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake[7]	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake[8]	Reactor building door
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	b
	Receptor heights (m) [2]	13.9	13.9	13.9	13.9	13.9	13.9	10.0
Horizontal distance Source to Receptor (m)[3]		29	29	27	29	27	29	16
Vertical distance (m) [3]		-35	-35	-35	-35	-35	-35	-39
Straight distance (m) [3]		46	46	44	46	44	46	43
Direction Receptor to Source (degree) [4]		322	38	320	322	40	38	53
Lateral diffusion coefficient (m)		7.98	7.98	7.98	7.98	7.98	7.98	7.98
Vertical diffusion coefficient (m)		5.03	5.03	5.03	5.03	5.03	5.03	5.03
χ/Q (s/m^3) [6]	0-8 hr	2.2×10^{-3}		2.4×10^{-3}				
	8-24 hr	1.3×10^{-3}		1.4×10^{-3}				
	24-96 hr	8.3×10^{-4}		9.1×10^{-4}				
	96-720 hr	3.6×10^{-4}		4.0×10^{-4}				

Table 2.3.4-6 Combination of Sources and Receptors for LOCA Analysis (Sheet 3 of 3)

Accidents		LOCA							
		TSC							
Sources	Locations (1)	Plant vent				Ground level containment release point (5)			
		9				3 of the North			
	Release heights (m) (2)	69.9				49.5			
Receptors	Locations (1)	Intake		inleak		Intake		inleak	
		TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Horizontal distance Source to Receptor (m)(3)		55	61	55	61	46	48	46	48
Vertical distance (m) (3)		-45	-45	-45	-45	-24	-24	-24	-24
Straight distance (m) (3)		71	76	71	76	52	54	52	54
Direction Receptor to Source (degree) (4)		81	64	81	64	91	76	91	76
Lateral diffusion coefficient (m)		0	0	0	0	7.98	7.98	7.98	7.98
Vertical diffusion coefficient (m)		0	0	0	0	5.03	5.03	5.03	5.03
χ/Q (s/m^3) (6)	0-8 hr	1.4×10^{-3}		1.4×10^{-3}		1.9×10^{-3}		1.9×10^{-3}	
	8-24 hr	8.0×10^{-4}		8.0×10^{-4}		1.1×10^{-3}		1.1×10^{-3}	
	24-96 hr	5.1×10^{-4}		5.1×10^{-4}		7.2×10^{-4}		7.2×10^{-4}	
	96-720 hr	2.2×10^{-4}		2.2×10^{-4}		3.2×10^{-4}		3.2×10^{-4}	

Table 2.3.4-7 Combination of Sources and Receptors for Fuel Handling Accident Analysis (Sheet 1 of 3)

Accidents		Fuel handling accident in the containment								
		MCR								
Sources	Locations (1)	Plant vent								
		9								
	Release heights (m) (2)	69.9								
Receptors	Locations (1)	Intake		Inleak						
		MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	c of the North	c of the South	b
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9	13.9	13.9	25.4	25.4	10.0
Horizontal distance Source to Receptor (m)(3)		68	53	66	68	51	53	55	61	37
Vertical distance (m) (3)		-56	-56	-56	-56	-56	-56	-45	-45	-60
Straight distance (m) (3)		88	77	87	88	76	77	71	76	70
Direction Receptor to Source (degree) (4)		318	19	316	318	20	19	81	64	28
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.1×10^{-3}		1.4×10^{-3}						
	8-24 hr	6.6×10^{-4}		8.0×10^{-4}						
	24-96 hr	4.2×10^{-4}		5.1×10^{-4}						
	96-720 hr	1.9×10^{-4}		2.2×10^{-4}						

Table 2.3.4-7 Combination of Sources and Receptors for Fuel Handling Accident Analysis (Sheet 2 of 3)

Accidents		Fuel handling accident in the fuel handling area								
		MCR								
Sources	Locations (1)	Fuel handling area								
		8								
	Release heights (m) (2)	5.9								
Receptors	Locations (1)	Intake		Inleak						
		MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(7)	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake(8)	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	c of the North	c of the South	b
	Receptor heights (m) (2)	13.9	13.9	13.9	13.9	13.9	13.9	23.3	23.3	7.4
Horizontal distance Source to Receptor (m)(3)		78	104	76	78	102	104	112	119	91
Vertical distance (m) (3)		8	8	8	8	8	8	17	17	2
Straight distance (m) (3)		79	104	76	79	102	104	113	120	91
Direction Receptor to Source (degree) (4)		2	41	2	2	42	41	71	63	48
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.1×10^{-3}		1.1×10^{-3}						
	8-24 hr	6.4×10^{-4}		6.7×10^{-4}						
	24-96 hr	4.1×10^{-4}		4.3×10^{-4}						
	96-720 hr	1.8×10^{-4}		1.9×10^{-4}						

Table 2.3.4-7 Combination of Sources and Receptors for Fuel Handling Accident Analysis (Sheet 3 of 3)

Accidents		Fuel handling accident in the containment				Fuel handling accident in the fuel handling area			
		TSC							
Sources	Locations (1)	Plant vent				Fuel handling area			
		9				8			
	Release heights (m) (2)	69.9				5.9			
Receptors	Locations (1)	Intake		inleak		Intake		inleak	
		TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	25.4	25.4	25.4	25.4	23.3	23.3	23.3	23.3
Horizontal distance Source to Receptor (m)(3)		55	61	55	61	112	119	112	119
Vertical distance (m) (3)		-45	-45	-45	-45	17	17	17	17
Straight distance (m) (3)		71	76	71	76	113	120	113	120
Direction Receptor to Source (degree) (4)		81	64	81	64	71	63	71	63
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
χ/Q (s/m^3) (6)	0-8 hr	1.4×10^{-3}		1.4×10^{-3}		6.7×10^{-4}		6.7×10^{-4}	
	8-24 hr	8.0×10^{-4}		8.0×10^{-4}		3.9×10^{-4}		3.9×10^{-4}	
	24-96 hr	5.1×10^{-4}		5.1×10^{-4}		2.5×10^{-4}		2.5×10^{-4}	
	96-720 hr	2.2×10^{-4}		2.2×10^{-4}		1.1×10^{-4}		1.1×10^{-4}	

NOTES for Tables 2.3.4-1 through 2.3.4-7:

(1) The inside of a parenthesis shows the source locations and receptor locations of the Figure 2.3-2

(2) The height is from the ground level. The ground level is El. 2'-7"

(3) These values are the distance differences in a unit of meter from the source to the receptor. After the distance differences are calculated from the locations of the source and the receptor in a unit of feet, the resulted distance differences are rounded off. Those rounded numbers of the distance differences are converted to those in a unit of meter. Therefore, note that these values are a bit different from the difference between the source height and receptor height in a unit of meter indicated in the above (2), because the source height and receptor height in a unit of meter are directly converted from those in a unit of feet, without any calculation in a unit of feet.

(4) The angle of receptors from Plant North centering on sources (Direction increases in a clockwise fashion based on the Plant North, i.e. The Plant North is 0 degree.)

(5) Area source, which is determined from the method in Sections C.3.2.4.4 and C.3.2.4.5 of RG 1.194.

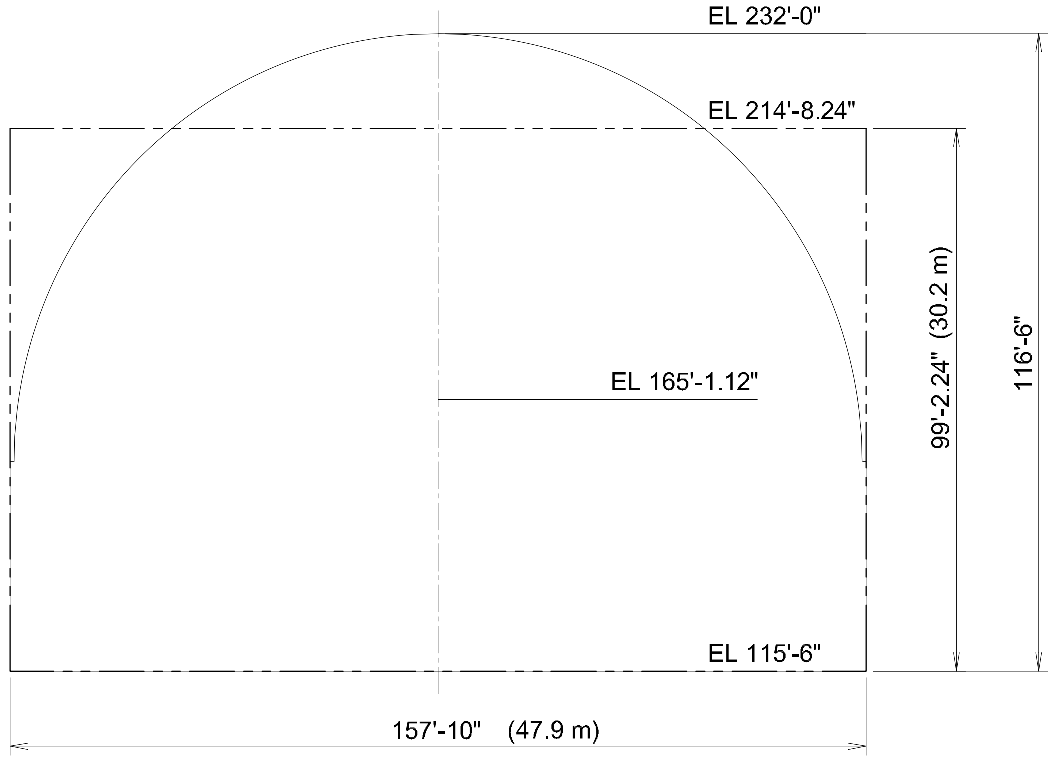
(6) - These χ/Q values are for US-APWR DCD Chapter15.

- The χ/Q values of MCR can't be directly calculated by ARCON96 itself because there is no site specific meteorological data in the stage of the DCD. Therefore, the diffusion equations described in ARCON96 (e.g. Revision 1 to NUREG-6331) are used for calculating the χ/Q values of MCR, together with the meteorological condition based on RG 1.194 (e.g., F stability with wind speeds of 1.0 m/s) and multiplier. According to the setting method of these χ/Q values, the closer the distance the more conservative it becomes. It is not used the ARCON96 directly in DCD.

- For each sources, the χ/Q values for inleakage and intake are set as those of the path with the shortest straight distances, respectively.

(7) Class 1E electrical room HVAC intake (south – east) and MCR HVAC Intake (east) are same intake duct (i.e. they are same location).

(8) Class 1E electrical room HVAC intake (south – west) and MCR HVAC Intake (west) are same intake duct (i.e. they are same location).



The ground level is E.L.=2' -7"

$\text{Width}_{\text{area source}}$ = 157 ft = 47.9 m

$\text{Height}_{\text{area source}}$ = 99 ft = 30.2 m

Figure 2.3-1 Area Source for Containment Shell

⬡ SOURCES

1. Containment Shell to Class 1E electrical room HVAC intake (As Diffuse Area Source)
2. Containment Shell to Main Control Room HVAC Intake and Class 1E electrical room HVAC intake (As Diffuse Area Source)
3. Containment Shell to Auxiliary Building HVAC Intake and Technical Support Center HVAC Intake (As Diffuse Area Source)
4. Containment Shell to Reactor Building Door (As Diffuse Area Source)
5. Main Steam Line (Source points are in the west and the east.)
6. Main Steam Relief Valve (Source points are in the west and the east.)
7. Main Steam Safety Valve (Source points are in the west and the east.)
8. Fuel Handling Area
9. Plant Vent

△ RECEPTORS

a. Main Control Room HVAC Intake
b. Reactor Building Door
c. Auxiliary Building HVAC Intake and Technical Support Center HVAC Intake
d. Class 1E electrical room HVAC intake

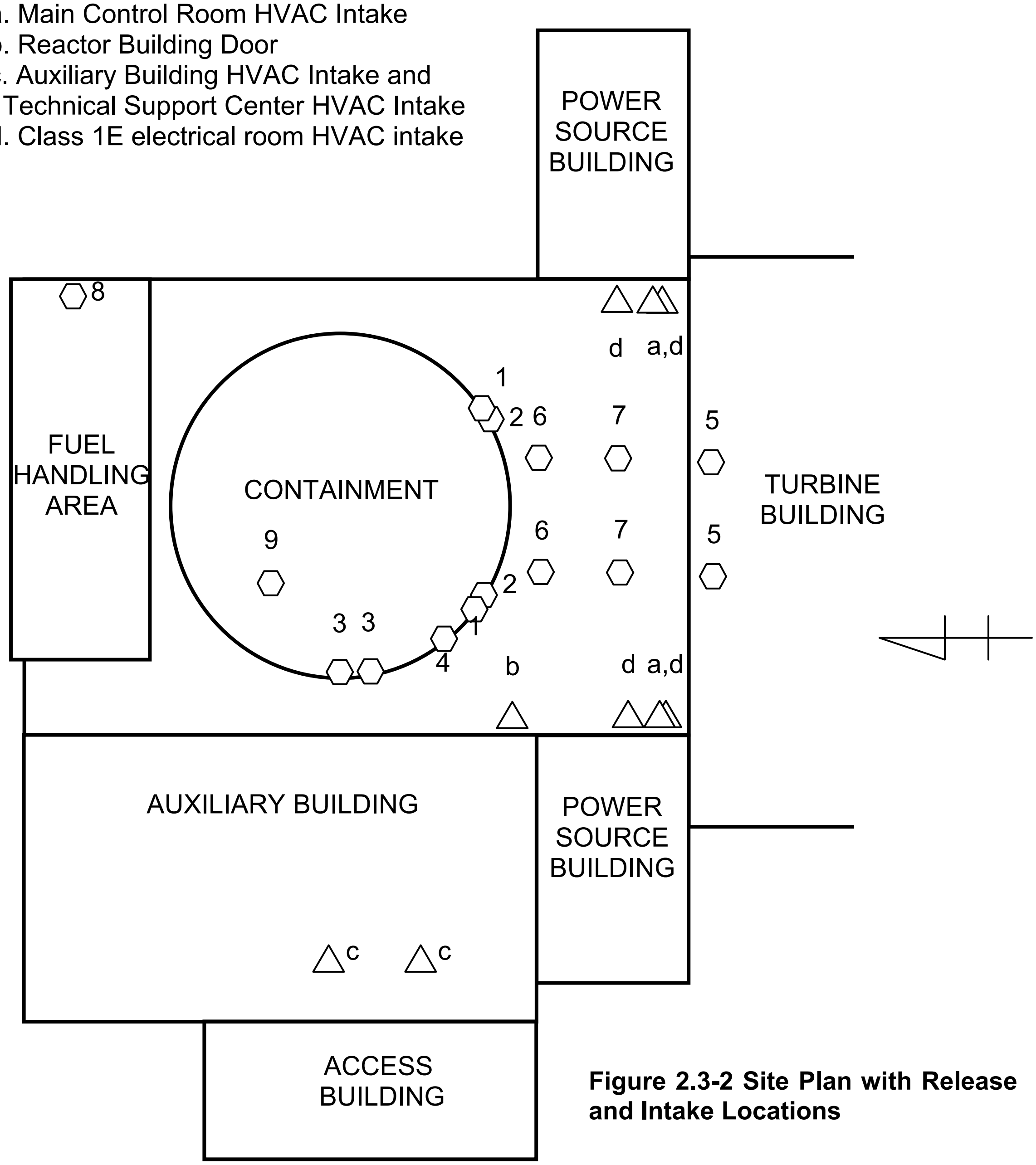


Figure 2.3-2 Site Plan with Release and Intake Locations

2.4 Hydrologic Engineering

The US-APWR is designed for a maximum ground water elevation of 1 ft. below plant grade as well as a maximum level for flood or tsunami of 1 ft. below plant grade. The US-APWR is designed for a maximum local intense precipitation of 19.4 in./hr. The local intense precipitation is a measure of the extreme amount of water falling in the immediate vicinity of the site, taken as the one-square-mile probable maximum precipitation (PMP). Table 2.0-1 contains standard plant design input for hydrology.

The COL Applicant is to provide sufficient information to verify that hydrologic-related events will not affect the safety-basis for the US-APWR.

Non safety-related structures and certain safety-related structures whose flooding would not prevent safe operation of the plant need not be designed for the effects of high water or ice. Examples of safety-related structures that may not be adversely affected by flooding or icing include water intake structures and ultimate heat sink basins.

2.4.1 Hydrologic Description

Major external hydrologic considerations for safety operation of the plant include both surface and subsurface sources. The hydrologic description includes the location, size, shape, and other hydrologic characteristics of streams, lakes, shore regions, and ground water environments influencing plant siting, and includes a description of existing and proposed water control structures, both upstream and downstream, that may influence conditions at the site.

2.4.2 Floods

The site-specific design of flood protection for safety-related components and structures of the plant is based on the highest calculated flood water level elevations and flood wave effects (site-characteristic flood) resulting from analyses of several different hypothetical causes. The site-specific design for local probable maximum precipitation demonstrates the capability of site drainage facilities to prevent flooding of safety-related facilities.

2.4.3 Probable Maximum Flood

The site-specific probable maximum flood (PMF) is based on the nearby streams and rivers contribution to the design basis flooding. Any reservoir and channel routing assumptions are addressed for site-specific impact, including coefficients and their bases with appropriate discussion of initial conditions, outlet works (controlled and uncontrolled), and spillways (controlled and uncontrolled).

A site-specific flood analysis also includes the translation of the estimated peak PMP discharge to elevation using applicable site profile and precipitation data.

2.4.4 Potential Dam Failures

A site-specific evaluation considers the potential hazard to the plant’s safety-related facilities as a result of plausible failures of onsite, upstream, and downstream water control structures. The evaluation is to include the potential for any of the following sources of hazards:

- Flood waves from severe breaching of an upstream dam
- Domino-type or cascading dam failures
- Dynamic effects on structures
- Loss of water supply due to failure of a downstream dam
- Effects on safety-related SSCs during dam failure-induced flood waves, such as sediment deposition and erosion
- Failure of onsite water control or storage structures
- Consideration of other site-related evaluation criteria.

2.4.5 Probable Maximum Surge and Seiche Flooding

Site-specific data relating to surges and seiches includes a discussion of hurricanes, frontal (cyclonic) type windstorms, moving squall lines, and surge mechanisms that are possible and applicable to the site. If applicable, the data includes the effects of seismic and non-seismic information on the postulated design bases, and how the data relates to surge and seiche in the vicinity of the site and the site region. The data includes the largest breaking wave height, setup, runup, and the effect of overtopping in relation to each safety-related facility, or the protection to be provided against hydrostatic forces and dynamic effects of splash.

2.4.6 Probable Maximum Tsunami Hazards

Sites that may be subject to tsunami or tsunami-like waves consider a historical tsunami, either recorded or translated and inferred, for determining the probable maximum water levels.

2.4.7 Ice Effects

The site-specific design includes any effects of potential icing. Considerations include the most severe ice sheets, ice jam flood, wind-driven ice ridges, or other ice-produced effects and forces that are reasonably possible and could affect safety-related facilities with respect to adjacent water bodies, such as streams or lakes, for both high and low water levels. Consideration is also given to the potential of frazil and anchor ice formation at the site, including the effects of ice-induced reduction in capacity of water storage facilities as they affect safety-related SSCs.

2.4.8 Cooling Water Canals and Reservoirs

The site-specific design bases for the capacity and operating plan for safety-related cooling water canals and reservoirs consider if the source of water for the UHS or other safety-related functions rely on cooling water canals or reservoirs and is dependent on a nearby stream, river, estuary, lake, or ocean. The availability of safety-related cooling water may be affected by low-water conditions caused by low streamflow and low water level resulting from draw-down caused by hurricanes, seiches, and tsunamis. The site-specific design bases considers applicable emergency storage evacuation of reservoirs (low-level outlet and emergency spillway) and describes verified runoff models (e.g., unit hydrographs), flood routing, spillway design, and outlet protection.

2.4.9 Channel Diversions

The potential for upstream diversion or rerouting of the source of cooling water (resulting from, for example, channel migration, river cutoffs, ice jams, or subsidence) is considered with respect to site-specific seismic, topographical, geologic, and thermal evidence in the region.

2.4.10 Flooding Protection Requirements

The static and dynamic consequences of any type of flooding are considered on each pertinent safety-related facility. Refer to Section 3.4 for information relating to flood design, and Section 3.8 for information relating to the qualification of buildings and structures subjected to flooding loads.

2.4.11 Low Water Considerations

The US-APWR has a cooling water volume requirement following SSE shutdown. Low water conditions are described as part of the site-specific hydrologic engineering evaluation, including how this volume of cooling water will be available for safety basis events.

The site-specific summary is to include the minimum safety-related cooling water flow, the sump invert elevation and configuration, the minimum design operating level, pump submergence elevations (operating heads), and design bases for effluent submergence, mixing, and dispersion. The cooling water pumps are to maintain a sufficient water supply during periods of low water resulting from a 100-year drought. Refer to Table 2.4-1 for normal system water demands during normal plant operation. Subsections 9.2.1, 9.2.5, and 10.4.5 of the FSAR may be referenced where applicable, as may institutional restraints on water use. The site-specific analysis also considers other uses of water drawn from the UHS, such as fire water or system charging requirements.

2.4.12 Ground Water

Ground water conditions and issues relative to the US-APWR are site-specific, including monitoring and safeguards requirements to be implemented to the design and operational requirements in RG 4.21. A conservative analysis includes critical ground water pathways for a liquid effluent release at the site and an evaluation (where applicable) of the dispersion, ion-exchange, and dilution capability of the ground water environment with respect to present and projected users. Pathways are evaluated for the potential to contaminate nearby ground water users and to water bodies such as springs, lakes, or streams.

The maximum site-specific operational ground water level is determined for ground-water-induced hydrostatic loadings on subsurface portions of safety-related SSC. Where dewatering during construction is critical to the integrity of safety-related structures, the bases for subsurface hydrostatic loadings assumed during construction and the dewatering methods to be employed in achieving these loadings are to be discussed.

2.4.13 Accident Releases of Radioactive Liquid Effluent in Ground and Surface Waters

The site is evaluated for the ability of the ground and surface water environment to delay, disperse, dilute, or concentrate liquid effluents, as related to existing or potential future water users. The bases used to determine dilution factors, dispersion coefficients, flow velocities, travel times, adsorption, and pathways of liquid contaminants is to be discussed, including references to the locations and users of surface waters, and the site-specific release points.

2.4.14 Technical Specification and Emergency Operation Requirements

Any emergency protective measures designed to minimize the impact of adverse hydrology-related events on safety-related facilities are described on a site-specific basis. Applicable site-specific information includes the manner in which to incorporate these requirements into appropriate TSs and emergency procedures, and the need for any TSs for plant shutdown to minimize the consequences of an accident resulting from hydrologic phenomena such as floods or the degradation of the UHS. The potential effects of seismic and non-seismic information on the postulated technical specifications and emergency operations is also to be evaluated for the proposed plant site. If emergency procedures are used to meet safety requirements associated with hydrologic events, the event is to be identified, and appropriate water levels and lead times available are to be provided.

2.4.15 Combined License Information

COL 2.4(1) *The COL Applicant is to provide sufficient information to verify that hydrologic-related events will not affect the safety-basis for the US-APWR.*

2.4.16 References

2.4-1 Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning. Regulatory Guide 4.21, Rev. 0, U.S. Nuclear Regulatory Commission, Washington, DC, June 2008.

Table 2.4-1 Normal Operation Water Demands

System	Water Demand (1)
Circulating Water System	Approximately 3.2×10^4 gpm
Essential Service Water System	Note 2

Notes:

1 These values depend on site condition, and are for reference only. The COL Applicant is responsible for verifying water demands and sources

2 Water Demands depend on type of UHS

2.5 Geology, Seismology, and Geotechnical Engineering

The COL Applicant is to provide sufficient information regarding the seismic and geologic characteristics of the site and the region surrounding the site. This information is to permit an adequate evaluation of the proposed site, to support evaluations performed to estimate the site-specific ground motion related to the safe-shutdown earthquake following the certified seismic design response spectra (CSDRS), and to permit adequate engineering solutions to actual or potential geologic and seismic effects at the proposed site. A summary is to be provided that includes a synopsis of Subsections 2.5.1 through 2.5.5 below, including a brief description of the site, investigations performed, results of investigations, conclusions, and identification of who did the work.

2.5.1 Basic Geologic and Seismic Information

Basic geologic and seismic information is provided on a site-specific basis. All geologic, seismic, tectonic, nontectonic, and manmade hazards within the site region are to be discussed. A review of the regional tectonics, with emphasis on the quaternary period, structural geology, seismology, paleoseismology, physiography, geomorphology, stratigraphy, and geologic history within a distance of 200 miles from the site or site region are to be provided. Tectonic structures such as folds, faults, basins, and domes underlying the region surrounding the site are to be identified and described, including their geologic history.

A description of the site-related geologic features, seismic conditions, and conditions caused by human activities is provided at appropriate levels of detail. The description includes the site physiography and local land forms. Evaluations are to include areas that are significant to the site for actual or potential landsliding, surface or subsurface subsidence, uplift, or collapse resulting from natural features, such as tectonic depression and cavernous or karst terrains.

The site-specific discussion includes significant historical earthquakes, as well as evidence (or lack of evidence) of paleoseismology. The detailed lithologic and stratigraphic conditions of the site are described, as well as the relationship to the regional stratigraphy. The site-specific information describes the thicknesses, physical characteristics, origins, and degree of consolidation of each lithologic unit, including a local stratigraphic column.

The site-specific engineering-geology evaluation includes the local geologic features that affect the plant structures. The discussion includes in detail the geologic conditions underlying all seismic category I structures, dams, dikes, and pipelines, and describe the dynamic behavior of the site during prior earthquakes. Site-specific considerations include the effects of human activities in the area, such as withdrawal or addition of subsurface fluids or mineral extraction at the site.

2.5.2 Vibratory Ground Motion

Table 2.0-1 defines the peak ground acceleration (PGA) as 0.3g for the US-APWR. The design spectra for the US-APWR are described in Section 3.7.1 and shown on Figures 3.7.1-1 and 3.7.1-2. The US-APWR design response spectra follow a modified high frequency approach to RG 1.60 (Reference 2.5-1) spectra. Subsection 3.7.1.1 defines this approach in further detail. The spectra shown in Figures 3.7.1-1 and 3.7.1-2 are RG 1.60 spectra enhanced by moving the 9 Hz control point to 12 Hz and by moving the 33 Hz control point to 50 Hz. PGA is 0.3g and this value is used to scale the RG 1.60 spectra, which are based on a surmised 1.0 PGA level. The SSE is based on the CSDRS.

2.5.2.1 Seismicity

For the site-specific evaluation, a complete list of all historically reported earthquakes is provided that could have reasonably affected the region surrounding the site, including all earthquakes of modified Mercalli intensity greater than or equal to IV or of magnitude greater than or equal to 3.0 that have been reported within 200 miles of the site. Any large earthquakes outside of this area are considered that would impact the response spectra. In addition, any earthquake-induced geologic failure is to be described, such as liquefaction (including paleoseismic evidence of large prehistoric earthquakes), landsliding, land spreading, and lurching, including the estimated level of strong motion that induced failure and the physical properties of the materials.

2.5.2.2 Geologic and Tectonic Characteristics of the Site and Region

For the site-specific evaluation of each seismic source, the characteristics are described for the geologic structure, tectonic history, present and past stress regimes, seismicity, recurrence, and maximum magnitudes that distinguish the various seismic sources and the particular areas within those sources where historical earthquakes have occurred. The discussion is to be augmented with a regional-scale map showing the seismic sources, earthquake epicenters, locations of geologic structures, and other features that characterize the seismic sources. In addition, a table is to be provided reflecting seismic sources that contain maximum magnitudes, recurrence parameters, a range of source-to-site distances, alternative source models (including probability weighting factors), and any notable historical earthquakes or paleoseismic evidence of large prehistoric earthquakes.

2.5.2.3 Correlation of Earthquake Activity with Seismic Sources

Whenever an earthquake hypocenter or concentration of earthquake hypocenters can be reasonably correlated with geologic structures, the rationale for the association considering the characteristics of the geologic structure (including geologic and geophysical data, seismicity, and tectonic history) and regional tectonic model is provided.

2.5.2.4 Probabilistic Seismic Hazard Analysis and Controlling Earthquake

A site-specific probabilistic seismic hazard analysis is described, including the underlying assumptions and methodology.

2.5.2.5 Seismic Wave Transmission Characteristics of the Site

A site-specific description is provided of the site response analyses, including the method used to represent the uncertainty and variability across the site, and a presentation of the following material properties for each stratum under the site:

- Thickness
- Seismic compressional and shear velocities
- Bulk densities
- Soil index properties and classification
- Shear modulus and damping variations with strain level
- Water table elevation and its variations

2.5.2.6 Ground Motion Response Spectrum (GMRS)

The site-specific GMRS is provided at a sufficient number of frequencies (at least 25) such that it adequately represents the local and regional seismic hazards. The vertical to horizontal (V/H) response spectral ratio used to determine the vertical GMRS from the horizontal GMRS is also to be provided. Further discussion of the GMRS is provided in Subsection 3.7.1.1.

2.5.3 Surface Faulting

Detailed surface and subsurface geological, seismological, and geophysical investigations performed around the site are compiled on a site-specific basis. Sufficient surface and subsurface information, supported by detailed investigations, either confirms the absence of surface tectonic deformation (i.e., faulting) or, if surface deformation is present, demonstrates the age of its most recent displacement and ages of previous displacements. If tectonic deformation is present in the site vicinity, the geometry, amount and sense of displacement, recurrence rate, and age of latest movement is to be defined.

The structure and generic relationship between site area faulting or other tectonic deformation and the regional tectonic framework are discussed on a site-specific basis. For regions with active tectonics, a discussion is provided of any detailed geologic and geophysical investigations conducted to demonstrate the structural relationships of site area faults with regional faults known to be seismically active.

2.5.4 Stability of Subsurface Materials and Foundations

Site-specific information is provided concerning the properties and stability of all soils and rock that may affect the nuclear power plant facilities, under both static and dynamic conditions, including the vibratory ground motions associated with the GMRS. The acceptability of soil materials is to be discussed to assure the consistency between the assumptions made in Section 3.7.2 and the site specific conditions identified within this subsection.

2.5.4.1 Geologic Features

Site-specific geologic features are to be discussed, including the following information:

1. Areas of actual or potential surface or subsurface subsidence, solution activity, uplift, or collapse and the causes of these condition

2. Zones of alteration or irregular weathering profiles and zones of structural weakness
3. Unrelieved residual stresses in bedrock and their potential for creep and rebound effects
4. Rocks or soils that might be unstable because of their mineralogy, lack of consolidation, water content, or potentially undesirable response to seismic or other events
5. History of deposition and erosion, including glacial and other preloading influence on soil deposits
6. Estimates of consolidation and preconsolidation pressures and methods used to estimate these values

2.5.4.2 Properties of Subsurface Materials

The site-specific properties of underlying materials, including the static and dynamic engineering properties of all soils and rocks in the site area are to be described in detail. The extent to which procedures used in field investigations to determine the engineering properties of soil and rock materials conform to RG 1.132, Site Investigations for Foundations of Nuclear Power Plants (Reference 2.5-2) are to be identified. Likewise, the extent to which the procedures used in laboratory investigations of soils and rocks conform to RG 1.138, Laboratory Investigations of Soils and Rocks for Engineering Analysis and Design of Nuclear Power Plants (Reference 2.5-3) is to be indicated.

2.5.4.3 Foundation Interfaces

Profiles illustrating the detailed relationship of the foundations of all seismic category I and other safety-related facilities to the subsurface materials are provided on a site-specific basis. Refer also to Subsection 3.8.5.4 for analyses of settlement for the US-APWR standard plant design.

2.5.4.4 Geophysical Surveys

A description is provided on a site-specific basis of the geophysical investigations performed at the site to determine the dynamic characteristics of the soil or rock and geophysical features. The geophysical investigations also support the results of compressional and shear wave velocity surveys.

2.5.4.5 Excavations and Backfill

Site-specific data concerning excavation, backfill, and earthwork analyses includes the following information:

1. Sources and quantities of backfill and borrow, including a description of exploration and laboratory studies and the static and dynamic engineering properties of these materials in the same fashion detailed in Subsections 2.5.4.2 and 2.5.4.3.
2. Extent (horizontally and vertically) of all seismic category I excavations, fills, and slopes, including the locations and limits of excavations, fills, and backfills on plot plans and geologic sections and profiles.

3. Compaction specifications and embankment and foundation designs
4. Dewatering and excavation methods and control of ground water during excavation to preclude degradation of foundation materials, including a discussion of proposed quality control and Quality Assurance programs related to foundation excavation, and subsequent protection and treatment, and measures to monitor foundation rebound and heave.

2.5.4.6 Ground Water Conditions

Site-specific ground water conditions include the following information:

1. Ground water conditions relative to the foundation stability of the safety-related nuclear power plant facilities
2. Plans for dewatering during construction
3. Plans for analysis and interpretation of seepage and potential piping conditions during construction
4. Records of field and laboratory permeability tests
5. History of ground water fluctuations, as determined by periodic monitoring of local wells and piezometers, including flood conditions

If the analysis of ground water at the site has not been completed at the time the COLA, a description of the implementation program, including milestones, is to be included.

2.5.4.7 Response of Soil and Rock to Dynamic Loading

The response of soil and rock to dynamic loading is to be provided, including the following information as appropriate:

1. Any investigations to determine the effects of prior earthquakes on the soils and rocks in the vicinity of the site, including evidence of liquefaction and sand cone formation
2. Compressional and shear (P and S) wave velocity profiles, as determined from field seismic surveys (surface refraction and reflection and in-hole and cross-hole seismic explorations), including data and interpretation of the data
3. Results of dynamic tests in the laboratory on samples of the soil and rock

2.5.4.8 Liquefaction Potential

The US-APWR standard plant design is based on the premise that there is no potential of liquefaction occurring at the site. Site-specific foundation materials adjacent to and under safety-related structures that are saturated soils, or soils that have a potential to become saturated and the water table is above bedrock, are analyzed for the potential of liquefaction occurring at the site.

2.5.4.9 Earthquake Site Characteristics

The derivation of the SSE ground motion is provided by a site-specific summary.

2.5.4.10 Static Stability

The stability of all safety-related facilities for static loading conditions is analyzed for site-specific conditions including foundation rebound, settlement, differential settlement, and bearing capacity under the dead loads of fills and plant facilities. A discussion and evaluation of lateral earth pressures and hydrostatic ground water loads acting on plant facilities is included.

2.5.4.11 Design Criteria

Site-specific design criteria and methods of design used in the stability studies of all safety-related facilities are provided, including how they compare to the geologic and seismic site characteristics. The required and computed factors of safety, assumptions, and conservatisms in each analysis are to be identified, and any computer analyses used are to be explained and verified.

2.5.4.12 Techniques to Improve Subsurface Conditions

If applicable, a discussion is to be prepared and specifications provided for any measures to improve foundations, such as grouting, vibroflotation, dental work, rock bolting, and anchors. A verification program designed to permit a thorough evaluation of the effectiveness of foundation improvement measures is also to be discussed. If the foundation improvement verification program discussed in this section has not been completed at the time of the COLA, a description of the implementation program, including milestones, is to be included.

2.5.5 Stability of Slopes

The US-APWR standard plant design is based on the premise that there is no site-specific potential for slope failure that could jeopardize safety-related SSCs. Site-specific information is presented concerning the static and dynamic stability of all natural and manmade earth or rock slopes (such as cuts, fills, embankments, and dams) for which failure, under any of the conditions to which they could be exposed during the life of the plant, could adversely affect the safety of the nuclear power plant facilities.

2.5.6 Combined License Information

COL 2.5(1) *The COL Applicant is to provide sufficient information regarding the seismic and geologic characteristics of the site and the region surrounding the site.*

2.5.7 References

2.5-1 Design Response Spectra for Seismic Design of Nuclear Power Plants. Regulatory Guide 1.60, Rev. 1, U.S. Nuclear Regulatory Commission, Washington, DC, December 1973.

2.5-2 Site Investigations for Foundations of Nuclear Power Plants. Regulatory Guide 1.132, Rev. 2, U.S. Nuclear Regulatory Commission, Washington, DC, October 2003.

2.5-3 Laboratory Investigations of Soils and Rocks for Engineering Analysis and Design of Nuclear Power Plants. Regulatory Guide 1.138, Rev. 2, U.S. Nuclear Regulatory Commission, Washington, DC, December 2003.