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2.1 Geography and Demography

2.1.1 Site Location and Description

2.1.1.1 Site Location

The VCS site is approximately 13.3 miles south of the city of Victoria and located in the southern part of Victoria County, Texas. The city of Victoria is the county seat and is also the nearest population center with a population of 60,603 based on the U.S. Census Bureau's 2000 census data.

The VCS site is comprised of approximately 11,500 acres of land. The site boundary is the same as the property boundary. The northwest corner of the site boundary lies adjacent to U.S. Highway 77. The southeast site boundary runs parallel to the Union Pacific railway. The northeast site boundary winds through Linn Lake and along a portion of the lower Guadalupe River to the southeast corner of the VCS site. Situated to the east is the unincorporated town of Bloomington with a population of 2562 (during the 2000 Census). Bloomington is the largest community within 10 miles of the VCS site. Other communities within 10 miles are Dernal, Inari, and McFaddin. Among them, McFaddin is the nearest town and is approximately 4.3 miles southeast of the VCS power block area. Population estimates and projections for the low population zone of the VCS site and the 50-mile region are given in Subsection 2.1.3.

Figure 2.1-1 presents the VCS location and the surrounding area within 50 miles. The locations of natural and recreational areas are identified in Figures 2.1-1 and 2.1-2, a map of the local area within 10 miles of the VCS site. These figures also show the location of the site with respect to prominent natural and man-made features including rivers and lakes, and major transportation routes.

As described in Section 2.2, within 5 miles of the VCS site, there are no significant industrial facilities; however, there are ten active and two abandoned natural gas transmission pipelines, one gasoline/diesel fuel pipeline, one ethylene/cyclohexane pipeline, four active natural gas gathering pipeline systems, and six major natural gas and oil fields with active extraction wells. Major, nearby transportation routes include one navigable waterway (Victoria Barge Canal), one highway (U.S. Highway 77), and one railway (Union Pacific Railway). See Section 2.2 for detailed descriptions and analyses of these potential hazards to VCS operations.

Between 5 and 10 miles from the VCS site, there are six industrial facilities that are significant enough to be considered in the hazards screening presented in Section 2.2. Also, there are four public roads and one railway. The private Green Lake Ranch Airport is located just outside of the 10-mile radius of the VCS site. Victoria Regional Airport is approximately 18 miles northeast of the VCS site. Locations of other public airports in the 50-mile region are identified in Figure 2.1-1. The closest military base is a naval air station located in Ingleside, Texas, approximately 55 miles south of

VCS. The Kingsville Military Operations Area includes the VCS site and is considered in the hazards screening and analyses of Section 2.2.

Victoria County lies in the Coastal Plain region in the southeastern part of Texas and is bounded to the south by Calhoun and Refugio Counties, to the west by Goliad County, to the east by Jackson County, and to the north by DeWitt and Lavaca Counties. Victoria County extends across approximately 890 square miles of mostly open prairie with some notable water bodies and forested and wetland areas. The general landscape of Victoria County is broad and nearly level. Agriculture is the major industry, and oil and gas extraction activities are numerous in the county. The VCS site is bracketed by the U.S. Geological Survey 7.5 minute quadrangles named Raisin, Bloomington, McFaddin, and Bloomington SW.

A prominent feature of the VCS site is the approximately 4900-acre VCS cooling basin, a closed-loop cooling system for VCS operations. Makeup water for the VCS operation is drawn from the Guadalupe River approximately 0.1 mile upstream of the saltwater barrier and approximately 11 miles to the southeast of the VCS site. The Guadalupe River empties into the San Antonio Bay, which empties into the Gulf of Mexico, northeast of Corpus Christi. The transportation corridor from the VCS site to the Port of Victoria Turning Basin will support VCS construction activities. These VCS features are shown in Figure 2.1-2. Blowdown from the cooling basin is routed through a buried pipeline that runs adjacent to the heavy haul road and transportation corridor to a diffuser discharge in the Guadalupe River. In Figure 2.1-3, the power block area, which contains all safety-related structures including the ultimate heat sink (if applicable), is shown relative to the exclusion area boundary, with distance measurements from the power block reference point along the 16 cardinal compass points. The location and orientation of principal plant structures within the site area will be provided with the COL application when a reactor technology has been selected.

2.1.1.2 Site Description

Coordinates for the power block reference point are provided in geodetic and Universal Transverse Mercator (UTM) systems, as follows:

Geodetic		Texas State Plane Coordinates		UTM Zone 14 (in meters)	
Latitude	**Longitude**	**Northing**	**Easting**	**Northing**	**Easting**
N28° 36’ 52”	W97° 1’ 50”	N13412682.02	E2600321.39	3,166,858	692,544

North American Datum 1983 (NAD 83).

The power block reference point is approximately 250 ft plant south of the centroid of the power block area and was used as the reference point for many distance measurements in relation to the site as well as the midpoint for the EAB and LPZ.

The major land transportation routes near the VCS site include U.S. Highway 77 and the Union Pacific railway. U.S. Highway 77 runs adjacent to the northwest corner of the VCS site boundary, approximately 0.85 miles from the center of the power block at its nearest approach. The Union Pacific railway runs approximately 4 miles southeast of the VCS power block at its nearest point. In addition, the Guadalupe River is approximately 4.3 miles east of the site, and the Victoria Barge Canal, which connects to the Gulf Intracoastal Waterway, is approximately 4.9 miles east of the power block area boundary. Access to the VCS site is via an access road from U.S. Highway 77, the transportation corridor from the Port of Victoria Turning Basin and the rail spur from the Union Pacific railway.

Naval Air Station Kingsville, approximately 90 miles south of the VCS site, is responsible for the Kingsville Military Operations Area and maintains records pertaining to its use by all military facilities. Naval Air Station Kingsville has reported approximately 10,000 operations per year for the entire Military Operations Area, indicated by the Federal Aviation Administration chart as “Alert Area A-632E concentrated student jet training.” In the area surrounding the VCS site, an actual count of 421 flight operations is reported for 2007 calendar year. There are no military airports in the VCS vicinity, so no takeoffs and landings are a part of these operations. There are no federal airway corridors with edges within 2 miles of the VCS site. Aircraft flight operations in the vicinity of the VCS site are described and considered in the safety analysis of site and nearby hazards in Section 2.2.

2.1.2 Exclusion Area Authority and Control

As required by 10 CFR 100.21(a), an exclusion area boundary (EAB) and a low population zone (LPZ) have been identified to meet the requirements established in 10 CFR 100.3. The EAB is an oval, 9000 feet in the plant east-west direction and 8000 feet in the plant north-south direction. The LPZ is a circle with a radius of 5 miles. The center point for the EAB and LPZ is the power block reference point. The EAB and LPZ are shown in Figures 2.1-4 and 2.1-5, respectively.

2.1.2.1 Authority

Exelon has the right to purchase the VCS site, including all the land within the EAB, under a purchase and sale agreement with the current landowner. The site boundary of the VCS site entirely encompasses the EAB. Exelon, as the owner and operator, will determine all activities within the EAB and the site boundary. The EAB extends into the cooling basin, which is entirely within the site boundary, and, accordingly, Exelon will have control over activities involving the cooling basin. Thus, on or before site acquisition, Exelon will have the requisite authority to control all activities within the EAB, including exclusion or removal of individuals and property consistent with NRC regulations to ensure protection of public health and safety in the event of an emergency.

2.1.2.2 Control of Activities Unrelated to Plant Operation

There are no residents on the VCS site or within the EAB. No person or entity can reside, build, or conduct other activities within the designated EAB for VCS. Exelon has no plans to allow recreational activities on any part of the VCS site.

Within the EAB, Exelon determines what activities not associated with operation of VCS can occur. Exelon maintains the right to relocate activities occurring within the EAB (e.g., activities associated with gas and oil production) to a safe distance. Exelon plans to acquire all mineral rights, including all related oil and gas leases, under the power block area. Exelon plans to acquire a surface waiver from the mineral interest owners and oil and gas lessees for the area comprising the EAB. The description and analysis of hazards are provided in Section 2.2.

VCS uses a closed-loop circulating water system with a cooling basin constructed on the VCS site. Makeup water to the cooling basin is drawn via an intake pumping system from the Guadalupe River. The cooling basin is approximately 4900 acres. To the extent activities not associated with plant operations within the EAB are permitted, Exelon maintains the right to evacuate all persons engaged in those activities from the EAB in the event of an emergency as required by 10 CFR 100.3. Should an event necessitate public use restrictions outside the VCS EAB and the property boundary, the restrictions will be enforced under the authority and direction of the federal, state, and local agencies as designated in the VCS Emergency Plan.

2.1.2.3 Arrangements for Traffic Control

No federal, state, or county roads, railways, or waterways traverse the exclusion area or the site; therefore, no traffic control, rerouting or abandonment of public transportation routes is necessary. Exelon controls access to the VCS site. No special arrangements are necessary that cannot be accommodated through regular plant security procedures.

2.1.2.4 Abandonment or Relocation of Public Roads

The VCS site has no public roads that are abandoned or relocated.

2.1.3 Population Distribution

Exelon estimated the population surrounding the VCS site to a 50-mile radius, based on the 2000 census data. The population distribution was estimated in 10 concentric rings at 0 to 1 mile, 1 to 2 miles, 2 to 3 miles, 3 to 4 miles, 4 to 5 miles, 5 to 10 miles, 10 to 20 miles, 20 to 30 miles, 30 to 40 miles, and 40 to 50 miles from the VCS site, and 16 directional sectors, each sector consisting of 22.5 degrees. The populations for 2010 through 2080 have been projected by calculating a growth rate using state population projections (by county) as the base. Projecting the population through 2080 allows for a 20-year ESP, a 10-year construction period, and a 40-year plant life.

2.1.3.1 Resident Population within 10 Miles

Figure 2.1-6 shows the general locations of the municipalities and other features within 10 miles of the VCS site. The unincorporated community of Bloomington, which had a population of 2562 in 2000, is the largest community within 10 miles of the site. The small communities of Dernal, Inari, and McFaddin also lie within 10 miles of the site (Figure 2.1-6).

The resident population distribution within 10 miles of the site was computed by overlaying the 2000 census block data (the smallest unit of census data) on the grid shown on Figure 2.1-6 and summing the populations of the census block points in each sector. Exelon used SECPOP 2000, a code developed for the NRC by Sandia National Laboratories, to calculate population by emergency planning zone sectors (Reference 2.1-1). SECPOP overlays 2000 census block data onto the sectors in the annuli prescribed by the user. County population projections to year 2040 were obtained from the Texas State Data Center and used to calculate an exponential growth rate for each county within the 50-mile radius of the VCS site (Reference 2.1-2). The growth rate for each county was used to project future populations in each sector, taking into account the percent of each sector in a particular county.

The population distributions (including transient population) and related information were tabulated for all distances in each of the 16 sectors. Figures 2.1-7 through 2.1-15 show the populations for the year 2000 and the projected populations (by decade) through the year 2080. Each figure also provides totals by direction and by radius. The SECPOP 2000 results (with transient population added) produced the 10-mile radius populations for the years 2000 through 2080 (by decade) as follows:

Year	10-Mile Radius Population
2000	6,628
2010	7,195
2020	7,829
2030	8,527
2040	9,284
2050	10,104
2060	10,985
2070	11,931
2080	13,003

2.1.3.2 Resident Population Between 10 and 50 Miles

The 50-mile radius centered at the VCS site includes all or parts of 16 counties in Texas (Figure 2.1-16). Estimates of the 2000 resident population between 10 and 50 miles from the site were computed using the same methodology used to develop the 10-mile population distribution.

The population grid from 10 to 50 miles is shown on Figure 2.1-16. The 10- to 50-mile population distributions for the years 2000 through 2080 (by decade) are shown on Figures 2.1-17 through 2.1-25. The 50-mile radius populations (including the 0- to 10-mile populations) for each year are as follows:

Year	50-Mile Radius Population
2000	239,411
2010	255,337
2020	272,596
2030	291,671
2040	312,638
2050	334,567
2060	359,149
2070	385,251
2080	414,902

2.1.3.3 Transient Population

2.1.3.3.1 Transient Population Within 10 Miles

The transient population segment includes individuals in the workforce, hotels/motels, and recreational areas, as well as seasonal residents and migrant populations. Major employers in the area include Fordyce Ltd.-Briggs Plant (160 employees), Invista S.A.R.L. (610), Equistar (115), and Bloomington Elementary School (43). In addition to including employees at Invista S.A.R.L. as transients, the plant offers a wetlands class to area students, with a maximum class size of 50. The Guadalupe Wildlife Management Area and a private hunting ranch are also located within the 10-mile radius and offer hunting opportunities for a maximum of approximately 204 people at a time. Major employers and recreational opportunities account for 1182 transients within the 10-mile radius.

The seasonal population category includes those who reside in the area on a temporary basis. Based on census information on seasonal housing, an estimated 288 individuals reside within the 10-mile Emergency Planning Zone on a seasonal basis. Migrant workers are another category of transients that is considered in this analysis. However, the U.S. Department of Agriculture reports that there are no farms in Victoria County employing migrant labor (Reference 2.1-3). Therefore, the total number of transients within the 10-mile radius is 1470.

The 10-mile transient population was added to the resident distribution and projected for future years (Figures 2.1-7 through 2.1-15). The baseline transient population distribution for the 10-mile radius is shown on Figure 2.1-26.

2.1.3.3.2 Transient Population Between 10 and 50 Miles

The Office of the Governor, Economic Development and Tourism (Texas Tourism) includes three of the 16 counties that fall within 50 miles of the VCS site in its Gulf Coast Region of Texas: Colorado, Matagorda, and Wharton. The number of person-trips (one trip for one person) to the Gulf Coast Region for 2003 through 2004 (two-year period) was 33 million (16.5 million person-trips per year), and the volume of person-days (one day for one person) was 72 million (36 million person-days per year). Leisure travel represented 73 percent of travel (in person-days) to the Gulf Coast Region, with business travel making up the remaining 27 percent. The Gulf Coast Region's share of total person-days ranked third among Texas' 10 regions, behind the South and Metroplex Regions. The Houston-Baytown-Sugar Land Metropolitan Statistical Area (MSA), which is outside the 50-mile radius, represented most of the tourism in the Gulf Coast Region (69 million of the total 72 million person-days for the 2-year period). (Reference 2.1-4)

The remaining 13 counties with portions that fall in the 50-mile region (Aransas, Bee, Calhoun, DeWitt, Goliad, Gonzales, Jackson, Karnes, Lavaca, Nueces, Refugio, San Patricio, and Victoria) are contained within the South Region as defined by Texas Tourism. The number of person-trips to the South Region was estimated at 45 million person-trips for the 2003–2004 2-year period (22.5 million person-trips per year) and 99 million person-days (49.5 million person-days per year). Leisure travel represented 76 percent of travel (in person-days) with business travel making up the remaining 24 percent. The Victoria MSA, consisting of Victoria County, had the fewest number of visitors (2 million person-days for 2003 and 2004) of the South Region MSAs. A portion of the Corpus Christi MSA (Aransas, Nueces, and San Patricio counties) also falls within 50 miles of the VCS site. The Corpus Christi MSA ranks second among the South Region MSAs (following San Antonio), with a travel volume of 16 million person-days for 2003 and 2004. (Reference 2.1-5)

Seasonal agricultural workers also make up a portion of the transient population in the 10- to 50-mile radius. Farms in the following Texas counties that fall wholly or partially within the 50-mile radius employ migrant labor: Calhoun (2 farms), Colorado (29), DeWitt (10), Goliad (1), Gonzales (7), Jackson (1), Lavaca (11), Matagorda (72), Nueces (13), Refugio (6), San Patricio (21), and Wharton (40). No farms employing migrant labor are listed for Aransas, Bee, Karnes, or Victoria counties. (Reference 2.1-3)

The transient population between 10 and 50 miles cannot be quantified with any certainty. Because of this, the transient population was not keyed to sectors or projected for future years. However,

compared with the resident population within a 50-mile radius, the transient population is expected to be insignificant.

2.1.3.4 Low Population Zone

The Low Population Zone (LPZ) for the VCS site is the area falling within 5 miles of the center of the power block area. No facilities or institutions requiring special consideration for emergency planning purposes such as schools, nursing homes, hospitals, prisons, or major employers exist in the LPZ. A seasonal population of 236 people was identified in the LPZ, as well as a residential population of 167 people. Figure 2.1-27 shows the topographical features of the LPZ. U.S. Highway 77 provides the site and surrounding areas with an evacuation route north (to Victoria) or south (to Inari). A rail line is also located along the southern boundary of the site, providing egress to the northeast (Bloomington) or the southwest (Inari).

The resident and transient population distributions in the LPZ for each decade from 2000 through 2080 can be seen on Figures 2.1-7 through 2.1-15. The total populations in the LPZ for year 2000 and projected through year 2080 are as follows:

Year	LPZ Population
2000	403
2010	420
2020	442
2030	464
2040	490
2050	514
2060	543
2070	573
2080	607

2.1.3.5 Population Center

The closest population center (population of greater than 25,000) is the city of Victoria, which is located approximately 13.3 miles north of the VCS site (Figure 2.1-16). Victoria had a 2000 population of 60,603, not including transient population. The distance to the boundary of the population center (approximately 11 miles) is more than twice the radius of the 5-mile LPZ and is greater than the minimum distance of one and one-third times the distance from the reactor to the outer boundary of the LPZ as required by 10 CFR 100.21(b).

There are very few population groupings within the 10-mile radius (Figure 2.1-6). The overall population density for the 10-mile radius is 20.5 individuals per square mile and is projected to increase to 40.7 by year 2080. The 5 to 10-mile east-northeast sector, containing the community of

Bloomington, has the highest population density for the 10-mile radius (195 individuals per square mile for the year 2000 and 393 individuals per square mile projected for the year 2080). The 5- to 10-mile northeast sector containing the community of Dernal has the second highest population density with a year 2000 density of 89.1 individuals per square mile and a projected year 2080 density of 179 individuals per square mile. Overall, densities within the 10-mile radius are low, with only 3 sectors having densities greater than 50 individuals per square mile for the year 2000.

2.1.3.6 Population Density

Figure 2.1-28 shows the cumulative population in year 2000 within 20 miles of the site and projected cumulative populations in years 2020 and 2080. On the same figure, spanning the same radial distances, a population curve is shown for a hypothetical density of 500 persons per square mile as required by RG 4.7, Position C.4.

The year 2020 population, as well as that for year 2080, is well below the 500 individuals per square mile density criteria.

2.1.4 References

2.1-1 U.S. Nuclear Regulatory Commission, *SECPOP 2000: Sector Population, Land Fraction, and Economic Estimation Program, 2003*, Office of Nuclear Regulatory Research, August 2003.

2.1-2 Texas State Data Center, *Projections of the Population of Texas and Counties in Texas by Age, Sex and Race/Ethnicity for 2000–2040,* Office of the State Demographer, Institute for Demographic and Socioeconomic Research, University of Texas at San Antonio, October 2006.

2.1-3 U.S. Department of Agriculture, *Texas State and County Data, 2002* Census of Agriculture. Volume 1, Geographic Area Series, Part 43A, AC-02-A-43A, National Agricultural Statistics Service, June 2004.

2.1-4 D. K. Shifflet and Associates, *Texas Destinations, 2003–2004 — Gulf Coast Region, 2005*, Prepared for Texas Economic Development and Tourism.

2.1-5 D. K. Shifflet and Associates, *Texas Destinations, 2003–2004 — South Region 2005*, Prepared for Texas Economic Development and Tourism.