

SECTION 2

SITE CHARACTERISTICS

2.1 GEOGRAPHY AND DEMOGRAPHY

2.1.1 Site Location

The Salem site is located on the southern part of Artificial Island on the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, New Jersey. The point of intersection of the centerlines of the two Containment Buildings and the Auxiliary Building is located at Latitude 39° 27 min 46 sec north and Longitude 75° 32 min 08 sec west. The Universal Transverse Mercator coordinates of the reactor site are 4,368,100 m north and 454,070 m east, Zone 18. While called Artificial Island, the site is actually connected to the mainland of New Jersey by a strip of tideland formed by hydraulic fill from dredging operations on the Delaware River by the U. S. Army Corps of Engineers. The site is 15 miles south of the Delaware Memorial Bridge, 18 miles south of Wilmington, Delaware, 30 miles southwest of Philadelphia, Pennsylvania, and 7-1/2 miles southwest of Salem, New Jersey. The location of the site with respect to major cities in the northeast is shown on Figures 2.1-1 and 2.1-2.

Salem Generating Station (SGS) is located on a 700-acre site which is owned by Public Service Electric & Gas (PSE&G). Access to the site is achieved by a road (constructed by PSE&G) that connects with Alloways Creek Neck Road, about 2-1/2 miles east of the site. The location of the site with respect to the surrounding area is shown on Figure 2.1-3, a U. S. Geological Survey map. An aerial photograph is presented on Figure 2.1-4.

2.1.2 Site Description

The location of the site boundary and significant plant features is shown on Figure 2.1-5.

The site exclusion area is defined as follows:

Land

The land exclusion area is defined as that area bounded by the property line as shown on Figure 2.1-5. This land is owned by and under the control of PSE&G. The minimum distance between the reactors and the exclusion area boundary (property line) is 1270 meters.

Water

The water portion of the exclusion area is defined as that area bounded by the locus of points 1270 meters from the Containment Buildings of either Units 1 or 2 and also falling within the Delaware River. The 1270 meters is consistent with the minimum land exclusion area distance.

Discussion of the exclusion of people, property, and river traffic from that portion of the exclusion area which extends over the river is included as part of the detailed Emergency Plan, Section 13.3.

2.1.2.1 Exclusion Area Control

PSE&G owns and has control of the 700-acre land area that comprises the exclusion area. Control of the water portion of the exclusion area is described in Section 13.3, Emergency Plan.

2.1.2.2 Boundaries for Establishing Effluent Release Limits

The land boundary on which technical specification limits on release of gaseous radioactive effluents is based on the property line defining land owned by PSE&G. Figure 2.1-5 is a scale drawing showing the property line in relation to the reactor units. Distances from both the Units 1 and 2 vents to the property line in any direction may be scaled from this drawing. The minimum distance from the vents to the property line is nominally 1270 meters.

2.1.3 Population Distribution

The sources used for the 1970 distribution of population were the U. S. Bureau of the Census counts for 1970 (1), census and topographic maps (2,3), aerial photos (4), and field check surveys.

The Bureau of the Census published various levels of population data: county, minor civil division (MCD), census tract, and block. In 1970, the study area (within 50 miles of the Salem site), included portions of 4 states, 24 counties, 338 MCDs, hundreds of tracts, and thousands of census blocks.

Population distribution about SGS is provided in the sector format required. Concentric circles with the required radii for distances to 10 miles and 10 to 50 miles are provided. The circles are then divided into 22.5 degree segments, each centered on one of the 16 cardinal compass points (e.g., north, north-northeast, etc.). Projections on 10-year intervals to the year 2020 are provided on the above described sector format. Population projections are based on 1970 census data. Projections based on current census data will be provided after the validity of the current projection assumption and calculational techniques have been analyzed.

2.1.3.1 Population Within 10 Miles

For the 96 sectors within 10 miles of the site, the following method of distribution was used. It was felt, and subsequently proven, that the "area" method for distribution, successfully used beyond 10 miles depends on large sector area. Within 10 miles, the sector size is significantly smaller. For example, an average size MCD beyond 10 miles falls into two sectors. Within 10 miles, a similar-sized MCD would include over 5 sectors. The assumption of evenly distributed population within a MCD is only valid beyond 10 miles. This is clearly seen in the area within 5 miles of the site which is mostly marsh. An even distribution of people throughout a sector would place residents in uninhabitable areas. Beyond 10 miles, this factor is not of great concern since habitable land is also included in the larger sectors.

To arrive at an accurate portrayal of the 1970 population distribution within 10 miles, a house count was made from topographic maps. The count was field checked within 5 miles. The total house count for a MCD or census tract was divided into the 1970 census population resulting in persons per household factor of 2.99 to 3.36 as shown in Table 2.1-1. The factors were then applied to the houses in their respective MCDs. By totaling the population in each sector, the 1970 distribution was derived. The results are shown on Figures 2.1-6 through 2.1-10. One problem encountered was the lack of updated maps in some sectors. A review of township population growth showed that in the areas not covered by the 1970 photo-revised topographic maps (concurrent with the census data), the township growth was minimal. Any growth was in areas already populated and beyond 5 miles of the site. The field check proved this to be true. The house count method assumed that growth to 1970 is proportional to development already mapped.

To be consistent, house counts were made for all MCDs which were partially within 10 miles but which extended beyond 10 miles. This dot-map distribution method is more precise than the area

distribution method which assumes equal population density throughout the MCD. However, as noted above, house counts were only necessary within 10 miles where the sector sizes required greater precision.

The great amount of swampy and marshy areas found around the site is not populated. The proximity of the Delaware River is also responsible for the low density within 5 and 10 miles. The population densities for land area only were 29 people per square mile and 109 people per square mile within 5 and 10 miles respectively, in 1970. The nearest residence is approximately 3.4 miles west-northwest of the site in Bay View Beach, Delaware. Other nearby residences are located 3.5 miles east-northeast, and 3.7 miles northwest of the site.

2.1.3.1.1 Population Projections for 0 to 10 Mile Area

The methodology for population projection is described in Section 2.1.3.7. The allocation of 1970 population to the rose within 10 miles was based on house distribution. Projected population distribution is assumed to be similar. Within 5 miles, a land survey field check was made. The area is marsh and meadowland, not suitable in its present form for residential development. Thus, the areas presently developed are assumed to be the focal points of further development. Figures 2.1-6 through 2.1-10 show the estimated future population distributions.

2.1.3.1.2 Population Update Within 10 Miles

Updated population is provided for the most current estimate of population within 10 miles. The updated population is provided in Tables 2.1-2 and 2.1-3.

The population estimates are essentially current (March 1980), although they are based on U.S. Bureau of Census figures of July 1, 1977 and Dresdner Associates' surveys (5) conducted in September 1979 and March 1980. There has been little population

change by sector since July 1, 1977. Changes that have occurred tend to emphasize the conservative (high) nature of the population estimate, including decreased family size, out-migration in older communities, and decline in new housing starts. The methodology of allocating and reporting population is consistent with that already described.

Distribution of Population, 0 to 5 Miles, New Jersey

The distribution of population in New Jersey within 0 to 5 miles of the SGS is based on a comprehensive land use survey of dwelling units factored by an estimated average household size.

1. The 0 to 5 mile area from the SGS was divided into 35 sector/zones based on the standard Nuclear Regulatory Commission (NRC) designators for population distribution maps. The sectors located in New Jersey are north, north-northeast, northeast, east-northeast, east, east-southeast, and southeast in the 0 to 5 mile area.
2. A survey of land uses within the 0 to 5 mile area identified all residential units by zone and sector in New Jersey. The reasonableness of this survey was confirmed by sample counts from aerial photos, the USGS maps, and municipal master plans.
3. Based on the 1970 average household size by community, the population of each sector was determined by multiplying the number of dwelling units in the sector by the average household size of the community in the sector. Where more than one community was within a sector, the average household size of the community with the largest population was assumed to be reasonable. The resultant figure is considered conservative (a high estimate) because all literature indicates that average household size has decreased since 1970.

Distribution of Population, 0 to 5 Miles, Delaware

The distribution of population within 0 to 5 miles in Delaware of the SGS is based on small area (sub-municipal) population estimates made by the Wilmington Metropolitan Area Planning Council (WILMAPCO).

1. The 0 to 5 mile area from the SGS was divided into 45 sector/zones based on standard NRC designators for population distribution maps. The sectors located in Delaware are south-southeast, south, south-southwest, southwest, west-southwest, west, west-northwest, northwest, and north-northwest.
2. The entire portion of the 0 to 5 mile area in Delaware is included in the WILMAPCO Parcel Land Use System (PLUS). This program presented small area, sub-municipal (cells) population data for the year 1976, and estimated current for 1980.
3. Each small area, or cell, was assigned to a zone/sector. Where a cell was located in more than one zone/sector, its proportional area was allocated to each cell.
4. The population of each cell was then proportionately distributed to each zone/sector in the 0 to 5 mile ring in Delaware. This proportional distribution was based on the assumption that population is generally evenly distributed throughout the cell. This distribution was validated by a "windshield" survey, examination of aerial photos, and review of USGS maps. On the basis of this validation, transfers of population from one sector/zone to another (but within the same cell) were undertaken to account for grossly unequal distributions of population within a cell. A typical example would be where the wetlands portion of a cell was located in one zone/sector, and the built up portion located in an

adjacent zone/sector. In such a case, it was assumed that population was concentrated in the developable section of the cell.

Distribution of Population, 5 to 10 Miles, New Jersey

The allocation of population within 5 to 10 miles of the SGS was based on a count of dwelling units except for the City of Salem, New Jersey, where the population was based on a Census update.

1. The 5 to 10 mile area from the SGS was divided into 35 sector/zones based on the standard NRC designators for population distribution maps. The sectors located in New Jersey are north, north-northeast, northeast, east-northeast, east, east-southeast, and southeast in the 5 to 10 mile area, with zones at one mile intervals.
2. A survey of land uses within the 5 to 10 mile area identified all residential units (outside of boroughs and cities) by zone and sector, except for the City of Salem.
3. The population of the City of Salem was taken from the Census update (see Sources) and allocated to the appropriate sector based on its aerial distribution.
4. Based on the 1970 average household size by community, the population of each sector was determined by multiplying the number of dwelling units in the sector by the average household size of the community in the sector. Where more than one community was within the sector, then the average household size of the community with the largest population was assumed to be reasonable. The resultant figure was considered conservative (a high estimate) because all literature indicates that average household size has decreased since 1970.

Distribution of Population, 5 to 10 Miles, Delaware

The distribution of population in Delaware within 5 to 10 miles of SGS is based on small area, sub-municipal population estimates made by WILMAPCO.

1. The 5 to 10 mile area from the SGS was divided into 45 sector/zones based on standard NRC designators for population distribution maps. The sectors located in Delaware are south-southeast, south, south-southwest, southwest, west-southwest, west, west-northwest, northwest, and north-northwest.
2. The entire portion of the 5 to 10 mile area in Delaware is included in WILMAPCO's PLUS program, except for a small section of Kent County. This program presented small area, sub-municipal (cells) population data for the year 1976 and estimated current for 1980.
3. Each small area, or cell, was assigned to a zone/sector. Where a cell was located in more than one zone/sector, its proportional area was allocated to each cell.
4. The population of each cell was then proportionately distributed to each zone/sector in the 5 to 10 mile ring in Delaware. This proportional distribution was based on the assumption that population is generally evenly distributed throughout the cell. This distribution was validated by a "windshield" survey, examination of aerial photos, and review of USGS maps. On the basis of this validation, transfer of population from one sector/zone to another (but within the same cell) were undertaken to account for grossly unequal distributions of population within a cell. A typical example would be where the wetlands portion of a cell was located in one zone/sector, and the built up portion located in an adjacent zone/sector. In such a case, it was assumed

that population was concentrated in the developable section of the cell.

2.1.3.2 Population Between 10 and 50 Miles

This area from 10 to 50 miles is divided into 64 sectors ranging in size from 59 square miles to 177 miles. The great majority of MCDs are divided between two sectors. For this reason, the MCD was chosen as the unit to be studied from 10 to 50 miles. Only in Philadelphia County, which is one MCD, were census tracts used. This was due to the size of Philadelphia which falls within four sectors and partially beyond the 50 mile radius circle. Census tracts more accurately portray the 1970 distribution in urban areas as they are smaller in size than MCDs. However, for most areas beyond 10 miles, they were not available. In many of the rural areas, census tracts are contiguous with MCDs.

The 1970 population data on the MCD level was allocated to the sectors assuming equal distribution throughout the sector. This percentage of each MCD within a sector was calculated. This percentage was multiplied by the MCD population to obtain the population in the sector. The procedure was repeated for all land areas within a sector. The sum of these computations for each sector yielded its 1970 population. The results are shown on Figures 2.1-11 through 2.1-15.

2.1.3.2.1 Population Projections for 10 to 50 Mile Area

The population derived from the MCDs, as discussed above, were allocated to the rose in the same manner as the 1970 populations. The results are shown on Figures 2.1-11 through 2.1-15. The methodology for these projections is described in Section 2.1.3.7.

2.1.3.2.2 Population Update 10 to 50 Miles

Updated population is provided for the most current estimate of population for the area 10 to 50 miles from SGS. This population

distribution is tabulated in Table 2.1-4. The population estimates are essentially current (March 1980), although they are based on U.S. Bureau of Census figures of July 1, 1977 and Dresdner Associates' surveys (5) conducted in September 1979 and March 1980.

There has been little population change by sector since July 1, 1977. Changes that have occurred tend to emphasize the conservative (high) nature of the population estimate, including decreased family size, out-migration in older communities and decline in new housing starts. The methodology of allocating and reporting population is consistent with that already described.

Distribution of Population, 10 to 50 Miles, New Jersey

The distribution of population within 10 to 50 miles in New Jersey of SNGS is based on updated Bureau of Census reports.

1. The 10 to 50 mile area from SGS in New Jersey was divided into 46 sector/zones. The sectors located in New Jersey are north, north-northeast, northeast, east-northeast, east, east-southeast, and southeast.
2. The population for the entire portion of the 10 to 50 mile area in New Jersey is included in the Bureau of Census, P-25 series, Report No. 843. This report, entitled "Population Estimates and Projections," contains current estimates of the July 1977 population for all counties, incorporated places, and active MCDs.
3. Each municipality was assigned a zone/sector. Where a municipality was located in more than one sector, a proportional area was allocated to each one.
4. The population of each sector/zone was based on the percentage of aerial distribution, assuming equal distribution of population through the municipality.

5. Equal distribution of population throughout the municipality was assumed excluding wildlife refuges, state parks, coastal wetlands, and marshlands.
6. Total population distribution by sector.

Distribution of Population, 10 to 50 Miles, Pennsylvania

The distribution of population from 10 to 50 miles from SGS in Pennsylvania was determined by Census Bureau update reports.

1. The 10 to 50 mile area from SGS in Pennsylvania was divided into 30 sector/zones. The sectors in Pennsylvania are north, north-northeast, northeast, west-northwest, northwest, and north-northwest, and fall into the 20 to 50 mile zones.
2. The population for the entire portion of the 20 to 50 mile area in Pennsylvania is included in the Bureau of Census, P-25 series, Report No. 851. This report, entitled "Population Estimates and Projections," contains current estimates of July 1977 populations for all counties, incorporated places, and active minor civil divisions.
3. Each municipality was assigned a zone/sector. Where a municipality was located in more than one sector or zone, a proportional area was allocated to each.
4. The population of each zone/sector was based on the percentage of aerial distribution, assuming equal population throughout the municipality.
5. Equal distribution of the population throughout the municipality was assumed excluding wildlife refuges, state parks, coastal wetlands, and marshlands.

6. Total population distribution by sector.

Distribution of Population, 10 to 50 Miles, Delaware

The distribution of population with 10 to 50 miles in Delaware of SGS is based on updated Bureau of Census reports.

1. The 10 to 50 mile area from SGS in Delaware was divided into 43 sector/zones. The sectors are north, north-northwest, northwest, west-northwest, west, west-southwest, southwest, and south-southwest.
2. The population estimates for this area are available from the Bureau of the Census, P-25 series, Report No. 821. This report, entitled "Population Estimates and Projections," contains current estimates of the July 1977 population for all counties, incorporated areas, and active MCDs. Much of the Delaware and Maryland populations remain unincorporated, meaning that this portion of the populace is represented in the county total only.

To determine the number of unincorporated people per county, the total incorporated population was subtracted from the county total. This portion of the population was then equally allocated, based on a percentage of developed land area for each sector/zone.

1. Each governmental unit was assigned a sector/zone. Where a governmental unit was located in more than one, a proportional area was allocated to each sector or zone.
2. The population of each sector/zone was based on the percentage of aerial distribution for incorporated and unincorporated areas. Equal population distribution was assumed for each.

Distribution of Population, 10 to 50 Miles, Maryland

The distribution of population within 10 to 50 miles in Maryland of SGS is based on updated Bureau of Census reports.

1. The 10 to 50 mile area from SGS in Maryland was divided into 41 sector/zones. The sectors are northwest, west-northwest, west, west-southwest, southwest, and south-southwest.
2. The population estimates for this area are available from the Bureau of Census, P-25 Series, Report No. 833. This report contains current population estimates for July 1977 for all counties, incorporated areas, and active MCDs. Much of the Maryland population remains unincorporated and, therefore, is represented only in the county totals.

To determine the number of unincorporated people per county, the total incorporated population was subtracted from the county total. This portion of the population was then equally allocated, based on a percentage of developed land area for each sector/zone.

1. Each governmental unit was assigned a sector/zone. Where a governmental unit was located in more than one, a proportional area was allocated to each sector or zone.
2. The population of each sector/zone was based on the percentage of aerial distribution for incorporated and unincorporated areas. Equal population distribution was assumed for each.

2.1.3.3 Low Population Zone

The radius of the low population zone (defined in 10CFR100) is 5 miles. This distance is based on plant design and protective

action considerations. The update population (1980) for the area within the 5 mile low population zone is 1298 persons.

2.1.3.4 Transient Population

Within 5 miles of the site, there are no major seasonal or daily additions to the population with the exception of the Salem Station and Hope Creek Station construction and outage support crews and onsite visitor's center. The center has a seating capacity of 140 persons. The area is marsh and meadowland which attracts only limited numbers of hunters and trappers.

A list of the transient population attracted by the recreational facilities around the site is provided in Table 2.1-5. Pleasure craft are used on the Delaware River and Alloways Creek. Prime usage occurs on weekends and holidays. The boats range from 14 feet to 35 feet in length and might accommodate an average maximum of 120 passengers.

The only other major source of transients in the vicinity is the Delaware River traffic. Annual passenger traffic according to the U.S. Corp of Engineers is over four million people (6). This number seems high and might include double counting at the various ports north of the site. It should be stressed that river traffic does not remain within 5 miles of the site vicinity longer than the time required to traverse the river, normally less than 1 hour.

2.1.3.5 Population Center

The nearest population center of about 25,000 (as defined in 10CFR100) is Wilmington, Delaware, 18 miles north of the site. The 1970 population of Wilmington is listed in the U.S. Census report as 80,386, a decrease of 16 percent from the 1960 U.S. Census report population of 95,287. Bridgeton, New Jersey, 15.5 miles east of the site, is listed in the U.S. Census report as

having a 1970 population of 20,453, a decrease of 2.5 percent from the 1960 U.S. Census report.

Wilmington is the center of a Standard Metropolitan Statistical Area (SMSA). The Wilmington SMSA has a population in excess of 300,000. Philadelphia, Pennsylvania, and Camden, New Jersey, are part of the SMSA with a population in excess of 3.5 million, beginning about 30 miles north-northeast of the site. Baltimore, Maryland, with a population of less than 1 million is located 50 miles west of the site.

The City of Salem, located 8 miles north-northeast of the site, had a 1970 population of 7648.

2.1.3.6 Public Facilities and Institutions

An area of approximately 10 miles radius (slightly larger and irregular) has been defined as the Emergency Planning Area (EPZ) for the Salem site. The EPZ area, as defined in NUREG-0654, Rev. 1, dated November 1980, obtains the irregular shape by virtue of being defined by political and physical boundaries. This area is slightly larger than a 10-mile radius, a description of which is provided on Figure 2.1-16. All information related to special facilities, including public facilities and institutions, are those facilities which reside in this area. Additional information with respect to the facilities and related transient population is provided in the Salem Generating Station Emergency Plan and in references contained in Reference 28 of this plan. Total transient population and special facilities population is provided on Figures 2.1-17 and 2.1-18.

2.1.3.6.1 Schools

There are a total of 24 schools in this area. The schools located closest to the site are Lower Alloways Creek Township School, located 6.5 miles east with a total population (students and instructors) of 285, and the Corbit School (185 persons) located

6.5 miles west in Odessa, Delaware. A listing of the schools is provided in Table 2.1-6 and identified on Figure 2.1-16.

2.1.3.6.2 Hospitals and Nursing Homes

There are two hospitals and one nursing home located within the 10 mile EPZ. The Salem County Memorial Hospital is a public facility located in Salem, New Jersey, 10 miles north-northeast of the site. It has a bed capacity of 168. There is also a daytime facility (Association of Retarded Citizens in New Jersey) with an attendance of 80 persons.

The Governor Bacon Health Center is located near Delaware City, Delaware and is 8.5 miles north-northwest of the Salem site. It is operated by the State Division of Mental Health and Retardation primarily for emotionally and mentally ill children. Present capacity is 222 patients with a daytime staff of 66.

Salem Nursing Center, 8 miles north-northeast of the site, has a capacity of 110 patients.

Table 2.1-7 lists the hospital and nursing homes with current patient and staff population.

2.1.3.6.3 Correctional Institutions

There are two correctional institutions within or very near 10 miles of the site. The nearest institution is the Salem County Jail located 8 miles north-northeast of the site with a capacity of 115 inmates and an average of 75 inmates.

The Delaware State Correctional Institution has a total capacity of 775 inmates. Inmate average population as of the beginning of 1981 was 900 inmates. The institution is located in Smyrna, Delaware, 12 miles south-southwest of the Salem Site. Table 2.1-11 lists the correctional institutions.

2.1.3.6.4 Recreational Facilities

Recreational facilities which include State Parks, wildlife refuge areas and boating access areas are tabulated in Table 2.1-5. The major recreational facilities with the largest transient populations are Fort Delaware, 9 miles north-northwest, with a peak summer day attendance of 1200 persons, and Fort Mott State Park, 9.5 miles north, with an annual attendance for the same period of 500 persons. The boating access areas are Augustine Beach and Woodland Beach, located 5 miles west-northwest and 9.8 miles south-southeast, respectively. Both of these access areas are heavily used between April 1 and September 30; however no attendance statistics are available.

Five wildlife refuges are within 10 miles of the site. Artificial Island Wildlife Area is the closest, as it adjoins the site. The northern part of the island and the marshes connecting the island to the mainland are owned by the U.S. Government. Some of this area is leased to hunting and fishing clubs. Adjacent property extending for 3 miles south on the New Jersey Coast is owned by the State of New Jersey and operated as a fish and game preserve for limited use by sportsmen. The closest attraction, although not strictly a recreational facility, is the site Visitor's Center with a seating capacity of 140 persons.

2.1.3.7 Population Projection Methodology

This section describes the procedures used to project the population of the year 2020 and to allocate it to the rose format. It also describes exceptions and their impact. The basis for population projection shown on Figures 2.1-6 through 2.1-15 is a form of cohort-survival analysis. Utilizing data projected on a national level, projections are based on proportions or shares at the MCD level. This step-down method is a systematic approach (7) relying on three assumptions. These are that historic trends of birth, death, and migration will continue.

The Bureau of Census (8,9) formulates projections for the nation to 2020 and for the states to 1990. They project for a range of fertility rates: 3.35 (A) through 2.11 (E); and a choice of migration patterns: the same as presently observed (I), no migration (III) and a mixture (II). The A and B fertility rates have been declared unrealistically high and as of 1972, only C, D, and E rates are used in Federal projections.

The migration patterns projected are I and III. For consistent conservatism, the projections for Salem reflect a C fertility rate, or 2.78 children per woman, and both I and III migration rates. The numbers shown on Figures 2.1-6 through 2.1-10 reflect the IC and IIIC projections.

In the step down method, the change in proportion is all important. Thus, the state projections were extended from 1990 to 2020 by calculating the change in share of state to nation from 1940 to 1990. The change from 1980 to 1990 was considered characteristic and was reapplied to determine the state population in 2000, 2010, and 2020. An example is shown in Table 2.1-8.

The proportion method was carried down to the county level using projections from state or regional planning commissions (10-14). Although the numbers were discarded, the ratio of county to state population was retained. The change in proportion was applied to the federally projected percentage for the state to yield a projected county population. It was felt that the state or regional planning staffs were cognizant of the areas of growth within their region, but that the absolute number might not be reliable.

Thus the total county population of 24 counties was derived from the IC and IIIC Federal/state populations. In the same manner, the MCD populations were calculated. This time, however, the data was only partially complete. Many rural planning boards have not made projections for their counties.

Other commissions have made only limited or short range projections. Although this last is the most realistic and sensible approach, the projections had to be extended to 2020. Accordingly, the county data was reviewed and categorized based on type of projection available. Table 2.1-9 lists the counties and the categories. The basis for classification is discussed below:

1. Near-complete projections - The Delaware Valley Regional Planning Commission (DVRPC) has jurisdiction over seven of the counties in this study. Its projections at the MCD level are by decade to 2000 (10). York and Salem Counties have planning commissions that project MCD populations by decade to 2010 (15,16). These near-complete projections were used to determine projections to 2020.

As with the step down from state to county, this study utilized the proportions but not the absolute numbers projected. Again it was felt that local agencies have a grasp of where growth will occur within their regions, but the local policies of boosterism or isolationism will bias the numbers.

Thus, using the proportions of growth for an MCD, and the projected county population, the absolute MCD population, by decade to 2020, was calculated.

2. Limited projections - Six counties involved were placed in this category because planning boards had made one or possibly two projections for the next 45 years (17-22).

These were not by decade, rather at 15 or 20 year intervals. To utilize these projections, a ratio was made to determine the proportion of the county represented by an MCD at each 10 year interval. This ratio was then extended to 2020.

3. No reliable projections - Nine counties were placed in this division. As shown in Table 2.1-9, four of the counties could be projected on the basis of historic trends. Changes in proportions of MCDs to the county for 10 year periods since 1940 were averaged for each MCD. The result was applied to the 1970 MCD proportion to arrive at the 1980 proportion, and so on to the year 2020. Using the county absolute projections, the MCD future populations were derived.

The MCD populations in the other five counties where no reliable projections were available were calculated assuming future population distribution similar to the 1970 distribution. They include Philadelphia City/County which is partially within four sectors and is one MCD. Using census tract data for the city (23), the 1970 population was derived for each sector. The same proportion of census tract to MCD/County was used for future populations. This means that city-wide growth over the next 50 years is assumed to occur in proportions similar to the present population. To determine a more reliable projection would require a detailed study of the area. However, the 2020 city population total would be the same; only the distribution within the city would alter. Philadelphia is beyond 30 miles of the site and any distribution effect on the sector totals is minimal.

Other areas where the 1970 proportions were used throughout the 50 years also fall at the outer edges of the study area and are not divided into many sectors. Sussex County, Delaware, has been restricted since the 1960 census; thus historic trends could not be utilized. Projections for Baltimore County were made to 1985, but were based on 1960 census data and are not reliable. Cecil and Queen Anne's Counties, Maryland, are rural in

nature, and the planning boards have not made projections.

2.1.4 Use of Adjacent Land

The site is located in the southern region of the Delaware River Valley, which is defined as the area immediately adjacent to the Delaware River and extending from Trenton to Cape May Point, New Jersey on the eastern side; and from Morrisville, Pennsylvania, to Lewes, Delaware, on the western side. The northern region is one of the major commercial, industrial, and residential centers of the nation. Much of the land area is highly industrialized or residential.

The southern region is characterized by extensive tidal marshlands and low-lying meadowlands. The major portion of the land in this area is undeveloped. The site, located 15 miles south of the Delaware Memorial Bridge, is isolated from the industrial and population centers of Philadelphia, Wilmington, Camden, and the New York-Washington corridor in general. The Chamber Works, at Deepwater, New Jersey, and at the Carneys Point Works, at Penns Grove, New Jersey, of E. I. DuPont deNemours Company are the southern-most major industrial activities from the Delaware Memorial Bridge, with the exception of the Getty Oil Company refinery across the river near Delaware City, Delaware, about 9 miles north-northwest of the site.

The area within a 25 mile radius of the site encompasses the major portion of 5 counties: Cecil in Maryland, New Castle and Kent in Delaware, and Salem and Cumberland in New Jersey. A summary of land use in these counties is presented in Table 2.1-10. As shown in the table, developed urban land constitutes only a small fraction of the available land - about 10 percent on the average for the 5 counties. The remaining 90 percent is used for agriculture (44 percent) or is undeveloped (46 percent). Agriculture statistics are summarized in Table 2.1-12. Crops primarily consist of fruit (apples and peaches), vegetables (snap

beans, sweet corn, peppers, and tomatoes), and animal feed products.

The Hope Creek Generating Station is located north-northwest of Salem Units 1 and 2. The Hope Creek Generating Station construction area is contiguous to the Salem site (Figure 2.1-5). The remainder is covered with marsh grasses. A strip of land about 1 mile wide to the east of the site extending from Alloways Creek to Hope Creek is owned by the United States Government, and consists entirely of tidal marshes. Most of the diked meadow areas have reverted to tidelands and are not in use. Beyond 3 miles, the land is sufficiently elevated to permit farming and grazing. The Delaware side of the river is similar to the New Jersey site, except that the tidelands and marshes are not as extensive. A great deal of land adjacent to the river on both sides is public land (Federal and state owned), or land planned for future open space projects. In addition, industrial, commercial, or residential growth is limited by recent wetlands and New Jersey Coastal Area Facilities Review Act legislation.

Industrial water supplies are obtained directly from the river above the site. Another source of process water is derived from high capacity wells drilled into the excellent aquifers located close to the river which are subsequently recharged by the Delaware River. No industrial installations are located along the river below the site. Because of salt water intrusions, industrial use of the river water below Marcus Hook, some 25 miles upstream of the site, is limited to cooling water applications. Thus radioactive wastes discharged to the river will remain well downstream of any industrial or domestic usage of river water.

Potable water supplies in Salem County, New Jersey, are obtained primarily from ground water with some inland areas utilizing surface water sources. All municipalities near the site use deep wells with the exception of the city of Salem, New Jersey, which

obtains about two-thirds of its water from surface water supplies from Quinton which is on Alloways Creek about 8 miles northeast of the site. This water supply is a dammed fresh water stream approximately 9 miles upstream of the Delaware River - Alloways Creek confluence. The closest domestic well is a shallow well located about 3 miles from the site.

The Delaware Estuary is being studied by a group of Marine Ecologists (Ichthyological Associates). Over 74,000 specimens of 45 species of fish that with environmental were taken in 1,094 trawl hauls. The most prevalent fish species that account for 98.7 percent of the total trawl catch are the bay anchovy, weakfish, white perch, hog choker, alewife, spot, striped bass, blueback herring, and the silver perch. The drifted gill nets revealed that the anadromous American shad tend to migrate to the area west of Reedy Island Dike. During May and June, the greatest catches were in the eastern section of the estuary, and, in September and October, the western section of the estuary was predominant. The largest quantities of specimens and species from both day and night collections were collected in August. It was noted in July 1970 that a large fish kill had occurred somewhere up river. Many thousands of dead fish drifted into the study area after a period of heavy rain and resultant flooding in the watershed area. In most instances, death was attributed to a dissolved oxygen content below the minimum required to sustain fish life. This was caused by dilution of the river with the ground runoff from heavy rainfall.

Fishing in the Delaware River Estuary has been reduced markedly since 1900 due to river pollution with only 554,000 pounds (valued at \$65,000) landed in 1966. Landings in the Delaware River estuary were comprised of shad, striped bass, white perch, sturgeon, and crab with the latter accounting for 75 percent of the total poundage. In the Delaware Bay at the mouth of the estuary, 2.2 million pounds were landed in 1966 valued at \$875,000. Oysters accounted for about one-third of that total with the remaining species including weakfish, shad, striped bass,

white perch, and crab. No increase in these values is expected until such time as major water pollution problems are brought under control. The nearest oyster beds are located approximately 4 miles downstream of the Salem site on the New Jersey side of the river.

A comparison of current trends (circa 1972) can be made with respect to the 1966 figures from information for landings in Delaware and New Jersey from the Delaware Bay and the Estuary. The total fish catch was 585,600 pounds valued at \$99,387; hard crabs landed were 1,245,700 pounds valued at \$201,975; and oysters were 814,300 pounds with a value of \$588,234 for an overall total of 2,245,600 pounds and a value of \$889,596. This compares with the 1966 figures totaled at 2,754,000 pounds with a total value of \$940,000, and represents no significant difference.

2.1.4.1 Recreational Land Use

A description of parks and recreational land use is provided in Section 2.1.3.6.4. The recreational facilities within the 10 mile area around the site are listed in Table 2.1-5. This table lists the recreation areas, populations, and relative position with respect to the site. The location is indicated by compass heading and average distance in miles.

2.1.5 References for Section 2.1

1. U.S. Bureau of Census, 1971, U.S. Census of Population, 1970, "Number of Inhabitants" Final Report: PC (1) A9 Delaware; PC (2) A23 Maryland; PC (1) A32 New Jersey; PC (1) A40 Pennsylvania.
2. U.S. Bureau of Census, 1970, Civil Division Maps for: Delaware, Maryland, New Jersey, and Pennsylvania
3. U.S. Department of the Interior, Geological Survey Topographic Maps. 7.5-Minute Series: Ben Davis Point,

N.J.-Del., 1956; Bennetts Pier, Del., 1956; Bombay Hook, Del.-N.J., 1956; Bridgeton Quad, N.J., 1953; Canton, N.J.-Del., 1948; Cecilton, Del-Md., 1958; Cecilton, Del.-Md., 1944; Claiborne, Md., 1942; Clayton, Del., 1955; Delaware City, Del.-N.J. 1948, 1970; Langford Creek, Md., 1954; Little Creek, Del. (Kent County), 1956; Middletown, Md., 1953; Middletown, Del., 1953; Newark East, Del., 1953, 1970; Saint Georges, Del., 1953; Salem, N.J., (Salem County), 1948, 1970; Smyrna, Del., 1956; Taylors Bridge, Del.-N.J., 1948; and Wilmington South, Del.-N.J., 1967

4. U.S. Department of Agriculture, Aerial photo coverage for area within 5 miles of Salem site, scale of 1 inch to 660 feet, New Jersey portion flown 9/70 and Delaware portion, 5/68.
5. Dresdner Associates, "Distribution of Population within 50 Miles of the Salem Nuclear Generating Station," 1980.
6. U.S. Corps of Engineers, "Waterborne Commerce of the United States," 1970, Part 1: Atlantic Coast, 1971.
7. Communication, Dames & Moore and Michael R. Greenberg, PhD. and Donald A. Drueckeberg, PhD., Associate Professors, Department of Urban Planning and Policy Development, Rutgers University, New Brunswick, N.J.
8. U.S. Bureau of Census, Current Population Reports, Series P-25, No. 470, "Projections of the Population of the United States, by Age and Sex: 1970 to 2020," U.S. Government Printing Office, 1971.
9. U.S. Bureau of Census, Current Population Reports, Series P-25, No. 477, "Preliminary Projections of the Population of States: 1975-1990," U.S. Government Printing Office, 1972.

10. Delaware Valley Regional Planning Commission, "Preliminary Population Forecasts to the Year 2000," Philadelphia, Pa, 1971.
11. State Planning Board, "Preliminary Employment and Population," Harrisburg, Pa. 1971.
12. N.J. Department of Labor and Industry, "Preliminary Population Projections," Trenton, N.J., 1971.
13. Maryland Department of State Planning, "Preliminary Maryland Population Projections," 1980-2000, Baltimore, Md., 1971.
14. Delaware State Planning Office, "Final Population Projections," Dover, Del., 1972.
15. York County Planning Commission, "Population York County," York, Pa., 1971.
16. Salem County Planning Board, "Revised Population Estimates," Salem, N.J., 1971.
17. Kent County Regional Planning Commission, "The Comprehensive Plan," Dover, Del., 1971.
18. New Castle County Department of Planning, Population Estimates, Wilmington, Del., 1971.
19. Communication, Dames & Moore and David Cartes, County Administrator, Caroline Co., Md.
20. Harford County Planning and Zoning Commission, "The Comprehensive Plan," Bel Air, Md., 1969.
21. Planning Commission, "The Comprehensive Plan," Kent County, Md., 1968.

22. Lancaster County Planning Commission, "Sketch Plan," Vol. 1, Lancaster, Pa., 1970.
23. Philadelphia City Planning Commission, "Population and Housing Statistics for Philadelphia Census Tracts, 1970 Census," Philadelphia, Pa., 1971.
24. Parsons; Brinckerhoff, Quade and Douglas, Inc., "Evacuation Time Estimates for the Areas Near the Site of Salem and Hope Creek Generating Stations," 1981.