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SECTION 2.0

SITE

2.1 SUMMARY DESCRIPTION

This section provides information on the site and environs of the Peach Bottom Atomic Power Station, summarizes the analyses and studies which have been conducted pertinent to the site, and sets forth the conclusions which may be drawn there from to confirm the suitability of the site for Units 2 and 3. Information is included which has been used in establishing safety-related portions of the plant design basis and in analyzing the safety of the station under normal and abnormal conditions. A summary of the station design bases which require special consideration of the site characteristics is contained in paragraph 1.6.1.1.10.

Information provided in this section was prepared by various groups within the licensee's organization, as well as consultants retained by the licensee and Bechtel Corporation, including: Dr. D. W. Pritchard - The Johns Hopkins University (hydrology); Dames and Moore (seismology - geology); Meteorological Evaluation Services, Inc. (formerly Smith-Singer Meteorologists, Inc.)(meteorology); International Chemical and Nuclear Corporation (formerly Nuclear Science and Engineering Corporation); and Combustion Engineering, Inc. (environmental radiation monitoring). Dr. G. W. Housner, consultant to Bechtel Corporation, has reviewed the seismology portion of this section. Professor D. U. Deere of the University of Illinois was retained as a consultant to comment on the stability of the slopes.

2.2 SITE DESCRIPTION

2.2.1 Location

The PBAPS is located partly in Peach Bottom Township, York County, partly in Drumore Township, Lancaster County, and partly in Fulton Township, Lancaster County, in southeastern Pennsylvania, on the westerly shore of Conowingo Pond at the mouth of Rock Run Creek. The plant is about 38 mi north-northeast of Baltimore, Maryland, and 63 mi west-southwest of Philadelphia, Pennsylvania. Conowingo Pond is formed by the backwater of Conowingo Dam on the Susquehanna River; the dam is located about 9 mi downstream from the Unit 2 reactor. Figures 2.2.1 through 2.2.4 are maps showing the site location with respect to the surrounding area. The nearest communities are Delta, Pennsylvania and Cardiff, Maryland approximately 4 mi southwest of the closest reactor (Unit 2).

2.2.2 Property Ownership

The licensee owns the 620-acre property lying within the solid site boundary shown in Figure 2.2.5, except that the immediate area on which Units 2 and 3 stand is owned by the licensee, and PSEG Nuclear, LLC, as tenants in common. The adjoining area lying along the discharge canal in a downstream direction, described in Figure 2.2.5 by a dashed boundary, was owned by the Philadelphia Electric Power Company, a wholly-owned subsidiary of PECO, as part of the Federal Power Commission Project No. 405 (Conowingo). An application dated February 25, 1969, was filed with the Federal Power Commission to alter the Conowingo Project boundary so as to exclude from that project this 26-acre tract and a littoral strip of land about 7,000 ft in length (upstream of the 26-acre tract) which was subject to flowage rights in favor of the Conowingo Project. On October 13, 1970, the Commission issued an order approving the application.

The “site boundary,” as defined in Section 20.1003 of 10CFR Part 20, includes both the solid and dashed boundaries shown in Figure 2.2.5.

Although not a part of the Peach Bottom project, the remaining land along both sides of Conowingo Pond, from below Holtwood Dam to Conowingo Dam ranging up to 300 ft back from the waterline, is owned by Exelon Corporation’s subsidiaries.

2.2.3 Site Arrangement and Exclusion Area

Two aerial photographs of the site and surrounding countryside, taken in 1959 prior to construction of Unit 1, the now decommissioned HTGR, are shown in Figures 2.2.6 and 2.2.7. The first view looks approximately toward the west and the second approximately toward the north-northeast. Figure 2.2.8 is an aerial view of the site taken in November 1965 showing Unit 1 after completion.

The arrangement of the major structures on site for all three units is shown in Figure 2.2.5 and Drawing C-1. Drawing C-2 is a plot plan of Units 2 and 3. Figures 2.2.11 (looking approximately northwest) and 2.2.12 (looking approximately east-southeast) are aerial photographs of the site during the later stages of construction of Unit 2.

The Unit 2 and Unit 3 reactors are located about 700 ft and 1,000 ft, respectively, upstream of the center of the Unit 1 containment building and about 300 ft back from the shore line of Conowingo Pond existing prior to construction, shown in Figure 2.2.5.

The minimum exclusion distance from the center of the reactor to the site boundary from either Unit 2 or Unit 3 is about 2,700 ft as shown in Figure 2.2.5. The minimum distance from the center of a reactor to the site boundary in a downstream direction is about 3,300 ft (from Unit 2) and in an inland direction about 3,100 ft (from Unit 2). The minimum distance across the pond from either the Unit 2 or Unit 3 reactor to the far shore of the pond (to the northeast) is 7,600 ft. The minimum distance from the stack to the site boundary is 2,350 ft. The “exclusion area,” as defined in Section 100.3 of 10CFR Part 100, includes the area within the minimum exclusion distance from the center of Unit 2 and Unit 3 reactors as shown in Figure 2.2.5.

The "controlled area," as defined in Section 20.1003 of 10 CFR Part 20, includes the land area inside both the heavy solid black line and heavy dotted black line shown in Figure 2.2.5.

The “restricted area,” as defined in Section 20.1003 of 10CFR Part 20, includes the area within 1) the Protected Area Boundary (PAB) for Unit 2 and Unit 3, 2) the main Stack and the associated Radiation Monitor Building, and 3) the enclosed area surrounding the Onsite Radwaste Storage Facility. Other restricted areas may be established on a temporary basis in accordance with station procedures.

The restricted area for the Independent Spent Fuel Storage casks will be an appropriate barricaded area around the storage casks such that the limits of 10CFR 20 are met.

The meteorological conditions with respect to annual radioactive effluent releases from the plant stack and reactor building roof vents have been evaluated for all points on the site land boundary and along the waterline. Based on that evaluation it was determined that the point on the site boundary described in Appendix E, paragraph E.3.3.1, receives the maximum annual dose. Therefore, for normal plant operation, the pond can be considered as an unrestricted area.

2.2.4 Topography

A topographical description of the site and the surrounding area is shown in Figures 2.2.2 through 2.2.8 and Drawing C-1. The plant is located between Conowingo Pond and the foot of a low hill near the point at which Rock Run Creek discharges into the pond.

Within a 1-mi radius of the plant and on both sides of Conowingo Pond, steep sloping hills rise directly up to about 300 ft above plant grade with outcroppings of rock apparent at many locations. Because of the relatively rough terrain, much of this area is desolate with wooded areas scattered throughout, although the more gentle sloping areas are cleared and cultivated. The rather hilly terrain persists to a distance of 12 to 15 mi from the site. Thereafter, the land becomes low rolling hills. The population density becomes greater and more concentrated centers of population occur.

Elevation versus distance for 10 mi from the stack has been determined from U.S. Geological Survey maps for each of the sixteen 22.5-deg sectors shown in Figures 2.2.2 and 2.2.3. The highest elevation in any direction versus the approximate distance from the stack as well as the direction of each high elevation is listed in Table 2.2.1. These highest elevations, plotted versus distance in Figure 2.2.13, were used to calculate radiation doses from the stack. More extensive information was submitted in Enclosure B (dated September 30, 1976) to Information Requested in Enclosure 2 to letter from George Lear to E. G. Bauer dated February 17, 1976.

Plant grade between the turbine buildings and the pond is nominally Elevation 116.0 ft Conowingo Datum (C.D.) (Elevation 116.7 ft MSL). Grade between the reactor building and the hill is Elevation 135.0 ft C.D. Normal elevation of Conowingo Pond is between 104 ft and

109.25 ft C.D., but can vary down to Elevation 98.5 ft C.D. due to hydroelectric plant operation.

The minimum suction water elevation to maintain normal operation is 98.5 ft C.D. The minimum water level for safe plant shutdown is discussed in Section 2.4. The elevation of the cooling water intake invert at the screen structure is 84.0 ft C.D.

At the pump structure shown in Drawing C-1, the water intake invert is 79.83 ft C.D.

2.2.5 Site Access and Control

Access routes to the PBAPS are shown in Figure 2.2.4. The site area can be reached from the southeast on Maryland Route 623, from the southwest on Maryland Route 165, and from the northwest on Pennsylvania Route 74. The main access to Units 2 and 3 is either from Pennsylvania 74 via Lay Road and Papermill Road or from Maryland 623 to Flintville Road and Lay Road. Lay Road is a bituminous all-weather road which enters the site near Conowingo Pond upstream of the units. The south substation is reached from Flintville Road via Atom Road a bituminous all-weather road which enters the site from the south.

With the exception of the stack, the circulating water cooling towers, and the intake and discharge structures, Units 2 and 3 are completely enclosed in a chain link fence as shown in Drawing C-2. Entrance to the plant area is controlled 24 hours a day. Passage through the guardhouse is required to gain access to Units 2 and 3.

The Independent Spent Fuel Storage Installation is enclosed in its own protected area boundary by fences separate from the plant's protected area boundary. When access to the facility is not required, remotely monitored security features and routine patrols ensure the security of the facility.

A rail spur from the former Maryland and Pennsylvania Railroad was extended to the site from the west and has since been abandoned.

2.2.6 Land Use

2.2.6.1 On-Site

Approximately 700 ft and 1,000 ft downstream from Units 2 and 3, respectively, and included in their exclusion area is Unit 1, as shown in Figures 2.2.5 and Drawing C-1. Unit 1 is now in a SAFSTOR status that allows it to be safely stored and subsequently decontaminated to levels that permit release of the facility for unrestricted use.

Two 500-kV transmission substations are located on the Peach Bottom site, as shown in Figure 2.2.5. Each substation occupies a plot approximately 750 ft by 1,000 ft. The north substation is about 2,000 ft northwest of Unit 3 and the south substation is about 1,600 ft south-southwest of Unit 2. The substations are of outdoor construction; consisting of the necessary circuit breakers, disconnect switches, transformers, and associated equipment for four 500-kV transmission lines, two 500-kV substation tie lines, two 500-kV generator tie lines, and three 220-kV lines. The substations are unattended, and are remotely controlled from the control room of Units 2 and 3 and the Phila. main office. In addition, an existing 220-kV transmission substation is located adjacent to and upstream of Unit 1.

The two 500-kV substations are physically separated from both nuclear facilities and are enclosed each in separate fenced areas. The two 220-kV substations are located at the north substation (with one of the two 500-kV subs) and south of the switchgear building behind the emergency diesel building.

There are no public highways which pass through the site, and no major arterial highways pass near the site. There are no items listed in the National Register of Historical Places within or near the site boundary. The nearest such place is the Fulton House (birthplace of Robert Fulton) on US 222, about 6.6 mi east-northeast of Unit 3.

2.2.6.2 Off-Site

This section of the UFSAR describes the characteristics of the area surrounding PBAPS at the time of original construction unless otherwise noted.

The major portion of the land in the five-county area surrounding the site is used for agricultural purposes. In 1964, the portion

of each county's land used as farmland was: 55 percent in Chester County, Pennsylvania; 77 percent in Lancaster County, Pennsylvania; 66 percent in York County, Pennsylvania; 57 percent in Cecil County, Maryland; and 53 percent in Harford County, Maryland. Pertinent agricultural statistics for each county are presented in Tables 2.2.2, 2.2.3, and 2.2.4.

Industrialization in the five counties surrounding the site is quite diversified and is becoming increasingly important. There are only a few industries within a 5- to 10-mi radius of the station, but most of them are associated with food processing, textiles, or tobacco. Pertinent industrial employment statistics for the five-county area are given in Table 2.2.5. In 1967, according to the Department of Commerce, the portion of each county's labor force employed in manufacturing was: 50 percent in Chester County, Pennsylvania; 54 percent in Lancaster County, Pennsylvania; 57 percent in York County, Pennsylvania; 48 percent in Cecil County, Maryland; and 35 percent in Harford County, Maryland. The employment in various types of manufacturing for each of the five counties and for the total five-county area is shown in Tables 2.2.6 through 2.2.11. In addition, Table 2.2.12 lists the products of and employment by the industrial companies located within a 10-mi radius of the site. None of these activities would adversely affect operations at the site.

A number of government installations are located in the five-county area. Cecil County, Maryland contains the Veterans' Administration Hospital at Perryville and a unit of the Army Engineers Corps along the Chesapeake and Delaware Canal. Harford County, Maryland is the site of the Aberdeen Proving Grounds, approximately 20 mi almost directly south of the site. Chester County, Pennsylvania contains the Veterans' Administration Hospital near Coatesville.

The use of land in a 19-county area, extending approximately 50 mi from the site, has been evaluated. The counties in this area are listed in Table 2.2.13.

As the distance from the Peach Bottom site increases, agricultural activities become less important, as evidenced by the drop in the percentage of those employed in agriculture services from 0.48 percent in the five-county area surrounding the site (Table 2.2.5) to 0.24 percent in the counties lying within approximately 50 mi of Peach Bottom (Table 2.2.14). Data in the latter table also indicate that the relative employment in other segments of business is not substantially different from those nearer the site.

Employment by type of product manufactured in the 19-county area is shown in Table 2.2.15.

The area adjacent to the plant site, included in an arc with a radius of 7,600 ft or more, extending from northwest to east to southwest, is covered by Conowingo Pond. The pond is used for recreation and small boats may occasionally be in this area, especially during the summer season.

Within 10 statute mi of the PBAPS site are four aerodromes with only emergency facilities or no facilities according to the Washington Sectional Aeronautical Chart, 29th Edition, effective March 20, 1981, which is published in accordance with Inter-agency Air Cartographic Committee specifications and agreements and approved by the Department of Defense, Federal Aviation Administration, and the Department of Commerce. Tanglewood, Conowingo, Ruff, and Delta Aerodromes are listed in Table 2.2.15.1; Tanglewood and Conowingo are for public use. These aerodromes have no traffic areas. There are no civil or military aerodromes within 10 mi of the site.

The center lines of Victor 3 Airway and Victor 93E Airway are within 1 mi of the PBAPS site. Victor airways extend 4 mi on either side of their center lines. Victor airways are low altitude designated routes that carry commercial and general flights between 3,000 and 18,000 ft.

Approximately at the closest point on Victor 3 to PBAPS is Norris intersection which is established by another radio navigation facility called Lancaster VOR. The intersection is the point at which the airway changes between a "From" bearing and a "To" bearing with respect to the above-mentioned terminal radio facilities. The air traffic on Victor 3 passes PBAPS high overhead in the east-northeast and west-southwest magnetic directions.

2.2.7 Population

The information in this section is historical and was submitted in the original FSAR to support the license application unless otherwise noted. For the most current information regarding the population, schools, and recreational and public areas, as well as population density within the sixteen meteorological zones, consult the Emergency Plan. For the most current information regarding operational dose estimates, consult the Annual Radiological Environmental Operating Report and the Annual Effluent Release Report.

The area within a 60-mi radius of the Peach Bottom site covers portions of four states including at least part of 30 counties and the cities of Baltimore and Philadelphia. This area is shown in Figure 2.2.1 by county, township, urban places, cities, boroughs, villages, urbanized areas, etc. Tables 2.2.16 through 2.2.26 show the Census of Population for 1950, 1960, and 1970 and the projected populations for 1970 and 1980 for these and other close-by counties. Projections for 1970 and 1980 are those published by state agencies or the Chamber of Commerce of Metropolitan Baltimore with the exception of the 1980 projections for eight counties in Maryland. The 1980 projections for these eight counties were estimated by extrapolation of growth rates as shown in Figure 2.2.14. The population of the area increased 40 percent between 1950 and 1960 and was projected to increase another 40 percent by 1980.

Beyond 1980, population projections for the area of concern are not provided. However, if the same growth between 1960 and 1980 is projected for 1990 and 2000, the population would increase about 20 percent every 10 yr.

The 1960 Census of Population for the various townships, urban places, cities, boroughs, villages, urbanized areas, etc, that comprise the annular rings between 5 mi and 60 mi of the site is listed in Tables 2.2.17 through 2.2.22 by direction and distance from the site. The populations for the City of Baltimore and the City-County of Philadelphia are listed by election wards to provide smaller population units.

In the tabulation between 20 mi and 60 mi it was assumed that all the people lived at an estimated center of population of each civil division. Between 5 mi and 20 mi, the population of each civil division was apportioned to each annular section, assuming that the population was uniformly distributed within the civil division. The cumulative population from the location of Units 2 and 3 for each of 16 sectors for 0 to 5 mi distance is shown in Figure 2.2.15, and for 5 to 60 mi in Figure 2.2.16.

The population distribution around the site for the years 1950, 1960, 1970, and 1980, and for various distances between 5 and 60 mi and for 16 directions, is shown in Table 2.2.23. The population density for each of these annular sectors is given in Table 2.2.24. Table 2.2.25 tabulates the 1964 to 1966 population distribution within a 5-mi radius of the Peach Bottom site by radial 1-mi increments and the 16 sectors. This population distribution was determined by counting electric meters and converting to population. This method of determining population is conservative

because it automatically includes summer residents. The year-round population within 1-mi of the site is less than one-half of the total listed. Population density for the 0- to 5-mi area, as given in Table 2.2.26, was determined from data in Table 2.2.25. Current population density within 5 mi, as given in Table 2.2.26.1, was determined from data in Table 2.2.25.1.

The comparison between the population distribution from 5 to 60 mi for Peach Bottom Units 2 and 3 of the 1970 Census and the 1970 population as projected in about 1966 according to the sources listed in Table 2.2.16 is presented in Table 2.2.23.1 along with the 1960 and 1980 distributions. The comparison for the same years of the population density is given in Table 2.2.24.1.

The City of Lancaster, located in Lancaster County, Pennsylvania, lies 19.4 mi to the north of the reactors and has 57,690 residents according to the 1970 Census of Population. The corresponding "population center distance," i.e., "the distance from the reactor to the nearest boundary of a densely populated center containing more than about 25,000 residents," for the Peach Bottom site is 17.9 mi. Distances to other population centers of over 25,000 people within a 60-mi radius are shown in Figure 2.2.17. Distances to the center of other large communities are given in Tables 2.2.17 through 2.2.22.

2.2.7.1 Five-to-Sixty-Mile Population Distribution

The population within 60 mi of Peach Bottom Units 2 and 3 as reported in the 1970 Census increased 1.8 percent more than was projected at the time of the Final Safety Analysis Report (FSAR). Growth was slower than projected from the northeast through the south-southeast sectors and faster than projected from the north-northwest through the north-northeast sectors. The remainder of the area had mixed growth performance with respect to projections. The largest difference between 1970 Census figures and those projected for 1970 at the time of the Peach Bottom FSAR occurred in the southwest sector, particularly between 20 and 40 mi from the site. In this segment, the population exceeds projections by 62 percent and already exceeds what was expected in this area by the year 2000. Such rapid growth has occurred in only two out of the 96 segments analyzed.

Updating with the 1970 Census data has been complicated because the Bureau of Commerce which distributes Census information has not released the maps which show boundary changes of civil divisions and the boundaries of newly created civil divisions. Nevertheless, the 1970 Census of Population is published according to the new

boundaries. In all cases except the City and County of Philadelphia and the State of Delaware, the new entities were merged back into the civil divisions from which they were derived. For Delaware and Philadelphia this merge back into 1960 entities was impossible because they have been completely redefined internally. To accommodate analysis at this time, the 1970 population projections have been used for Philadelphia and Delaware.

Comparison of Census and Projected Population for Philadelphia and Delaware

County	State	1960	1970	Projected 1970	1980
Philadelphia Co.	Pa.	2,002,517	1,948,609	2,074,157	2,180,011
Kent Co.	Del.	65,651	81,892	91,800	133,600
New Castle Co.	Del.	307,446	385,856	409,700	582,700
Sussex Co.	Del.	73,195	80,356	80,900	91,800
Total		2,448,809	2,496,713	2,656,557	2,988,111

Population projections for the decades ahead do not yet reflect the 1970 Census because the agencies which make projections have not all had sufficient time to analyze the factors leading to the differences between the 1970 population as counted by the Census and as they predicted prior to that time. New projections are not anticipated for several years.

2.2.7.2 Zero-to-Five-Mile Population Distribution

The resident population and its distribution within 5 mi of Peach Bottom Units 2 and 3 do not appear to have changed significantly since reported in the FSAR. Improvements in the accuracy of the data and in the validity of methods for population distribution analysis are believed to have caused most of the differences between the analysis for the FSAR and the current analysis. During 1970, the licensee was in the process of performing an audit between its customer records used for billing purposes, which are the data used for making local population estimates, versus its geographic maps of customer locations, which are the basis for distributing the population estimates. Because the customer

coordinates obtained by the digitizing process of the audit are to be used in the company's computerized Customer Information System, these current data give an improved picture of the population distribution.

North and east of the plant within 5 mi is territory of the Pennsylvania Power and Light Company (PP&L). Since they supplied the population distribution for the Peach Bottom FSAR in 1964, PP&L has digitized its customers also and has produced a new set of maps. Furthermore, adjustment has been made for the 6-deg misalignment between the coordinate system used by PP&L and the licensee's coordinate system. This misalignment was not corrected for in the original FSAR submittal.

Within 1 mi of Peach Bottom Units 2 and 3, the resident population was verified by a door-to-door survey conducted in June 1971. Seasonal dwellings within the first mile were considered to contribute three persons each which is a conservative factor at this time.

The 1970 Census did not include the temporary residences of the construction forces engaged at the PBAPS. This temporary population is estimated to more than double the population of Peach Bottom township in which the facilities are located. After completion of construction, the population should be back in line with the figures reported by the Census.

2.2.7.3 Parameters and Characteristics for a Low Population Zone

Although 10CFR50.67 provides the dose acceptance criteria for the PBAPS licensing basis design basis accidents, 10CFR100 was historically used to determine the distance of site boundaries.

The three criteria given in 10CFR100, "Reactor Site Criteria," were considered in selecting the low population zone for Peach Bottom Units 2 and 3. The low population distance of 7,300 m meets all three criteria; therefore, it is acceptable for use in the safety analysis of Units 2 and 3.

The first criterion, as given in 10CFR100.3(b), requires that there be a reasonable probability that appropriate protective measures could be taken in the event of a serious accident.

Table 2.2.25.1 indicates that the estimated 1970 population within 5 mi of the site is less than 6,000. The estimated 1970 population within the 7,300-m low population zone, as shown in Table 2.2.27,

is 4,567, representing about 1,600 residences. These are mostly concentrated to the southwest and mostly farther than 3 mi from the plant.

In the unlikely event of an accidental release, released material would not be likely to travel rapidly in all directions at once; it would move with the wind during the period of release. This would further reduce the area and therefore the number of people affected immediately, allowing a longer time to effect protective measures. If it is assumed a 45-deg sector is affected by the release, the maximum estimated 1970 population that could be affected is 1,288 in the southwest and west-southwest sectors. The annual wind rose at Elevation 688 ft MSL, based on 3 yr of data, indicates the wind only blows toward this 45-deg sector about 7.6 percent of the year. The estimated 1970 population in the 45-deg sector (southeast and south-southeast) toward which the wind blows most frequently (22.9 percent of the year) is only 328; of these, only 89 live within 4 mi of the site.

The second criterion given in 10CFR100.11(a) (2) specifies a maximum whole-body dose of 25 Rem and a maximum thyroid dose of 300 Rem during an accidental release. The implementation of the Alternative Source Term methodology supersedes the 10CFR100 offsite dose criteria with the dose criterion in 10CFR50.67(b)(2)(ii). Per 10CFR50.67, an individual located at any point on the outer boundary of the low population zone, who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage), would not receive a radiation dose in excess of 0.25 Sv (25 rem) total effective dose equivalent (TEDE).

The highest corresponding calculated doses for any of the design accidents, as listed in Table 14.9.7, is the LOCA dose of 9.59 Rem at 7,300 m. These calculations utilized the NRC assumptions given in Regulatory Guide 1.183. For the elevated Off-Gas Stack scenario, the highest terrain value within a given directional sector between the Station and the LPZ at 7,300 meters was assigned to the LPZ receptor in that given direction. Therefore, a low population zone of 7,300 m conservatively meets this criterion.

The third criterion given in 10CFR100.11(a)(3) specifies that the population center distances must be at least 1 1/3 times the distance to the outer edge of the low population zone.

The outer edge of the selected low population zone is about 4.5 mi (7,300 m). The nearest population center, as shown in Figure 2.2.17 in Lancaster, Pennsylvania, is about 17.9 mi from the

units. Based on Lancaster, a maximum low population zone of 17.9 1 1/3 or 13.4 mi is allowed under this criterion. Therefore, the selected low population zone distance of 7,300 m (about 4.5 mi) is well within the criterion and is acceptable on this basis.

TABLE 2.2.1

MAXIMUM ELEVATION OF TERRAIN VERSUS DISTANCE FROM OFF-GAS STACK

Distance from Off-Gas Stack (ft)	Maximum Elevation Above MSL	Direction of Maximum Elevation	Distance from Off-Gas Stack (ft)	Elevation Above MSL	Direction of Maximum Elevation
0	280	-	5,800	470	SSW
100	300	WSW, W, WNW, NW, NNW	6,000	470	SSW
200	310	N, SW, WSW, W, WNW, NW, NNW	6,200	490	SSW
300	330	WNW, NW	6,400	490	SSW
400	340	N, W, WNW, NW, NNW	6,600	490	SSW
500	350	N	6,800	490	SSW
600	360	N, NNW	7,000	490	SSW
700	360	N, NNW	7,200	490	SSW
800	350	N, NNW	7,400	490	SSW
900	340	N, W, WNW, NNW	7,600	490	SSW
1,000	340	W, WNW	7,800	490	SSW
1,100	340	W, WNW	8,000	490	SSW, WNW
1,200	350	W	8,200	490	SSW, WNW
1,300	350	W	8,400	490	SSW, WNW
1,400	350	W	8,600	490	SSW, WNW
1,500	360	NNW	8,800	480	WNW
1,600	380	NNW	9,000	480	SSW
1,700	380	NNW	9,200	500	SW
1,800	380	NNW	9,400	510	SW
1,900	380	NNW	9,600	520	SW
2,000	380	NNW	9,800	530	SW
2,200	380	WNW, NW	10,000	540	SW
2,400	380	WNW	10,200	530	SW
2,600	380	WNW	10,400	500	SW
2,800	390	SSE, S	10,600	500	SW
3,000	400	SSE, S	10,800	510	SW
3,200	400	SSE, S	11,000	520	SW
3,400	420	S	11,200	530	SW
3,600	430	SSW	11,400	550	SW
3,800	420	SSW	11,600	540	SW
4,000	400	S, SSW, SW, W, WNW	11,800	550	SW
4,200	410	S, SSW	12,000	550	SW
4,400	410	S, SW, WNW	12,200	530	SW
4,600	430	SW	12,400	520	SW
4,800	440	SW	12,600	530	SW, NW
5,000	450	SW	12,800	550	SW
5,200	450	SW	13,000	540	SW
5,400	440	SSW, SW	13,200	560	SW
5,600	450	SSW	13,400	560	SW
13,600	550	SW	20,400	660	SW
13,800	550	SW	20,600	670	SW
14,000	570	SW	20,800	670	SW

TABLE 2.2.1 (Continued)

Distance from Off-Gas Stack (ft)	Maximum Elevation Above MSL	Direction of Maximum Elevation	Distance from Off-Gas Stack (ft)	Elevation Above MSL	Direction of Maximum Elevation
14,200	590	SW	21,000	670	SW
14,400	590	SW	21,200	670	SW
14,600	590	SW	21,400	670	SW
14,800	590	SW	21,600	680	SW
15,000	600	SW	21,800	690	SW
15,200	610	SW	22,000	690	SW
15,400	600	SW	22,200	670	SW
15,600	590	SW	22,400	670	SW
15,800	590	SW	22,600	670	SW
16,000	590	SW	22,800	660	SW
16,200	590	SW	23,000	660	SW
16,400	590	SW	23,200	690	SW
16,600	610	SW	23,400	690	SW
16,800	610	SW	23,600	690	SW
17,000	620	SW	23,800	710	SW
17,200	630	SW	24,000	720	SW
17,400	630	SW	24,200	740	SW
17,600	630	SW	24,400	740	SW
17,800	630	SW	24,600	740	SW
18,000	630	SW	24,800	803	SW
18,200	630	SW	25,000	760	SW
18,400	630	SW	25,200	780	SW
18,600	630	SW	25,400	760	SW
18,800	640	SW	25,600	730	SW
19,000	650	SW	25,800	730	SW
19,200	650	SW	26,000	730	SW
19,400	650	SW	26,200	725	SW
19,600	650	SW	26,400	680	SW, N
19,800	650	SW	27,000	660	N
20,000	650	SW	27,500	690	N
20,200	650	SW	28,000	680	SW
28,500	690	SW	46,500	930	N
29,000	690	SW	47,000	930	N
29,500	690	SW	47,500	930	N
30,000	700	SW	48,000	930	N
30,500	710	SW	48,500	920	N
31,000	690	SW	49,000	910	N
31,500	670	SW, WNW	49,500	900	N
32,000	670	N, WNW	50,000	890	N
32,500	690	NNW	50,500	880	N
33,000	730	NNW	51,000	870	N
33,500	700	WNW, NNW	51,500	870	N
34,000	700	WNW	52,000	860	N
34,500	720	NNW	52,500	850	N
35,000	760	NNW	53,000	840	N
35,500	800	NNW			

TABLE 2.2.1 (Continued)

Distance from Off-Gas Stack (ft)	Maximum Elevation Above MSL	Direction of Maximum Elevation	Distance from Off-Gas Stack (ft)	Elevation Above MSL	Direction of Maximum Elevation
36,000	810	NNW			
36,500	850	NNW			
37,000	840	NNW			
37,500	850	NNW			
38,000	840	NNW			
38,500	840	NNW			
39,000	870	N			
39,500	870	N			
40,000	860	N			
40,500	850	N			
41,000	830	N			
41,500	830	N			
42,000	850	N			
42,500	850	N			
43,000	860	N			
43,500	880	N			
44,000	890	N			
44,500	900	N			
45,000	900	N			
45,500	910	N			
46,000	910	N			

TABLE 2.2.2

PERCENTAGE OF COUNTY LAND USED FOR FARMING
IN THE
FIVE-COUNTY AREA SURROUNDING THE PEACH BOTTOM SITE

County	Total Farmland	Harvested Cropland	Land Used as Pasture	Woodland not Pastured	Other Farmland
Chester, Pa.	55.4	26.0	16.1	5.8	7.5
Lancaster, Pa.	77.4	52.8	13.6	5.0	6.0
York, Pa.	65.7	37.9	10.1	8.4	9.3
Cecil, Md.	56.6	25.5	13.1	11.5	6.5
Harford, Md.	52.9	21.6	17.9	8.5	4.9

Source: 1964 U.S. Census of Agriculture, U.S. Dept of Commerce.

TABLE 2.2.3

AGRICULTURAL EMPLOYMENT
IN THE
FIVE-COUNTY AREA SURROUNDING THE PEACH BOTTOM SITE

County	Number of Farms[1]	Agricultural Employment[2]	Portion of County Employment[2]
Chester, Pa.	2,339	5,102	6.6%
Lancaster, Pa.	6,247	9,744	8.6%
York, Pa.	3,816	4,383	4.6%
Cecil, Md.	659	1,181	7.9%
Harford, Md.	1,060	2,056	8.5%
Total	14,121	22,466	

(1) Source: 1964 U.S. Census of Agriculture, U.S. Dept of Commerce.

(2) Source: County and City Data Book 1962, U.S. Dept of Agriculture.

TABLE 2.2.4

VALUE OF FARM PRODUCTS SOLD IN THE

FIVE-COUNTY AREA SURROUNDING THE PEACH BOTTOM SITE

	Total Farm Products		Source of Farm Income*				
County	Value*	Rank in State	All Crops	Dairy Products	Poultry Products	Livestock Products	Other Products
Chester, Pa.	$ 44,885,470	Second	53.2%	30.3%	4.2%	12.3%	.1%
Lancaster, Pa.	109,121,532	First	19.7%	28.0%	27.8%	24.5%	.1%
York, Pa.	34,857,686	Third	33.2%	22.9%	24.2%	19.7%	.3%
Cecil, Md.	7,984,648	Fifteenth	30.5%	49.5%	8.4%	11.6%	.2%
Harford, Md.	11,279,049	Eleventh	17.7%	63.2%	3.9%	15.2%	.7%

* Sources: 1. 1964 U.S. Census of Agriculture, U.S. Dept of Commerce.
2. County and City Data Book 1962, U.S. Dept of Commerce.

TABLE 2.2.5

EMPLOYMENT IN FIVE-COUNTY AREA SURROUNDING

THE PEACH BOTTOM SITE

	Chester, Pa.	Lancaster, Pa.	York, Pa.	Cecil, Md.	Harford Md.
Agricultural Services	.48%	.56%	.14%	.19%	.65%
Mining	.13%	.39%	.48%	1.08%	.74%
Contract Construction	4.44%	5.05%	4.85%	7.27%	8.66%
Manufacturing	50.32%	54.35%	56.67%	48.51%	34.72%
Transportation and Other Public Utilities	6.08%	4.55%	5.01%	5.59%	8.06%
Wholesale Trade	3.90%	4.70%	4.34%	3.25%	2.05%
Retail Trade	15.22%	15.45%	15.55%	19.28%	24.31%
Finance, Insurance, and Real Estate	2.96%	2.75%	2.67%	4.52%	5.33%
Services	16.27%	12.04%	10.16%	9.90%	15.16%
Unclassified	.20%	.18%	.13%	.41%	.33%
Total Percent	100.00%	100.00%	100.00%	100.00%	100.00%
Total Employment	63,055	100,766	91,528	78,690	13,608

Source: County Business Patterns, 1967 - U.S. Dept of Commerce.

TABLE 2.2.6

MANUFACTURING ESTABLISHMENTS AND EMPLOYMENT IN CHESTER COUNTY, PENNSYLVANIA

Type of Product Manufactured	Number of Employees Reported	Total Number of Units Reported
Food and Kindred Products	3,354	43
Textile Mill Products	1,257	12
Apparel and Related Products	772	14
Lumber and Wood Products	197	16
Furniture and Fixtures	*	5
Paper and Allied Products	1,495	14
Printing and Publishing	1,419	30
Chemicals and Allied Products	1,678	19
Rubber and Plastics Products	1,095	6
Stone, Clay, and Glass Products	1,053	25
Primary Metal Industries	7,874	15
Fabricated Metal Products	1,349	42
Machinery, Except Electrical	2,591	53
Electrical Machinery	5,323	16
Transportation Equipment	*	9
Not Separately Classified	--	24
Total Manufacturing	31,736	343

*Figures not published to avoid disclosure of operations of reporting units.

Source: County Business Patterns, 1967 - U.S. Dept of Commerce.

TABLE 2.2.7

MANUFACTURING ESTABLISHMENTS AND EMPLOYMENT IN LANCASTER COUNTY, PENNSYLVANIA

Type of Product Manufactured	Number of Employees Reported	Total Number of Units Reported
Food and Kindred Products	4,370	118
Tobacco Manufacturers	614	12
Textile Mill Products	1,869	18
Apparel and Related Products	6,123	62
Lumber and Wood Products	541	31
Furniture and Fixtures	442	17
Paper and Allied Products	796	12
Printing and Publishing	2,417	65
Chemicals and Allied Products	*	16
Leather and Leather Products	2,850	23
Stone, Clay, and Glass Products	2,438	24
Primary Metal Industries	2,846	33
Fabricated Metal Products	5,801	55
Machinery, Except Electrical	5,188	82
Electrical Machinery	7,513	12
Transportation Equipment	1,109	16
Instruments and Related Products	*	4
Not Separately Classified	--	33
Total Manufacturing	54,779	633

*Figures not published to avoid disclosure of operations of reporting units.
Source: County Business Patterns, 1967-U.S. Dept of Commerce.

TABLE 2.2.8

MANUFACTURING ESTABLISHMENTS AND EMPLOYMENT IN

YORK COUNTY, PENNSYLVANIA

Type of Product Manufactured	Number of Employees Reported	Total Number of Units Reported
Ordnance and Accessories	*	2
Food and Kindred Products	3,753	88
Tobacco Manufacturers	1,127	24
Textile Mill Products	3,485	21
Apparel and Related Products	5,380	50
Lumber and Wood Products	565	23
Furniture and Fixtures	4,294	39
Paper and Allied Products	3,315	29
Printing and Publishing	2,772	44
Chemicals and Allied Products	292	11
Petroleum and Coal Products	294	7
Rubber and Plastics Products	400	5
Leather and Leather Products	2,412	16
Stone, Clay, and Glass Products	1,666	29
Primary Metal Industries	1,831	13
Fabricated Metal Products	3,374	49
Machinery, Except Electrical	8,597	73
Electrical Machinery	2,411	17

*Figures not published to avoid disclosure of operations of reporting units.

TABLE 2.2.8 (Continued)

Type of Product Manufactured	Number of Employees Reported	Total Number of Units Reported
Transportation Equipment	1,272	7
Instrument and Related Products	*	2
Not Separately Classified	--	16
Total Manufacturing	51,873	565

*Figures not published to avoid disclosure of operations of reporting units.

Source: County Business Patterns, 1976 - U.S. Dept of Commerce.

TABLE 2.2.9

MANUFACTURING ESTABLISHMENTS AND EMPLOYMENT IN

CECIL COUNTY, MARYLAND

Type of Product Manufactured	Number of Employees Reported	Total Number of Units Reported
Ordnance and Accessories	*	2
Textile Mill Products	201	4
Apparel and Related Products	368	3
Lumber and Wood Products	91	10
Paper and Allied Products	*	1
Chemicals and Allied Products	313	12
Rubber and Plastics Products	*	1
Primary Metal Industries	*	1
Electrical Machinery	*	2
Transportation Equipment	*	4
Not Separately Classified	--	15
Total Manufacturing	3,817	55

*Figures not published to avoid disclosure of operations of reporting units.

Source: County Business Patterns, 1967 - U.S. Dept of Commerce.

TABLE 2.2.10

MANUFACTURING ESTABLISHMENTS AND EMPLOYMENT IN

HARFORD COUNTY, MARYLAND

Type of Product Manufactured	Number of Employees Reported	Total Number of Units Reported
Food and Kindred Products	132	7
Apparel and Related Products	420	4
Lumber and Wood Products	*	11
Chemicals and Allied Products	775	8
Rubber and Plastics Products	*	2
Stone, Clay, and Glass Products	428	8
Fabricated Metal Products	454	5
Not Separately Classified	--	14
Total Manufacturing	4,723	59

*Figures not published to avoid disclosure of operations of reporting units.

Source: County Business Patterns, 1967 - U.S. Dept of Commerce.

TABLE 2.2.11

MANUFACTURING ESTABLISHMENTS AND EMPLOYMENT

IN THE FIVE-COUNTY AREA SURROUNDING THE PEACH BOTTOM SITE

Type of Product Manufactured	Number of Employees Reported	Total Number of Units Reported	Number of Units Not Reporting Employees
Ordnance and Accessories	*	4	4
Food and Kindred Products	11,609	256	-
Tobacco Manufacturers	1,741	36	-
Textile Mill Products	6,812	55	-
Apparel and Related Products	13,063	133	-
Lumber and Wood Products	1,394	91	11
Furniture and Fixtures	4,736	61	5
Paper and Allied Products	5,606	56	1
Printing and Publishing	6,608	139	-
Chemicals and Allied Products	3,063	66	16
Petroleum and Coal Products	294	7	-
Leather and Leather Products	5,262	39	-
Rubber and Plastic Products	1,495	14	3
Stone, Clay, and Glass Products	5,585	86	-
Primary Metal Industries	12,551	62	1
Fabricated Metal Products	10,978	151	-
Machinery, Except Electrical	16,376	208	-
Electrical Machinery	15,247	47	2
Transportation Equipment	2,381	36	13
Instruments and Related Products	*	6	6
Not Separately Classified	-	102	-
Total Manufacturing	146,928	1,655	-

*Figures not published to avoid disclosure of operations of reporting units.

Source: County Business Patterns, 1967 - U.S. Dept of Commerce.

TABLE 2.2.12

COMPANIES LOCATED WITHIN 10 MILES OF THE

PEACH BOTTOM SITE*

(HISTORICAL)

Company Name	Approximate Employees	Type of Industry
	Cecil County	
Fawn Grove Manufacturing Company	100	Sewing factory
H.E. Shallcross & Sons	35	Butcher
	Harford County	
Blue Ridge Flooring Company	65	Saw milling, flooring
C.D. Miller		Lumber manufacturing, saw milling
Maryland Green Marble Corporation	16	Maryland Verde antique marble Green marble chips
Maryland Lava Company	70	Lava insulation, special insulators, Pilot tips
Miller Chemical & Fertilizer Corporation	21	Chemicals, fertilizer
McCorquodale Color Card Company	22	Color Charts
Maryland Ceramic & Steatite Company, Inc.	45	Epoxy and lava products
Whitefore Packing Company	150	Canned foods
Petti Frocks, Inc., Assoc.	84	Wearing apparel
R. Roberts & Son	20	Fuel tanks, refuse containers
B. G. S. Jourdan & Sons	55	Canned tomatoes
The Susquehanna Electric Company	65	Hydro Electric Plant
	York County	
Star Printing Company		Printing
Weldon Packing Company		Canned foods
Snyder Packing Company	100	Canned foods
PECO Energy	64	Nuclear Power Generating Station
	Lancaster County	
Pennsylvania Power & Light Company	150	Hydro Electric Plant

* Companies with less than 10 employees have not been reported.

TABLE 2.2.13

COUNTIES LYING WITHIN ABOUT 50 MILES OF THE PEACH BOTTOM SITE

Delaware	New Jersey
New Castle	Salem
Maryland	**Pennsylvania**
Anne Arundel	Adams
Baltimore*	Berks
Carroll	Chester
Cecil	Cumberland
Harford	Dauphin
Howard	Delaware
Kent	Lancaster
Queen Annes	Lebanon
	York

*Including city of Baltimore

TABLE 2.2.14

EMPLOYMENT IN COUNTIES WITHIN 50 MILES OF THE PEACH BOTTOM SITE

	Employment	Percent of Total Employment
Agricultural Services	3,285	.24
Mining	3,771	.27
Contract Construction	77,983	5.65
Manufacturing	596,897	43.23
Transportation and Other Public Utilities	87,712	6.35
Wholesale Trade	77,517	5.61
Retail Trade	248,209	17.98
Finance, Insurance, and Real Estate	68,752	4.98
Services	213,221	15.44
Unclassified Establishments	2,413	.17
*	1,098	.08
	1,380,858	100.00

*Figures not published to avoid disclosure of operation of reporting units.

Source: County Business Patterns, 1967 - U.S. Dept of Commerce.

TABLE 2.2.15

MANUFACTURING ESTABLISHMENTS AND EMPLOYMENTS

IN COUNTIES WITHIN APPROXIMATELY 50 MILES OF THE PEACH BOTTOM SITE

Type of Product Manufactured	Number of Employees Reported	Total Number of Units Reported	Number of Units Not Reporting Employees
Ordnance and Accessories	*	6	6
Food and Kindred Products	49,009	831	4
Tobacco Manufacturers	1,741	36	-
Textile Mill Products	21,379	198	5
Apparel and Related Products	44,783	545	1
Lumber and Wood Products	4,146	242	19
Furniture and Fixtures	10,641	184	11
Paper and Allied Products	19,454	190	3
Printing and Publishing	26,975	665	-
Chemicals and Allied Products	22,874	273	21
Petroleum and Coal Products	1,656	33	6
Leather and Leather Products	9,513	91	17
Rubber and Plastic Products	15,275	103	3
Stone, Clay, and Glass Products	13,823	275	7
Primary Metal Industries	36,032	181	29
Fabricated Metal Products	32,202	531	-
Machinery, Except Electrical	46,970	629	-
Electrical Machinery	50,678	183	11
Transportation Equipment	57,619	132	19
Instruments and Related Products	1,037	57	32
Not Separately Classified	-	516	-
Total Manufacturing	595,288	5,901	-

*Figures not published to avoid disclosure of operations of reporting units.

Source: County Business Patterns, 1967 - U.S. Dept of Commerce.

TABLE 2.2.15.1

AIRPORTS WITHIN 10 MILES OF THE

PEACH BOTTOM ATOMIC POWER STATION

Airport	Tangelwood	Conowingo	Ruff	Delta
Distance (statute mi)	6 1/2	7	4	4
Direction (true north)	36°	140°	272°	226°
Elevation (ft)	680	380	465	540
Type	Public Use	Public Use	Private, Restricted	Private, Restricted

TABLE 2.2.16

BUREAU OF CENSUS AND PROJECTED POPULATION OF COUNTIES

COUNTY	STATE	1950 (l)	1960 (1)	1970 (1)	1970 (2)	1980 (2)
KENT CO.	DE.	37870.	65651.	81892.	91800.	133600.
NEW CASTLE CO.	DE.	218879.	307446.	385856.	409700.	582700.
SUSSEX CO.	DE.	61336.	73195.	80356.	80900.	91800.
ANNE ARUNDEL CO.	MD.	117392.	206634.	297539.	316825.	415732.
8ALTIMORE (CITY)	MD.	949708.	939024.	905759.	946227.	950840.
8ALTIMORE CO.	MD.	270273.	492428.	621077.	645155.	802385.
CALVERT CO.	MD.	12100.	15826.	20682.	21890.	26200.
CAROL NE CO.	MD.	18234.	19462.	19781.	20570.	20600.
CARROLL CO.	MD.	44907.	52785.	69006.	66515.	75225.
CEC L CO.	MD.	33356.	48408.	53291.	59713.	72435.
DORCHESTER CO.	MD.	27815.	29666.	29405.	30622.	32124.
FREDERICK CO.	MD.	62287.	71930.	84927.	86543.	105470.
HARFORD CO.	MD.	51782.	76722.	115378.	110525.	150450.
HOWARD CO.	MD.	23119.	36152.	61911.	65268.	112835.
KENT CO.	MD.	13677.	15481.	16146.	17950.	18830.
MONTGOMERY CO.	MD.	164401.	340928.	522809.	508140.	630232.
PR. GEORGES CO.	MD.	194182.	357395.	660567.	621057.	770284.
QUEEN ANNES CO.	MD.	14579.	16569.	18422.	18289.	19500.
SOMERSET CO.	MD.	20745.	19623.	18924.	50698.	19940.
TALBOT CO.	MD.	19428.	21578.	23682.	23442.	26585
WASHINGTON CO.	MD.	78886.	91219.	103829.	101955.	113765.
WICOMICO CO	MD.	39641.	49050.	54236.	55964.	58490.
WORCESTER CO.	MD.	23148.	23733.	24442.	25342.	25477.
ATLANTIC CO.	NJ.	132399.	160880.	175043.	193200.	226200.
BERGEN CO.	NJ.	539139.	780255.	898012.	950000.	1093700.
BURLINGTON CO.	NJ.	135910.	224499.	323132.	333000.	413900.
CAMDEN CO.	NJ.	300743.	392035.	456291.	490800.	574600.
CAPE MAY CO.	NJ.	37131.	48555.	59554.	57000.	67600.
CUMBERL AND CO.	NJ.	86597.	106850.	121374.	133300.	159800.
ESSEX CO.	NJ.	905949.	923545.	929986.	973400.	1009800.
GLOCESTER CO.	NJ.	91727.	134840.	172681.	178200.	229600.
HUDSON CO.	NJ.	647437.	610734.	609266.	606000.	612100.
HUNTERDON CO.	NJ.	42736.	54107.	69718.	72300.	103700.
MERCER CO.	NJ.	229781.	266392.	303968.	323100.	372700.
MIDDLESEX CO.	NJ.	264872.	433856.	583813.	622000.	842800.
MONMOUTH CO.	NJ.	225327.	334401.	459379.	483500.	655200.
MORRIS CO.	NJ.	164371.	261620.	383454.	390100.	571900.
OCEAN CO.	NJ.	56622.	108241.	208470.	181000.	270000.
PASSAIC CO.	NJ.	337093.	406618.	460782.	483200.	545000.
SALEM CO.	NJ.	49508.	58711.	60346.	70400.	86100.
SOMERSET CO.	NJ.	99052.	143913.	198372.	207000.	283300.
SUSSEX CO.	NJ.	34423.	49255.	77528.	72700.	104300.
UNION CO.	NJ.	398138.	504255.	543116.	584600.	638400.
WARREN CO.	NJ.	54374.	63220.	73879.	76700.	104100.
ADAMS CO.	PA.	44197.	51906.	56937.	58560.	65082.
BERKS CO.	PA.	255740.	275414.	296382.	289378.	302383.
BUCKS CO.	PA.	144620.	308567.	415056.	395449.	526738.
CARBON CO.	PA.	57558.	52889.	50573.	53884.	53376.
CHESTER CO.	PA.	159141.	210608.	278311.	283607.	389552.
COLUMBIA CO.	PA.	53460.	53489.	55114.	53705.	53500.
CUMBERLAND CO.	PA.	94457.	124816.	158177.	156296.	192934.
DAUPHIN COUNTY	PA.	197784.	220255.	223834.	233891.	250515.
DELAWARE CO.	PA.	414234.	553154.	600035.	620179.	713775.
FRANKL N CO.	PA.	75927.	88172.	100833.	106342.	128205.
JUNIATA CO.	PA.	15243.	15874.	16712.	17973.	20443.
LACKAWANNA CO.	PA	257396.	234531.	234107.	213363.	189405.
LANCASTER CO.	PA.	234717.	278359.	319693.	315216.	385471.
LEBANON CO.	PA.	78905.	90853.	99665.	98539.	106021.
LEHIGH CO.	PA.	198207.	227536.	255304.	243425.	255321.
LUZERNE CO.	PA.	392241.	346972.	342301.	338858.	322108.
LYCOMING CO.	PA.	101249.	109367.	113296.	112442.	113681.
MIFFLIN CO.	PA.	43691.	44348.	45268.	46470.	47712.
MONROE CO.	PA.	33803.	39567.	45422.	484l0.	58969.
MONTGOMERY CO.	PA.	353068.	516682.	623799.	652966.	814053.
MONTOUR CO.	PA.	16001.	16730.	16508.	17492.	18139.
NORTHAMPTON CO.	PA.	185243.	201412.	214368.	216781.	233662.
NORTHUMBERLAND CO.	PA.	116612.	104138.	99190.	100568.	95790.
PERRY CO.	PA.	24782.	26582.	28615.	27565.	28671.
PHILA. CO.	PA.	2071605.	2002517.	1948609.	2074157.	2180011.
PIKE CO.	PA,	8425.	9158.	11818.	10569.	11617.
SCHUYLKILL CO.	PA.	200577.	173027.	160089.	166777.	157506.
SNYDER CO.	PA.	22912.	25922.	29269.	32546.	40776.
SULLIVAN CO.	PA.	6745.	6251.	5961.	5316.	4394.
UNION CO.	PA.	23150.	25646.	28603.	33352.	44321.
WAYNE CO.	PA.	28478.	28237.	29581.	31198.	34347.
WYOMING CO.	PA.	16766.	16813.	19082.	16295.	15735.
YORK CO.	PA.	202737.	238336.	272603.	269554.	306422

(1) BUREAU OF CENSUS
(2) PROJECTED POPULATION

TABLE 2.2.16 (Continued)

SOURCES OF PROJECTED POPULATIONS

State	Year 1970	1980	1985	1990	2000
Delaware					
Kent Co.	1	1	2	2	2
New Castle Co.	1	1	2	2	2
Sussex Co.	3	3	3	3	2
Maryland	4	4	2	2	4
New Jersey	5	5	5	5	5
Pennsylvania	6	6	2	2	2

KEY:		Year of Estimate
1	- Division of Urban Affairs, U. of Delaware	1965
2	- Estimate by Philadelphia Electric Company	-
3	- Delaware State Planning Office	1967
4	- Maryland State Planning Department	1967
5	- Bureau of Research and Statistics Division of Economic Development New Jersey Department of Conservation and Economic Development	1966
6	- Pennsylvania State Planning Board	1967

TABLE 2.2.17

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

(HISTORICAL)

5 TO 10 MILES

CIVIL DIVISION		COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DRUMORE TWP	5-10	N LANCASTER CO.	PA.	6.	N	5.6	2.2	40.4	79	83	87	115
MARTIC TWP.	5-10	N LANCASTER CO.	PA.	355.	N	8.1	6.2	78.3	470	497	484	688
PROVIDENCE	5-10	N LANCASTER CO.	PA.	7.	N	8.9	3.0	142.1	283	343	426	475
DRUMORE TWP	5-10	NNELANCASTER CO.	PA.	18.	NNE	6.2	7.7	40.5	282	298	313	413
E.DRUMORE T	5-10	NNELANCASTER CO.	PA.	28.	NNE	8.5	5.6	76.9	280	350	427	485
PROVIDENCE	5-10	NNELANCASTER CO.	PA.	15.	NNE	9.3	2.0	141.9	189	229	284	317
DRUMORE TWP	5-10	NELANCASTER CO.	PA.	44.	NE	5.3	0.9	40.7	34	36	38	50
E.DRUMORE T	5-10	NELANCASTER CO.	PA.	47.	NE	7.5	13.3	76.9	672	840	1025	1163
LIT.BRITAIN	5-10	NELANCASTER CO.	PA.	56.	NE	9.1	1.9	59.8	91	102	115	141
FULTON TWP	5-10	ENELANCASTER CO.	PA.	67.	ENE	5.9	2.9	63.0	133	159	180	220
LIT.BRITAIN	5-10	ENELANCASTER CO.	PA.	68.	ENE	8.5	10.9	59.8	518	580	654	803
FULTON TWP	5-10	E LANCASTER CO.	PA.	96.	E	5.5	2.9	63.0	133	159	180	220
LIT.BRITAIN	5-10	E LANCASTER CO.	PA.	90.	E	8.6	11.7	59.8	556	623	702	863
DIST.6 RSUN	5-10	ESECECIL CO.	MD.	114.	ESE	9.9	4.5	128.7	342	499	577	747
OAKWOOD A	5-10	ESECECIL CO.	MD.	116.	ESE	7.4	7.6	78.5	411	558	597	835
FULTON TWP	5-10	ESELANCASTER CO.	PA.	108.	ESE	5.8	4.3	62.9	199	239	270	331
DIST.6 RSUN	5-10	SECECIL CO.	MD.	128.	SE	9.7	3.1	128.5	239	349	403	522
OAKWOOD B	5-10	SECECIL CO.	MD.	135.	SE	7.3	9.5	78.5	514	697	746	1043
DISTRICT 5	5-10	SSEHARFORD CO.	MD.	153.	SSE	7.1	16.9	106.5	1161	1484	1797	2910
DISTRICT 5	5-10	S HARFORD CO.	MD.	179.	S	7.5	16.9	106.5	1160	1482	1795	2906
DISTRICT 5	5-10	SSWHARFORD CO.	MD.	201.	SSW	7.4	16.9	106.5	1160	1482	1795	2906
DISTRICT 5	5-10	SW HARFORD CO.	MD.	226.	SW	7.5	16.9	106.5	1160	1482	1795	2906
DISTRICT 4	5-10	WSWHARFORD CO.	MD.	245.	WSW	9.6	7.2	81.6	347	406	586	796
DISTRICT 5	5-10	WSWHARFORD CO.	MD.	245.	WSW	8.6	8.4	106.4	580	741	897	1453
FAWN GROVE	5-10	WSWYORK CO.	PA.	246.	WSW	8.5	0.0	*******	136	140	166	180
FAWN TWP	5-10	WSWYORK CO.	PA.	254.	WSW	8.5	1.5	45.1	67	64	66	82
PEACH BOT	5-10	WSWYORK CO.	PA.	252.	WSW	6.8	4.6	46.6	205	199	214	256
FAWN GROVE	5-10	W YORK CO.	PA.	266.	W	7.8	0.0	*******	106	109	129	140
FAWN TWP	5-10	W YORK CO.	PA.	269.	W	8.7	8.7	44.8	398	382	392	491
PEACH BOT	5-10	W YORK CO.	PA.	265.	W	6.5	7.6	46.6	340	331	356	426
FAWN TWP	5-10	WNWYORK CO.	PA.	284.	WNW	8.9	1.5	45.1	67	64	66	82
LCHANCEFORD	5-10	WNWYORK CO.	PA.	293.	WNW	7.3	15.0	41.0	555	555	617	713
LCHANCEFORD	5-10	NWYORK CO.	PA.	313.	NW	7.6	12.9	41.0	475	475	528	611
MARTIC TWP.	5-10	NNWLANCASTER CO.	PA.	337.	NNW	7.5	17.0	78.3	1294	1368	1332	1894
					TOTALS		252.1		14636	17405	20039	28183
					DENSITY				58.1	69.0	79.5	111.8

TABLE 2.2.18

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

(HISTORICAL)

10 TO 20 MILES

CIVIL DIVISION	COUNTY	STATE	DIRECTION FROM SITE DEGREE	DIRECTION FROM SITE SECTOR	DISTANCE FROM SITE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	POPULATION 1960	POPULATION 1970	POPULATION 1980
E.LAMPETER 10-20	N LANCASTER CO.	PA.	6.	N	19.1	14.3	433.0	3616	5179	6183	7172
LANCASTER CITY	LANCASTER CO.	PA.	354.	N	19.4	6.9	8360.9	63774	61055	57690	84549
LANCASTER T10-20	N LANCASTER CO.	PA.	352.	N	18.0	4.9	1693.2	5490	8020	8267	11106
MARTIC TWP.10-20	N LANCASTER CO.	PA.	352.	N	11.0	4.6	78.3	352	372	362	515
PEQUEA TWP 10-20	N LANCASTER CO.	PA.	355.	N	13.8	11.8	229.1	1534	2192	2702	3035
PROVIDENCE 10-20	N LANCASTER CO.	PA.	3.	N	10.9	8.0	142.2	755	915	1137	1267
STRASBURG 10-20	N LANCASTER CO.	PA.	8.	N	13.3	2.9	130.7	283	312	382	432
WEST LAMPETER TWP	LANCASTER CO.	PA.	2.	N	16.3	15.9	400.9	4119	5520	6374	7644
BART TWP 10-20	NNELANCASTER CO.	PA.	33.	NNE	15.7	15.8	110.7	1286	1466	1746	2030
E.DRUMORE T10-20	NNELANCASTER CO.	PA.	31.	NNE	10.2	2.0	40.6	72	76	80	105
E.LAMPETER 10-20	NNELANCASTER CO.	PA.	15.	NNE	18.7	6.1	433.1	1550	2220	2651	3074
EDEN TWP 10-20	NNELANCASTER CO.	PA.	28.	NNE	13.0	6.1	81.5	325	373	494	517
PARADISE TP10-20	NNELANCASTER CO.	PA.	29.	NNE	17.7	16.6	202.8	2458	2952	3376	4088
PROVIDENCE 10-20	NNELANCASTER CO.	PA.	21.	NNE	11.1	7.0	142.1	661	801	995	1109
QUARRYVILLE BOROUGH	LANCASTER CO.	PA.	31.	NNE	11.0	1.1	1428.2	1187	1427	1571	1976
STRASBURG BOROUGH	LANCASTER CO.	PA.	17.	NNE	16.1	0.8	2371.2	1109	1416	1897	1961
STRASBURG T10-20	NNELANCASTER CO.	PA.	20.	NNE	14.6	16.6	130.8	1607	1769	2168	2450
BART TWP 10-20	NELANCASTER CO.	PA.	41.	NE	15.2	0.8	111.1	68	77	92	107
CHRISTIANA BOROUGH	LANCASTER CO.	PA.	47.	NE	19.9	0.5	2264.0	1043	1069	1132	1480
COLERAIN TP10-20	NELANCASTER CO.	PA.	49.	NE	13.1	10.2	56.4	384	526	574	728
E.DRUMORE T10-20	NELANCASTER CO.	PA.	46.	NE	10.1	3.6	40.5	133	140	147	194
EDEN TWP 10-20	NELANCASTER CO.	PA.	41.	NE	12.4	6.1	81.5	325	373	494	517
PARADISE TP10-20	NELANCASTER CO.	PA.	36.	NE	18.7	1.8	202.7	273	328	375	454
SADSBURY TP10-20	NELANCASTER CO.	PA.	49.	NE	17.7	18.4	77.1	877	1212	1420	1678
LOWER OXFORD TWP	CHESTER CO.	PA.	77.	ENE	15.7	18.9	104.7	1657	2007	1979	3712
UPPER OXFORD TWP	CHESTER CO.	PA.	71.	ENE	18.0	16.9	116.0	903	997	1961	1844
WEST FALLOWFIELD	CHESTER CO.	PA.	59.	ENE	19.1	18.2	93.1	1069	1425	1694	2636
COLERAIN TP10-20	ENELANCASTER CO.	PA.	67.	ENE	13.0	18.9	56.4	714	977	1067	1353
LIT.BRITAIN10-20	ENELANCASTER CO.	PA.	75.	ENE	10.9	1.4	59.7	64	72	81	100
SADSBURY TP10-20	ENELANCASTER CO.	PA.	59.	ENE	16.7	1.0	77.1	46	64	75	89
CALVERT 9 10-20	E CECIL CO.	MD.	100.	E	17.2	3.6	69.5	168	212	248	317
EAST NOTTINGHAM TWP	CHESTER CO.	PA.	88.	E	16.3	21.4	112.2	1748	2298	2402	4251
ELK TWP	CHESTER CO.	PA.	94.	E	19.6	10.8	60.1	462	539	649	997
OXFORD BOROUGH	CHESTER CO.	PA.	84.	E	16.4	1.4	2612.9	3091	3376	3658	6244
WEST NOTTINGHAM TWP	CHESTER CO.	PA.	96.	E	12.0	14.9	96.6	881	1137	1440	2103
LIT.BRITAIN10-20	E LANCASTER CO.	PA.	84.	E	10.6	1.4	59.7	64	72	81	100
NORTHEAST 510-20	ESECECIL CO.	MD.	120.	ESE	17.5	38.7	82.6	1545	2552	3195	3819
DIST.6 RSUN10-20	ESECECIL CO.	MD.	113.	ESE	12.2	17.5	128.6	1335	1947	2250	2913
RISING SUN TOWN	CECIL CO.	MD.	110.	ESE	11.6	0.0	*******	668	824	956	1233
CALVERT 9 10-20	ESECECIL CO.	MD.	107.	ESE	16.8	20.2	69.6	950	1201	1408	1797
NORTHEAST 510-20	SECECIL CO.	MD.	127.	SE	18.0	38.6	82.7	1544	2551	3194	3817
CHARLESTOWN TOWN	CECIL CO.	MD.	129.	SE	19.8	0.0	*******	551	711	721	1064
DIST.6 RSUN10-20	SECECIL CO.	MD.	128.	SE	11.4	6.3	128.6	479	699	808	1046
DIST. 7 PT DEPOSIT	CECIL CO.	MD.	136.	SE	15.0	33.1	307.7	5714	11498	10185	17205
PERRYVILLE TOWN	CECIL CO.	MD.	141.	SE	17.0	0.0	*******	679	674	2091	1009
PORT DEPOSIT TOWN	CECIL CO.	MD.	142.	SE	13.4	0.0	*******	1139	953	906	1426
DISTRICT 2 10-20	SSEHARFORD CO.	MD.	157.	SSE	13.7	96.5	159.3	9069	12201	15367	23926

TABLE 2.2.18 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
ABERDEEN TOWN	HARFORD CO.	MD.	163.	SSE	18.1	2.5	4950.0	2944	9679	12375	18980
DIST 6	HARFORD CO.	MD.	148.	SSE	17.0	2.2	4450.5	7809	8510	9791	16688
DISTRICT 2 10-20 S	HARFORD CO.	MD.	169.	S	18.7	10.7	159.3	1008	1356	1708	2659
DISTRICT 3 10-20 S	HARFORD CO.	MD.	180.	S	13.8	37.7	259.8	2972	5214	9798	10224
DISTRICT 3 10-20 SSW	HARFORD CO.	MD.	202.	SSW	15.0	56.6	259.8	4459	7821	14698	15337
BEL AIR TOWN	HARFORD CO.	MD.	195.	SSW	15.8	1.2	5255.8	2578	4300	6307	8432
DISTRICT 4 10-20 SSW	HARFORD CO.	MD.	213.	SSW	16.3	10.3	81.6	495	580	838	1137
DISTRICT 4 10-20 SW	HARFORD CO.	MD.	231.	SW	14.4	56.5	81.6	2726	3192	4610	6260
DISTRICT 4 10-20 WSW	HARFORD CO.	MD.	248.	WSW	14.4	28.8	81.6	1388	1625	2347	3187
FAWN GROVE 10-20 WSW	YORK CO.	PA.	254.	WSW	12.7	0.0	*******	97	100	119	129
FAWN TWP 10-20 WSW	YORK CO.	PA.	257.	WSW	11.0	1.5	45.1	67	64	66	82
E.HOPEWELL 10-20 W	YORK CO.	PA.	279.	W	14.1	7.1	42.0	283	275	296	354
FAWN GROVE 10-20 W	YORK CO.	PA.	267.	W	12.2	0.0	*******	58	60	71	77
FAWN TWP 10-20 W	YORK CO.	PA.	267.	W	12.2	14.6	44.9	664	638	655	821
HOPEWELL TWP	YORK CO.	PA.	271.	W	16.9	26.7	64.7	1305	1330	1728	1710
N.HOPEWELL 10-20 W	YORK CO.	PA.	280.	W	19.1	2.7	65.9	138	148	179	190
STEWARTSTOWN BORO	YORK CO.	PA.	269.	W	17.2	0.6	1928.3	1133	1164	1157	1497
CHANCEFORD 10-20 WNW	YORK CO.	PA.	299.	WNW	13.9	14.8	63.4	771	800	936	1028
CROSS ROADS BOROUGH	YORK CO.	PA.	284.	WNW	16.6	1.8	90.6	178	166	163	213
E.HOPEWELL 10-20 WNW	YORK CO.	PA.	286.	WNW	15.0	13.0	41.9	524	509	547	654
FAWN TWP 10-20 WNW	YORK CO.	PA.	282.	WNW	10.7	1.5	45.1	67	64	66	82
FELTON BOROUGH	YORK CO.	PA.	294.	WNW	16.9	0.6	708.3	429	430	425	553
LCHANCEFORD10-20 WNW	YORK CO.	PA.	295.	WNW	10.5	4.3	41.1	158	158	176	203
N.HOPEWELL 10-20 WNW	YORK CO.	PA.	287.	WNW	18.0	15.4	65.9	782	838	1014	1078
WINDSOR BOROUGH	YORK CO.	PA.	303.	WNW	19.8	0.4	3245.0	1126	1029	1298	1323
WINSOR TWP.10-20 WNW	YORK CO.	PA.	297.	WNW	18.7	14.9	237.4	1772	2513	3529	3231
WINTERSTOWN BOROUGH	YORK CO.	PA.	286.	WNW	19.3	2.3	184.3	298	349	424	449
CHANCEFORD 10-20 NW	YORK CO.	PA.	315.	NW	13.9	34.4	63.4	1798	1865	2183	2398
EAST PROSPECT BORO	YORK CO.	PA.	318.	NW	19.9	0.6	911.7	500	623	547	801
LCHANCEFORD10-20 NW	YORK CO.	PA.	311.	NW	10.4	4.3	41.1	158	158	176	203
LOWER WINDSOR TWP	YORK CO.	PA.	315.	NW	19.8	25.2	153.9	2934	3424	3879	4402
WINSOR TWP.10-20 NW	YORK CO.	PA.	306.	NW	18.7	13.2	237.4	1579	2238	3143	2877
CONESTOGA TWP	LANCASTER CO.	PA.	338.	NNW	13.2	15.4	158.9	2007	2230	2447	3088
LANCASTER 10-20 NNW	LANCASTER CO.	PA.	348.	NNW	18.2	1.2	1693.5	1369	2000	2062	2770
MANOR TWP	LANCASTER CO.	PA.	336.	NNW	17.5	47.2	207.0	4461	6939	9769	9609
MARTIC TWP.10-20 NNW	LANCASTER CO.	PA.	345.	NNW	10.3	2.2	78.1	165	174	169	241
MILLERSVILLE BORO	LANCASTER CO.	PA.	345.	NNW	17.6	1.3	4920.0	2551	3883	6396	5377
PEQUEA TWP 10-20 NNW	LANCASTER CO.	PA.	347.	NNW	15.5	1.3	229.5	170	243	300	337
WASHINGTON BOROUGH	LANCASTER CO.	PA.	327.	NNW	19.5	0.3	1416.7	483	450	425	623
				TOTALS		1037.5		182225	225916	265542	350493
				DENSITY				175.6	217.7	255.9	337.8

TABLE 2.2.19

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

(HISTORICAL)

20 TO 30 MILES

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
AKRON BOROUGH	LANCASTER CO.	PA.	7.	N	27.7	0.9	3498.9	1028	2167	3149	3001
EAST PETERSBURG BOR	LANCASTER CO.	PA.	349.	N	24.1	1.8	1892.8	1268	2053	3407	2843
EPHRATE BOROUGH	LANCASTER CO.	PA.	10.	N	29.4	2.1	4601.0	7027	7688	9662	10646
EPHRATE TWP	LANCASTER CO.	PA.	8.	N	29.3	17.6	200.7	3649	4321	3532	5984
LITITZ BOROUGH	LANCASTER CO.	PA.	356.	N	27.5	1.9	3722.1	5568	5987	7072	8291
MANHEIM TWP	LANCASTER CO.	PA.	358.	N	23.3	23.4	920.5	9289	14855	21539	20571
PENN TWP	LANCASTER CO.	PA.	351.	N	29.9	29.2	130.2	2734	3072	3801	4254
WARWICK TWP	LANCASTER CO.	PA.	360.	N	27.5	20.3	323.3	3273	4716	6562	6531
WEST EART TWP	LANCASTER CO.	PA.	10.	N	25.9	18.0	243.1	2957	3496	4375	4841
EARL TWP	LANCASTER CO.	PA.	20.	NNE	26.5	22.5	196.9	3232	3668	4430	5079
EAST EARL TWP	LANCASTER CO.	PA.	26.	NNE	28.5	23.6	200.0	3235	3723	4721	5156
LEACOCK TWP	LANCASTER CO.	PA.	24.	NNE	21.2	20.4	180.3	2578	3041	3678	4211
NEW HOLLAND BOROUGH	LANCASTER CO.	PA.	22.	NNE	25.4	1.4	2836.4	2602	3425	3971	4743
TERRE HILL BOROUGH	LANCASTER CO.	PA.	23.	NNE	29.9	0.5	2258.0	1000	1129	1129	1563
UPPER LEACOCK TWP	LANCASTER CO.	PA.	12.	NNE	22.4	18.4	351.0	3403	4549	6459	6299
ATGLEN BOROUGH	CHESTER CO.	PA.	51.	NE	20.4	0.7	1057.1	668	721	740	1334
PARKESBURG BOROUGH	CHESTER CO.	PA.	53.	NE	23.3	1.2	2250.8	2611	2759	2701	5103
SADSBURY TWP	CHESTER CO.	PA.	51.	NE	24.4	5.7	368.9	1502	981	2103	1815
VALLEY TWP	CHESTER CO.	PA.	55.	NE	27.2	6.3	601.7	3148	3101	3791	5736
WEST CALN TWP	CHESTER CO.	PA.	48.	NE	27.4	22.3	141.3	1485	2140	3152	3958
WEST SADSBURY TWP	CHESTER CO.	PA.	49.	NE	21.9	10.7	111.1	802	1102	1189	2038
POMEROY	CHESTER CO.	PA.	55.	NE	24.9	0.7	2087.1	0	1085	1461	2007
SALISBURY TWP	LANCASTER CO.	PA.	37.	NE	22.9	42.2	125.5	3932	4509	5294	6244
COATESVILLE CITY	CHESTER CO.	PA.	57.	ENE	28.5	1.4	8807.9	13026	12971	12331	23992
EAST FALLOWFIELD	CHESTER CO.	PA.	61.	ENE	28.0	15.7	222.1	1795	2745	3487	5077
HIGHLAND TWP	CHESTER CO.	PA.	60.	ENE	23.1	17.2	72.6	904	1029	1248	1903
LONDONDERRY TWP	CHESTER CO.	PA.	69.	ENE	22.3	11.5	80.0	595	718	920	1328
LONDON GROVE TWP	CHESTER CO.	PA.	78.	ENE	24.9	17.3	179.7	1844	2734	3109	5057
MODENA BOROUGH	CHESTER CO.	PA.	60.	ENE	28.6	0.4	2167.5	824	859	867	1589
PENN TWP	CHESTER CO.	PA.	78.	ENE	21.4	9.6	103.0	705	1097	989	2029
SOUTH COATESVILLE	CHESTER CO.	PA.	58.	ENE	28.0	1.8	879.4	1996	2032	1583	3758
WEST MARLBOROUGH TWP	CHESTER CO.	PA.	69.	ENE	26.4	17.2	53.3	786	901	917	1667
NEWARK CITY	NEW CASTLE CO.	DE.	101.	E	27.8	0.2	835.0	0	125	167	237
NEWARK CITY	NEW CASTLE CO.	DE.	101.	E	27.8	3.7	3618.1	6639	10046	13387	19040
NEWARK CITY	NEW CASTLE CO.	DE.	101.	E	27.8	1.9	864.7	92	1233	1643	2337
DIST. 4 FAIR HILL	CECIL CO.	MD.	100.	E	23.0	27.9	121.8	2044	2696	3399	4034
AVONDALE BOROUGH	CHESTER CO.	PA.	80.	E	26.1	0.5	2050.0	941	1016	1025	1879
FRANKLIN TWP	CHESTER CO.	PA.	89.	E	23.4	13.0	80.2	666	817	1043	1511
LONDON BRITAIN TWP	CHESTER CO.	PA.	91.	E	25.7	10.0	96.3	559	686	963	1269
NEW GARDEN TWP	CHESTER CO.	PA.	81.	E	27.8	15.9	261.2	3027	3718	4153	6877
NEW LONDON TWP	CHESTER CO.	PA.	87.	E	20.8	12.3	76.3	660	845	938	1563
WEST GROVE BOROUGH	CHESTER CO.	PA.	80.	E	23.8	0.6	3116.7	1521	1607	1870	2972
DISTRICT 11	NEW CASTLE CO.	DE.	111.	ESE	29.9	46.1	233.9	2507	8092	10783	15337
CHESAPEAKE CITY	CECIL CO.	MD.	123.	ESE	29.2	0.6	1718.3	1154	1104	1031	1652
DIST. 3 ELKTON	CECIL CO.	MD.	114.	ESE	24.5	39.5	209.4	3542	6721	8270	10057
ELKTON TOWN	CECIL CO.	MD.	114.	ESE	25.3	1.7	3154.1	5245	5989	5362	8962
NORTH EAST TOWN	CECIL CO.	MD.	122.	ESE	20.6	1.3	1398.5	1517	1628	1818	2436

TABLE 2.2.19 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DIST. 2 CHESAPEAKE	CECIL CO.	MD.	127.	SE	29.0	50.4	46.1	1264	1691	2321	2530
BETTERTON TOWN	KENT CO.	MD.	158.	SSE	29.2	0.0	*******	314	328	327	399
OLIVER-DT. 15	BALTIMORE CO.	MD.	189.	S	26.8	2.2	849.1	0	1426	1868	2324
DIST 1 ABINGDON	HARFORD CO.	MD.	185.	S	20.5	80.1	242.5	10188	12756	19426	25014
EDGEWOOD	HARFORD CO.	MD.	184.	S	23.4	0.4	21377.5	0	1670	8551	3275
DISTRICT 11	BALTIMORE CO.	MD.	203.	SSW	25.6	68.8	386.8	10450	17127	26614	27908
PARKVILLE-CARNEY	BALTIMORE CO.	MD.	210.	SSW	29.4	3.9	5877.4	0	17496	22922	28509
PARKVILLE-CARNEY	BALTIMORE CO.	MD.	208.	SSW	28.2	1.5	3018.0	0	3455	4527	5630
PARKVILLE-CARNEY	BALTIMORE CO.	MD.	207.	SSW	29.9	0.9	9148.9	0	6285	8234	10241
DISTRICT 8	BALTIMORE CO.	MD.	224.	SW	28.5	59.9	643.9	8708	10027	38568	16338
DISTRICT 10	BALTIMORE CO.	MD.	225.	SW	22.0	51.2	110.3	2588	3740	5647	6094
COCKEYSVILLE	BALTIMORE CO.	MD.	228.	SW	27.6	6.1	554.6	0	2582	3383	4207
TIMONIUM-DT. 8	BALTIMORE CO.	MD.	220.	SW	29.6	2.6	4433.8	0	8799	11528	14337
TIMONIUM-DT. 10	BALTIMORE CO.	MD.	218.	SW	29.9	0.8	5676.2	0	3466	4541	5648
DISTRICT 5	BALTIMORE CO.	MD.	244.	WSW	28.8	48.6	64.2	2106	2551	3120	4157
DISTRICT 6	BALTIMORE CO.	MD.	258.	WSW	24.3	37.2	55.8	1567	1627	2076	2651
DISTRICT 7	BALTIMORE CO.	MD.	246.	WSW	22.1	57.3	82.3	3413	4167	4714	6790
CODORUS TWP	YORK CO.	PA.	275.	W	27.9	32.9	84.0	2168	2354	2762	3078
GLEN ROCK BOROUGH	YORK CO.	PA.	276.	W	24.6	0.7	2285.7	1477	1546	1600	1988
NEW FREEDOM BOROUGH	YORK CO.	PA.	267.	W	22.9	1.8	830.6	1271	1395	1495	1794
RAILROAD BOROUGH	YORK CO.	PA.	270.	W	22.6	0.7	440.0	300	273	308	351
SHREWSBURY BOROUGH	YORK CO.	PA.	272.	W	21.8	0.4	4290.0	787	943	1716	1212
SHREWSBURY TWP	YORK CO.	PA.	272.	W	22.9	29.7	86.8	2163	2471	2578	3177
DALLASTOWN BOROUGH	YORK CO.	PA.	296.	WNW	22.0	0.8	4450.0	3304	3615	3560	4648
JACOBUS BOROUGH	YORK CO.	PA.	291.	WNW	24.9	0.9	1511.1	706	968	1360	1245
LOGANVILLE BOROUGH	YORK CO.	PA.	286.	WNW	24.2	0.9	1023.3	569	742	921	954
NEW SALEM BOROUGH	YORK CO.	PA.	290.	WNW	29.3	0.3	1280.0	333	350	384	450
NORTH CODORUS TWP	YORK CO.	PA.	286.	WNW	29.9	31.5	143.3	2787	3525	4514	4532
NORTH YORK BOROUGH	YORK CO.	PA.	302.	WNW	28.8	0.4	5080.0	2445	2290	2032	2944
RED LION BOROUGH	YORK CO.	PA.	299.	WNW	20.4	1.4	4032.1	5119	5594	5645	7192
SEVEN VALLEYS BORO	YORK CO.	PA.	284.	WNW	27.1	1.1	625.5	437	515	688	662
SPRINGFIELD TWP	YORK CO.	PA.	285.	WNW	24.8	25.5	87.1	1467	1751	2221	2251
SPRING GARDEN TWP	YORK CO.	PA.	297.	WNW	27.2	7.4	1681.5	8338	11387	12443	14640
WEST YORK BOROUGH	YORK CO.	PA.	297.	WNW	29.4	0.5	10628.0	5756	5526	5314	7105
YOE BOROUGH	YORK CO.	PA.	298.	WNW	22.1	0.3	2633.3	681	731	790	940
YORK CITY	YORK CO.	PA.	300.	WNW	28.0	4.5	11185.6	59953	54504	50335	70074
YORK TWP	YORK CO.	PA.	296.	WNW	23.3	24.4	520.6	4502	8506	12702	10936
MARIETTA BOROUGH	LANCASTER CO.	PA.	324.	NW	25.5	0.4	7095.0	2442	2385	2838	3303
HALLAM BOROUGH	YORK CO.	PA.	314.	NW	24.4	0.6	3041.7	976	1234	1825	1587
HELLAM TWP	YORK CO.	PA.	316.	NW	24.6	29.1	108.5	2081	2550	3158	3278
SPRINGETTSBURY TWP	YORK CO.	PA.	307.	NW	26.7	16.1	1204.9	5537	14232	19399	18298
WRIGHTSVILLE BORO	YORK CO.	PA.	323.	NW	23.1	4.3	620.5	2104	2345	2668	3015
YORKANA BOROUGH	YORK CO.	PA.	312.	NW	22.6	0.1	2620.0	229	251	262	323
COLUMBIA BOROUGH	LANCASTER CO.	PA.	328.	NNW	22.4	1.6	7023.1	11993	12075	11237	16721

TABLE 2.2.19 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
EAST DONEGAL TWP	LANCASTER CO.	PA.	326.	NNW	27.1	23.9	125.6	2642	3099	3003	4291
EAST HEMPFIELD TWP	LANCASTER CO.	PA.	345.	NNW	23.1	21.2	553.7	4322	6727	11739	9316
MANHEIM BOROUGH	LANCASTER CO.	PA.	347.	NNW	28.8	1.0	5434.0	4246	4790	5434	6633
MOUNT JOY BOROUGH	LANCASTER CO.	PA.	333.	NNW	27.1	1.2	4200.8	3006	3292	5041	4559
MOUNTVILLE BOROUGH	LANCASTER CO.	PA.	337.	NNW	21.0	0.6	2423.3	1064	1411	1454	1954
RAPHO TWP	LANCASTER CO.	PA.	341.	NNW	29.7	48.1	106.5	3865	4484	5121	6209
WEST HEMPFIELD TWP	LANCASTER CO.	PA.	335.	NNW	22.6	21.6	283.3	3578	5318	6119	7364
FLORIN E DRUMORE	LANCASTER CO.	PA.	331.	NNW	27.7	0.5	2276.0	817	1005	1138	1392
LANDISVILLE	LANCASTER CO.	PA.	342.	NNW	24.4	0.6	3190.0	0	1690	1914	2340
FLORIN MT JOY	LANCASTER CO.	PA.	332.	NNW	28.1	0.8	726.2	502	513	581	710
				TOTALS		1368.8		314945	431317	553887	646329
				DENSITY				230.1	315.1	404.7	472.2

TABLE 2.2.20

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

(HISTORICAL)

30 TO 40 MILES

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
CLAY TWP	LANCASTER CO.	PA.	4.	N	32.1	23.1	122.6	1793	2006	2832	2778
ELIZABETH TWP	LANCASTER CO.	PA.	356.	N	32.1	18.1	101.0	1164	1555	1828	2153
WEST COCALICO TWP	LANCASTER CO.	PA.	9.	N	35.4	27.7	153.3	2947	3608	4247	4996
HEIDELBERG TWP	LEBANON CO.	PA.	0.	N	37.7	24.7	114.7	2446	2597	2833	3031
SOUTH LEBANON TWP	LEBANON CO.	PA.	352.	N	39.0	20.4	326.9	4488	5617	6669	6555
ADAMSTOWN BOROUGH	BERKS CO.	PA.	19.	NNE	35.9	0.0	*******	20	16	1202	18
BRECKNOCK TWP	BERKS CO.	PA.	26.	NNE	36.0	17.2	113.7	1085	1499	1956	1646
CUMRU TWP	BERKS CO.	PA.	26.	NNE	39.9	21.4	391.0	5242	7250	8367	7960
MOHNTON BOROUGH	BERKS CO.	PA.	23.	NNE	39.4	0.7	3075.7	2004	2223	2153	2441
SOUTH HEIDELBERG	BERKS CO.	PA.	14.	NNE	39.7	13.7	233.4	3726	3771	3198	4140
BRECKNOCK TWP	LANCASTER CO.	PA.	23.	NNE	33.1	24.8	140.2	2226	2981	3478	4128
CAERNARVON TWP	LANCASTER CO.	PA.	31.	NNE	31.0	22.8	101.9	1673	1843	2323	2552
DENVER BOROUGH	LANCASTER CO.	PA.	12.	NNE	33.4	1.0	2248.0	1658	1875	2248	2596
EAST COCALICO TWP	LANCASTER CO.	PA.	15.	NNE	33.1	21.0	237.8	3044	3791	4993	5250
ADAMSTOWN BOROUGH	LANCASTER CO.	PA.	19.	NNE	35.3	1.4	949.3	1000	1174	1329	1626
CAERNARVON TWP	BERKS CO.	PA.	36.	NE	35.1	12.7	132.3	1105	1326	1680	1656
EAST BRANDYWINE TWP	CHESTER CO.	PA.	56.	NE	33.7	11.3	242.6	1108	1618	2741	2993
EAST NANTMEAL TWP	CHESTER CO.	PA.	48.	NE	38.4	16.4	52.3	665	730	858	1350
ELVERSON BOROUGH	CHESTER CO.	PA.	40.	NE	35.9	1.0	509.0	370	472	509	873
HONEY BROOK BOROUGH	CHESTER CO.	PA.	39.	NE	30.0	0.4	2787.5	864	1023	1115	1892
HONEYBROOK TWP	CHESTER CO.	PA.	42.	NE	30.8	25.0	115.3	1261	1584	2883	2930
UPPER UWCHLAN TWP	CHESTER CO.	PA.	53.	NE	37.4	12.0	83.0	761	909	996	1681
WALLACE TWP	CHESTER CO.	PA.	50.	NE	35.0	11.9	113.2	771	1065	1347	1970
WARWICK TWP	CHESTER CO.	PA.	43.	NE	39.8	19.2	86.8	1144	1436	1667	2656
WEST BRANDYWINE TWP	CHESTER CO.	PA.	51.	NE	31.3	13.3	204.0	1122	1675	2713	3098
WEST NANTMEAL TWP	CHESTER CO.	PA.	43.	NE	34.6	13.3	96.6	806	968	1285	1790
BIRMINGHAM TWP	CHESTER CO.	PA.	75.	ENE	36.9	6.2	134.5	429	453	834	838
CALN TWP	CHESTER CO.	PA.	58.	ENE	32.0	8.7	768.9	5779	6685	6689	12365
DOWNINGTOWN BOROUGH	CHESTER CO.	PA.	60.	ENE	34.7	1.8	4131.7	4948	5598	7437	10354
EAST BRADFORD TWP	CHESTER CO.	PA.	67.	ENE	36.1	15.2	214.5	1187	1713	3260	3168
EAST CALN TWP	CHESTER CO.	PA.	61.	ENE	36.1	4.0	434.7	403	758	1739	1402
EAST MARLBOROUGH	CHESTER CO.	PA.	74.	ENE	30.4	15.5	195.5	1868	2417	3031	4471
KENNETT SQUARE BORO	CHESTER CO.	PA.	79.	ENE	30.3	1.1	4432.7	3699	4355	4876	8055
NEWLIN TWP	CHESTER CO.	PA.	69.	ENE	30.8	12.1	121.0	957	1477	1464	2732
PENNSBURY TWP	CHESTER CO.	PA.	77.	ENE	35.3	10.2	172.8	686	936	1763	1731
POCOPSON TWP	CHESTER CO.	PA.	72.	ENE	33.7	8.2	189.8	475	1315	1556	2432
THORNBURY TWP	CHESTER CO.	PA.	73.	ENE	40.0	3.9	367.9	297	746	1435	1380
UWCHLAN TWP	CHESTER CO.	PA.	57.	ENE	37.9	10.5	521.2	761	995	5473	1840
WEST BRADFORD TWP	CHESTER CO.	PA.	65.	ENE	32.7	18.7	160.2	1530	1894	2996	3503
WEST CHESTER BORO	CHESTER CO.	PA.	69.	ENE	37.9	1.8	10722.8	15168	15705	19301	29049
WEST GOSHEN TWP	CHESTER CO.	PA.	65.	ENE	39.1	9.6	592.7	1970	4593	5690	8495
CHATWOOD	CHESTER CO.	PA.	69.	ENE	39.6	2.3	3116.5	1572	3621	7168	6698
WESTTOWN TWP	CHESTER CO.	PA.	72.	ENE	39.8	8.7	582.6	994	1947	5069	3601
WEST WHITELAND TWP	CHESTER CO.	PA.	62.	ENE	38.9	12.9	554.2	1573	4412	7149	8161
BIRMINGHAM TWP	DELAWARE CO.	PA.	79.	ENE	37.7	8.8	145.6	836	1093	1281	1410
DIST. 1 WILMINGTON	NEW CASTLE CO.	DE.	92.	E	38.6	6.1	1707.0	11515	7814	10413	14810
DIST. 2 WILMINGTON	NEW CASTLE CO.	DE.	90.	E	38.6	6.4	7031.9	35762	33772	45004	64008

Table 2.2.20 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DIST. 3 WILMINGTON	NEW CASTLE CO.	DE.	90.	E	37.5	1.8	13591.7	21417	18359	24465	34796
DIST. 4 WILMINGTON	NEW CASTLE CO.	DE.	92.	E	37.9	0.5	14376.0	9078	5394	7188	10223
DIST. 5 WILMINGTON	NEW CASTLE CO.	DE.	91.	E	37.1	1.5	27085.3	32584	30488	40628	57784
DISTRICT 7	NEW CASTLE CO.	DE.	89.	E	35.2	31.4	1653.1	25739	38951	51906	73824
ELSEMERE TOWN	NEW CASTLE CO.	DE.	92.	E	36.1	1.0	9753.0	5314	7319	9753	13872
NEWPORT TOWN	NEW CASTLE CO.	DE.	95.	E	35.2	0.2	8255.0	1171	1239	1651	2348
DISTRICT 8	NEW CASTLE CO.	DE.	91.	E	30.9	44.0	705.7	7677	23303	31053	44166
DISTRICT 9	NEW CASTLE CO.	DE.	100.	E	30.1	21.1	631.2	2418	9994	13318	18942
DISTRICT 10	NEW CASTLE CO.	DE.	100.	E	35.8	48.6	982.3	16428	35824	47739	67897
NEW CASTLE CITY	NEW CASTLE CO.	DE.	100.	E	37.5	1.9	3134.2	5396	4469	5955	8470
KENNETT TWP	CHESTER CO.	PA.	80.	E	31.7	15.4	220.4	2145	3026	3394	5597
DISTRICT 12	NEW CASTLE CO.	DE.	111.	ESE	35.4	30.6	75.9	1690	1743	2323	3303
DELAWARE CITY TOWN	NEW CASTLE CO.	DE.	109.	ESE	38.1	1.2	1840.8	1363	1658	2209	3142
DISTRICT 13	NEW CASTLE CO.	DE.	120.	ESE	36.0	65.3	51.0	2332	2501	3333	4740
ODESSA TOWN	NEW CASTLE CO.	DE.	123.	ESE	38.5	0.0	*******	467	526	701	997
MIDDLETOWN TOWN	NEW CASTLE CO.	DE.	126.	SE	36.3	1.9	1536.8	1755	2191	2920	4153
DISTRICT 14	NEW CASTLE CO.	DE.	129.	SE	39.6	56.9	49.2	1734	2100	2798	3980
TOWNSEND TOWN	NEW CASTLE CO.	DE.	129.	SE	39.6	0.0	*******	441	434	578	823
DIST. 1 CECILTON	CECIL CO.	MD.	140.	SE	30.8	79.7	26.1	1698	1919	2077	2871
CECILTON TOWN	CECIL CO.	MD.	139.	SE	32.4	0.0	*******	510	596	581	892
DIST. 1 MASSEYS	KENT CO.	MD.	143.	SE	38.6	70.1	27.3	1627	1943	1911	2363
CALENA TOWN	KENT CO.	MD.	144.	SE	35.5	0.0	*******	259	299	361	364
DIST. 2	KENT CO.	MD.	154.	SSE	35.0	70.0	26.3	1645	1797	1840	2186
DIST. 3 WORTON	KENT CO.	MD.	164.	SSE	32.8	46.2	35.3	1371	1591	1629	1935
DIST. 4 CHESTERTOWN	KENT CO.	MD.	164.	SSE	38.1	8.0	91.6	252	362	733	440
CHESTERTOWN TOWN	KENT CO.	MD.	164.	SSE	39.0	0.9	3862.2	3143	3602	3476	4381
DIST. 6 FAIRLEE	KENT CO.	MD.	173.	S	37.2	40.2	33.6	1102	1320	1352	1606
WARD NO. 1	BALTIMORE (CITY)	MD.	206.	SSW	36.7	0.0	*******	24831	21185	17000	21452
WARD NO. 2	BALTIMORE (CITY)	MD.	207.	SSW	36.8	0.0	*******	13924	10401	8300	10532
WARD NO. 3	BALTIMORE (CITY)	MD.	208.	SSW	37.0	0.0	*******	11892	7610	7700	7706
WARD NO. 4	BALTIMORE (CITY)	MD.	210.	SSW	37.2	0.0	*******	11649	7966	6600	8066
WARD NO. 5	BALTIMORE (CITY)	MD.	209.	SSW	36.6	0.0	*******	12423	8703	5400	8813
WARD NO. 6	BALTIMORE (CITY)	MD.	207.	SSW	36.1	0.0	*******	26708	20645	17400	20905
WARD NO. 7	BALTIMORE (CITY)	MD.	208.	SSW	35.8	0.0	*******	30261	24749	16600	25060
WARD NO. 8	BALTIMORE (CITY)	MD.	208.	SSW	36.1	0.0	*******	46400	47610	48400	48209
WARD NO. 9	BALTIMORE (CITY)	MD.	210.	SSW	34.7	0.0	*******	45094	44612	45400	45173
WARD NO. 10	BALTIMORE (CITY)	MD.	209.	SSW	36.2	0.0	*******	19804	16604	11700	16813
WARD NO. 11	BALTIMORE (CITY)	MD.	210.	SSW	36.6	0.0	*******	21370	11546	6200	11691
WARD NO. 12	BALTIMORE (CITY)	MD.	211.	SSW	35.3	0.0	*******	40278	34984	31700	35424
WARD NO. 13	BALTIMORE (CITY)	MD.	213.	SSW	35.7	0.0	*******	39417	37788	35200	38263
WARD NO. 14	BALTIMORE (CITY)	MD.	212.	SSW	36.7	0.0	*******	26499	22240	17200	22520
WARD NO. 16	BALTIMORE (CITY)	MD.	213.	SSW	37.8	0.0	*******	53771	51779	56200	52431
WARD NO. 17	BALTIMORE (CITY)	MD.	211.	SSW	37.1	0.0	*******	19991	13287	10500	13454
WARD NO. 18	BALTIMORE (CITY)	MD.	211.	SSW	37.7	0.0	*******	19688	15462	9000	15657
WARD NO. 19	BALTIMORE (CITY)	MD.	211.	SSW	38.0	0.0	*******	24717	20477	12900	20735
WARD NO. 20	BALTIMORE (CITY)	MD.	213.	SSW	38.8	0.0	*******	45419	46224	41900	46806
WARD NO. 21	BALTIMORE (CITY)	MD.	210.	SSW	38.5	0.0	*******	15976	13955	10200	14131

Table 2.2.20 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
WARD NO. 22	BALTIMORE (CITY)	MD.	209.	SSW	37.7	0.0	*******	10989	6475	2100	6556
WARD NO. 23	BALTIMORE (CITY)	MD.	209.	SSW	38.3	0.0	*******	12679	10159	8700	10287
WARD NO. 24	BALTIMORE (CITY)	MD.	207.	SSW	38.0	0.0	*******	17552	14803	13200	14989
WARD NO. 25	BALTIMORE (CITY)	MD.	208.	SSW	39.8	0.0	*******	50330	63511	64000	64310
WARD NO. 26	BALTIMORE (CITY)	MD.	205.	SSW	34.8	0.0	*******	73111	86636	91600	87726
WARD NO. 27	BALTIMORE (CITY)	MD.	213.	SSW	33.1	0.0	*******	127353	166283	180900	168375
DISTRICT 12	BALTIMORE CO.	MD.	200.	SSW	36.5	9.7	7449.6	40155	70659	72261	115135
DISTRICT 14	BALTIMORE CO.	MD.	203.	SSW	31.5	11.4	2045.9	16394	10662	23323	17373
OVERLEA	BALTIMORE CO.	MD.	205.	SSW	30.2	1.7	7697.6	0	10795	13086	17590
DISTRICT 15	BALTIMORE CO.	MD.	194.	SSW	32.7	66.4	451.0	64178	23283	29947	37938
DUNDALK	BALTIMORE CO.	MD.	198.	SSW	35.7	1.8	7286.7	0	11769	13116	19177
ESSEX	BALTIMORE CO.	MD.	198.	SSW	32.6	6.0	6365.5	0	35205	38193	57365
MIDDLE RIVER	BALTIMORE CO.	MD.	196.	SSW	30.6	2.4	8306.2	0	10825	19935	17639
LOCH RAVEN	BALTIMORE CO.	MD.	212.	SSW	30.4	3.4	8970.0	0	23278	30498	37930
SPARROWS POINT-FORT	BALTIMORE CO.	MD.	195.	SSW	38.3	3.6	4285.3	0	11775	15427	19187
WARD NO. 15	BALTIMORE (CITY)	MD.	215.	SW	36.9	0.0	*******	82038	78635	86200	79624
WARD NO. 28	BALTIMORE (CITY)	MD.	217.	SW	38.1	0.0	*******	25544	34695	43600	35132
DISTRICT 2	BALTIMORE CO.	MD.	227.	SW	39.2	43.9	1266.9	10467	11765	55618	19170
DISTRICT 3	BALTIMORE CO.	MD.	224.	SW	33.8	20.1	703.8	11072	8262	14146	13462
PIKESVILLE	BALTIMORE CO.	MD.	222.	SW	35.9	5.0	4831.8	0	18737	24159	30531
OWINGS-MILLS	BALTIMORE CO.	MD.	230.	SW	35.5	4.7	1566.0	0	3810	7360	6208
DISTRICT 9	BALTIMORE CO.	MD.	216.	SW	30.2	10.3	9938.5	40856	7070	102367	11520
WOODLAWN-DT. 1	BALTIMORE CO.	MD.	218.	SW	38.8	0.8	5756.2	0	3515	4605	5728
WOODLAWN-DT. 2	BALTIMORE CO.	MD.	221.	SW	38.2	5.2	3965.4	0	15739	20620	25646
GLYNDON-DT. 4	BALTIMORE CO.	MD.	234.	SW	35.6	5.4	1023.0	2077	4216	5524	6870
STONELEIGH-DT. 9	BALTIMORE CO.	MD.	214.	SW	31.6	2.5	8198.8	0	15645	20497	25493
TOWSON	BALTIMORE CO.	MD.	216.	SW	30.2	6.8	3678.1	0	19090	25011	31106
DISTRICT 4	BALTIMORE CO.	MD.	238.	WSW	34.3	52.6	443.6	7376	7578	23331	12348
DIST 4 WOOLERYS	CARROLL CO.	MD.	243.	WSW	38.9	46.2	141.4	3757	4368	6532	6225
MANCHESTER TOWN	CARROLL CO.	MD.	258.	WSW	33.3	0.2	7330.0	1027	1108	1466	1579
DIST 7 WESTMINSTER	CARROLL CO.	MD.	243.	WSW	38.9	45.5	199.9	4727	7052	9097	10050
DIST 8 HAMPSTEAD	CARROLL CO.	MD.	250.	WSW	34.2	31.1	139.2	1970	2714	4329	3868
HAMPSTEAD TOWN	CARROLL CO.	MD.	251.	WSW	32.5	0.0	*******	677	696	961	992
DIST 6 MANCHESTER	CARROLL CO.	MD.	260.	W	33.2	51.8	73.1	2715	3130	3787	4461
ABBOTTSTOWN BOROUGH	ADAMS CO.	PA.	281.	W	38.8	0.5	1104.0	538	561	552	703
BERWICK TWP	ADAMS CO.	PA.	281.	W	38.8	8.1	170.2	870	1102	1379	1382
CONEWAGO TWP	ADAMS CO.	PA.	273.	W	39.9	9.5	188.9	1158	1436	1795	1801
MIDWAY	ADAMS CO.	PA.	275.	W	39.1	1.1	1487.3	1271	1568	1636	1966
MCSHERRYSTOWN BORO	ADAMS CO.	PA.	275.	W	39.8	0.5	5546.0	2510	2839	2773	3560
HANOVER BOROUGH	YORK CO.	PA.	275.	W	37.9	3.1	5039.7	14048	15538	15623	19977
HEIDELBERG TWP	YORK CO.	PA.	278.	W	34.7	14.5	123.1	1138	1493	1785	1920
JEFFERSON BOROUGH	YORK CO.	PA.	278.	W	30.5	0.5	1080.0	449	447	540	575
MANHEIM TWP	YORK CO.	PA.	269.	W	31.2	22.9	68.4	1259	1435	1566	1845
PENN TWP	YORK CO.	PA.	275.	W	37.0	10.5	289.0	1964	2547	3034	3275
PARKVILLE	YORK CO.	PA.	273.	W	37.3	3.6	1422.2	3299	4516	5120	5806
WEST MANHEIM TWP	YORK CO.	PA.	268.	W	35.9	19.8	113.4	1535	1776	2246	2283
EAST BERLIN BOROUGH	ADAMS CO.	PA.	288.	WNW	39.7	0.7	1551.4	913	1037	1086	1300

Table 2.2.20 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DOVER BOROUGH	YORK CO.	PA.	299.	WNW	35.0	0.4	2920.0	809	975	1168	1254
DOVER TWP	YORK CO.	PA.	297.	WNW	35.6	42.8	209.7	3864	6399	8975	8227
JACKSON TWP	YORK CO.	PA.	288.	WNW	33.6	23.2	169.4	2548	2749	3931	3534
MANCHESTER TWP	YORK CO.	PA.	304.	WNW	30.4	16.4	425.5	3397	5519	6979	7096
PARADISE TWP	YORK CO.	PA.	287.	WNW	37.2	20.1	107.7	1476	1778	2165	2286
SPRING GROVE BORO	YORK CO.	PA.	284.	WNW	32.6	0.5	3338.0	1238	1675	1669	2154
WEST MANCHESTER TWP	YORK CO.	PA.	295.	WNW	30.7	20.0	612.8	5438	9505	12257	12220
LONDONDERRY TWP	DAUPHIN COUNTY	PA.	322.	NW	36.7	26.3	131.3	1595	3053	3453	3472
MIDDLETOWN BOROUGH	DAUPHIN COUNTY	PA.	321.	NW	39.1	1.8	5044.4	9184	11182	9080	12718
ROYALTON BOROUGH	DAUPHIN COUNTY	PA.	321.	NW	38.2	0.4	2600.0	1175	1128	1040	1283
CONOY TWP	LANCASTER CO.	PA.	319.	NW	31.3	18.4	107.4	1742	1867	1977	2585
WEST DONEGAL TWP	LANCASTER CO.	PA.	324.	NW	31.8	15.3	243.1	2335	3392	3719	4697
CONEWAGO TWP	YORK CO.	PA.	309.	NW	34.1	24.7	150.6	1877	2992	3719	3847
EAST MANCHESTER TWP	YORK CO.	PA.	314.	NW	31.3	16.8	103.3	1784	2253	1735	2897
GOLDSBORO BOROUGH	YORK CO.	PA.	317.	NW	37.6	0.4	1440.0	558	542	576	697
MANCHESTER BOROUGH	YORK CO.	PA.	311.	NW	31.7	0.4	5977.5	1264	1454	2391	1869
MOUNT WOLF BOROUGH	YORK CO.	PA.	312.	NW	31.1	0.6	3018.3	1164	1514	1811	1947
NEWBERRY TWP	YORK CO.	PA.	314.	NW	35.2	31.3	191.0	2998	4045	5978	5201
YORK HAVEN BOROUGH	YORK CO.	PA.	316.	NW	34.0	0.3	2236.7	743	736	671	946
CONEWAGO TWP	DAUPHIN COUNTY	PA.	330.	NNW	36.4	16.3	69.0	966	1353	1124	1539
ELIZABETHTOWN BORO	LANCASTER CO.	PA.	327.	NNW	32.3	2.0	4036.0	5083	6780	8072	9389
MOUNT JOY TWP	LANCASTER CO.	PA.	333.	NNW	31.1	28.6	147.8	2584	3622	4228	5016
CORNWALL BOROUGH	LEBANON CO.	PA.	348.	NNW	36.8	9.2	229.5	1760	1934	2111	2257
MOUNT CRETNA BORO	LEBANON CO.	PA.	342.	NNW	35.2	0.2	765.0	83	93	153	109
NORTH CORNWALL TWP	LEBANON CO.	PA.	346.	NNW	39.4	8.9	375.6	1090	1377	3343	1607
SOUTH ANNVILLE TWP	LEBANON CO.	PA.	341.	NNW	39.6	19.4	72.3	1104	1214	1403	1417
SOUTH LONDONDERRY	LEBANON CO.	PA.	337.	NNW	36.3	23.0	104.3	2146	1850	2399	2159
CAMPBELLTOWN	LEBANON CO.	PA.	335.	NNW	39.6	1.7	797.1	0	1061	1355	1238
WEST CORNWALL TWP	LEBANON CO.	PA.	345.	NNW	37.1	8.6	148.4	948	1020	1276	1190
				TOTALS		2097.4		1536719	1760986	2105839	2297832
				DENSITY				732.7	839.6	1004.0	1095.6

TABLE 2.2.21

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

(HISTORICAL)

40 TO 50 MILES

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
BERNVILLE BOROUGH	BERKS CO.	PA.	10.	N	47.2	0.4	2120.0	363	884	848	971
BETHEL TWP	BERKS CO.	PA.	358.	N	49.6	42.7	60.9	2038	2152	2600	2363
HEIDELBERG TWP	BERKS CO.	PA.	8.	N	42.4	13.9	90.9	945	1086	1263	1192
JEFFERSON TWP	BERKS CO.	PA.	7.	N	47.8	15.8	54.1	662	748	854	821
MARION TWP	BERKS CO.	PA.	4.	N	43.8	14.3	87.4	1033	1172	1250	1287
NORTH HEIDELBERG	BERKS CO.	PA.	10.	N	44.8	13.9	50.4	566	536	701	588
ROBESONIA BOROUGH	BERKS CO.	PA.	10.	N	41.4	0.9	1872.2	1590	1579	1685	1734
TULPEHOCKEN TWP	BERKS CO.	PA.	2.	N	47.4	23.1	77.5	1601	1583	1791	1738
WOMELADORF BOROUGH	BERKS CO.	PA.	6.	N	42.0	0.9	1723.3	1549	1471	1551	1615
BETHEL TWP	LEBANON CO.	PA.	351.	N	46.8	35.2	79.7	2302	2433	2804	2839
JACKSON TWP	LEBANON CO.	PA.	357.	N	43.3	24.7	137.2	2244	2778	3388	3242
MILLCREEK TWP	LEBANON CO.	PA.	2.	N	40.5	19.8	51.1	2442	947	1012	1105
NEWMANSTOWN	LEBANON CO.	PA.	4.	N	41.1	2.1	729.5	0	1459	1532	1703
MYERSTOWN BOROUGH	LEBANON CO.	PA.	357.	N	41.9	1.0	3645.0	3050	3268	3645	3814
NORTH LEBANON TWP	LEBANON CO.	PA.	349.	N	42.8	16.0	369.5	3436	4468	5912	5214
AVON	LEBANON CO.	PA.	352.	N	41.4	0.1	2340.0	0	245	234	286
RICHLAND BOROUGH	LEBANON CO.	PA.	1.	N	41.3	0.6	2406.7	1090	1276	1444	1489
AVON	LEBANON CO.	PA.	352.	N	41.4	0.4	2592.5	0	967	1037	1128
ALSACE TWP	BERKS CO.	PA.	27.	NNE	48.2	12.0	252.8	1782	2739	3034	3007
BERN TWP	BERKS CO.	PA.	18.	NNE	47.0	20.1	237.0	2308	3912	4764	4295
EXETER TWP	BERKS CO.	PA.	32.	NNE	45.0	24.1	440.1	5278	8488	10607	9319
KENHORST BOROUGH	BERKS CO.	PA.	25.	NNE	41.6	0.4	8705.0	2551	2815	3482	3091
LAURELDALE BOROUGH	BERKS CO.	PA.	23.	NNE	47.5	0.6	7531.7	3585	4051	4519	4448
LOWER ALSACE TWP	BERKS CO.	PA.	27.	NNE	45.7	4.9	1039.0	3718	4965	5091	5451
LOWER HEIDELBERG	BERKS CO.	PA.	16.	NNE	42.8	15.9	100.1	1368	1755	1592	1927
MOUNT PENN BOROUGH	BERKS CO.	PA.	28.	NNE	43.7	0.4	8662.5	3635	3574	3465	3924
MUHLENBERG TWP	BERKS CO.	PA.	22.	NNE	46.6	11.3	1211.8	7001	10955	13693	12028
OLEY TWP	BERKS CO.	PA.	32.	NNE	49.8	24.2	114.8	2144	2474	2778	2716
PENN TWP	BERKS CO.	PA.	13.	NNE	47.6	19.0	63.4	1215	1064	1205	1168
READING CITY	BERKS CO.	PA.	25.	NNE	43.8	9.6	9129.5	109320	98177	87643	107791
ROBESON TWP	BERKS CO.	PA.	31.	NNE	40.7	36.3	100.4	2893	3163	3644	3473
ST. LAWRENCE BORO	BERKS CO.	PA.	29.	NNE	44.7	1.1	1141.8	810	929	1256	1020
SHILLINGTON BOROUGH	BERKS CO.	PA.	23.	NNE	41.0	1.0	6249.0	5059	5639	6249	6191
SINKING SPRING BORO	BERKS CO.	PA.	18.	NNE	41.2	1.3	2201.5	1982	2244	2862	2464
SPRING TWP	BERKS CO.	PA.	20.	NNE	40.8	17.6	788.8	4867	8934	13883	9809
TEMPLE BOROUGH	BERKS CO.	PA.	22.	NNE	48.4	0.4	4167.5	1460	1633	1667	1793
WERNERSVILLE BORO	BERKS CO.	PA.	14.	NNE	40.6	0.6	2935.0	1280	1462	1761	1605
WEST LAWN BOROUGH	BERKS CO.	PA.	21.	NNE	41.4	0.2	9865.0	2144	2059	1973	2261
WEST READING BORO	BERKS CO.	PA.	23.	NNE	43.2	0.6	7630.0	5072	4538	4578	5422
WYOMISSING BOROUGH	BERKS CO.	PA.	22.	NNE	43.3	3.8	1877.9	4187	5044	7136	5538
WYOMISSING HILLS	BERKS CO.	PA.	21.	NNE	42.5	0.7	2491.4	646	1644	1744	1805
AMITY TWP	BERKS CO.	PA.	38.	NE	46.7	18.4	256.4	2019	2699	4718	2963
BIRDSBORO BOROUGH	BERKS CO.	PA.	35.	NE	42.5	1.4	2282.9	3158	3025	3196	3321
DOUGLASS TWP	BERKS CO.	PA.	40.	NE	47.8	13.6	216.5	1843	2668	2944	2929
UNION TWP	BERKS CO.	PA.	38.	NE	43.2	23.3	100.1	1668	2046	2332	2246
EAST COVENTRY TWP	CHESTER CO.	PA.	48.	NE	46.3	10.8	304.1	1499	2183	3284	4038
EAST PIKELAND TWP	CHESTER CO.	PA.	55.	NE	45.5	8.9	492.6	1395	2817	4384	5210

TABLE 2.2.21 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION FROM SITE DEGREE	DIRECTION FROM SITE SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
EAST VINCENT TWP	CHESTER CO.	PA.	52.	NE	45.6	13.7	371.1	4576	5453	5084	10086
NORTH COVENTRY TWP	CHESTER CO.	PA.	44.	NE	44.8	12.0	329.7	1738	2517	3956	4656
SOUGH POTTSTOWN	CHESTER CO.	PA.	44.	NE	46.1	1.4	1952.9	1504	1850	2734	3422
SOUTH COVENTRY TWP	CHESTER CO.	PA.	47.	NE	42.8	7.9	192.2	863	1212	1518	2242
SPRING CITY BOROUGH	CHESTER CO.	PA.	53.	NE	47.9	0.8	4472.5	3258	3162	3578	5849
WEST VINCENT TWP	CHESTER CO.	PA.	52.	NE	41.9	17.6	107.4	1116	1431	1890	2647
LOWER POTTSGROVE	MONTGOMERY CO.	PA.	46.	NE	49.6	7.9	652.8	3389	3824	5157	6025
POTTSTOWN BOROUGH	MONTGOMERY CO.	PA.	44.	NE	47.2	4.8	5282.3	22589	26144	25355	41191
ROYERSFORD BOROUGH	MONTGOMERY CO.	PA.	53.	NE	48.8	1.0	4235.0	3862	3969	4235	6253
UPPER POTTSGROVE	MONTGOMERY CO.	PA.	43.	NE	49.3	5.2	476.3	1173	1987	2477	3131
UPPER PROVIDENCE	MONTGOMERY CO.	PA.	56.	NE	49.8	18.2	270.8	3423	4483	4928	7063
WEST POTTSGROVE TWP	MONTGOMERY CO.	PA.	42.	NE	47.6	2.4	184.2	483	736	442	1160
STOWE	MONTGOMERY CO.	PA.	43.	NE	46.2	1.1	3269.1	2524	2765	3596	4356
CHARLESTOWN TWP	CHESTER CO.	PA.	59.	ENE	44.4	12.6	280.0	854	1931	3528	3572
EAST GOSHEN TWP	CHESTER CO.	PA.	67.	ENE	41.6	10.3	498.8	1039	1694	5138	3133
EASTTOWN TWP	CHESTER CO.	PA.	66.	ENE	48.3	8.4	1138.7	3811	6907	9565	12776
EAST WHITELAND TWP	CHESTER CO.	PA.	62.	ENE	42.9	10.8	670.6	1740	5078	7242	9393
MALVERN BOROUGH	CHESTER CO.	PA.	64.	ENE	44.3	1.2	2152.5	1764	2268	2583	4195
PHOENIXVILLE BORO	CHESTER CO.	PA.	57.	ENE	47.4	2.4	6176.2	12932	13797	14823	25520
SCHUYLKILL TWP	CHESTER CO.	PA.	60.	ENE	47.7	10.2	566.6	3835	3461	5779	6402
TREDYFFRIN TWP	CHESTER CO.	PA.	64.	ENE	48.5	19.9	1172.7	7836	16004	23337	29602
WEST PIKELAND TWP	CHESTER CO.	PA.	56.	ENE	41.2	10.0	142.0	683	782	1420	1446
WILLISTOWN TWP	CHESTER CO.	PA.	69.	ENE	44.4	18.3	498.8	2709	6492	9128	12008
CHESTER HEIGHTS	DELAWARE CO.	PA.	78.	ENE	43.5	2.2	580.5	474	534	1277	689
CONCORD TWP	DELAWARE CO.	PA.	79.	ENE	41.2	13.8	332.8	1945	3149	4592	4063
EDGEMONT TWP	DELAWARE CO.	PA.	73.	ENE	45.0	9.8	139.6	1048	1404	1368	1812
MEDIA BOROUGH	DELAWARE CO.	PA.	77.	ENE	48.0	0.7	9205.7	5726	5803	6444	7488
MIDDLETOWN TWP	DELAWARE CO.	PA.	78.	ENE	48.1	13.6	946.9	6038	11256	12878	14524
NEWTOWN TWP	DELAWARE CO.	PA.	72.	ENE	48.4	10.2	1086.4	3518	9270	11081	11962
SWARTHMORE BOROUGH	DELAWARE CO.	PA.	79.	ENE	50.0	1.4	4397.1	4825	5753	6156	7424
THORNBURY TWP	DELAWARE CO.	PA.	74.	ENE	42.0	9.3	285.2	2101	2035	2652	2626
UPPER PROVIDENCE TWP	DELAWARE CO.	PA.	75.	ENE	48.2	5.9	1565.1	3598	6059	9234	7818
MONT CLARE	MONTGOMERY CO.	PA.	57.	ENE	48.4	0.6	2123.3	1063	1124	1274	1771
DISTRICT 6	NEW CASTLE CO.	DE.	86.	E	40.0	39.3	1922.3	22567	56692	75547	107448
BELLEFONTE TOWN	NEW CASTLE CO.	DE.	89.	E	40.9	0.2	10235.0	1472	1536	2047	2911
LOGAN TWP	GLOUCESTER CO.	NJ.	88.	E	49.5	26.6	69.2	2222	1924	1840	3276
OLDMANS TWP	SALEM CO.	NJ.	94.	E	45.2	21.7	96.2	1657	2913	2088	4272
PENNS GROVE BOROUGH	SALEM CO.	NJ.	93.	E	42.5	0.9	21136.7	6669	6176	19023	9057
PILESGROVE TWP	SALEM CO.	NJ.	98.	E	49.8	37.9	71.4	1942	2519	2706	3694
UPPER PENNS NECK	SALEM CO.	NJ.	95.	E	42.9	19.6	358.0	6717	7595	7016	11138
ASTON TWP	DELAWARE CO.	PA.	80.	E	45.4	5.8	2362.8	5576	10595	13704	13672
BETHEL TWP	DELAWARE CO.	PA.	82.	E	41.8	5.4	376.7	1283	1834	2034	2367
BROOKHAVEN BOROUGH	DELAWARE CO.	PA.	81.	E	47.3	1.7	4335.3	1042	5280	7370	6813
CHESTER CITY	DELAWARE CO.	PA.	83.	E	48.6	6.0	9388.5	66039	63658	56331	82143
CHESTER TWP	DELAWARE CO.	PA.	82.	E	46.6	1.4	4077.1	3547	3602	5708	4648
EDDYSTONE BOROUGH	DELAWARE CO.	PA.	82.	E	49.9	1.5	1804.0	3014	3006	2706	3879
LOWER CHICHESTER	DELAWARE CO.	PA.	84.	E	44.8	1.1	3644.5	2938	4460	4009	5755

TABLE 2.2.21 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
MARCUS HOOK BOROUGH	DELAWARE CO.	PA.	85.	E	45.3	1.6	1900.6	3843	3299	3041	4257
NETHER PROVIDENCE	DELAWARE CO.	PA.	80.	E	48.6	4.7	2903.0	6173	10380	13644	13394
PARKSIDE BOROUGH	DELAWARE CO.	PA.	81.	E	47.9	0.2	11715.0	1637	2426	2343	3130
ROSE VALLEY BORO	DELAWARE CO.	PA.	80.	E	47.7	0.7	1172.9	498	626	821	808
TRAINER BOROUGH	DELAWARE CO.	PA.	84.	E	46.1	1.3	1796.9	2001	2358	2336	3043
UPLAND BOROUGH	DELAWARE CO.	PA.	82.	E	47.7	0.7	5614.3	4081	4343	3930	5604
UPPER CHICHESTER	DELAWARE CO.	PA.	83.	E	44.2	6.8	1678.5	6997	9682	11414	12493
ELSINBORO TWP	SALEM CO.	NJ.	110.	ESE	44.5	14.2	84.8	674	1220	1204	1789
LOWER ALLOWAYS	SALEM CO.	NJ.	112.	ESE	46.3	52.8	26.5	1307	1293	1400	1896
MANNINGTON TWP	SALEM CO.	NJ.	102.	ESE	47.8	41.7	45.9	1686	2024	1913	2968
QUINTON TWP	SALEM CO.	NJ.	108.	ESE	49.6	26.3	97.6	1821	2440	2567	3578
SALEM CITY	SALEM CO.	NJ.	107.	ESE	44.5	2.7	2832.6	9050	8941	7648	13112
LOWER PENNS NECK	SALEM CO.	NJ.	101.	ESE	41.5	26.3	474.9	7376	10417	12491	15277
CLAYTON TOWN DT.1	KENT CO.	DE.	134.	SE	46.7	0.2	2860.0	299	409	572	832
SMYRNA TOWN	KENT CO.	DE.	132.	SE	47.3	0.9	5035.6	2346	3241	4532	6595
DISTRICT 3	KENT CO.	DE.	139.	SE	48.3	61.2	51.3	1673	2246	3141	4571
CLAYTON TOWN DT.3	KENT CO.	DE.	134.	SE	46.7	0.2	4330.0	526	619	866	1260
KENTON TOWN	KENT CO.	DE.	139.	SE	48.8	0.0	*******	211	249	348	507
DISTRICT 15	NEW CASTLE CO.	DE.	129.	SE	44.6	59.1	37.0	1321	1643	2189	3114
MILLINGTON TOWN	KENT CO.	MD.	146.	SSE	41.4	0.0	*******	356	334	435	406
DIST 1 DIXON	QUEEN ANNES CO.	MD.	151.	SSE	46.9	72.7	20.3	1355	1489	1476	1752
BARCLAY TOWN	QUEEN ANNES CO.	MD.	153.	SSE	47.6	0.0	*******	108	142	187	167
SUDLERSVILLE TOWN	QUEEN ANNES CO.	MD.	151.	SSE	45.1	0.0	*******	347	394	417	464
DIST 2 CHURCH HILL	QUEEN ANNES CO.	MD.	161.	SSE	43.9	53.3	30.0	1429	1292	1599	1521
CHURCH HILL TOWN	QUEEN ANNES CO.	MD.	160.	SSE	45.0	0.0	*******	271	263	247	310
DIST 3 CENTREVILLE	QUEEN ANNES CO.	MD.	167.	SSE	49.0	79.1	21.6	1558	1728	1711	2034
DIST 7 CRUMPTON	QUEEN ANNES CO.	MD.	154.	SSE	41.4	37.1	58.3	1331	1790	2163	2107
MILLINGTON TOWN	QUEEN ANNES CO.	MD.	147.	SSE	41.5	0.0	*******	0	74	39	87
DIST. 5 EDESVILLE	KENT CO.	MD.	176.	S	42.5	34.1	51.7	1946	1856	1764	2258
ROCK HALL TOWN	KENT CO.	MD.	178.	S	43.0	0.6	1875.0	786	1073	1125	1305
DIST. 7 POMONA	KENT CO.	MD.	169.	S	42.3	38.0	31.4	876	976	1193	1187
DISTRICT 3	ANNE ARUNDEL CO.	MD.	198.	SSW	46.4	104.1	851.7	22172	47369	88663	95303
RIVIERA BEACH	ANNE ARUNDEL CO.	MD.	197.	SSW	42.9	1.5	4976.0	1849	4902	7464	9862
DISTRICT 5	ANNE ARUNDEL CO.	MD.	207.	SSW	43.8	33.9	1795.5	24962	50214	60868	101027
GREEN HAVEN	ANNE ARUNDEL CO.	MD.	199.	SSW	45.2	0.4	4990.0	0	1302	1996	2620
ORCHARD BEACH	ANNE ARUNDEL CO.	MD.	198.	SSW	42.7	0.9	2881.1	1203	1691	2593	3402
SEVERNA PARK-ROUND	BANNE ARUNDEL CO.	MD.	197.	SSW	49.9	3.0	1905.3	1095	3728	5716	7500
DISTRICT 13	BALTIMORE CO.	MD.	209.	SSW	41.0	2.2	60.0	19205	521	132	849
ARBUTUS-DT. 13	BALTIMORE CO.	MD.	212.	SSW	42.0	5.9	3855.1	0	22053	22745	35934
LANSDOWNE-BALTIMORE	BALTIMORE CO.	MD.	210.	SSW	42.1	2.3	7380.9	0	13134	16976	21401
DIST 1 ELK RIDGE	HOWARD CO.	MD.	214.	SSW	45.7	19.4	495.5	4607	7262	9613	22666
DISTRICT 1	BALTIMORE CO.	MD.	216.	SW	42.6	16.4	546.5	29661	12573	8963	20487
CATONSVILLE	BALTIMORE CO.	MD.	217.	SW	41.1	6.3	8679.4	0	37372	54680	60896
ARBUTUS-DT. 1	BALTIMORE CO.	MD.	214.	SW	41.3	0.0	*******	0	349	457	569
DIST 5 FREEDOM	CARROLL CO.	MD.	235.	SW	43.0	28.7	351.1	6360	7285	10076	10382
DIST 2 ELLICOTT	HOWARD CO.	MD.	222.	SW	45.1	30.5	572.0	5235	9575	17445	29885
DIST 3	HOWARD CO.	MD.	228.	SW	47.2	44.3	82.8	2348	2721	3667	8493

TABLE 2.2.21 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DIST 2 UNIONTOWN	CARROLL CO.	MD.	257.	WSW	45.6	33.2	80.5	2134	2114	2672	3013
SYKESVILLE TOWN	CARROLL CO.	MD.	242.	WSW	42.1	0.2	6995.0	941	1196	1399	1704
WESTMINSTER CITY	CARROLL CO.	MD.	252.	WSW	40.5	0.9	8007.8	6140	6123	7207	8726
DIST 9 FRANKLIN	CARROLL CO.	MD.	244.	WSW	47.4	26.5	72.6	1186	1350	1925	1924
DIST 11 NEW WINDSOR	CARROLL CO.	MD.	250.	WSW	46.1	25.7	63.3	1239	1296	1626	1844
NEW WINDSOR TOWN	CARROLL CO.	MD.	251.	WSW	46.8	0.0	*******	707	738	788	1052
DIST 12 UNION BR	CARROLL CO.	MD.	255.	WSW	49.3	7.2	107.5	691	816	774	1163
DIST 14 BERRETT	CARROLL CO.	MD.	239.	WSW	46.5	38.6	110.3	1921	2735	4258	3898
DIST 1 TANEYTOWN	CARROLL CO.	MD.	263.	W	48.3	40.7	59.2	1717	2084	2411	2970
TANEYTOWN CITY	CARROLL CO.	MD.	262.	W	48.4	2.5	692.4	1420	1519	1731	2165
DIST 3 MYERS	CARROLL CO.	MD.	263.	W	40.9	39.8	66.6	1844	2130	2651	3036
GERMANY TWP	ADAMS CO.	PA.	268.	W	43.5	11.5	113.7	954	1151	1308	1443
LITTLESTOWN BOROUGH	ADAMS CO.	PA.	269.	W	43.4	0.7	4322.9	2635	2756	3026	3456
MOUNT JOY TWP	ADAMS CO.	PA.	271.	W	47.6	25.8	69.6	1143	1380	1795	1730
MOUNT PLEASANT TWP	ADAMS CO.	PA.	276.	W	44.7	31.5	83.7	1867	2531	2636	3173
NEW OXFORD BOROUGH	ADAMS CO.	PA.	280.	W	42.4	0.5	2990.0	1366	1407	1495	1764
OXFORD TWP	ADAMS CO.	PA.	279.	W	41.4	10.0	180.8	1193	1581	1808	1982
STRABAN TWP	ADAMS CO.	PA.	280.	W	48.1	34.4	93.6	1941	2387	3221	2993
UNION TWP	ADAMS CO.	PA.	269.	W	40.8	17.8	83.1	908	1170	1479	1467
HAMILTON TWP	ADAMS CO.	PA.	283.	WNW	40.9	14.0	74.9	603	763	1048	957
HUNTINGTON TWP	ADAMS CO.	PA.	290.	WNW	48.8	25.0	59.4	1348	1491	1484	1869
LATIMORE TWP	ADAMS CO.	PA.	293.	WNW	46.6	22.0	50.2	910	1092	1105	1369
READING TWP	ADAMS CO.	PA.	288.	WNW	43.1	27.4	62.9	1138	1352	1724	1695
TYRONE TWP	ADAMS CO.	PA.	289.	WNW	45.5	21.6	59.8	1037	1186	1291	1487
YORK SPRINGS BORO	ADAMS CO.	PA.	291.	WNW	48.0	0.1	4670.0	413	384	467	481
CARROLL TWP	YORK CO.	PA.	302.	WNW	46.5	15.2	157.0	1002	1558	2386	2003
DILLSBURG BOROUGH	YORK CO.	PA.	301.	WNW	47.3	0.5	2882.0	1146	1322	1441	1700
FRANKLINTOWN BORO	YORK CO.	PA.	299.	WNW	45.9	0.2	1395.0	328	287	279	369
FRANKLIN TWP	YORK CO.	PA.	297.	WNW	47.4	18.8	85.0	958	1179	1598	1516
WARRINGTON TWP	YORK CO.	PA.	302.	WNW	40.9	35.8	69.7	1806	2041	2494	2624
WASHINGTON TWP	YORK CO.	PA.	295.	WNW	41.1	28.3	48.2	1066	1200	1365	1543
WELLSVILLE BOROUGH	YORK CO.	PA.	299.	WNW	41.0	0.2	1730.0	309	320	346	411
CAMP HILL BOROUGH	CUMBERLAND CO.	PA.	314.	NW	48.1	1.9	5226.8	5934	8559	9931	13230
LEMOYNE BOROUGH	CUMBERLAND CO.	PA.	315.	NW	47.1	1.5	3083.3	4605	4662	4625	7206
LOWER ALLEN TWP	CUMBERLAND CO.	PA.	312.	NW	47.1	9.9	1382.8	5115	11614	13690	17952
NEW CUMBERLAND BORO	CUMBERLAND CO.	PA.	315.	NW	45.7	1.7	5766.5	6204	9257	9803	14309
SHIREMANSTOWN BORO	CUMBERLAND CO.	PA.	311.	NW	48.4	0.3	5910.0	887	1212	1773	1873
UPPER ALLEN TWP	CUMBERLAND CO.	PA.	308.	NW	47.7	14.0	523.2	1594	2631	7325	4067
WEST FAIRVIEW BORO	CUMBERLAND CO.	PA.	316.	NW	49.6	0.3	4626.7	1896	1718	1388	2656
WORMLEYSBURG BORO	CUMBERLAND CO.	PA.	316.	NW	48.6	0.8	3990.0	1511	1794	3192	2773
HARRISBURG CITY	DAUPHIN COUNTY	PA.	317.	NW	47.5	11.6	5867.3	89544	79697	68061	90646
HIGHSPIRE BOROUGH	DAUPHIN COUNTY	PA.	319.	NW	41.3	0.6	4911.7	2799	2999	2947	3411
LOWER PAXTON TWP	DAUPHIN COUNTY	PA.	323.	NW	47.1	28.4	933.7	6546	17618	26517	20038
LOWER SWATARA TWP	DAUPHIN COUNTY	PA.	321.	NW	41.4	14.6	360.8	3557	4508	5267	5127
PAXTANG BOROUGH	DAUPHIN COUNTY	PA.	319.	NW	45.9	0.4	5400.0	1857	1916	2160	2179
PENBROOK BOROUGH	DAUPHIN COUNTY	PA.	319.	NW	47.2	0.5	7422.0	3691	3671	3711	4175
STEELTON BOROUGH	DAUPHIN COUNTY	PA.	318.	NW	43.7	3.3	2592.7	12574	11266	8556	12814

TABLE 2.2.21 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
SUSQUEHANNA TWP	DAUPHIN COUNTY	PA.	320.	NW	48.6	15.4	1104.4	11081	17474	17008	19875
SWATARA TWP	DAUPHIN COUNTY	PA.	320.	NW	44.3	14.6	1176.6	9350	14795	17178	16828
FAIRVIEW TWP	YORK CO.	PA.	314.	NW	42.6	36.2	255.5	5514	6530	9248	8395
LEWISBERRY BOROUGH	YORK CO.	PA.	310.	NW	40.7	0.1	4900.0	299	314	490	404
MONAGHAN TWP	YORK CO.	PA.	306.	NW	45.0	12.8	88.6	910	943	1134	1212
DERRY TWP	DAUPHIN COUNTY	PA.	331.	NNW	40.5	24.0	359.9	9993	5537	8638	6298
HERSHEY	DAUPHIN COUNTY	PA.	331.	NNW	41.4	3.1	2389.4	0	6851	7407	7792
EAST HANOVER TWP	DAUPHIN COUNTY	PA.	333.	NNW	46.7	39.1	79.1	1557	1535	3091	1746
HUMMELSTOWN BOROUGH	DAUPHIN COUNTY	PA.	326.	NNW	42.0	1.3	3633.1	3789	4474	4723	5089
SOUTH HANOVER TWP	DAUPHIN COUNTY	PA.	328.	NNW	43.7	11.5	169.0	1581	1841	1943	2094
WEST HANOVER TWP	DAUPHIN COUNTY	PA.	329.	NNW	47.4	22.7	194.1	1495	2770	4407	3151
ANNVILLE TWP	LEBANON CO.	PA.	342.	NNW	41.6	1.7	2767.1	3699	4264	4704	4976
CLEONA BOROUGH	LEBANON CO.	PA.	345.	NNW	41.4	0.9	2266.7	1483	1988	2040	2320
EAST HANOVER TWP	LEBANON CO.	PA.	339.	NNW	47.9	33.4	63.7	1842	2140	2127	2497
JONESTOWN BOROUGH	LEBANON CO.	PA.	346.	NNW	46.4	0.6	1590.0	853	813	954	949
LEBANON CITY	LEBANON CO.	PA.	349.	NNW	41.0	4.3	6644.6	28156	30045	28572	35061
NORTH ANNVILLE TWP	LEBANON CO.	PA.	341.	NNW	43.3	17.4	125.3	1517	1813	2180	2116
NORTH LONDONDERRY	LEBANON CO.	PA.	337.	NNW	42.8	11.2	245.7	961	1684	2752	1965
PALMYRA BOROUGH	LEBANON CO.	PA.	336.	NNW	41.7	1.4	5439.3	5910	6999	7615	8167
SWATARA TWP	LEBANON CO.	PA.	347.	NNW	46.7	20.6	116.8	1953	2164	2407	2525
UNION TWP	LEBANON CO.	PA.	344.	NNW	47.9	34.0	78.3	1787	1967	2661	2295
WEST LEBANON TWP	LEBANON CO.	PA.	347.	NNW	41.2	0.4	2465.0	1050	1054	986	1230
WEST LEBANON	LEBANON CO.	PA.	347.	NNW	41.2	0.5	2704.0	998	1247	1352	1455
				TOTALS		2812.9		926203	1197591	1414224	1733285
				DENSITY				329.3	425.7	502.8	616.2

TABLE 2.2.22

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

(HISTORICAL)

SITE LATITUDE = 39.45.31.
LONGITUDE =76.16.12.
PEACH BOTTOM ATOMIC POWER STATION

50 TO 60 MILES

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
STRAUSATOWN BOROUGH	BERKS CO.	PA.	5.	N	50.8	0.2	2005.0	368	380	401	417
UPPER BERN TWP	BERKS CO.	PA.	10.	N	53.2	18.3	50.8	858	888	930	975
UPPER TULPEHOCKEN	BERKS CO.	PA.	6.	N	51.2	22.7	34.5	642	663	783	728
AUBURN BOROUGH	SCHUYLKILL CO.	PA.	9.	N	58.6	1.3	688.5	994	936	895	852
PINE GROVE BOROUGH	SCHUYLKILL CO.	PA.	354.	N	54.7	1.1	1997.3	2237	2267	2197	2064
PINE GROVE TWP	SCHUYLKILL CO.	PA.	352.	N	54.5	38.4	77.7	2871	2887	2985	2628
SOUTH MANHEIM TWP	SCHUYLKILL CO.	PA.	7.	N	57.8	21.1	36.5	641	650	771	592
TREMONT TWP	SCHUYLKILL CO.	PA.	351.	N	58.5	24.2	10.4	440	442	252	402
WASHINGTON TWP	SCHUYLKILL CO.	PA.	358.	N	55.6	30.2	49.6	1225	1292	1497	1176
WAYNE TWP	SCHUYLKILL CO.	PA.	2.	N	57.7	34.3	60.2	1568	1729	2065	1574
CENTERPORT BOROUGH	BERKS CO.	PA.	16.	NNE	52.2	0.2	1135.0	226	208	227	228
CENTRE TWP	BERKS CO.	PA.	16.	NNE	50.7	22.2	82.4	1622	1589	1830	1745
FLEETWOOD BOROUGH	BERKS CO.	PA.	27.	NNE	53.7	0.7	4377.1	2338	2647	3064	2906
HAMBURG BOROUGH	BERKS CO.	PA.	16.	NNE	56.9	2.1	1861.4	3805	3747	3909	4114
KUTZTOWN BOROUGH	BERKS CO.	PA.	27.	NNE	58.7	1.1	5470.0	3110	3312	6017	3636
LEESPORT BOROUGH	BERKS CO.	PA.	19.	NNE	50.0	0.8	1447.5	535	1138	1158	1249
LENHARTSVILLE BORO	BERKS CO.	PA.	20.	NNE	59.7	0.1	2200.0	229	209	220	229
LYONS BOROUGH	BERKS CO.	PA.	29.	NNE	56.7	0.4	1472.5	545	571	589	627
MAIDENCREEK TWP	BERKS CO.	PA.	20.	NNE	51.0	14.8	160.5	1951	2042	2376	2242
MAXATAWNY TWP	BERKS CO.	PA.	28.	NNE	59.6	26.4	105.6	2513	2885	2789	3168
UNTELAUNEE TWP	BERKS CO.	PA.	20.	NNE	50.1	9.5	165.1	1413	1109	1568	1218
PERRY TWP	BERKS CO.	PA.	19.	NNE	55.0	18.6	113.5	1272	1651	2112	1813
PIKE TWP	BERKS CO.	PA.	34.	NNE	53.4	14.3	60.6	639	754	867	828
RICHMOND TWP	BERKS CO.	PA.	24.	NNE	55.8	23.9	114.9	2030	2369	2745	2601
ROCKLAND TWP	BERKS CO.	PA.	30.	NNE	55.5	16.2	89.6	1166	1289	1452	1415
RUSCOMBMANOR TWP	BERKS CO.	PA.	27.	NNE	51.4	14.8	134.1	1538	1787	1985	1962
SHOEMAKERSVILLE BOR	BERKS CO.	PA.	17.	NNE	53.6	0.6	2378.3	1066	1464	1427	1607
TILDEN TWP	BERKS CO.	PA.	14.	NNE	55.9	18.2	97.9	1392	1784	1781	1959
TOPTON BOROUGH	BERKS CO.	PA.	30.	NNE	59.5	0.7	2491.4	1572	1684	1744	1849
WINDSOR TWP	BERKS CO.	PA.	17.	NNE	57.9	22.6	93.3	1330	1655	2108	1817
PORT CLINTON BORO	SCHUYLKILL CO.	PA.	13.	NNE	58.3	0.5	726.0	451	739	363	673
BALLY BOROUGH	BERKS CO.	PA.	39.	NE	57.2	0.5	2394.0	753	1033	1197	1134
BECHTELSVILLE BORO	BERKS CO.	PA.	39.	NE	54.3	0.5	1456.0	603	625	728	686
BOYERTOWN BOROUGH	BERKS CO.	PA.	41.	NE	51.5	0.8	5535.0	4074	4067	4428	4465
COLEBROOKDALE TWP	BERKS CO.	PA.	39.	NE	52.3	7.5	251.9	2224	1728	1889	1897
NEW BERLINVILLE	BERKS CO.	PA.	40.	NE	52.7	1.2	954.2	0	1151	1145	1264
DISTRICT TWP	BERKS CO.	PA.	35.	NE	57.0	11.6	64.8	480	570	752	626
EARL TWP	BERKS CO.	PA.	36.	NE	51.7	13.8	165.9	1470	1904	2290	2090
WASHINGTON TWP	BERKS CO.	PA.	38.	NE	56.5	14.1	161.2	1316	1637	2273	1797
COLLEGEVILLE BORO	MONTGOMERY CO.	PA.	56.	NE	52.3	1.6	1994.4	1900	2254	3191	3551
DOUGLASS TWP	MONTGOMERY CO.	PA.	42.	NE	53.3	16.2	257.8	2046	3083	4177	4857
GREENLANE BOROUGH	MONTGOMERY CO.	PA.	47.	NE	58.4	0.3	1810.0	550	582	543	917
LIMERICK TWP	MONTGOMERY CO.	PA.	50.	NE	50.9	23.8	233.4	3290	5110	5556	8051
LOWER FREDERICK TWP	MONTGOMERY CO.	PA.	49.	NE	55.0	8.5	295.9	1620	2108	2515	3321

TABLE 2.2.22 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION FROM SITE DEGREE	DIRECTION FROM SITE SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
LOWER SALFORD TWP	MONTGOMERY CO.	PA.	53.	NE	58.1	14.7	340.7	2290	3389	5008	5340
MARLBOROUGH TWP	MONTGOMERY CO.	PA.	47.	NE	59.8	12.9	191.1	1432	1875	2465	2954
NEW HANOVER TWP	MONTGOMERY CO.	PA.	44.	NE	53.9	23.4	180.0	1745	3218	4211	5070
PERKIOMEN TWP	MONTGOMERY CO.	PA.	53.	NE	53.5	4.8	504.6	1211	1992	2422	3138
RED HILL BOROUGH	MONTGOMERY CO.	PA.	45.	NE	59.3	0.8	1501.2	914	1086	1201	1711
SCHWENKSVILLE BORO	MONTGOMERY CO.	PA.	51.	NE	54.7	0.3	2696.7	563	620	809	977
SKIPPACK TWP	MONTGOMERY CO.	PA.	55.	NE	55.2	14.0	379.7	3843	4729	5316	7451
TRAPPE BOROUGH	MONTGOMERY CO.	PA.	54.	NE	51.3	2.1	798.1	773	1264	1676	1991
UPPER FREDERICK TWP	MONTGOMERY CO.	PA.	47.	NE	55.3	10.5	135.0	891	1157	1418	1823
UPPER HANOVER TWP	MONTGOMERY CO.	PA.	43.	NE	59.5	22.0	123.7	1762	2293	2721	3613
UPPER SALFORD TWP	MONTGOMERY CO.	PA.	50.	NE	57.7	8.9	219.1	1119	1273	1950	2006
ALDAN BOROUGH	DELAWARE CO.	PA.	78.	ENE	53.2	0.6	8335.0	3430	4324	5001	5580
CLIFTON HEIGHTS	DELAWARE CO.	PA.	77.	ENE	53.0	0.6	13913.3	7549	8005	8348	10329
COLLINGDALE BOROUGH	DELAWARE CO.	PA.	78.	ENE	53.7	0.9	11783.3	8443	10268	10605	13250
COLWYN BOROUGH	DELAWARE CO.	PA.	79.	ENE	55.0	0.2	15845.0	2143	3074	3169	3967
DARBY BOROUGH	DELAWARE CO.	PA.	78.	ENE	54.7	0.8	17161.2	13154	14059	13729	18141
EAST LANSDOWNE	DELAWARE CO.	PA.	76.	ENE	54.6	0.2	15930.0	3527	3224	3186	4160
HAVERFORD TWP	DELAWARE CO.	PA.	73.	ENE	53.2	9.9	5568.9	39641	54019	55132	69705
LANSDOWNE BOROUGH	DELAWARE CO.	PA.	77.	ENE	54.3	1.2	11741.7	12169	12601	14090	16260
MARPLE TWP	DELAWARE CO.	PA.	73.	ENE	50.4	10.4	2407.7	4779	19722	25040	25449
MILLBORNE BOROUGH	DELAWARE CO.	PA.	75.	ENE	55.7	0.1	6370.0	901	793	637	1023
MORTON BOROUGH	DELAWARE CO.	PA.	78.	ENE	51.2	0.4	6505.0	1352	2207	2602	2848
RADNOR TWP	DELAWARE CO.	PA.	69.	ENE	51.6	13.7	2004.3	14709	21697	27459	27997
RUTLEDGE BOROUGH	DELAWARE CO.	PA.	79.	ENE	50.9	0.1	11670.0	919	947	1167	1222
SPRINGFIELD TWP	DELAWARE CO.	PA.	77.	ENE	51.2	6.3	4604.1	10917	26733	29006	34496
UPPER DARBY TWP	DELAWARE CO.	PA.	75.	ENE	54.5	7.8	12296.2	84951	93158	95910	120209
YEADON BOROUGH	DELAWARE CO.	PA.	77.	ENE	55.3	1.6	7585.0	11068	11610	12136	14981
BRIDGEPORT BOROUGH	MONTGOMERY CO.	PA.	64.	ENE	54.7	0.7	8042.9	5827	5306	5630	8360
CONSHOHOCKEN BORO	MONTGOMERY CO.	PA.	67.	ENE	55.8	1.0	10195.0	10922	10259	10195	16163
EAST NORRITON TWP	MONTGOMERY CO.	PA.	62.	ENE	56.5	6.0	1972.8	2987	7773	11837	12247
LOWER MERION TWP	MONTGOMERY CO.	PA.	72.	ENE	55.2	23.8	2663.5	48745	59420	63392	93619
LOWER PROVIDENCE	MONTGOMERY CO.	PA.	59.	ENE	52.4	15.5	978.6	5887	9955	15169	15684
NARBERTH BOROUGH	MONTGOMERY CO.	PA.	72.	ENE	56.1	0.5	10302.0	5407	5109	5151	8049
NORRISTOWN BOROUGH	MONTGOMERY CO.	PA.	63.	ENE	55.0	3.6	10602.5	38126	38925	38169	61328
PLYMOUTH TWP	MONTGOMERY CO.	PA.	65.	ENE	56.7	8.5	1985.4	5118	11430	16876	18008
TOWAMENCIN TWP	MONTGOMERY CO.	PA.	56.	ENE	59.6	9.6	493.5	1604	3724	4738	5867
UPPER MERION TWP	MONTGOMERY CO.	PA.	65.	ENE	53.7	17.9	1324.0	6404	17096	23699	26935
WEST CONSHOHOCKEN	MONTGOMERY CO.	PA.	67.	ENE	54.9	0.9	2437.8	2482	2254	2194	3551
WEST NORRITON TWP	MONTGOMERY CO.	PA.	61.	ENE	54.3	5.1	2042.0	4879	8342	12456	13143
WHITEMARSH TWP	MONTGOMERY CO.	PA.	66.	ENE	58.7	14.7	1080.7	5977	12286	15886	19357
WHITPAIN TWP	MONTGOMERY CO.	PA.	63.	ENE	59.7	12.9	720.5	3063	7331	9295	11550
WORCESTER TWP	MONTGOMERY CO.	PA.	58.	ENE	57.1	17.7	239.7	1939	3250	4243	5121
WARD NO. 7	PHILA. CO.	PA.	78.	ENE	59.9	0.4	44225.0	21741	17079	17690	18593
WARD NO. 15	PHILA. CO.	PA.	76.	ENE	59.9	1.0	37275.0	39887	35988	37275	39178
WARD NO. 21	PHILA. CO.	PA.	71.	ENE	58.8	8.0	5536.4	41409	42761	44291	46551
WARD NO. 24	PHILA. CO.	PA.	76.	ENE	58.6	4.0	15015.2	63391	57987	60061	63127
WARD NO. 26	PHILA. CO.	PA.	79.	ENE	59.4	1.4	32912.1	56517	44486	46077	48429

TABLE 2.2.22 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
WARD NO. 27	PHILA. CO.	PA.	77.	ENE	58.1	1.4	17475.7	30070	23621	24466	25715
WARD NO. 29	PHILA. CO.	PA.	75.	ENE	59.7	0.8	36576.2	30333	28250	29261	30754
WARD NO. 30	PHILA. CO.	PA.	78.	ENE	59.4	0.5	48738.0	27208	23527	24369	25612
WARD NO. 34	PHILA. CO.	PA.	75.	ENE	56.0	1.8	29287.2	50695	50896	52717	55407
WARD NO. 36	PHILA. CO.	PA.	78.	ENE	58.7	1.3	36097.7	52786	45306	46927	49322
WARD NO. 44	PHILA. CO.	PA.	76.	ENE	57.5	1.2	31469.2	41552	36459	37763	39691
WARD NO. 46	PHILA. CO.	PA.	76.	ENE	56.6	2.2	37957.7	88206	80623	83507	87769
WARD NO. 48	PHILA. CO.	PA.	79.	ENE	58.7	4.8	7431.5	31800	34439	35671	37492
WARD NO. 51	PHILA. CO.	PA.	77.	ENE	56.9	1.5	29569.3	45301	42822	44354	46618
WARD NO. 52	PHILA. CO.	PA.	75.	ENE	56.9	2.6	20813.5	56372	52246	54115	56877
EAST GREENWICH TWP	GLOUCESTER CO.	NJ.	88.	E	54.6	15.0	218.7	2336	2722	3280	4635
ELK TWP	GLOUCESTER CO.	NJ.	96.	E	59.6	19.9	136.0	2074	2635	2707	4487
GREENWICH TWP	GLOUCESTER CO.	NJ.	85.	E	52.6	10.9	520.7	606	1245	5676	2120
HARRISON TWP	GLOUCESTER CO.	NJ.	92.	E	56.6	19.4	137.2	2225	2410	2661	4104
MANTUA TWP	GLOUCESTER CO.	NJ.	90.	E	58.6	16.1	598.9	3548	7991	9643	13607
NATIONAL PARK BORO	GLOUCESTER CO.	NJ.	83.	E	58.3	1.5	2486.7	2419	3380	3730	5755
PAULSBORO BOROUGH	GLOUCESTER CO.	NJ.	84.	E	54.7	2.1	3849.5	7842	8121	8084	13828
SOUTH HARRISON TWP	GLOUCESTER CO.	NJ.	95.	E	53.6	15.8	77.6	868	974	1226	1658
SWEDESBORO BOROUGH	GLOUCESTER CO.	NJ.	92.	E	51.4	0.8	2858.7	2459	2449	2287	4170
WENONAH BOROUGH	GLOUCESTER CO.	NJ.	88.	E	59.9	1.0	2364.0	1511	2100	2364	3576
WEST DEPTFORD TWP	GLOUCESTER CO.	NJ.	84.	E	57.3	18.3	761.1	5446	11152	13928	18989
WOODBURY CITY	GLOUCESTER CO.	NJ.	85.	E	59.5	2.1	5908.6	10931	12453	12408	21204
WOODBURY HEIGHTS	GLOUCESTER CO.	NJ.	87.	E	59.4	1.2	3017.5	1373	1723	3621	2934
WOOLWICH TWP	GLOUCESTER CO.	NJ.	92.	E	51.3	21.3	53.8	1343	1235	1147	2103
GIBBSTOWN	GLOUCESTER CO.	NJ.	85.	E	52.2	1.2	3105.8	2546	2820	3727	4802
UPPER PITTSGROVE	SALEM CO.	NJ.	100.	E	56.1	43.4	66.5	2204	2715	2884	3982
WOODSTOWN BOROUGH	SALEM CO.	NJ.	98.	E	50.6	1.6	1960.6	2345	2942	3137	4314
DARBY TWP	DELAWARE CO.	PA.	79.	E	53.4	1.4	9427.1	3454	12598	13198	16256
FOLCROFT BOROUGH	DELAWARE CO.	PA.	80.	E	53.3	1.4	6864.3	1909	7013	9610	9049
GLENOLDEN BOROUGH	DELAWARE CO.	PA.	79.	E	52.8	1.0	8697.0	6450	7249	8697	9354
NORWOOD BOROUGH	DELAWARE CO.	PA.	80.	E	52.4	0.8	9036.2	5246	6729	7229	8683
PROSPECT PARK BORO	DELAWARE CO.	PA.	80.	E	51.8	0.7	10357.1	5834	6596	7250	8511
RIDLEY PARK BORO	DELAWARE CO.	PA.	81.	E	50.8	1.1	8204.5	4921	7387	9025	9532
RIDLEY TWP	DELAWARE CO.	PA.	80.	E	50.5	5.2	7516.3	17212	35738	39085	46115
SHARON HILL BORO	DELAWARE CO.	PA.	79.	E	53.9	0.8	9330.0	5464	7123	7464	9191
TINICUM TWP	DELAWARE CO.	PA.	82.	E	52.6	9.0	545.1	5314	4375	4906	5645
WARD NO. 40	PHILA. CO.	PA.	79.	E	56.0	6.6	9024.8	64556	57507	59564	62604
BRIDGETON CITY	CUMBERLAND CO.	NJ.	112.	ESE	59.5	6.4	3193.0	18378	20966	20435	31356
GREENWICH TWP	CUMBERLAND CO.	NJ.	117.	ESE	54.4	19.1	50.4	966	1086	963	1624
HOPEWELL TWP	CUMBERLAND CO.	NJ.	113.	ESE	57.6	31.4	126.4	2460	3586	3970	5363
SHILOH BOROUGH	CUMBERLAND CO.	NJ.	112.	ESE	55.3	1.0	573.0	427	554	573	829
STOW CREEK TWP	CUMBERLAND CO.	NJ.	113.	ESE	53.6	19.1	55.0	957	1010	1050	1511
UPPER DEERFIELD TWP	CUMBERLAND CO.	NJ.	108.	ESE	58.2	30.0	169.3	2919	4242	5079	6344
SEABROOK FARMS	CUMBERLAND CO.	NJ.	108.	ESE	58.7	1.9	825.8	2284	1798	1569	2689
ALLOWAY TWP	SALEM CO.	NJ.	105.	ESE	51.0	35.9	71.0	1792	2226	2550	3264
ELMER BOROUGH	SALEM CO.	NJ.	102.	ESE	59.5	0.8	1990.0	1460	1505	1592	2207
DISTRICT 1	KENT CO.	DE.	130.	SE	52.1	62.3	54.6	1777	2434	3403	4953

TABLE 2.2.22 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DISTRICT 2	KENT CO.	DE.	134.	SE	57.8	79.4	279.4	2557	15868	22188	32291
CHESWOLD TOWN DT.2	KENT CO.	DE.	136.	SE	52.0	0.0	*******	31	34	48	69
DOVER CITY	KENT CO.	DE.	136.	SE	57.0	0.5	3684.0	1141	1317	1842	2680
LEIPSIC TOWN	KENT CO.	DE.	132.	SE	53.7	0.0	*******	253	281	393	572
LITTLE CREEK TOWN	KENT CO.	DE.	133.	SE	60.0	0.0	*******	266	306	428	623
CHESWOLD TOWN DT.3	KENT CO.	DE.	136.	SE	52.0	0.0	*******	261	247	345	503
DISTRICT 4	KENT CO.	DE.	142.	SE	53.8	64.7	76.8	2416	3552	4967	7228
HARTLY TOWN	KENT CO.	DE.	144.	SE	50.4	0.0	*******	139	164	229	334
DISTRICT 5	KENT CO.	DE.	137.	SE	55.8	8.7	513.0	970	3192	4463	6496
DOVER CITY	KENT CO.	DE.	136.	SE	57.0	1.5	5530.7	5082	5933	8296	12074
CAMDEN TOWN	KENT CO.	DE.	139.	SE	58.8	0.4	3932.5	606	1125	1573	2289
WYOMING TOWN	KENT CO.	DE.	139.	SE	58.1	0.4	4097.5	911	1172	1639	2385
DIST 1 HENDERSON	CAROLINE CO.	MD.	151.	SSE	53.4	35.3	37.6	1197	1248	1326	1321
GOLDSBORO TOWN	CAROLINE CO.	MD.	153.	SSE	56.0	0.0	*******	198	204	231	216
HENDERSON TOWN	CAROLINE CO.	MD.	151.	SSE	54.2	0.0	*******	106	129	135	137
MARYDEL TOWN	CAROLINE CO.	MD.	148.	SSE	52.3	0.0	*******	110	130	176	138
TEMPLEVILLE TOWN	CAROLINE CO.	MD.	148.	SSE	50.4	0.0	*******	16	28	19	30
DIST 2 GREENSBORO	CAROLINE CO.	MD.	155.	SSE	59.0	50.5	32.6	1440	1545	1644	1635
GREENSBORO TOWN	CAROLINE CO.	MD.	155.	SSE	59.4	0.5	2346.0	1181	1160	1173	1228
DIST 7 RIDGELY	CAROLINE CO.	MD.	159.	SSE	58.9	26.4	40.2	1008	885	1060	937
RIDGELY TOWN	CAROLINE CO.	MD.	160.	SSE	59.7	0.0	*******	834	886	822	938
BRIDGETOWN TOWN	CAROLINE CO.	MD.	157.	SSE	54.2	0.0	*******	16	39	41	41
TEMPLEVILLE TOWN	QUEEN ANNES CO.	MD.	149.	SSE	50.1	0.0	*******	66	70	83	82
CENTREVILLE TOWN	QUEEN ANNES CO.	MD.	169.	SSE	50.3	1.6	1158.1	1804	1863	1853	2193
DIST 6 RUTHSBURG	QUEEN ANNES CO.	MD.	162.	SSE	53.8	56.8	13.7	1010	875	778	1030
HIGHLAND BEACH TOWN	ANNE ARUNDEL CO.	MD.	190.	S	58.0	0.0	*******	5	5	6	10
DIST 4 KENT ISLAND	QUEEN ANNES CO.	MD.	182.	S	53.7	42.7	89.7	2205	3114	3832	3665
DIST 5 QUEENSTOWN	QUEEN ANNES CO.	MD.	174.	S	54.9	64.6	54.3	2779	3020	3509	3554
QUEENSTOWN TOWN	QUEEN ANNES CO.	MD.	173.	S	53.4	0.0	*******	316	355	387	418
DISTRICT 2	ANNE ARUNDEL CO.	MD.	197.	SSW	55.0	77.9	324.9	24207	14077	25306	28322
DISTRICT 4	ANNE ARUNDEL CO.	MD.	206.	SSW	50.8	81.2	604.8	19509	35415	49109	71252
ODENTON	ANNE ARUNDEL CO.	MD.	207.	SSW	51.7	3.2	1871.6	1059	1914	5989	3851
DISTRICT 6	ANNE ARUNDEL CO.	MD.	193.	SSW	55.2	7.8	703.5	0	4621	5487	9297
ANNAPOLIS CITY	ANNE ARUNDEL CO.	MD.	193.	SSW	55.2	5.9	5015.6	10047	23385	29592	47049
WOODLAND BEACH	ANNE ARUNDEL CO.	MD.	195.	SSW	58.6	2.6	1093.8	0	1855	2844	3732
DIST 14 BOWIE	PR. GEORGES CO.	MD.	208.	SSW	59.0	34.2	376.7	3935	5587	12882	12042
BOWIE TOWN	PR. GEORGES CO.	MD.	207.	SSW	58.6	1.7	9575.9	860	1059	16279	2282
DIST 4 LISBON	HOWARD CO.	MD.	234.	SW	52.5	63.5	66.9	2828	3309	4250	10328
DIST 5 CLARKSVILLE	HOWARD CO.	MD.	223.	SW	52.2	57.3	236.2	2551	4119	13536	12856
DIST 6 GUELFORD	HOWARD CO.	MD.	216.	SW	51.0	35.2	320.6	4312	7825	11284	24423
SAVAGE	HOWARD CO.	MD.	215.	SW	51.8	0.9	2351.1	1238	1341	2116	4185
DIST 1 LAYTONSVILLE	MONTGOMERY CO.	MD.	230.	SW	59.2	43.6	72.5	1617	1937	3159	3581
LAYTONSVILLE TOWN	MONTGOMERY CO.	MD.	231.	SW	59.9	0.0	*******	132	196	293	362
DIST 5 COLESVILLE	MONTGOMERY CO.	MD.	219.	SW	59.9	40.3	1230.9	6773	20904	49605	38643
DIST 8 OLNEY	MONTGOMERY CO.	MD.	226.	SW	59.3	45.6	279.7	3491	5180	12754	9576
BROOKEVILLE TOWN	MONTGOMERY CO.	MD.	226.	SW	57.9	0.0	*******	117	140	136	259
DIST 1 VANSVILLE	PR. GEORGES CO.	MD.	214.	SW	59.6	20.0	979.7	3779	7192	19594	15501

TABLE 2.2.22 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DIST 10 LAUREL	PR. GEORGES CO.	MD.	215.	SW	56.0	10.6	1986.2	1541	2701	21054	5821
LAUREL TOWN	PR. GEORGES CO.	MD.	214.	SW	54.8	1.3	8096.2	4482	8503	10525	18326
DIST 10 MIDDLEBURG	CARROLL CO.	MD.	259.	WSW	52.3	20.9	62.5	1064	1080	1306	1539
UNION BRIDGE TOWN	CARROLL CO.	MD.	255.	WSW	50.0	0.0	*******	840	833	904	1187
DIST 13 MOUNT AIRY	CARROLL CO.	MD.	241.	WSW	52.3	15.6	115.1	992	1435	1795	2045
MOUNT AIRY TOWN	CARROLL CO.	MD.	240.	WSW	53.7	0.7	1872.9	838	985	1311	1404
DIST. 4 CREAGERS	FREDERICK CO.	MD.	258.	WSW	58.8	19.5	58.5	880	976	1140	1431
DIST. 8 LIBERTY	FREDERICK CO.	MD.	250.	WSW	54.9	22.3	56.4	1106	1123	1257	1647
DIST. 9 NEW MARKET	FREDERICK CO.	MD.	244.	WSW	60.0	49.8	91.7	2458	3238	4565	4748
NEW MARKET TOWN	FREDERICK CO.	MD.	244.	WSW	59.3	0.0	*******	301	358	339	525
DIST. 11 WOODSBORO	FREDERICK CO.	MD.	255.	WSW	57.0	27.4	61.6	1402	1503	1688	2204
WOODSBORO TOWN	FREDERICK CO.,	MD.	255.	WSW	57.5	0.0	*******	427	430	439	631
DIST. 13	FREDERICK CO.	MD.	249.	WSW	59.7	19.0	81.9	920	1018	1556	1493
DIST. 17 JOHNSVILLE	FREDERICK CO.	MD.	254.	WSW	52.0	27.4	48.0	1225	1102	1314	1616
DIST. 18 WOODVILLE	FREDERICK CO.	MD.	243.	WSW	54.1	25.6	55.3	946	1081	1416	1585
MOUNT AIRY TOWN	FREDERICK CO.	MD.	241.	WSW	53.9	0.2	2570.0	223	367	514	538
DIST. 19 LINGANORE	FREDERICK CO.	MD.	248.	WSW	50.9	17.4	48.1	735	760	837	1114
DIST. 26	FREDERICK CO.	MD.	252.	WSW	59.9	14.4	57.4	599	739	827	1084
DIST 12 DAMASCUS	MONTGOMERY CO.	MD.	236.	WSW	59.4	32.1	198.5	2825	4488	6372	8296
DIST 5 EMMITSBURG	FREDERICK CO.	MD.	264.	W	55.7	46.1	84.5	3138	3205	3896	4699
EMMITSBURG TOWN	FREDERICK CO.	MD.	267.	W	56.1	0.5	3064.0	1261	1369	1532	2007
CUMBERLAND TWP	ADAMS CO.	PA.	276.	W	52.7	34.0	102.9	1999	2925	3497	3667
FAIRFIELD BOROUGH	ADAMS CO.	PA.	272.	W	58.2	0.5	1094.0	451	519	547	651
FRANKLIN TWP	ADAMS CO.	PA.	273.	W	56.1	70.2	39.1	2334	2483	2744	3113
FREEDOM TWP	ADAMS CO.	PA.	270.	W	52.6	14.2	39.1	464	470	555	589
GETTYSBURG BOROUGH	ADAMS CO.	PA.	276.	W	51.1	1.5	4850.0	7046	7960	7275	9981
HAMILTONBAN TWP	ADAMS CO.	PA.	273.	W	58.7	40.8	41.3	1673	1779	1686	2231
HIGHLAND TWP	ADAMS CO.	PA.	274.	W	55.8	11.9	55.6	409	546	662	685
LIBERTY TWP	ADAMS CO.	PA.	269.	W	58.2	21.6	49.8	608	724	1075	908
ARENDTSVILLE BORO	ADAMS CO.	PA.	282.	WNW	55.5	0.7	841.4	409	588	589	737
BENDERSVILLE BORO	ADAMS CO.	PA.	287.	WNW	54.0	0.4	1320.0	409	484	528	607
BIGLERVILLE BOROUGH	ADAMS CO.	PA.	283.	WNW	53.0	0.7	1395.7	870	923	977	1157
BUTLER TWP	ADAMS CO.	PA.	283.	WNW	52.3	23.6	74.4	1295	1504	1757	1886
MENALLEN TWP	ADAMS CO.	PA.	287.	WNW	54.0	43.0	45.0	1514	1827	1937	2291
CARLISLE BOROUGH	CUMBERLAND CO.	PA.	302.	WNW	57.8	3.5	5165.4	16812	16623	18079	25695
COOKE TWP	CUMBERLAND CO.	PA.	289.	WNW	57.5	20.4	3.5	36	16	71	25
DICKINSON TWP	CUMBERLAND CO.	PA.	297.	WNW	59.2	45.8	52.8	1936	2025	2416	3130
MONROE TWP	CUMBERLAND CO.	PA.	304.	WNW	51.0	26.8	124.1	1875	2298	3326	3552
MOUNT HOLLY SPRINGS	CUMBERLAND CO.	PA.	297.	WNW	54.8	0.3	6696.7	1701	1840	2009	2044
NORTH MIDDLETON TWP	CUMBERLAND CO.	PA.	304.	WNW	59.7	25.4	258.7	3208	5079	6572	7851
SOUTH MIDDLETON TWP	CUMBERLAND CO.	PA.	300.	WNW	55.6	48.4	124.0	4204	4242	6000	6557
BOILING SPRINGS	CUMBERLAND CO.	PA.	301.	WNW	53.0	2.6	585.0	0	1182	1521	1827
EAST PENNSBORO TWP	CUMBERLAND CO.	PA.	316.	NW	51.3	10.7	1162.6	5582	8977	12440	13876
HAMPDEN TWP	CUMBERLAND CO.	PA.	312.	NW	51.1	17.4	680.9	2095	6558	11847	10137
MECHANICSBURG BORO	CUMBERLAND CO.	PA.	308.	NW	50.1	1.8	5213.9	6786	8123	9385	12556
MIDDLESEX TWP	CUMBERLAND CO.	PA.	306.	NW	56.8	26.0	109.9	1632	2333	2857	3606
SILVER SPRING TWP	CUMBERLAND CO.	PA.	308.	NW	53.2	33.6	188.2	2509	4044	6324	6251

TABLE 2.2.22 (Continued)

(HISTORICAL)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DAUPHIN BOROUGH	DAUPHIN COUNTY	PA.	320.	NW	54.8	0.4	2495.0	667	638	998	726
HALIFAX TWP	DAUPHIN COUNTY	PA.	324.	NW	59.4	30.5	66.8	1424	1747	2038	1987
MIDDLE PAXTON TWP	DAUPHIN COUNTY	PA.	321.	NW	55.4	57.7	58.3	2155	3124	3362	3553
REED TWP	DAUPHIN COUNTY	PA.	320.	NW	58.8	8.6	30.1	246	251	259	285
DUNCANNON BOROUGH	PERRY CO.	PA.	317.	NW	59.5	0.4	4347.5	1852	1800	1739	1941
MARYSVILLE BOROUGH	PERRY CO.	PA.	319.	NW	53.4	2.2	1058.2	2158	2580	2328	2783
PENN TWP	PERRY CO.	PA.	316.	NW	59.2	22.7	100.0	1603	2072	2269	2235
RYE TWP	PERRY CO.	PA.	314.	NW	56.1	24.9	52.9	690	832	1316	897
WATTS TWP	PERRY CO.	PA.	314.	NW	53.2	12.4	49.4	425	520	613	561
ELIZABETHVILLE BORO	DAUPHIN COUNTY	PA.	331.	NNW	58.9	0.4	4072.5	1506	1455	1629	1655
JEFFERSON TWP	DAUPHIN COUNTY	PA.	337.	NNW	56.8	24.4	6.7	150	178	164	202
RUSH TWP	DAUPHIN COUNTY	PA.	338.	NNW	55.1	23.5	6.8	103	113	160	129
WAYNE TWP	DAUPHIN COUNTY	PA.	328.	NNW	57.2	13.9	36.9	363	432	513	491
WILLIAMSTOWN BORO	DAUPHIN COUNTY	PA.	342.	NNW	59.7	0.3	6396.7	2332	2097	1919	2385
WILLIAMS TWP	DAUPHIN COUNTY	PA.	341.	NNW	59.9	8.5	111.2	1109	951	945	1082
COLD SPRING TWP	LEBANON CO.	PA.	341.	NNW	54.1	20.4	5.7	67	71	117	83
PORTER TWP	SCHUYLKILL CO.	PA.	347.	NNW	59.3	17.9	141.1	3004	2738	2525	2492
TOWER CITY BOROUGH	SCHUYLKILL CO.	PA.	345.	NNW	59.2	0.6	2956.7	2054	1968	1774	1791
				TOTALS		3371.1		1564946	1797431	2111033	2439392
				DENSITY				464.2	533.2	626.2	723.6

TABLE 2.2.23

POPULATION DISTRIBUTION BETWEEN 5 MILES AND 60 MILES
OF PEACH BOTTOM UNITS 2 AND 3
BY RADIAL INCREMENT AND DIRECTION FROM SITE

(HISTORICAL)

PEACH BOTTOM ATOMIC POWER STATION
POPULATION DISTRIBUTION AROUND SITE

DIRECTION		5.- 10.	10.- 20.	20.- 30.	30.- 40.	40.- 50.	50.- 60.	
N	1950	832	79923	36793	12838	24911	11844	167141
	1960	923	83565	48355	15383	29052	12134	189412
	1970	997	83097	63099	18409	33551	12776	211929
	1980	1278	115720	66962	19513	33129	11408	248010
NNE	1950	751	10255	16050	21678	174305	30743	253782
	1960	877	12500	19535	26423	182658	34633	276626
	1970	1024	14978	24388	31247	188626	40331	300594
	1980	1215	17310	27051	32357	200546	37886	316365
NE	1950	797	3103	14148	9977	62080	36869	126974
	1960	978	3725	16398	12806	74971	48748	157626
	1970	1178	4234	20431	17794	85808	59881	189326
	1980	1354	5158	28235	22689	118788	70730	246954
ENE	1950	651	4453	23275	45132	67539	1046287	1187337
	1960	739	5542	25086	60713	104801	1105391	1302272
	1970	834	6857	25451	88211	139499	1184691	1445543
	1980	1023	9734	46400	111685	168224	1359734	1696800
E	1950	689	6414	16149	176644	151915	172436	524247
	1960	782	7634	22789	219952	204904	221382	677443
	1970	882	8478	28588	292467	239658	248538	818611
	1980	1083	14012	41719	416737	303802	301208	1078561
ESE	1950	952	4498	13965	5852	21914	31643	78824
	1960	1296	6524	23534	6428	26335	36973	101090
	1970	1444	7809	27264	8566	27223	37781	110087
	1980	1913	9762	38444	12182	38620	55187	156108
SE	1950	753	10106	1264	8024	6376	16410	42933
	1960	1046	17086	1691	9482	8407	35625	73337
	1970	1149	17905	2321	11226	11648	49814	94063
	1980	1565	25567	2530	15446	16879	72497	134484
SSE	1950	1161	19822	314	6411	6755	8986	43449
	1960	1484	30390	328	7352	7506	9062	56122
	1970	1797	37533	327	7678	8274	9341	64950
	1980	2910	59594	399	8942	8848	9926	90619
S	1950	1160	3980	10188	1102	3608	5305	25343
	1960	1482	6570	15852	1320	3905	6494	35623
	1970	1795	11506	29845	1352	4082	7734	56314
	1980	2906	12883	30613	1606	4750	7647	60405
SSW	1950	1160	7532	10450	962853	75093	59617	1116705
	1960	1482	12701	44363	1033945	152176	87913	1332580
	1970	1795	21843	62297	1031786	216766	147488	1481975
	1980	2906	24906	72288	1175418	300564	177827	1753909
SW	1950	1160	2726	11296	172054	43604	32861	263701
	1960	1482	3192	28614	221179	69875	63347	387689
	1970	1795	4610	63667	409707	95288	148306	723373
	1980	2906	6260	46624	290490	130712	143861	620853
WSW	1950	1335	1552	7086	19534	14959	17781	62247
	1960	1550	1789	8345	23516	16366	21516	73082
	1970	1929	2532	9910	45716	20649	27560	108316
	1980	2767	3398	13598	35062	23324	33087	111236
W	1950	844	3581	8166	32754	16988	19383	81716
	1960	822	3615	9022	38388	20096	21980	93923
	1970	877	4086	10459	41836	23561	23469	104288
	1980	1057	4649	11600	49554	26179	28531	121570
WNW	1950	622	6105	96397	19683	12064	34269	169140
	1960	619	6856	100004	29637	14175	38631	189922
	1970	683	8578	102909	38230	17028	45782	213210
	1980	795	8814	128573	38071	18024	58159	252436
NW	1950	475	6969	13369	26419	175468	29824	252524
	1960	475	8308	22997	34156	203178	43599	312715
	1970	528	9928	30150	36150	214004	57775	348535
	1980	611	10681	29804	42159	249170	61394	393819
NNW	1950	1294	11206	36035	15764	68624	10688	143611
	1960	1368	15919	44404	20304	79186	10003	171184
	1970	1332	21568	52781	25464	88559	9746	199450
	1980	1894	22045	61489	25921	91726	10310	213385
RING TOTALS								
	1950	14636	182225	314945	1536719	926203	1564946	4539674
	1960	17405	225916	431317	1760986	1197591	1797431	5430646
	1970	20039	265542	553887	2105839	1414224	2111033	6470564
	1980	28183	350493	646329	2297832	1733285	2439392	7495514

TABLE 2.2.23.1

COMPARISON BETWEEN 1970 PROJECTED AND 1970 CENSUS POPULATION DISTRIBUTION BETWEEN 5 MILES AND 60 MILES OF THE PEACH BOTTOM UNITS 2 AND 3 BY RADIAL INCREMENT AND BY DIRECTION FROM SITE (HISTORICAL)

PEACH BOTTOM ATOMIC POWER STATION
POPULATION DISTRIBUTION AROUND SITE

DIRECTION		5.- 10.	10.- 20.	20.- 30.	30.- 40.	40.- 50.	50.- 60.	
N	1960	923	83565	48355	15383	29052	12134	189412
	1970	997	83097	63099	18409	33551	12776	211929
	70-P	1045	94629	54758	17028	31129	11864	210453
	1980	1278	115720	66962	19513	33129	11408	248010
NNE	1960	877	12500	19535	26423	182658	34633	276626
	1970	1024	14978	24388	31247	188626	40331	300594
	70-P	993	14156	22121	28716	191917	36325	294228
	1980	1215	17310	27051	32357	200546	37886	316365
NE	1960	978	3725	16398	12806	74971	48748	157626
	1970	1178	4234	20431	17794	85808	59881	189326
	70-P	1108	4220	21116	16854	94229	58898	196425
	1980	1354	5159	28235	22689	118788	70730	246954
ENE	1960	739	5542	25086	60713	104801	1105391	1302272
	1970	834	6857	25451	88211	139499	1184691	1445543
	70-P	837	7225	33781	81510	130828	1215556	1469737
	1980	1023	9734	46400	111685	168224	1359734	1696800
E	1960	782	7634	22789	219952	204904	221382	677443
	1970	882	8478	28588	292467	239658	248538	818611
	70-P	886	10242	30224	293148	243925	256441	834866
	1980	1083	14012	41719	416737	303802	301208	1078561
ESE	1960	1296	6524	23534	6428	26335	36973	101090
	1970	1444	7809	27264	8566	27223	37781	110087
	70-P	1575	8047	29832	8566	31578	45945	125543
	1980	1913	9762	38444	12182	38620	55187	156108
SE	1960	1046	17086	1691	9482	8407	35625	73337
	1970	1149	17905	2321	11226	11648	49814	94063
	70-P	1291	21076	2086	11998	11648	49814	97913
	1980	1565	25567	2530	15446	16879	72497	134484
SSE	1960	1484	30390	328	7352	7506	9062	56122
	1970	1797	37533	327	7678	8274	9341	64950
	70-P	2138	43779	380	8525	8304	9708	72834
	1980	2910	59594	399	8942	8848	9926	90619
S	1960	1482	6570	15852	1320	3905	6494	35623
	1970	1795	11506	29845	1352	4082	7734	56314
	70-P	2135	9464	22650	1531	4528	7171	47479
	1980	2906	12883	30613	1606	4750	7647	60405
SSW	1960	1482	12701	44363	1033945	152176	87913	1332580
	1970	1795	21843	62297	1031786	216766	147488	1481975
	70-P	2135	18298	58122	1104870	227336	136153	1546914
	1980	2906	24906	72288	1175418	300564	177827	1753909
SW	1960	1482	3192	28614	221179	69875	63347	387689
	1970	1795	4610	63667	409707	95288	148306	723373
	70-P	2135	4599	37489	255497	97271	104192	501183
	1980	2906	6260	46624	290490	130712	143861	620853
WSW	1960	1550	1789	8345	23516	16366	21516	73082
	1970	1929	2532	9910	45716	20649	27580	108316
	70-P	2108	2526	10933	30011	20623	27423	93624
	1980	2767	3398	13598	35062	23324	33087	111236
W	1960	822	3615	9022	38388	20096	21980	93923
	1970	877	4086	10459	41836	23561	23469	104288
	70-P	929	4088	10205	43801	23428	25140	107591
	1980	1057	4649	11600	49554	26179	28531	121570
WNW	1960	619	6856	100004	29637	14175	38631	189922
	1970	683	8578	102909	38230	17028	45782	213210
	70-P	700	7755	113104	33516	16013	47714	218802
	1980	795	8814	128573	38071	18024	58159	252436
NW	1960	475	8308	22997	34158	203178	43599	312715
	1970	528	9928	30150	36150	214004	57775	348535
	70-P	537	9396	26013	37577	224183	51819	349525
	1980	611	10681	29804	42159	249170	61394	393819
NNW	1960	1368	15919	44404	20304	79186	10003	171184
	1970	1332	21568	52781	25464	88559	9746	199450
	70-P	1549	18027	50284	22490	85361	10163	187874
	1980	1894	22045	61489	25921	91726	10310	213385
RING TOTALS								
	1960	17405	225916	431317	1760986	1197591	1797431	5430646
	1970	20039	265542	553887	2105839	1414224	2111033	6470564
	70-P	22101	277527	523098	1995638	1442301	2094326	6354991
	1980	28183	350493	646329	2297832	1733285	2439392	7495514

1960
1970*
70-P**
1980

*1970 Census.
**1970 Projected. For sources, see Table 2.2.16.

TABLE 2.2.24

POPULATION DENSITY* BETWEEN 5 MILES AND 60 MILES OF PEACH BOTTOM UNITS 2 AND 3 BY RADIAL INCREMENT AND BY DIRECTION FROM SITE

(HISTORICAL)

PEACH BOTTOM ATOMIC POWER STATION
POPULATION DENSITY DISTRIBUTION AROUND SITE

DIRECTION		5.- 10.	10.- 20.	20.- 30.	30.- 40.	40.- 50.	50.- 60.	
N	1950	73.4	1153.3	319.4	112.6	110.3	61.8	229.8
	1960	81.5	1205.8	419.7	134.9	128.7	63.3	260.4
	1970	88.0	1199.1	547.7	161.5	148.6	66.6	291.3
	1980	112.8	1669.8	581.3	171.2	146.7	59.5	340.9
NNE	1950	49.2	142.3	184.9	174.8	845.7	147.3	356.0
	1960	57.4	173.5	225.1	213.1	886.3	165.9	388.0
	1970	67.0	207.9	281.0	252.0	915.2	193.2	421.6
	1980	79.5	240.3	311.6	260.9	973.1	181.5	443.8
NE	1950	49.3	74.8	157.6	73.1	364.3	171.6	189.8
	1960	60.5	89.8	182.6	93.8	440.0	226.9	235.6
	1970	72.8	102.1	227.5	130.4	503.6	278.8	282.9
	1980	83.7	124.4	314.4	166.2	697.1	329.3	369.1
ENE	1950	47.2	59.2	252.7	281.7	393.6	4607.2	1604.4
	1960	53.6	73.7	272.4	379.0	610.7	4867.4	1759.8
	1970	60.5	91.1	276.3	550.6	812.9	5216.6	1953.4
	1980	74.2	129.4	503.8	697.2	980.3	5987.4	2292.9
E	1950	47.2	120.1	187.8	981.9	820.7	785.2	709.8
	1960	53.6	142.9	265.0	1222.6	1107.0	1008.1	917.2
	1970	60.4	158.7	332.4	1625.7	1294.7	1131.8	1108.3
	1980	74.2	262.3	485.1	2316.5	1641.3	1371.6	1460.2
ESE	1950	58.1	58.9	156.6	60.3	133.6	217.3	133.9
	1960	79.1	85.4	263.8	66.2	160.6	253.9	171.7
	1970	88.1	102.2	305.7	88.2	186.0	259.5	187.0
	1980	116.8	127.8	431.0	125.5	235.5	379.0	265.2
SE	1950	59.6	129.5	25.1	38.5	52.4	75.3	62.3
	1960	82.8	219.0	33.6	45.5	69.1	163.5	106.4
	1970	90.9	229.5	46.1	53.8	95.8	228.6	136.5
	1980	123.8	327.7	50.2	74.0	138.8	332.7	195.1
SSE	1950	68.8	195.9	****	51.2	27.9	52.5	66.2
	1960	87.9	300.4	****	58.8	31.0	53.0	85.5
	1970	106.5	371.0	****	61.4	34.2	54.6	98.9
	1980	172.4	589.0	****	71.5	36.5	58.0	138.0
S	1950	68.8	82.2	123.2	27.4	49.6	49.4	68.8
	1960	87.9	135.6	191.7	32.8	53.7	60.5	96.7
	1970	106.5	237.5	360.9	33.6	56.1	72.1	152.9
	1980	172.4	265.9	370.2	40.0	65.3	71.3	164.1
SSW	1950	68.8	110.7	139.1	9049.4	432.6	277.9	1706.2
	1960	87.9	186.7	590.7	9717.5	876.6	409.9	2036.0
	1970	106.5	321.0	829.5	9697.2	1248.7	687.6	2264.3
	1980	172.4	366.0	962.6	11047.2	1731.4	829.0	2679.8
SW	1950	68.8	48.3	93.7	1643.3	345.5	103.2	354.8
	1960	87.9	56.5	237.3	2112.5	553.7	199.0	521.7
	1970	106.5	81.6	527.9	3913.2	755.1	465.9	973.4
	1980	172.4	110.8	386.6	2774.5	1035.8	452.0	835.4
WSW	1950	61.6	51.4	49.5	111.2	113.1	60.8	78.3
	1960	71.5	59.2	58.3	133.9	123.7	73.6	91.9
	1970	89.0	83.8	69.3	260.3	156.1	94.4	136.2
	1980	127.7	112.4	95.0	199.7	176.3	113.2	139.9
W	1950	51.5	69.3	123.4	223.7	78.9	80.3	110.9
	1960	50.2	70.0	136.3	262.2	93.4	91.1	127.4
	1970	53.5	79.1	158.0	285.8	109.5	97.3	141.5
	1980	64.5	90.0	175.2	338.5	121.6	118.2	164.9
WNW	1950	37.7	88.6	964.9	158.6	57.7	141.8	222.5
	1960	37.5	99.5	1001.0	238.8	67.8	159.9	249.9
	1970	41.4	124.5	1030.1	308.1	81.4	189.5	280.5
	1980	48.2	127.9	1287.0	306.8	86.2	240.7	332.1
NW	1950	36.9	89.6	264.2	193.3	1038.9	119.6	362.8
	1960	36.9	106.9	454.5	249.9	1202.9	174.9	449.2
	1970	41.0	127.7	595.9	264.4	1267.0	231.7	500.7
	1980	47.5	137.4	589.0	308.4	1475.3	246.3	565.7
NNW	1950	76.1	162.7	297.6	133.7	300.9	97.3	216.6
	1960	80.4	231.1	366.7	172.2	347.2	91.0	258.2
	1970	78.3	313.1	435.8	216.0	388.2	88.7	300.9
	1980	111.3	320.0	507.8	219.9	402.1	93.8	321.9
	1950	58.1	175.6	230.1	732.7	329.3	464.2	415.0
	1960	69.0	217.7	315.1	839.6	425.7	533.2	496.4
	1970	79.5	255.9	404.7	1004.0	502.8	626.2	591.5
	1980	111.8	337.8	472.2	1095.6	616.2	723.6	685.2

*Densities are persons per square mile of land area.

Note: SSE 20-30 miles, no area is available for Betterton Town, Kent Co., Md. It is included in District 3 Worton, Kent Co., Md., in the 30-40 mile ring, SSE.

TABLE 2.2.24.1

COMPARISION BETWEEN 1970 PROJECTED AND 1970 CENSUS POPULATION DENSITY* BETWEEN 5 MILES AND 60 MILES OF PEACH BOTTOM UNITS 2 AND 3 BY RADIAL INCREMENT AND BY DIRECTION FROM SITE

(HISTORICAL)

PEACH BOTTOM ATOMIC POWER STATION
POPULATION DENSITY DISTRIBUTION ARCUND SITE

DIRECTION		5.- 10.	10.- 20.	20.- 30.	30.- 40.	40.- 50.	50.- 60.	
N	1960	81.5	1205.8	419.7	134.9	128.7	63.3	260.4
	1970	88.0	1199.1	547.7	161.5	148.6	66.6	291.3
	70-P	92.2	1365.5	475.3	149.4	137.9	61.9	289.3
	1980	112.8	1669.8	581.3	171.2	146.7	59.5	340.9
NNE	1960	57.4	173.5	225.1	213.1	886.3	165.9	388.0
	1970	67.0	207.9	281.0	252.0	915.2	193.2	421.6
	70-P	65.0	196.5	254.9	231.6	931.2	174.1	412.7
	1980	79.5	240.3	311.6	260.9	973.1	181.5	443.8
NE	1960	60.5	89.8	182.6	93.8	440.0	226.9	235.6
	1970	72.8	102.1	227.5	130.4	503.6	278.8	282.9
	70-P	68.5	101.7	235.1	123.5	553.0	274.2	293.5
	1980	83.7	124.4	314.4	166.2	697.1	329.3	369.1
ENE	1960	53.6	73.7	272.4	379.0	610.7	4867.4	1759.8
	1970	60.5	91.1	276.3	550.6	812.9	5216.6	1953.4
	70-P	60.7	96.0	366.8	508.8	762.4	5352.5	1986.1
	1980	74.2	129.4	503.8	697.2	980.3	5987.4	2292.9
E	1960	53.6	142.9	265.0	1222.6	1107.0	1008.1	917.2
	1970	60.4	158.7	332.4	1625.7	1294.7	1131.8	1108.3
	70-P	60.7	191.7	351.4	1629.5	1317.8	1167.8	1130.3
	1980	74.2	262.3	485.1	2316.5	1641.3	1371.6	1460.2
ESE	1960	79.1	85.4	263.8	66.2	160.6	253.9	171.7
	1970	88.1	102.2	305.7	88.2	166.0	259.5	187.0
	70-P	96.1	105.3	334.4	88.2	192.5	315.6	213.3
	1980	116.8	127.8	431.0	125.5	235.5	379.0	265.2
SE	1960	82.8	219.0	33.6	45.5	69.1	163.5	106.4
	1970	90.9	229.5	46.1	53.8	95.8	228.6	136.5
	70-P	102.2	270.1	41.4	57.5	95.8	228.6	142.1
	1980	123.8	327.7	50.2	74.0	138.8	332.7	195.1
SSE	1960	87.9	300.4	****	58.8	31.0	53.0	85.5
	1970	106.5	371.0	****	61.4	34.2	54.6	98.9
	70-P	126.7	432.7	****	68.1	34.3	56.7	111.0
	1980	172.4	589.0	****	71.5	36.5	58.0	138.0
S	1960	87.9	135.6	191.7	32.8	53.7	60.5	96.7
	1970	106.5	237.5	360.9	33.6	56.1	72.1	152.9
	70-P	126.7	195.4	273.9	38.1	62.3	66.8	128.9
	1980	172.4	265.9	370.2	40.0	65.3	71.3	164.1
SSW	1960	87.9	186.7	590.7	9717.5	876.6	409.9	2036.0
	1970	106.5	321.0	829.5	9697.2	1248.7	687.6	2264.3
	70-P	126.7	268.9	773.9	10384.1	1309.5	634.7	2363.5
	1980	172.4	366.0	962.6	11047.2	1731.4	829.0	2679.8
SW	1960	87.9	56.5	237.3	2112.5	553.7	199.0	521.7
	1970	106.5	81.6	527.9	3913.2	755.1	465.9	973.4
	70-P	126.7	81.4	310.9	2440.3	770.8	327.3	674.4
	1980	172.4	110.8	386.6	2774.5	1035.8	452.0	835.4
WSW	1960	71.5	59.2	58.3	133.9	123.7	73.6	91.9
	1970	89.0	83.8	69.3	260.3	156.1	94.4	136.2
	70-P	97.3	83.6	76.4	170.9	155.9	93.8	117.7
	1980	127.7	112.4	95.0	199.7	176.3	113.2	139.9
W	1960	50.2	70.0	136.3	262.2	93.4	91.1	127.4
	1970	53.5	79.1	158.0	285.8	109.5	97.3	141.5
	70-P	56.7	79.1	154.2	299.2	108.9	104.2	146.0
	1980	64.5	90.0	175.2	338.5	121.6	118.2	164.9
WNW	1960	37.5	99.5	1001.0	238.8	67.8	159.9	249.9
	1970	41.4	124.5	1030.1	308.1	81.4	189.5	280.5
	70-P	42.4	112.5	1132.2	270.1	76.6	197.5	287.9
	1980	48.2	127.9	1287.0	306.8	86.2	240.7	332.1
NW	1960	36.9	106.9	454.5	249.9	1202.9	174.9	449.2
	1970	41.0	127.7	595.9	264.4	1267.0	231.7	500.7
	70-P	41.7	120.8	514.1	274.9	1327.3	207.9	502.1
	1980	47.5	137.4	589.0	308.4	1475.3	246.3	565.7
NNW	1960	80.4	231.1	366.7	172.2	347.2	91.0	258.2
	1970	78.3	313.1	435.8	216.0	388.2	88.7	300.9
	70-P	91.1	261.7	415.2	190.8	374.2	92.5	283.4
	1980	111.3	320.0	507.8	219.9	402.1	93.8	321.9
	1960	69.0	217.7	315.1	839.6	425.7	533.2	496.4
	1970	79.5	255.9	404.7	1004.0	502.8	626.2	591.5
	70-P	87.7	267.5	382.2	951.5	512.7	621.3	580.9
	1980	111.8	337.8	472.2	1095.6	616.2	723.6	685.2

1960

1970**

70-P***

1980

*Densities are persons per square mile of land area.

**1970 Census

***1970 Projected. For sources, see Table 2.2.16.

Note: SSE 20-30 miles, no area is available for Betterton Town, Kent Co., Md. It is included in District 3 Worton, Kent Co., Md., in the 30-40 mile ring, SSE.

TABLE 2.2.25

INITIAL ESTIMATED POPULATION DISTRIBUTION* WITHIN

5 MILES OF THE PEACH BOTTOM UNITS 2 AND 3

BY RADIAL 1-MILE INCREMENTS AND BY DIRECTION

FROM SITE

(HISTORICAL)

Direction	0-1** Mile	1-2 Miles	2-3 Miles	3-4 Miles	4-5 Miles	0-5 Miles
N	-	-	89	16	37	142
NNE	-	21	24	58	47	150
NE	-	6	49	111	54	220
ENE	-	26	77	106	280	489
E	-	-	297	43	80	420
ESE	-	-	-	35	49	84
SE	-	-	-	-	50	50
SSE	3	6	-	36	389	434
S	3	29	24	101	115	272
SSW	3	45	16	42	83	189
SW	-	51	42	744	857	1,694
WSW	3	22	35	138	67	265
W	6	26	38	80	314	464
WNW	32	32	13	58	144	279
NW	29	141	176	246	207	799
NNW	35	77	24	19	39	194
Total	114	482	904	1,833	2,812	6,145

* Distribution determined by counting electric meters and converting to population. Conversion factors for PECO meters (1966) are based on the 1960 Bureau of Census' population per housing unit factor for York Co., Pennsylvania and Harford Co., Maryland, whereas, factors for PP&L meters (1964) are based on the 1960 ratio of the number of customers to the Bureau of Census population for Drumore, Fulton, and Martic Townships, Lancaster Co., Pennsylvania

** There are no residents within the site boundary (2,500 ft minimum).

TABLE 2.2.25.1

CURRENT ESTIMATED POPULATION DISTRIBUTION*

WITHIN 5 MILES OF PEACH BOTTOM UNITS 2 AND 3

BY RADIAL 1-MILE INCREMENTS AND BY DIRECTION FROM SITE

Direction	0-1** Miles	1-2 Miles	2-3 Miles	3-4 Miles	4-5 Miles	0-5 Miles
N	-	-	90	31	45	166
NNE	-	-	119	28	77	224
NE	-	49	59	129	70	307
ENE	-	10	94	52	259	415
E	-	91	84	129	304	608
ESE	-	87	262	63	105	517
SE	-	-	3	42	106	151
SSE	5	11	-	28	352	396
S	-	13	28	120	63	224
SSW	2	27	5	99	116	249
SW	-	32	16	651	684	1,383
WSW	13	2	30	126	113	284
W	8	7	14	45	115	189
WNW	36	20	4	100	105	265
NW	21	80	65	100	167	433
NNW	22	46	-	62	18	148
Total	107	475	873	1,805	2,699	5,959

* Distribution is determined by counting electric meters and converting to population. Conversion factors for Conowingo Power Company, a subsidiary of PECO are based on the ratio of the 1970 Census to the number of residential meters, excluding those showing less than five kilowatt hours per day average, which is less than one-quarter the average daily usage of suburban customers. The conversion factor used for PP&L meters, which are northeast of the site across Susquehanna River, is 3.5 people per meter.

** There are no residents within the site boundary (2,500 ft minimum).

TABLE 2.2.26

INITIAL ESTIMATED POPULATION DENSITY*

WITHIN 5 MILES OF PEACH BOTTOM UNITS 2 AND 3

BY RADIAL 1-MILE INCREMENTS AND BY DIRECTION FROM SITE

Direction	0-1 Mile	1-2 Miles	2-3 Miles	3-4 Miles	4-5 Miles	0-5 Miles
N	-	-	148	12	21	38
NNE	-	175	24	42	26	35
NE	-	16	50	81	30	49
ENE	-	84	78	77	158	110
E	-	-	306	31	45	98
ESE	-	-	-	25	28	23
SE	-	-	-	-	33	20
SSE	33	10	-	37	397	125
S	36	49	24	74	65	57
SSW	34	76	16	31	47	39
SW	-	86	43	543	484	354
WSW	28	37	30	101	38	55
W	62	44	39	58	177	96
WNW	242	49	33	42	81	58
NW	209	247	205	191	128	179
NNW	333	428	343	21	25	69
Annular Ring	120	80	70	91	105	92

* Population densities are the number of people per square mile of land area. In computing the population density of the 0-1 mi area, the land area of site property is excluded. Populations used are given in Table 2.2.25.

TABLE 2.2.26.1

CURRENT ESTIMATED POPULATION DENSITY* WITHIN

5 MILES OF PEACH BOTTOM UNITS 2 AND 3 BY RADIAL

3-MILE INCREMENTS AND BY DIRECTION FROM SITE

Direction	0-1 Mile	1-2 Miles	2-3 Miles	3-4 Miles	4-5 Miles	0-5 Miles
N	-	-	150	23	26	44
NNE	-	-	119	20	43	52
NE	-	131	60	94	39	68
ENE	-	32	115	38	146	93
E	-	303	109	75	171	142
ESE	-	870	655	45	60	142
SE	-	-	10	60	70	60
SSE	55	18	-	29	359	114
S	-	22	28	88	36	47
SSW	23	46	5	73	66	51
SW	-	54	16	475	386	289
WSW	121	3	26	92	64	59
W	83	12	14	33	65	39
WNW	272	31	10	72	59	55
NW	151	140	76	78	103	97
NNW	209	225	-	69	12	53
Annular Ring	113	79	68	90	101	89

* Population densities are the number of people per square mile of land area. In computing the population density of the 0-1 mi area, the land area of site property is excluded. Populations used are given in Table 2.2.25.1.

TABLE 2.2.27

CURRENT ESTIMATED POPULATION DISTRIBUTION* WITHIN THE LOW POPULATION ZONE** AROUND PEACH BOTTOM UNITS 2 AND 3 BY RADIAL 1-MILE INCREMENTS AND BY DIRECTION FROM SITE

Direction	0-1*** Mile	1-2 Miles	2-3 Miles	3-4 Miles	4-4.5 Miles	0-4.5 Miles
N	-	-	90	31	38	159
NNE	-	-	119	28	44	191
NE	-	49	59	129	41	278
ENE	-	10	94	52	78	234
E	-	91	84	129	68	372
ESE	-	87	262	63	75	487
SE	-	-	3	42	31	76
SSE	5	11	-	28	208	252
S	-	13	28	120	21	182
SSW	2	27	5	99	49	182
SW	-	32	16	651	368	1,067
WSW	13	2	30	126	50	221
W	8	7	14	45	41	115
WNW	36	20	4	100	37	197
NW	21	80	65	100	140	406
NNW	22	46	-	62	18	148
Total	107	475	873	1,805	1,307	4,567

* Distribution determined by counting electric meters and converting to population. Conversion factors for Conowingo Power Company, a subsidiary of PECO, are based on the ratio of the 1970 Census to the number of residential meters excluding those showing less than 5 kWh per day average which is less than one-quarter the average daily usage of suburban customers. The conversion factor used for PP&L meters which are northeast of the site across the Susquehanna River is 3.5 people per meter.

** Low population zone distance is 7,300 m or about 4.5 mi.
*** There are no residents within the site boundary (2,500 ft minimum

2.3 METEOROLOGY

This section provides information obtained from the meteorological monitoring program in place prior to 1973. On February 7, 1973, Tower 1 was replaced by Tower 1A to allow routing of a 500-kV line over the partially dismantled Tower 1. Tower 1A is only 150 ft from Tower 1 and comparison of the data indicates that the two locations are very similar. Therefore, Tower 1 data is applicable to Tower 1A. In April 1992, the 1A Tower was abandoned in place due to use of Tower 2 and River Tower information.

Other changes involved the removal of the short-term, research-type bivane from the 150-ft level of the microwave tower and the discontinuance of temperature readings at the Hill Pole.

2.3.1 General Meteorological Features

The site is located in a well-defined river valley, which in turn lies in rolling but not exceptionally rugged country. Maximum elevations in the immediate vicinity of the facility seldom exceed 300 ft above river level, although there are several plateau sections and hilltops reaching 500 to 800 ft above the river within 10 mi to the southwest, west, northwest, and north of the site. A more complete topographical description of the site and surrounding area is given in paragraph 2.2.4. Nothing in the existing site data or the general records of the area suggests any particularly unusual or disturbing meteorological features.

There is clear evidence of channeling in the valley and of slope-flow on the western shore where the plant is located, but these patterns are not difficult to define. Close to the steep, western side of the valley, virtually all stable atmospheric conditions are accompanied by downslope motion, with the air flowing out over the river and then either up or down stream. In unstable conditions, accompanied by local solar heating, the pattern is more varied, but channeling is also quite apparent.

At higher elevations, the wind flow becomes progressively divorced from valley effects until, at Elevation 688 ft MSL (height above mean sea level) near the top of the microwave tower, it is difficult to see the channeling, and the distribution of wind directions and speeds is typical of the unrestricted flow of the eastern United States.

The frequency of stable dispersion conditions is normal for a location of this type, averaging approximately 30 percent of all

hours annually and reaching a peak of about 45 percent during the most stable months.

The meteorological conditions with respect to annual radioactive effluent releases from the plant stack and reactor building roof vents have been evaluated for all points on the site land boundary and along the waterline. Based on that evaluation, it was determined that the point on the site boundary described in Appendix E, paragraph E.3.3.1, receives the maximum annual dose. Therefore, for normal plant operation, the pond can be considered as an unrestricted area.

2.3.2 Sources of Data

The Peach Bottom site is equipped with two meteorological towers and two satellite wind instruments, all of which have been operating long enough to provide a good understanding of wind patterns and stability at almost any elevation of interest in design and operation of the facility. The locations and elevations of the equipment, which have been divided into two weather stations (designated No. 1 and No. 2) are listed in Table 2.3.1 and shown in Figures 2.3.1 and 2.3.2. In addition to the instruments located on towers, a continuous record of relative humidity and precipitation is obtained at the base of both the microwave tower and Weather Tower No. 1, and atmospheric pressure is recorded at the base of the microwave tower.

Two years of records (August, 1967 through July, 1969) from both the new meteorological equipment installed at Weather Station No. 2 to provide data for Units 2 and 3 and the original equipment at Weather Station No. 1 installed in 1959 for Unit 1 have been processed and analyzed. The instruments have operated satisfactorily. Data obtained from the weather instrumentation at Weather Station No. 1 complements that from the high-level tower. The Aerovane installed over the river has been in service for a shorter period of time (since July 1968), but the data from it have been most helpful in establishing flow patterns from the site over the river.

The meteorological monitoring program was upgraded in 1983 to conform to the requirements of Regulatory Guide 1.23, proposed Rev. 1. The details of this upgrade are discussed in Section 2.3.3.

Background data on high winds, tornadoes, and other relatively unusual phenomena have been derived from long-term records in the general area. These records are from National Weather Service

stations in Philadelphia and Harrisburg Pennsylvania, Wilmington Delaware, and Baltimore Maryland.

2.3.3 Onsite Meteorological Measurements

2.3.3.1 Meteorological Measurements Program, 1967-1982

Data Collection at the Peach Bottom site began with the installation of Weather Station No. 1 in 1959 for use in the licensing of Unit 1. The meteorological monitoring program in support of Units 2 and 3 began in August 1967. This program included measurements at Towers No. 1 and No. 2 and the Hill Pole.

Tower No. 1 was located on the river bank slightly southeast of Unit 1 near the visitors center. Wind direction and speed were measured at two levels, along with ambient temperature, temperature lapse rate, precipitation and relative humidity. In 1973 Tower 1 was replaced with Tower 1A. Tower 1A has identical measurement levels and instrument exposure, but was located approximately 150 ft. from Tower 1 to avoid interference with overhead transmission lines.

Tower No. 2 (microwave tower) is located on the bluff slightly north and west of Units 2 and 3. Wind speed and direction were measured at two levels on Tower 2, along with ambient temperature, temperature lapse rate, precipitation and relative humidity. In addition, bivane measurements were taken at Tower 2 for a brief period.

The Hill Pole is located directly behind Units 2 and 3 on the bluff near the base of the off-gas stack. Wind speed and direction, and ambient temperature were measured at one level. An additional wind sensor was installed at the River Tower in August 1968.

The location and elevation of all sensors in the Peach Bottom meteorological monitoring program are documented in Table 2.3.1. The locations of the meteorological towers and their elevations with respect to the local terrain and gaseous effluent release points are shown in Figures 2.3.1 and 2.3.2.

2.3.3.2 Meteorological Measurements Program, 1983 - Present

The meteorological monitoring program was upgraded during the period October 1982 through May 1983 to conform to the new requirements of Regulatory Guide 1.23, proposed Rev. 1, and NUREG-0654.

2.3.3.2.1 Measurements and Instrumentation

2.3.3.2.1.1 Siting

The upgraded meteorological system in general utilizes the same tower locations and instrument elevations as the previous system shown in Figures 2.3.1 and 2.3.2. The only exceptions to this are the addition of two wind levels on Tower No. 2 and a change in the delta temperature measurement interval at Tower No. 2. These changes were made to conform with Regulatory Guide 1.23, proposed Rev. 1, and are documented in Table 2.3.1-A.

2.3.3.2.1.2 Instrumentation and Performance Specifications

The upgraded instrumentation systems installed at Peach Bottom were designed to meet the requirements of Regulatory Guide 1.23, proposed Rev. 1.

2.3.3.2.1.3 Windspeed

The Bendix Aerovane Wind Transmitter has been removed. This instrument is not required by Regulatory Guide 1.23, proposed Rev. 1, and does not meet the required starting speed.

All other wind speed measurements are provided by Climatronics three-cup anemometers. A 30-hole photochopper with an LED photochopper device provides a frequency output directly proportional to wind speed.

2.3.3.2.1.4 Wind Direction

The Bendix Aerovane Wind Transmitter has been removed.

All other wind direction measurements are provided by Climatronics Wind Direction Sensor. The sensor consists of a counterbalanced, light weight vane and a precision, low torque, highly reliable potentiometer to yield a voltage output proportional to the wind direction.

2.3.3.2.1.5 Sigma Theta (Standard Deviation)

Standard deviation of wind direction is computed utilizing two methods, one for analog and one for digital data output.

2.3.3.2.1.5.1 Sigma Theta (Analog)

Analog output of the standard deviation of wind direction is computed by the Climatronics sigma computer using a CMOS microprocessor with a sampling rate of 1 per second. Each wind sample is converted from polar to rectangular coordinates with northern and eastern components. From this, the standard deviation (sigma theta) is computed over an interval of 15 minutes.

2.3.3.2.1.5.2 Sigma Theta (Digital)

The Sigma Theta Digital computation has been removed.

2.3.3.2.1.6 Temperature

The ambient temperature measuring system uses a standard 100 Ohm, 4-wire platinum RTD. Climatronics platinum temperature translator provides a voltage output of 0 to 5 volts corresponding to an ambient temperature of -30 to 120°F. Each translator is calibrated to its comparison sensor which enables precise measurement accuracy. The nonlinear sensor response is compensated for by the translator electronics to provide an excellent fit to the Callendar-Van Dusen Equation. These sensors are housed in a Climatronics motor-aspirated temperature/dew point shield.

2.3.3.2.1.7 Temperature Difference

The temperature sensors used in determining temperature difference are identical to those used for ambient temperature. Climatronics platinum temperature difference translator provides a voltage output of 0 to 5 volts corresponding to a temperature difference of -10 to 20°F. These sensors are housed in the motor-aspirated temperature shield.

2.3.3.2.1.8 Dew Point

Dew point temperature is measured using Climatronics Lithium Chloride dew point sensor. The dew point translator provides a voltage output of 0 to 5 volts corresponding to -30 to 120°F. The sensor is housed in the motor-aspirated temperature/dew point shield at the same elevations as the ambient temperature sensors.

2.3.3.2.1.9 Precipitation

Precipitation is measured using a gauge of the "tipping bucket" type. Each tip of the bucket equals 0.01 inches of water. The gauge has an electrical heater for operation with snow or freezing rain. The gauge is manufactured by Climatronics Corp. The translator for this unit consists of an electronic counter and an A-D signal converter. The counter will recycle to 0 on the 100th count.

2.3.3.2.2 Calibration and Maintenance Procedures

2.3.3.2.2.1 Calibration

All sensors and related equipment are calibrated according to written procedures designed to ensure adherence to Regulatory Guide 1.23, proposed Rev. 1, guidelines for accuracy. Calibrations occur at least every six months, with component checks and adjustments performed when required.

All meters and other equipment used in calibrations are, in turn, calibrated at scheduled intervals. All instruments used in calibrations are traceable to the National Bureau of Standards.

2.3.3.2.2.2 Maintenance

Inspection and maintenance of all equipment is accomplished in accordance with the contractor’s procedures approved by Exelon Generation. Inspections occur at least once per month by qualified individuals capable of performing the maintenance if required. The results of the inspections, maintenance and calibrations performed are reported in the Monthly Report issued to the Station.

2.3.3.2.3 Data Communication, Recording and Display

Data from all tower locations are digitized at the base of the respective tower and transmitted to the control room and to an on-site computer for archive storage. The digitized data are available on computer terminals in the control room and Emergency Operations Facility (EOF) and are available for remote interrogation by the licensee, the NRC and State governments.

Data from Tower 2 is recorded at the base building at the tower and in the control room. Data from the River Tower are transmitted via radio telementry to the base of Tower 2, where the

data are recorded, as well as in the control room. Data from the Hill Pole are recorded in the control room only.

Weekly, all data is sent to an approved licensee meteorological consultant for data processing and analysis.

2.3.3.2.3.1 Data Analysis Procedures

2.3.3.2.3.1.1 Data Quality Control

The digital data acquisition systems are checked daily to monitor system performance. The evaluation criteria vary from parameter to parameter, but the overall objective is to identify potential problems and to notify plant personnel as soon as possible in order to minimize system down time. This procedure is performed on each working day.

All analog data is subject to a quality check. Analog data is inspected for the following items:

a. Verification of log sheets versus actual data received

b. Time continuity

c. Instrument malfunction

d. Directional switching problems

e. Missing data

2.3.3.2.3.1.2 Data Reduction

Digital *hourly averages, for all meteorological parameters, are taken from the PMS Computer (1985 - 1992) and the Plant Monitoring System (1993 – Present). Calibration corrections are applied and the data analyzed prior to input to the licensee's meteorological data base. (*Precipitation is an hourly total.)

2.3.4 Standard Meteorological Data

2.3.4.1 Temperature

The distribution of hourly temperatures at Weather Stations No. 1 and No. 2 is shown in Tables 2.3.4 and 2.3.5, respectively. There are no notable differences between the two stations, and both reflect what would be expected in this general location; a few

winter temperatures in the 5 to 10°F range and occasional readings above 90°F in the summer.

2.3.4.2 Precipitation

Precipitation data (representing rain, melted snow, etc) were obtained during the entire 2-yr period at Weather Station No. 1, but observations did not begin at Weather Station No. 2 until December, 1967. Data from the two stations are presented in Tables 2.3.6 and 2.3.7.

2.3.4.3 High Winds

The general wind flow in the site area is moderate. In terms of observational data, the long records of the Philadelphia area are of interest, and these suggest that peaks in excess of 75 mph are quite rare (Table 2.3.8). These modest peak winds are to be expected, since the site is too far inland to be affected by the full force of the hurricanes, and it is not usually influenced by any other phenomena producing exceptional wind speeds. The peak winds observed at the site during the 2-yr period are listed in Table 2.3.9.

The tornado frequency in the site area has been investigated. The particular 1-degree square surrounding the site has been affected by tornadoes 22 times during the period 1916 to 1961, according to Spohn's Tornado Climatology[1]. Using his technique for reducing the frequency of occurrence to the chance of a tornado affecting the site, the probability is found to be 1 in 2,600 years.

2.3.4.4 Ice Storms

There is a fairly high probability of severe ice storms in this part of Pennsylvania, and there have been numerous instances in which disruption of power, communications, and transportation facilities have occurred. One severe ice storm can be expected every 3 years between December and February[(2,3)]

2.3.5 Diffusion Meteorology

2.3.5.1 Turbulence Classification

The method of separating dispersion conditions according to the turbulence indicated by the wind direction fluctuations of a standard Bendix-Friez Aerovane has been used as a classification system in the analysis. The technique depends upon the magnitude of the angular swings of the vane as well as certain qualitative

characteristics of the recorded trace over the hourly sampling period, as detailed in Table 2.3.10. Much of the analysis is based on this classification system. (Turbulence Classification is no longer performed using the Bendix-Friez Aerovane.)

The monthly and annual distributions of the five turbulence classes are listed in Tables 2.3.11 and 2.3.12 for the highest Aerovane location on each of the main towers; namely, the nominal 100-ft level (Elevation 411 ft MSL) at Weather Station No. 1 and the nominal 320-ft level (Elevation 688 ft MSL) at Weather Station No. 2. The distributions at these two locations are similar, and they are also in accord with the results obtained at the site where the classification was originally used. The dominant classes at all seasons of the year are II and V, which are the typical daytime and typical nocturnal turbulence regimes, respectively. The low-level station, however, shows more stable Class V cases in the spring and less in the fall, as would be expected, since the seasonal relation between river and air temperatures favors such a result. The Class IV turbulence, representing the typical storm situation, is least prominent at both stations in the summer and accounts for approximately 15 percent of the hours during the remainder of the year. The Class I and III cases represent light wind conditions with convective turbulence, and are relatively infrequent at both stations.

Table 2.3.13 shows the relationship between lapse rates and the turbulence classes on an annual basis. The unstable cases are obviously Classes I, II, and III. Class IV is slightly more stable and Class V is the dominantly stable condition. The agreement between turbulence class and lapse rate is not perfect, however, indicating that factors other than thermal stability influence the turbulence.

2.3.5.2 Wind Direction Distributions

Complete wind rose data from all of the instruments are available in Appendix N, but only selected wind roses illustrating the typical flow patterns at various altitudes under the important stability conditions are presented in detail. Wind roses for the 3-month periods January-February-March and July-August-September for stability classifications II and V, the typical daytime and nocturnal inversion cases, respectively, are shown in Figures 2.3.3 through 2.3.22. Annual wind roses for all classes of wind combined for each Aerovane location are given in Figures 2.3.23 through 2.3.28. The annual directional distribution of wind for each class and all classes combined for the highest Aerovane location on each main tower is presented in Tables 2.3.14 and

2.3.15. (Wind Direction Distributions are no longer performed using the Bendix-Friez Aerovane.)

2.3.5.2.1 Class II

At the center of the river during both cold and warm months (Figures 2.3.11 and 2.3.12), there is a strong tendency for flow parallel to the valley, with a predominant downriver flow in winter giving way to an even upriver and downriver distribution in the warmer months. The same tendency exists at the nominal 30-ft level on Tower No. 1 (Figures 2.3.3 and 2.3.4). At the nominal 100-ft level, the Hill Pole, and the nominal 320-ft level, less marked preferences are found, although NW, N, and S winds are clearly preferred (Figures 2.3.5 through 2.3.10).

2.3.5.2.2 Class V

At the higher elevations, represented in Figures 2.3.15 through 2.3.20, the flow under stable conditions is not well defined, with modest preference for various directions at the nominal 100-ft level, at the Hill Pole, and at the nominal 320-ft level. At the two lower elevations, a striking illustration of the slope and valley flow is observed. At the nominal 30-ft elevation (Figures 2.3.13 and 2.3.14) the wind during stable conditions is almost exclusively downslope from the west, moving over the river. As shown in Figures 2.3.21 and 2.3.22, the air then tends to move upstream or downstream, although more commonly downstream in summer. It is at first suprising to observe upstream flow during stable conditions, since the literature would predict a marked favoritism for downstream motion, but the dammed-up river is virtually flat in this locality, and the normal pattern does not exist.

2.3.5.3 Wind Speed Distributions

The wind speed for the same set of meteorological conditions and seasons is summarized for all stations in Table 2.3.16. The nominal 320-ft level shows the highest speeds under all conditions, as would be expected from its position well above the terrain. The river vane shows the next highest speed, because it is well exposed, and even under stable conditions the flow is appreciable. The nominal 100-ft level, nominal 30-ft level, and the Hill Pole elevation all exhibit very light winds, especially in stable conditions, because they are almost completely shielded from the normal gradient aloft and from the developed flow over the river.

The percentage frequency distribution of wind speed as a function of stability classification for each location is shown in Tables 2.3.17 to 2.3.22. These tables clearly reflect the probability of low wind speeds close to the ground.

2.3.5.4 Lapse Rates

The thermal stability, as evidenced by the temperature differences between different elevations on the towers, is summarized in Tables 2.3.23 and 2.3.24. These tables list the distribution among lapse rate groups over the year. Figures 2.3.20 through 2.3.36 depict the mean diurnal variation in lapse rate for 1 month in each season. A single representative month in each season gives essentially the same pattern as the data for the entire season.

There is nothing unusual about any of the lapse rate distributions. They seem quite normal in every respect, and the differences observed between Weather Stations No. 1 and No. 2 are what would be anticipated. The lower tower shows more marked variations from day to night with rather steep inversions, particularly in the spring when the river water is cold and in the fall when the general climatic conditions favor inversions. The upper tower shows relatively shallow inversions and it probably often extends above the top of the surface inversion layers.

2.3.5.5 Steadiness Analysis

The records form the nominal 100-ft level of the lower tower (Weather Station No. 1) and the nominal 320-ft level (Weather Station No. 2) have been analyzed for wind steadiness to determine the probability of nearly invariant wind direction occurring for extended periods of time.

The study shows that for periods up to 24 hr, very steady wind directions under stable as well as unstable conditions must be expected approximately once every year or two. At the lower elevation (Table 2.3.25) the preferred directions regardless of stability are SE and NW, but the slope flow from the WNW prevails under stable conditions. At the nominal 320-ft level on the upper tower (Table 2.3.26) the favored directions are NW and SE almost exclusively.

For periods longer than 1 day, steady winds (even over an 18-deg sector) are uncommon under any stability conditions, but a finite probability of having almost invariant winds for 48 hr on the

lower tower (Weather Station No. 1) with stable conditions is found, even though the return period is 160 months.

2.3.5.6 Bivane Fluctuations

The bivane mounted at a nominal 150-ft level (Elevation 518 ft MSL) on the microwave tower has been troublesome (as has been true for this type of instrument at most sites). Nevertheless, it has been possible to extract a reasonable amount of short-term fluctuation data from it. There is growing evidence, however, that these light bivanes are suitable only for brief research investigations, and produce unreliable data in continuous field service if not recalibrated frequently.

The data obtained from the Peach Bottom instrument are summarized in Table 2.3.27. The mean and modal (most frequently occurring) values of the hourly angular ranges of the horizontal and vertical fluctuations of the vane are given for the four prominent turbulence classes. The standard deviations of the fluctuations (σa for the horizontal directions and σe for the vertical directions) have been computed from the ranges. The values seem reasonable and compare favorably with those observed in other experiments, although the ratio of $\sigma e / \sigma a$ for the stable, Class V turbulence is larger than that observed at Brookhaven. It is difficult to say whether this difference is real, but it is probable that the rough terrain introduces somewhat more vertical motion in otherwise stable conditions.

2.3.5.7 Dispersion Parameters

Because of the terrain effect at the site, it is impossible to arrive at a simple set of dispersion parameters that will encompass most of the conditions encountered. Rather, the fate of each release will be strongly dependent upon its precise location, and must be treated uniquely.

At elevations well above the hilltops (e.g., at Elevation 688 ft MSL), there is little question that the simple expressions of dispersion parameters, such as the Pasquill values [5] or the ASME dispersion parameters[6] , would apply. At elevations somewhat closer to the hilltops, there is probably more vertical dispersion that suggested in these references, and it is probable that some of the excess vertical turbulence shown by the bivane is real.

A release within 50 ft of the slope, however, must be described in terms of trajectory and confining topography as well as simple dispersion. With unstable conditions, the most likely flow is a

gentle drift up or down valley having relatively large vertical and horizontal eddies but unusually light wind speeds. Under stable conditions, such a release is almost certain to drift slowly to the east over the river at a speed less than 1 m/sec, and then to turn either northwest or southeast and gradually expand laterally until confined by the valley walls.

2.3.5.8 Least Favorable Meteorological Conditions

From the extensive meteorological measurements made at Peach Bottom, it is possible to estimate least favorable meteorological conditions which might be expected. These least favorable conditions listed in Table 2.3.28 for both an elevated release (Elevation 765 ft) and a ground release were calculated such that 95 percent of the time diffusion would be better or, conversely, 5 percent of the total time diffusion would be more restrictive than that resulting from the conditions listed.

2.3.6 Summary and Conclusions

The unusually detailed set of data, begun before the construction of Unit 1 and extended to higher elevations and over the pond to meet the needs of Units 2 and 3, have defined the flow pattern in and over the valley quite adequately for both short- and long-term safety evaluations. The analysis confirms the existence of two rather distinct dispersion zones, one pertaining to the valley and the other representative of the more general synoptic pattern above it. In the Preliminary Safety Analysis Report, the speculation was offered that the downslope flow from west to east over the site during stable conditions would probably turn downstream rather than proceed across the valley. This speculation appears to have been essentially correct, but the flow over the river apparently may turn either northwest or southeast, rather than always proceeding down valley; the slope of the valley is apparently too slight to exert a determining influence on the direction during stable conditions.

The recent analysis has not uncovered any specialized conditions that were not anticipated in the earlier reports, and it is believed that the probable fate of any release over or above the site can be accurately estimated from the data available.

2.3.7 Accident Diffusion Estimates

2.3.7.1 Objective

Estimates of atmospheric diffusion (χ/Q) at the Exclusion Area Boundary (EAB), the outer boundary of the Low Population Zone (LPZ) and the Control Room Intake are calculated for the regulated short-term (accident) time-averaging periods of 0-2 hrs, 2-8 hrs, 8-24 hrs, 1-4 days and 4-30 days.

2.3.7.2 Selection of Meteorological Data

Meteorological data utilized for the χ/Q calculations were selected from the historical record of the Station meteorological monitoring tower network dating back to 1967. Examination of the subject Station release locations and configurations in conjunction with the sharply varying topography (both in the vicinity of the release and at the desired receptor locations to be addressed) resulted in the selection of three (3) different towers from which representative data for the χ/Q modeling analyses were used as shown below:

RELEASE/RECEPTOR SCENARIO	METEOROLOGICAL DATABASE SCENARIOS (Tower ID: Measurement Height above Tower Grade)		
	Wind Speed and Direction		Stability Class (Delta Temperature)
	Primary	Secondary*	
Control Room Intake			
Off-Gas Stack	Tower 2: 320′	Tower 2: 75′	Tower 2: 316 – 33′
Unit 2 Reactor Building Stack	Tower 1A: 92′ Tower 2: 75′	Tower 1A: 34′ Tower 2: 33′	Tower 1A: 89 – 33′ Tower 2: 150 – 33′
Unit 3 Reactor Building Stack	Tower 1A: 92′ Tower 2: 75′	Tower 1A: 34′ Tower 2: 33′	Tower 1A: 89 – 33′ Tower 2: 150 – 33′
EAB			
Off-Gas Stack	Tower 2: 320′	NA	Tower 2: 316 – 33′
Unit 2 Reactor Building Stack	River Tower 45′	NA	Tower 1A: 89 – 33′
Unit 3 Reactor Building Stack	River Tower 45′	NA	Tower 1A: 89 – 33′
LPZ			

Off-Gas Stack	Tower 2: 320′	NA	Tower 2: 316 – 33′
Unit 2 Reactor Building Stack	Tower 2: 33′	NA	Tower 2: 150 – 33′
Unit 3 Reactor Building Stack	Tower 2: 33′	NA	Tower 2: 150 – 33′

* - Secondary data used only for those hours when primary data are missing except for PAVAN Control Room X/Q calculation for releases from the Off-Gas Stack. In this case, only primary data are used.
NA - Not Applicable

Topographic cross-sectional profiles depicting the meteorological monitoring towers and the station stacks are provided in Figure 2.3.37.

As shown in the preceding table, two (2) towers were selected to be utilized for χ/Q calculations at the Control Room Intake for releases from the Units 2 and 3 Reactor Building Stacks. These stacks are not tall enough to avoid building-induced downwash; therefore, with zero (0) exit velocity having been assumed, ARCON96 treats their releases as a 'ground-level' type. Accordingly, the Tower 1A data would appear to be the representative database for the Reactor Building stacks. However, since these stack tops are at 305 ft msl, and thus, are actually nearer in the vertical to the Tower 2 grade elevation (367 ft msl) than they are to the Tower lA grade elevation (119 ft msl), an ARCON96 analysis is also performed using the most appropriate Tower 2 data, as indicated in the preceding table.

It was desired that a continuous five-year period of data common to all 3 towers, and for which available data meet NRC Regulator) Guide 1.23 (Reference 7) specifications be utilized for these calculations. The period of 1984 through 1988 was selected.

2.3.7.3 Calculation of χ/Q at the EAB and LPZ

χ/Q was calculated at the EAB (823 m) and LPZ (7300 m) for the Off-Gas Stack and the Units 2 and 3 Reactor Building Stacks using the NRC-recommended model PAVAN (Reference 8). The Off-Gas Stack was executed as a ‘stack’ type release, which results in non-fumigation χ/Q values as well as fumigation values. However, the Units 2 and 3 Reactor Building Stacks do not qualify as ‘elevated’ releases as defined by Regulatory Guide 1.145 (Reference 9), therefore, they are executed as ‘ground’ type releases with a result of non-fumigation χ/Q values only.

For stack releases during non-fumigation conditions, the equation

for ground-level relative concentration at the plume centerline is:

$$\chi/Q = \frac{1}{\pi \, \bar{U}_h \, \sigma_y \, \sigma_z} \exp\left[\frac{-h_e^2}{2\sigma_z^2}\right] \qquad (2.3.7\text{-}1)$$

where:

χ/Q is relative concentration, in sec/m^3

$\bar{U}_h$ is wind speed representing conditions at the release height, in m/sec

σ_y is lateral plume spread, in m, a function of atmospheric stability and distance

σ_z is vertical plume spread, in m, a function of atmospheric stability and distance

π is 3.14159

h_e is effective stack height, in m: $h_e = h_s - h_t$

h_s is the initial height of the plume (usually the stack height) above plant grade, in m

h_t is the maximum terrain height above plant grade between the release point and the point for which the calculation is made, in m. If h_t is greater than h_s then $h_e = 0$

For stack release during fumigation conditions, the equation for ground-level relative concentration at the plume centerline is:

$$\chi/Q = \frac{1}{(2\pi)^{1/2} \bar{U}_{h_e} \sigma_y \, h_e}, \quad h_e > 0 \qquad (2.3.7\text{-}2)$$

$\bar{U}_{h_e}$ is wind speed representative of the fumigation layer of depth h_e, in m/sec; in lieu of information to the contrary, the NRC staff considers a value of 2 m/sec as a reasonably conservative assumption for h_e of about 100 m.

σ_y is the lateral plume spread, in m, that is representative of the layer at a given distance; a moderately stable (F) atmospheric stability condition is usually assumed.

For the fumigation case that assumes F stability and a wind speed of 2 m/s, Equation 2.3.7-1 should be used instead of 2.3.7-2 at distances greater than the distance at which the χ/Q values determined using Equation 2.3.7-1 with $h_e = 0$ and Equation 2.3.7-2 are equal.

χ/Q values at the EAB and LPZ were calculated in accordance with Regulatory Guide 1.145. For ground-level releases, calculation for the 2 hours following the accident were based on the following equations:

$$\chi/Q = \frac{1}{\bar{U}_{10}(\pi\sigma_y \sigma_z + A/2)} \qquad (2.3.7\text{-}3)$$

$$\chi/Q = \frac{1}{\bar{U}_{10}(3\pi\sigma_y \sigma_z)} \qquad (2.3.7\text{-}4)$$

$$\chi/Q = \frac{1}{\bar{U}_{10}(\pi\sum_y \sigma_z)} \qquad (2.3.7\text{-}5)$$

where:

χ/Q is relative concentration, in sec/m^3

π is 3.14159

$\bar{U}_{10}$ is wind speed at 10 meters above plant grade, in m/sec

σ_y is lateral plume spread, in m, a function of atmospheric stability and distance

σ_z is vertical plume spread, in m, a function of atmospheric stability and distance

$\sum_y$ is lateral plume spread with meander and building wake effects (in meters), a function of atmospheric stability, wind speed, and distance [for distances of 800 m or less, $\sum_y = M\sigma_y$, where M is determined from Reg. Guide 1.145 Fig. 3; for distances greater then 800 m, $\sum_y = (M-1)\sigma_{y800m} + \sigma_y$

A is the smallest vertical-plane cross-sectional area of the reactor building, in m^2. (Other structures or a directional consideration may be justified when appropriate.)

Plume meander is only considered during neutral (D) or stable (E, F, or G) atmospheric stability conditions. For such, the higher of the values resulting from Equations 2.3.7-3 and 2.3.7-4 is compared to the value of Equation 2.3.7-5 for meander, and the lower value is selected. For all other conditions (stability classes A, B, or C), meander is not considered and the highest χ/Q value of equations 2.3.7-3 and 2.3.7-4 is selected.

The χ/Q values calculated at the EAB based on meteorological data representing a 1-hour average are assumed to apply for the entire 2-hour period.

To determine the maximum sector χ/Q value at the EAB, a cumulative frequency probability distribution (probabilities of a given χ/Q value being exceeded in that sector during the total time) is constructed for each of the 16 sectors using the χ/Q values calculated for each hour of data. This probability is then plotted versus the χ/Q values and a smooth curve is drawn to form an upper bound of the computed points. For each of the 16 curves, the χ/Q value that is exceeded 0.5 percent of the total hours is selected and designated as the sector χ/Q value. The highest of the 16 sector χ/Q values is the maximum sector χ/Q.

Per RG 1.145, Peach Bottom is classified as an inland site (more than 3.2 km from large bodies of water such as oceans or Great Lakes); therefore, the maximum sector χ/Q value at the EAB is determined by comparison of the sector fumigation and non-fumigation (as determined in the above paragraph) χ/Q values. If the fumigation value is greater, then it is used for the 0 – 0.5 hour time period and the non-fumigation value is used for the 0.5 - 2 hour time period. Otherwise, the non-fumigation sector value is used for the entire 0-2 hour time period.

Determination of the LPZ maximum sector χ/Q is based on a logarithmic interpolation between the 2-hour sector χ/Q and the annual average χ/Q for the same sector. For each time period, the highest of these 16 sector X/Q values is identified as the maximum sector χ/Q value. The maximum sector χ/Q values will, in most cases, occur in the same sector. If they do not occur in the same sector, all 16 sets of values are used in dose assessment requiring time-integrated concentration considerations. The set that results in the highest time-integrated dose within a sector is considered the maximum sector χ/Q.

The maximum sector χ/Q at the LPZ for stack releases during fumigation conditions at inland sites are determined in the same manner as the EAB (See paragraph 2 of this section).

The 5% overall site χ/Q value for the EAB and LPZ is determined by constructing an overall cumulative probability distribution for all directions. The value of χ/Q is plotted versus the

probability of it being exceeded, and an upper bound curve is drawn. From this curve, the 2-hour χ/Q value that is exceeded 5% of the time is found. The 5% overall site χ/Q at the LPZ for intermediate time periods is determined by logarithmic interpolation of the maximum of the 16 annual average χ/Q values and the 5% 2-hour χ/Q values.

2.3.7.3.1 PAVAN Meteorological Databases

The meteorological databases to be utilized for the EAB and LPZ χ/Q calculations (shown in Section 2.3.7.2) were prepared for use in PAVAN by transforming the five years (i.e., 1984-1988) of hourly meteorological tower data observations into joint wind speed-wind direction-stability class occurrence frequency distribution as shown in Table 2.3.29. In accordance with Regulatory Guide 1.145, atmospheric stability class was determined by vertical temperature difference between the release height and the 10-m level, and wind direction was distributed into 16 - 22.5° sectors.

Eleven (11) wind speed categories were defined according to Regulatory Guide 1.23 with the first category identified as "calm." The higher of the starting speeds of the wind vane and anemometer (i.e., 0.50 mph) was used as the threshold for calm winds, per Regulatory Guide 1.145, section 1.1. A midpoint was also assumed between each of the Regulatory Guide 1.23 wind speed categories, Nos. 2-10 as to be inclusive of all wind speeds. The wind speed categories have therefore been defined as follows:

PAVAN χ/Q Wind Speed Categories

Wind Speed Categories[a] (Regulatory Guide 1.23, Revision 1)	
Category	Wind Speed (mph)
1 (Calm)[b]	<0.5
2	>=0.5 to <2.35
3	>=2.35 to <3.47
4	>=3.47 to <4.59
5	>=4.59 to <6.82
6	>=6.82 to <9.06
7	>=9.06 to <11.30
8	>=11.30 to <13.53
9	>=13.53 to <18.01
10	>=18.01 to <22.37
11	>=22.37

[a] To be inclusive of all monitored wind speeds, a midpoint was assumed between each designated wind speed category.

[b] The higher of the starting speeds of the Climatronics® wind vane and anemometer equipment (i.e. 0.50 mph) was used as the threshold for calm winds, per Regulatory Guide 1.145, Section 1.1.

In the equations shown in Section 2.3.7.3, it should be noted that wind speed appears as a factor in the denominator. This causes obvious difficulties in making calculations for periods of calm. The procedures used by PAVAN assign a direction to each calm period according to the directional distribution for the lowest wind-speed class. This is done separately for the calms in each stability class.

2.3.7.3.2 Model Input Parameters

The Off-Gas Stack has a height of 500 ft and is located on terrain that is approximately 265 ft C.D. PAVAN does not have the capability to account for the difference between station grade and stack grade, therefore, they were conservatively assumed to be equal resulting in a stack input height of 152.4 m. For this elevated Off-Gas Stack scenario, PAVAN requires input of terrain data. The highest terrain value within a given directional sector between the Station and the EAB was assigned to the EAB receptor in that given direction. The LPZ terrain heights were analogously assigned. These terrain heights are provided in the following table.

HIGHEST INTERVENING TERRAIN BETWEEN SITE AND EAB, AND LPZ
(Meters Above Off-Gas Stack Grade)

DOWNWIND DIRECTION	EAB (823 m)	LPZ (7300 m)	DOWNWIND DIRECTION	EAB (823 m)	LPZ (7300 m)
N	0	110	S	31	55
NNE	0	85	SSW	31	61
NE	0	85	SW	18	128
ENE	0	67	WSW	12	104
E	0	48	W	24	73
ESE	0	67	WNW	31	98
SE	0	43	NW	31	104
SSE	0	43	NNW	24	85

The units 2 and 3 Reactor Building Stacks have heights of 189 ft above station grade, however since they do not qualify as elevated releases per Regulatory Guide 1.145, PAVAN requires that each of these stack heights be assigned an input value of 10 m. For this

assumed non-elevated Reactor Building Stack scenario, receptor terrain is not considered.

For both the Off-Gas Stack and Units 2 and 3 Reactor Building Stacks, the Reactor Building height of 54.3 m and calculated Reactor Building vertical cross-sectional area of 2584 m2 was utilized.

2.3.7.3.3 EAB and LPZ χ/Q Modeling Results

Atmospheric diffusion estimates at the EAB and LPZ are summarized in the following table.

RECEPTOR	RELEASE POINT	0-0.5 hour	0-2 hour	2-8 hour	8-24 hour	1-4 day	4-30 day
EAB (823 m)	Off-Gas Stack	5.30E-05	9.17E-06	3.24E-06	1.92E-06	6.22E-07	1.23E-07
	Units 2 and 3 Reactor Building Stacks, Turbine Building, and Personnel Access Doors, Railway Bay Doors, Roof Scuttle, and Ground-Level Hatches		9.11E-04	4.67E-04	3.35E-04	1.64E-04	6.26E-05
LPZ (7,300 m)	Off-Gas Stack	1.75E-05	9.05E-06	4.01E-06	2.67E-06	1.10E-06	3.10E-07
	Units 2 and 3 Reactor Building Stacks, Turbine Building, and Personnel Access Doors, Railway Bay Doors, Roof Scuttle, and Ground-Level Hatches		1.38E-04	5.81E-05	3.77E-05	1.48E-05	4.15E-06

2.3.7.4 Calculation of χ/Q at the Control Room Intake

Estimates of atmospheric diffusion (X/Q) are made at the Control Room Intake for releases from the Off-Gas Stack and the Units 2 and 3 Reactor Building Stacks for periods of 2, 8, and 16 hours and for 3 and 26 days. The NRC recommended model, ARCON96, in Reference 10 is utilized. In accordance with RG 1.194 (Reference 11), the PAVAN model is also utilized to supplement the Off-Gas Stack ARCON96 results for the 0-2 hour, 1-4 day, and 4-30 day χ/Q time intervals.

2.3.7.4.1 ARCON96 Model Analysis

Since the Units 2 and 3 Reactor Building Stacks are not 2.5 times the height of the adjacent structures, they do not qualify as an elevated release per RG 1.194, therefore, ARCON96 is executed in vent release mode. With an assumed zero (0) vertical exit velocity, vent releases are treated as ground-level releases by ARCON96. The basic model for a ground-level release is

$$\chi/Q = \frac{1}{\pi \sigma_y \sigma_z U} \exp\left[-0.5 \left(\frac{y}{\sigma_y}\right)^2\right] \qquad (2.3.7\text{-}6)$$

χ/Q	relative concentration (concentration divided by release rate) [$(Ci/m^3)/(Ci/s)$]
σ_y, σ_z	diffusion coefficients (m)
U	wind speed (m/s)
Y	distance from the center of the plume (m)

This equation assumes that the release is continuous, constant, and of sufficient duration to establish a representative mean concentration. It also assumes that the material being released is reflected by the ground. Diffusion coefficients are typically determined from atmospheric stability and distance from the release point using empirical relationships. A diffusion coefficient parameterization from the NRC PAVAN and XOQDOQ (Reference 12) codes is used for σ_y and σ_z.

The diffusion coefficients have the general form

$$\sigma = a\ x^b + c$$

where x is the distance from the release point, in meters, and a, b, and c are parameters that are functions of stability. The parameters are defined for 3 distance ranges - 0 to 100 m, 100 to 1000 m, and greater than 1000 m. The parameter values may be found in the listing of Subroutine NSIGMAl in Appendix A of NUREG/CR-6331 Rev. 1.

Diffusion coefficient adjustments for wakes and low wind speeds are incorporated as follows:

To estimate diffusion in building wakes, composite wake diffusion coefficients, $\sum_y$ and $\sum_z$, replace σ_y and σ_z. The composite wake diffusion coefficients are defined by

$$\sum_y = (\sigma_y^2 + \Delta\sigma_{y1}^2 + \Delta\sigma_{y2}^2)^{1/2} \qquad (2.3.7\text{-}7)$$

$$\sum_z = (\sigma_z^2 + \Delta\sigma_{z1}^2 + \Delta\sigma_{z2}^2)^{1/2} \qquad (2.3.7\text{-}8)$$

where σ_y and σ_z are the normal diffusion coefficients, $\Delta\sigma_{y1}$ and $\Delta\sigma_{z1}$ are the low wind speed corrections, and $\Delta\sigma_{y2}$ and $\Delta\sigma_{z2}$ are the building wake corrections. These corrections are described and evaluated in Ramsdall and Fosmire (Reference 13). The form of the low wind speed corrections is

$$\Delta\sigma_{y1}^2 = 9.13\text{x}10^5 \left[1 - \left(1 + \frac{x}{1000U}\right) \exp\left(\frac{-x}{1000U}\right)\right] \qquad (2.3.7\text{-}9)$$

$$\Delta\sigma_{z1}^2 = 6.67\text{x}10^2 \left[1 - \left(1 + \frac{x}{100U}\right) \exp\left(\frac{-x}{100U}\right)\right] \qquad (2.3.7\text{-}10)$$

where x is the distance from the release point to the receptor, in meters, and U is the wind speed in meters per second. It is appropriate to use the slant range distance for x because these corrections are made only when the release is assumed to be at the ground level and the receptor is assumed to be on the axis of the plume. The diffusion coefficients corrections that account for enhanced diffusion in the wake have a similar form. These corrections are

$$\Delta\sigma_{y2}^2 = 5.24\text{x}10^{-2}U^{-2}\text{A}\left[1 - \left(1 + \frac{x}{10\sqrt{\text{A}}}\right) \exp\left(\frac{-x}{10\sqrt{\text{A}}}\right)\right] \qquad (2.3.7\text{-}11)$$

$$\left[\left(\quad\right)\left(\quad\right)\right]$$

$$\Delta\sigma_{z2}^{2} = 1.17x10^{-2}U^{-2}A\ 1 - 1 + \frac{x}{10\sqrt{A}}\ \exp\frac{-x}{10\sqrt{A}} \qquad (2.3.7\text{-}12)$$

The value A is the cross-sectional area of the building.

An upper limit is placed on $\sum_y$ as a conservative measure. This limit is the standard deviation associated with a concentration uniformly distributed across a sector with width equal to the circumference of a circle with radius to the distance between the source and receptor. This value is

$$\sum_{ymax} = \frac{2\pi X}{\sqrt{12}} \qquad (2.3.7\text{-}13)$$

$$\approx 1.81x$$

The Off-Gas Stack does qualify as an elevated release and is therefore executed as such in ARCON96. For elevated releases, the relative concentration is given by:

$$\chi/Q = \frac{1}{\pi\sigma_y\sigma_z U} \exp\left[-0.5\left(\frac{y}{\sigma_y}\right)^2\right] \exp\left[-0.5\left(\frac{h_e - h_i}{\sigma_z}\right)^2\right]$$

where h_e is the effective stack height and h_i is the height of the intake. Wake corrections are not made to diffusion coefficients used in calculating concentrations in elevated plumes. Effective stack height is determined from the actual stack height (h_s), the difference in terrain elevation between the stack and intake locations (t_s-t_i), and stack downwash (Δh_d) by

$$h_e = h_s + (t_s - t_i) + \Delta h_d$$

where the stack downwash is computed as

$$\Delta h_d = 4r_s\left(\frac{w_o}{} - 1.5\right)$$

$U(h_s)$

and r_s is the radius of the stack, w_o is the vertical velocity of the effluent, and $U(h_s)$ is the wind speed at stack height. A release is considered elevated if the actual stack height is more than 2.5 times the height of structures in the immediate vicinity of the stack. Plume rise is not considered in calculating effective stack height in ARCON96. If consideration of plume rise is desired, the plume rise must be calculated manually and added to the release height before the release height is entered.

The sector-average model is used in calculating relative concentrations for elevated releases for averaging period longer than 8 hours. The sector-average plume model for elevated releases may be derived in the same manner as the sector-average plume model for ground-level releases. It is

$$\chi/Q = \frac{1}{2\pi W_s \sigma_z U} \exp\left[-0.5\left(\frac{h_e - h_i}{\sigma_z}\right)^2\right]$$

Note that the use of the elevated plume models may lead to unrealistically low concentrations at control room intakes. Near the base of stacks the highest concentrations are likely to occur during low wind speed conditions when there may be reversals in the wind direction. Since the Peach Bottom Off-Gas Stack is located close to the control room intake, RG 1.145 methodology is used in accordance with RG 1.194 to estimate potential control room intake concentrations during low wind speed conditions (See PAVAN modeling analysis in Section 2.3.7.4.2).

2.3.7.4.1.1 ARCON96 Meteorological Databases

The 1984-1988 meteorological databases utilized in ARCON96 are shown in Section 2.3.7.2 and consist of hourly meteorological data observations of wind speed and direction, and delta temperature stability class.

The designation of 'calm' is made to all wind speed observations of less than 0.5 mph. The higher of the starting speeds of the Climatronics® wind vane and anemometer equipment on each of the

towers (i.e., 0.50 mph) was used as the threshold for calm winds, per Regulatory Guide 1.145, Section 1.1.

2.3.7.4.1.2 ARCON96 Input Parameters

The parameters that were input into the ARCON96 model for use in calculating the Control Room χ/Q are summarized in the following table:

ARCON96 INPUT PARAMETER	OFF-GAS STACK	UNIT 2 REACTOR BUILDING STACK	UNIT 3 REACTOR BUILDING STACK
Release Height (m)	152.4	57.6	57.6
Intake Height (m)	21	21	21
Horizontal Distance from Intake to Stack (m)	208.8	58.4	58.4
Elevation Difference between Stack Grade and Intake Grade (m)	49.9	0	0
Building Area (m^2)	2583.6	2583.6	2583.6
Direction from Intake To Stack ($^\circ$)	244	113	15
Vertical Velocity (m/s)	0	0	0
Stack Flow (m^3/s)	0	0	0
Stack Radius (m)	0	0	0

2.3.7.4.1.3 ARCON96 Control Room χ/Q Results

A summary of the atmospheric diffusion estimates at the Control Room Intake for releases from the Off Gas Stack and Units 2 and 3 Reactor Building Stacks is shown in the following table.

ARCON96 Control Room χ/Q Results (sec/m^3)

RELEASE INTAKE & METEOROLOGICAL SCENARIO	0-2 hour	2-8 hour	8-24 hour	1-4 day	4-30 day
1. Off-Gas Stack to Control Room Intake:					
• Wind: Tower 2 320′ Stability: Tower 2 316 – 33′	1.00E-15	1.00E-15	1.00E-15	7.25E-15	5.92E-15
2. Unit 2 Reactor Building Stack to Control Room Intake:					
• Wind: Tower 1A 92′ Stability: Tower 1A 89 – 33′	1.17E-03	9.08E-04	4.14E-04	2.90E-04	2.26E-04
• Wind: Tower 2 92′ Stability: Tower 2 150 – 33′	1.18E-03	8.55E-04	3.50E-04	2.36E-04	1.67E-04
3. Unit 3 Reactor Building Stack to Control Room Intake:					
• Wind: Tower 2 92′ Stability: Tower 2 89 – 33′	1.02E-03	5.02E-04	2.38E-04	1.62E-04	1.36E-04
• Wind: Tower 2 75′ Stability: Tower 2 150 – 33′	1.18E-03	8.91E-04	4.00E-04	2.51E-04	1.98E-04

For the Units 2 and 3 stack release scenarios, the higher of the χ/Q values associated with the two meteorological databases analyzed is in larger text.

2.3.7.4.2 PAVAN Model Analysis

As mentioned in Section 2.3.7.4, a PAVAN modeling analysis was also performed to determine χ/Q values at the Control Room Intake for releases from the Off-Gas Stack. This analysis supplements the ARCON96 modeling analysis results for the 0-2 hour, 1-4 day, and 4-30 day χ/Q time intervals.

PAVAN was executed in stack release mode utilizing the equations outlined in Section 2.3.7.3.

2.3.7.4.2.1 PAVAN Meteorological Databases

The meteorological tower database utilized in PAVAN for calculation of Control Room χ/Q for releases from the Off-Gas Stack is identified in Section 2.3.7.2. This database is the same as used by PAVAN for the EAB and LPZ χ/Q analyses outlined in Section 2.3.7.3.1. Page 1 of Table 2.3.29 shows the joint frequency distribution for the database.

2.3.7.4.2.2 PAVAN Input Parameters

For the Off-Gas Stack to Control Room Intake scenario, PAVAN was executed with a stack-to-intake horizontal distance of 209 m. For conservatism in modeling this scenario, the Off-Gas Stack was assumed to have the same grade elevation as the Station. Review of this output was then performed in accordance with NRC RG 1.194 guidance to determine at which approximate distance the actual 0-2 hour maximum χ/Q is predicted to occur in each given downwind sector. Following this, a new set of PAVAN runs was executed for several distances ranging out to and exceeding the approximated distance. The initial predicted approximate distance to the maximum 0-2 hour χ/Q was 4000 m. Therefore, in all, the distances modeled to determine the actual maximum χ/Q are as follows: 209 (actual), 280, 300, 500, 750, 1000, 1500, 2000, 3000, 4000, 5000, and 6000 meters.

The Off-Gas Stack has a height of 500 ft and is located on terrain that is approximately 265 ft C.D. PAVAN does not have the capability to account for the difference between station grade and stack grade; therefore, in accordance with RG 1.194/ the release height is input as the difference between the actual release height and the intake height (500 ft - 69 ft = 431 ft = 131.4 m).

PAVAN requires terrain data to be input for stack releases. The terrain data utilized for this calculation of χ/Q at the Control Room are the same as those used for the EAB and LPZ as shown in Section 2.3.7.3.2.

The Reactor Building height of 54.3 m and the calculated Reactor Building vertical cross-sectional area of 2584 m^2 were utilized.

2.3.7.4.2.3 PAVAN Control Room χ/Q Results

PAVAN Maximum χ/Q (sec/m^3) Results
Off-Gas Stack to Control Room Intake

Averaging Period	Modeled Horizontal Distance (m) from Stack to Control Room Intake											
	209 (Actual Distance)	280	300	500	750	1000	1500	2000	3000	4000	5000	6000
	χ/Q (sec/m^3)											
0-2 hr	3.31E-06	3.31E-06	3.31E-06	3.31E-06	2.60E-06	2.32E-06	2.18E-06	2.05E-06	1.95E-06	1.87E-06	1.86E-06	1.75E-06
1-4 day	2.28E-08	1.68E-07	2.18E-07	3.93E-07	3.02E-07	2.55E-07	2.26E-07	2.34E-07	2.65E-07	2.74E-07	2.72E-07	2.62E-07
4-30 day	1.14E-09	2.79E-08	4.23E-08	1.09E-07	8.26E-08	6.75E-08	5.77E-08	6.61E-08	8.60E-08	9.17E-08	9.07E-08	8.76E-08

2.3.7.4.3 Control Room χ/Q Results (In accordance with RG 1.194)

The following table shows the final Control Room χ/Q results in accordance with RG 1.194, which is derived based on the ARCON96 and PAVAN analysis χ/Q values.

Control Room X/Q Results (sec/m^3)

RECEPTOR	RELEASE POINT	0-2 hour	2-8 hour	8-24 hour	1-4 day	4-30 day
Control Room Intake	Off-Gas Stack	3.31E-06	1.00E-15	1.00E-15	1.64E-08	4.54E-09
	Unit 2 Reactor Building Stack	1.18E-03	9.08E-04	4.14E-04	2.90E-04	2.26E-04
	Unit 3 Reactor Building Stack	1.18E-03	8.91E-04	4.00E-04	2.51E-04	1.98E-04

2.3 METEOROLOGY

REFERENCES

1. Spohn, H. R., et al, "Tornado Climatology," Monthly Weather Review, Washington, D. C., 90 (9), September, 1962, pp. 398-406.

2. Bennett, I., "Glaze: Its Meteorology & Climatology, Geographical Distribution & Ecomonic Effects," Environmental Protection Research Division Technical Report EP-105, Quartermaster Research Division Technical Report EP-105, Quartermaster Research & Engineering Command, Natick, Mass., March, 1959, p 217.

3. Kimble, George H. T., Our American Weather. N. Y., McGraw Hill, 1955.

4. Singer, I. and Smith, M., "Relation of Gustiness to Other Meteorological Parameters," Journal of Meteorology, Vol. 10, No. 2, April, 1953.

5. Slade, D. H., Meteorology and Atomic Energy 1968, (TID-24190) U.S. Atomic Energy Commission Division of Technical Information, July, 1968, p 101.

6. Smith, M. E. (ed.), Recommended Guide for the Prediction of the Dispersion of Airborne Effluents, American Society of Mechanical Engineers, New York, 1968, p 85.

7. Regulatory Guide 1.23 (Safety Guide 23) Rev. 1, Onsite Meteorological Programs; U.S. Nuclear Regulatory Commission; USNRC Office of Standards Development; Washington, D.C.; 2007.

8. Atmospheric Dispersion Code System for Evaluating Accidental Radioactivity Releases from Nuclear Power Stations; PAVAN, Version 2; Oak Ridge National Laboratory; U.S. Nuclear Regulatory Commission; December 1997.

9. Regulatory Guide 1.145; Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants (Revision 1); U.S. Nuclear Regulatory Commission; November 1982.

10. Atmospheric Relative Concentrations in Building Wakes; NUREG/CR-6331, PNNL-10521, Rev. 1; prepared by J.V.

Ramsdell, Jr., C. A. Simmons, Pacific Northwest National Laboratory; prepared for U.S. Nuclear Regulatory Commission; May 1997 (Errata, July 1997).

11. Regulatory Guide 1.194; Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants; U.S. Nuclear Regulatory Commission; June 2003.

12. XOQDOQ: Computer Program for the Meteorological Evaluation of Routine Releases at Nuclear Power Stations; NUREG/CR-2919; J. F. Sagendorf, J. T. Goll, and W. F. Sandusky, U.S. Nuclear Regulatory Commission; Washington, D.C; 1982.

13. Atmospheric Dispersion Estimates in the Vicinity of Buildings; J. V. Ramsdell and C. J. Fosmire, Pacific Northwest Laboratory; 1995.

TABLE 2.3.1

ELEVATION OF PEACH BOTTOM WEATHER INSTRUMENTS (a)

	WEATHER STATION NO. 1		WEATHER STATION NO. 2	
	Weather Tower No. 1	Hill Pole	Microwave Tower	River Tower
Grade	El 119	El 261	El 367	El 109
		Wind Instruments		
Location No.				
W1	El 153 (34', 30') (b)			
W2	El 211 (92', 100')			
W3		El 302 (41', 40')		
W4			El 443 (76', 75')	
W5			El 518 (151', 150') (c)	
W6			El 688 (321', 320')	
W7				El 164 (55', 50')
		Thermohms		
T1	El 152 (33', 30')			
T2	El 208 (89', 100')			
T3		El 299 (38', 40')		
T4		(d)		
T5			El 443 (76', 75')	
T6			El 513 (146', 150')	
T7			El 683 (316', 320')	
T8			(d)	

(a) All elevations refer to mean sea level (MSL).

(b) The first figure in parenthesis after the elevation above MSL refers to the actual height of the sensor above grade or above the normal Pond Elevation in the case of the River Tower. The second figure in the parenthesis refers to the nominal height of the sensor above grade.

(c) This is a bivane. All other wind instruments are aerovanes.

(d) This is a constant reference temperature (40 F).

TABLE 2.3.1-A

ELEVATION OF PEACH BOTTOM WEATHER INSTRUMENTS (a)
1983 SYSTEM UPGRADE

	WEATHER STATION NO. 1		WEATHER STATION NO. 2	
	Weather Tower No. 1(f)	Hill Pole	Microwave Tower	River Tower
Grade	El 119	El 261	El 367	El 109
Location No.				
		Wind Instruments		
W1	El 153 (34')			
W2	El 211 (92')			
W3		El 294 (33')		
W4			El 400 (33')	
W5			El 443 (76')	
W6			El 688 (321')	
W6A			El 697 (330') c	
W7				El 154 (45')
		RTD Temperature Sensors		
T1	El 152 (33')			
T1	El 152 (33') d			
T2	El 208 (89')			
T3 (e)				
T4 (e)				
T5			El 400 (33')	
T5			El 400 (33') d	
T6			El 517 (150')	
T7			El 683 (316')	
T8 (e)				
		Precipitation		
P1	El 124' (5')			
P2			El 372 (5')	

(a) All elevations refer to mean sea level (MSL).

(b) The first figure in parenthesis after the elevation above MSL refers to the actual height of the sensor above grade or above the normal Pond Elevation in the case of the River Tower.

(c) This is a Bendix Aerovane. All other instruments are Climatronics.

(d) This is a dew point sensor.

(e) Removed from service during upgrade.

(f) Removed from service in April 1992.

TABLE 2.3.2

SAMPLE WEATHER DATA LISTINGS

WEATHER STATION NO. 1[a]

Location
Peach Bottom 1

Date 4-30-69

	30 FT		100 FT		Wind Hill		Bivane		Gust		Temperature (F)								
Hour	DIR	SP	DIR	SP	DIR	SP	EL	AZ	S	L	30 FT	100-30	H-30		D	S	PCPN	PRESS	RH
1	295	4	315	8	295	5	-0	-0	-0	2	50.0	0.0	-.6	0.00	-0	0	.06	0.00	96
2	305	8	330	11	285	7	-0	-0	-0	2	50.0	-.2	-.8	0.00	-0	0	.04	0.00	96
3	315	7	330	10	275	7	-0	-0	-0	2	48.0	-.2	-.8	0.00	-0	0	0.00	0.00	96
4	310	6	330	7	255	7	-0	-0	-0	2	49.0	0.0	-.7	0.00	-0	0	0.00	0.00	87
5	325	7	340	11	265	5	-0	-0	-0	2	47.3	-.1	-.7	0.00	-0	0	0.00	0.00	83
6	325	6	335	9	305	7	-0	-0	-0	2	47.8	-.2	-.7	0.00	-0	0	0.00	0.00	82
7	325	6	345	10	300	7	-0	-0	-0	2	47.8	-.2	-.7	0.00	-0	0	0.00	0.00	82
8	330	7	345	10	305	6	-0	-0	-0	2	46.8	-.2	-.8	0.00	-0	0	0.00	0.00	80
9	345	8	360	12	315	8	-0	-0	-0	2	47.0	-.6	-.6	0.00	-0	0	0.00	0.00	81
10	355	9	360	12	315	6	-0	-0	-0	2	48.5	-.8	-.4	0.00	-0	0	.04	0.00	72
11	355	9	360	11	315	8	-0	-0	-0	2	49.5	-.7	-.6	0.00	-0	0	0.00	0.00	70
12	360	8	10	8	315	6	-0	-0	-0	2	51.0	-.8	.3	0.00	-0	0	0.00	0.00	68
13	355	7	5	9	315	10	-0	-0	-0	2	54.0	-.8	-.2	0.00	-0	0	0.00	0.00	65
14	25	6	5	8	330	11	-0	-0	-0	2	54.3	-.7	1.0	0.00	-0	0	0.00	0.00	62
15	30	6	35	8	335	11	-0	-0	-0	2	56.0	-.7	.7	0.00	-0	0	0.00	0.00	59
16	25	5	25	7	335	11	-0	-0	-0	2	55.0	-.7	.6	0.00	-0	0	0.00	0.00	55
17	25	2	30	2	335	11	-0	-0	-0	2	55.6	-.6	.4	0.00	-0	0	0.00	0.00	54
18	20	1	20	1	335	10	-0	-0	-0	5	56.8	-.5	0.0	0.00	-0	0	0.00	0.00	54
19	20	2	20	2	355	10	-0	-0	-0	5	57.8	0.0	.1	0.00	-0	0	0.00	0.00	58
20	275	2	285	1	355	9	-0	-0	-0	5	52.7	2.4	1.6	0.00	-0	0	0.00	0.00	94
21	280	3	275	0	355	10	-0	-0	-0	5	49.7	3.6	2.0	0.00	-0	0	0.00	0.00	96
22	275	3	275	3	360	9	-0	-0	-0	5	48.0	3.0	.8	0.00	-0	0	0.00	0.00	96
23	280	2	265	4	360	5	-0	-0	-0	5	46.0	2.6	.2	0.00	-0	0	0.00	0.00	96
24	280	3	265	4	355	3	-0	-0	-0	5	45.0	1.4	-.7	0.00	-0	0	0.00	0.00	96

LISTING OF THE DATA FROM PEACH BOTTOM WEATHER STATION NO. 1[a]

From left to right:

Hour of the day.
Nominal 30-ft level Aerovane, wind direction ( ) and speed (mi/hr) (at Location W1, El +153 MSL)
Nominal 100-ft level Aerovane, " " " " " (at Location W2, El +211 MSL)
Hill Aerovane, River Tower, " " " " " (at Location We, El +302 MSL)
Bivane Elevation and Azimuth (not used at this weather station)
Gustiness Classification[b] S (not used)
L - Turbulence at nominal 100-ft level
Temperature (F) - nominal 30-ft level (at Location T1, El 152 MSL)
Temperature Difference - T_{100}-T_{30} (F)
Temperature Difference - T -T_{30} (F)
Temperature - not used
Direction and Speed - not used
Precipitation - (in)
Pressure - not used at this station
Relative Humidity (%)

[a] See Table 2.3.1 for exact instrument locations.
[b] See Table 2.3.10 for description of Turbulence classes.

TABLE 2.3.3

SAMPLE WEATHER DATA LISTINGS

WEATHER STATION NO. 2[a]

Location
Peach Bottom 2

Date 4-30-69

Hour	75 FT DIR	75 FT SP	320 FT DIR	320 FT SP	Wind SAT DIR	Wind SAT SP	Bivane EL	Bivane AZ	Gust S	Gust L	Temperature (F) 75 FT	150-75	320-75		D	S	PCPN	PRES	RH
1	320	11	15	17	315	12	23	20	-0	2	49.4	-.2	-.6	0.00	-0	0	.05	29.53	100
2	345	13	20	19	345	17	14	22	-0	2	49.0	-.2	-.8	0.00	-0	0	0 00	29.52	100
3	340	13	25	18	340	15	13	18	-0	2	47.3	-.2	-1.0	0.00	-0	0	0 00	29.53	94
4	345	13	25	17	340	14	13	25	-0	2	47.5	-.2	-.9	0.00	-0	0	0 00	29.53	89
5	350	12	35	16	345	13	13	30	-0	2	47.0	-.2	-1.0	0.00	-0	0	0 00	29.56	87
6	345	13	35	15	355	15	14	30	-0	2	46.5	-.2	-1.0	0.00	-0	0	0 00	29.59	88
7	350	12	40	15	350	14	16	22	-0	2	46.0	-.3	-1.1	0.00	-0	0	0 00	29.62	88
8	345	12	35	13	350	14	17	58	-0	2	46.2	-.3	-1.1	0.00	-0	0	0 00	29.62	89
9	355	10	45	14	355	11	28	50	-0	2	46.8	-.2	-1.4	0.00	-0	0	0 00	29.65	90
10	5	9	45	12	360	13	38	50	-0	2	48.2	-.6	-1.7	0.00	-0	0	0 00	29.67	84
11	10	9	45	10	360	11	26	42	-0	2	48.0	-.6	-1.6	0.00	-0	0	0 00	29.66	69
12	20	9	50	12	5	10	28	34	-0	2	50.0	-.6	-1.6	0.00	-0	0	0 00	29.66	68
13	20	9	55	11	360	10	23	30	-0	2	51.0	-.7	-1.8	0.00	-0	0	0 00	29.66	64
14	30	8	60	9	10	9	22	50	-0	2	53.2	-.8	-2.0	0.00	-0	0	0 00	29.65	63
15	30	9	70	10	40	8	30	20	-0	2	54.0	-.9	-1.8	0.00	-0	0	0 00	29.65	59
16	30	7	65	9	35	7	16	18	-0	2	55.0	-.9	-1.8	0.00	-0	0	0 00	29.64	60
17	35	5	80	5	30	5	14	15	-0	2	55.1	-.6	-1.6	0.00	-0	0	0 00	29.65	62
18	35	2	80	3	25	3	15	15	-0	5	55.2	-.5	-1.4	0.00	-0	0	0 00	29.65	64
19	25	4	70	6	25	3	6	5	-0	5	55.0	-.2	-.9	0.00	-0	0	0 00	29.67	70
20	355	0	70	4	330	1	1	3	-0	5	54.7	-.2	-.6	0.00	-0	0	0 00	29.68	82
21	35	1	70	2	300	1	1	2	-0	5	52.2	.2	.7	0.00	-0	0	0 00	29.69	94
22	290	2	170	0	305	1	4	7	-0	5	51.7	.6	.4	0.00	-0	0	0 00	29.71	99
23	295	3	170	0	285	1	4	7	-0	5	50.0	.8	1.6	0.00	-0	0	0 00	29.70	99
24	315	4	170	0	285	1	2	8	-0	5	49.0	1.0	2.2	0.00	-0	0	0 00	29.70	99

LISTING OF THE DATA FROM PEACH BOTTOM WEATHER STATION NO. 2[a]

From left to right:

Hour of the day.
Nominal 75-ft level Aerovane, wind direction ( ) and speed (mi/hr) (at Location W4, El 443 MSL)
Nominal 320-ft level Aerovane, " " " " (at Location W6, El 688 MSL)
Satellite Aerovane, River Tower " " " " (at Location W7, El 164 MSL)
Bivane Elevation and Azimuth ( ) - nominal 150-ft level (at Location W5, El 518 MSL)
Gustiness Classification[b] S (not used)
L - Turbulence at nominal 320-ft level
Temperature (F) - nominal 75-ft level (at Location T5, El 443 MSL)
Temperature Difference - $T_{150}-T_{75}$ (F)
$T_{320}-T_{75}$ (F)
Temperature - not used
Direction and Speed - not used
Precipitation - (in)
Pressure - (in Hg)
Relative Humidity (%)

[a] See Table 2.3.1 for exact instrument locations.
[b] See Table 2.3.10 for description of Turbulence classes.

TABLE 2.3.4

DISTRIBUTION OF HOURLY TEMPERATURES
PEACH BOTTOM WEATHER STATION NO. 1
LOCATION T1 (NOMINAL 30-FT LEVEL, EL 152 FT MSL)

(Percent)

Period: August, 1967-July, 1969

	Temperature Classes (°F)										
Month	<0	0 to +10	+10 to +20	+20 to +30	+30 to +40	+40 to +50	+50 to +60	+60 to +70	+70 to +80	+80 to +90	+90 to +100	>100
Jan	0	2	22	38	29	8	1	0	0	0	0	0
Feb	0	1	5	16	64	13	1	0	0	0	0	0
Mar	0	0	1	20	42	22	8	4	2	1	0	0
Apr	0	0	0	<1	8	27	39	20	5	1	0	0
May	0	0	0	0	1	11	42	30	12	3	1	0
Jun	0	0	0	0	0	<1	10	37	39	13	1	0
Jul	0	0	0	0	0	0	2	14	64	18	2	0
Aug	0	0	0	0	0	0	7	27	42	22	2	0
Sep	0	0	0	0	0	2	20	39	34	5	0	0
Oct	0	0	0	0	9	15	34	36	4	2	<1	0
Nov	0	0	<1	3	28	43	22	3	1	0	0	0
Dec	0	1	5	22	46	22	4	0	0	0	0	0
Annual	0	<1	3	8	20	13	16	18	17	5	<1	0

TABLE 2.3.5

DISTRIBUTION OF HOURLY TEMPERATURES
PEACH BOTTOM WEATHER STATION NO. 2
LOCATION T5 (NOMINAL 75-FT LEVEL, EL 443 FT MSL)

(Percent)

Period: August, 1967-July, 1969

	Temperature Classes (°F)										
Month	<0	0 to +10	+10 to +20	+20 to +30	+30 to +40	+40 to +50	+50 to +60	+60 to +70	+70 to +80	+80 to +90	+90 to +100	>100
Jan	0	3	25	34	22	15	1	0	0	0	0	0
Feb	0	1	10	27	56	6	0	0	0	0	0	0
Mar	0	0	<1	12	34	31	16	6	1	0	0	0
Apr	0	0	0	<1	4	31	40	20	4	1	0	0
May	0	0	0	0	7	28	31	24	8	2	<1	0
Jun	0	0	0	0	0	0	8	38	47	13	<1	0
Jul	0	0	0	0	0	0	0	27	54	18	1	0
Aug	0	0	0	0	0	0	1	49	42	5	3	0
Sep	0	0	0	0	0	1	10	49	38	2	0	0
Oct	0	0	0	0	5	28	36	26	5	<1	0	0
Nov	0	0	0	31	22	25	20	2	0	0	0	0
Dec	0	<1	6	27	42	20	5	0	0	0	0	0
Annual	0	<1	4	11	16	16	14	20	16	3	<1	0

TABLE 2.3.6

PRECIPITATION

PEACH BOTTOM WEATHER STATION NO. 1

(Inches, water)

Period: August, 1967-July, 1969

Month	1967	1968	1969	Range of Maximum Hourly Rate
Jan		.33	.75	.11 to .20
Feb		.60	.64	.01 to .10
Mar		.06	1.08	.21 to .30
Apr		2.72	2.75	.81 to .90
May		5.11	1.23	.31 to .40
Jun		2.72	2.82	.81 to .90
Jul		1.01	3.95	>1.00
Aug	6.91	3.46		.91 to 1.00
Sep	.67	4.15		.81 to .90
Oct	1.41	3.14		.41 to .50
Nov	2.32	1.37		.21 to .30
Dec	4.43	2.26		.31 to .40
Annual Total		26.93		

TABLE 2.3.7

PRECIPITATION

PEACH BOTTOM WEATHER STATION NO. 2

(Inches, water)

Period: August, 1967-July, 1969

Month	1967	1968	1969	Range of Maximum Hourly Rate
Jan	*	.30	.64	.11 to .20
Feb	*	.45	.70	.01 to .10
Mar	*	2.89	.82	.21 to .30
Apr	*	1.60	3.12	.51 to .60
May	*	5.17	1.41	.31 to .40
Jun	*	3.44	3.02	.71 to .80
Jul	*	.44	6.94	.81 to .90
Aug	*	3.46		.91 to 1.00
Sep	*	4.66		.71 to .80
Oct	*	1.56		.31 to .40
Nov	*	4.66		.71 to .80
Dec	1.25	2.26		.11 to .20
Annual Total		30.89		

*No precipitation recorded

TABLE 2.3.8

DISTRIBUTION OF PEAK WINDS

PHILADELPHIA INTERNATIONAL AIRPORT

(25-yr record)

Month	Fastest Mile Speed (mph)	Fastest Mile Direction
Jan	61	NE
Feb	59	NW
Mar	56	NW
Apr	59	SW
May	56	SW
June	73	SW
July	67	E
Sep	49	NE
Oct	66	SW
Nov	60	SW
Dec	47	NW

Fastest Mile Observed in Area: 88 mph, North, July, 1931

Estimated Peak Hourly Value: 70 mph

TABLE 2.3.9

HIGHEST MEAN HOURLY WIND SPEED AND ESTIMATED PEAK GUST

PEACH BOTTOM WEATHER STATION NO. 2

LOCATION W6 (NOMINAL 320-FT LEVEL, EL 688 FT MSL)

Period: August, 1967-July, 1969

Year	Month	Maximum Hourly Mean Speed (mph)	Estimated Peak (mph)	Wind Direction (°)
1967	Aug	22	36	200
	Sep	35	55	170
	Oct	31	49	240
	Nov	33	53	305
	Dec	34	54	335
1968	Jan	37	56	300
	Feb	37	57	295
	Mar	40	60	325
	Apr	30	48	305
	May	29	44	090
	Jun	26	44	260
	Jul	22	33	345
	Aug	26	43	240
	Sep	24	39	125
	Oct	28	44	235
	Nov	28	42	200
	Dec	41	64	295
1969	Jan	28	44	295
	Feb	35	53	345
	Mar	26	39	325
	Apr	27	40	180
	May	26	39	280
	Jun	27	42	175
	Jul	21	32	065

TABLE 2.3.10

TURBULENCE CLASSIFICATION

Smith-Singer Classification	Pasquill Classification	Brookhaven National Laboratory Classification*	Description of Wind Trace
I	-	A	Fluctuations of the wind direction during the course of 1 hr exceed 90 deg.
II	B & C	B_1	Fluctuations are confined to a lower limit of 15 deg and an upper limit of 45 deg.
III	A	B_2	Trace is similar to I and II but the upper and lower limits are 90 and 45 deg.
IV	D	C	The lower limit of the fluctuations is 15 deg, and no upper limit is imposed. The case is distinguished by an unbroken solid core, through which a straight line can be drawn for the entire hour, without touching "open space" on the chart.
V	F & G	D	The trace approximates a line, and short-term fluctuations do not exceed 15 deg. Direction may vary gradually over a wide angle during the hour.

*Source: Singer, I. and Smith, M., "Relation of Gustiness to other Meteorological Parameters," Journal of Meteorology, Vol. 10, No. 2, April, 1953.

TABLE 2.2.11

MANUFACTURING ESTABLISHMENTS AND EMPLOYMENT

IN THE FIVE-COUNTY AREA SURROUNDING THE PEACH BOTTOM SITE

Type of Product Manufactured	Number of Employees Reported	Total Number of Units Reported	Number of Units Not Reporting Employees
Ordnance and Accessories	*	4	4
Food and Kindred Products	11,609	256	-
Tobacco Manufacturers	1,741	36	-
Textile Mill Products	6,812	55	-
Apparel and Related Products	13,063	133	-
Lumber and Wood Products	1,394	91	11
Furniture and Fixtures	4,736	61	5
Paper and Allied Products	5,606	56	1
Printing and Publishing	6,608	139	-
Chemicals and Allied Products	3,063	66	16
Petroleum and Coal Products	294	7	-
Leather and Leather Products	5,262	39	-
Rubber and Plastic Products	1,495	14	3
Stone, Clay, and Glass Products	5,585	86	-
Primary Metal Industries	12,551	62	1
Fabricated Metal Products	10,978	151	-
Machinery, Except Electrical	16,376	208	-
Electrical Machinery	15,247	47	2
Transportation Equipment	2,381	36	13
Instruments and Related Products	*	6	6
Not Separately Classified	-	102	-
Total Manufacturing	146,928	1,655	-

*Figures not published to avoid disclosure of operations of reporting units.

Source: County Business Patterns, 1967 - U.S. Dept of Commerce.

TABLE 2.3.12

PERCENTAGE FREQUENCY

OF TURBULENCE CLASSES

PEACH BOTTOM WEATHER STATION NO. 2

LOCATION W6 (NOMINAL 320-FT LEVEL, EL 688 FT MSL)

Period: August, 1967-July 1969

	Class				
Month	I	II	III	IV	V
Jan	1	55	2	12	30
Feb	<1	50	2	20	28
Mar	1	48	2	22	27
Apr	1	56	4	10	29
May	<1	54	4	10	32
Jun	1	61	4	5	29
Jul	2	58	4	3	33
Aug	1	48	4	7	40
Sep	2	43	2	11	42
Oct	1	45	2	10	42
Nov	1	41	1	11	46
Dec	1	53	2	14	30
Annual	1	51	3	12	33

TABLE 2.3.13

RELATION BETWEEN LAPSE RATES

AND TURBULENCE CLASSES

(Percent)

Period: August, 1967-July, 1969

Weather Station No. 1

Temperature Difference $T_{100} - T_{30}$ (°F)

Turbulence Class	<-1.7	-1.6 to -0.5	-0.4 to 0.5	0.6 to 1.5	1.6 to 2.5	2.6 to 3.4	3.6 to 4.5	>4.6
I	0.1	0.5	1.0	0.1	0.0	0.0	0.0	0.0
II	1.5	10.5	29.1	5.4	3.0	1.5	1.3	0.7
III	0.4	0.9	1.5	0.3	0.2	<0.1	0.0	<0.1
IV	0.2	1.7	4.7	0.5	0.3	0.3	0.2	<0.1
V	0.1	1.0	11.3	9.6	6.1	3.3	1.6	1.1

Weather Station No. 2

Temperature Difference $T_{320} - T_{75}$ (°F)

I	0.3	0.5	0.1	0.1	0.0	<0.1	0.0	0.0
II	8.2	34.1	4.7	1.2	0.5	0.2	0.1	0.1
III	0.7	1.3	0.2	0.1	0.1	<0.1	0.0	0.0
IV	0.3	10.7	2.7	0.4	0.2	<0.1	<0.1	0.0
V	0.1	6.8	9.4	4.7	3.6	2.8	2.3	3.5

TABLE 2.3.14

ANNUAL DISTRIBUTION OF WIND BY TURBULENCE CLASS AND DIRECTION

PEACH BOTTOM WEATHER STATION NO. 1

LOCATION W2 (NOMINAL 100-FT LEVEL, EL 211 FT MSL)

(Percent of All Hours During Which Data Are Available)

Period: August, 1967-July, 1969
Missing Hours: 4,622

Wind Direction	Turbulence Class I	II	III	IV	V	All Classes
10	<0.1	0.9	0.1	<0.1	0.4	1.4
20	<0.1	0.9	<0.1	0.1	0.2	1.2
30	<0.1	0.6	0.1	<0.1	0.4	1.2
40	0.1	0.5	<0.1	<0.1	0.5	1.2
50	<0.1	0.4	<0.1	<0.1	0.2	0.7
60	<0.1	0.5	<0.1	0.1	0.2	0.9
70	<0.1	0.6	<0.1	<0.1	0.3	1.0
80	<0.1	0.5	<0.1	0.1	0.3	1.0
90	<0.1	0.7	0.1	0.0	0.3	1.1
100	<0.1	0.9	0.1	<0.1	0.7	1.7
110	0.1	1.2	<0.1	<0.1	0.6	1.9
120	0.2	2.9	0.1	0.1	1.2	4.5
130	0.4	4.0	0.5	0.5	1.6	6.9
140	0.1	2.0	0.2	0.1	1.0	3.4
150	0.2	2.2	0.3	<0.1	1.5	4.2
160	0.1	1.3	0.1	<0.1	1.7	3.2
170	<0.1	1.0	0.1	0.1	1.0	2.2
180	0.1	0.8	0.1	0.2	1.0	2.2
190	<0.1	0.3	<0.1	<0.1	0.9	1.3
200	0.0	0.1	0.0	0.0	0.4	0.5
210	0.1	0.1	<0.1	0.0	0.9	1.0
220	0.1	0.2	<0.1	<0.1	1.5	1.9
230	0.0	0.4	<0.1	<0.1	0.8	1.2
240	0.1	1.0	0.1	0.1	1.5	2.7
250	0.1	1.8	0.1	0.3	2.2	4.5

TABLE 2.3.14 (Continued)

Wind Direction	Turbulence Class I	II	III	IV	V	All Classes
260	<0.1	1.8	0.1	0.4	1.8	4.0
270	0.2	2.3	0.1	0.4	2.2	5.3
280	0.1	3.7	0.3	0.4	2.0	6.5
290	<0.1	3.4	0.1	1.5	1.2	6.1
300	0.1	2.9	0.2	0.9	1.1	5.2
310	0.1	2.9	0.1	0.9	0.9	4.9
320	<0.1	2.5	<0.1	0.4	0.4	3.4
330	<0.1	2.7	0.2	0.6	0.6	4.2
340	<0.1	2.3	0.1	0.2	0.5	3.1
350	<0.1	1.8	0.1	0.1	0.3	2.3
360	<0.1	1.3	0.1	0.1	0.5	2.0
All	2.5	53.4	3.5	7.7	32.9	100.0

TABLE 2.3.15

ANNUAL DISTRIBUTION OF WIND BY TURBULENCE CLASS AND DIRECTION

PEACH BOTTOM WEATHER STATION NO. 2

LOCATION W6 (NOMINAL 320-FT LEVEL, EL 688 FT MSL)

(Percent of All Hours During Which Data Are Available)

Period: August, 1967-July, 1969
Missing Hours: 2,024

Wind Direction	Turbulence Class I	II	III	IV	V	All Classes
10	<0.1	1.4	0.1	0.2	0.7	2.3
20	0.0	1.2	0.1	0.1	0.5	1.9
30	<0.1	1.0	0.1	0.1	0.5	1.8
40	<0.1	1.0	<0.1	0.1	0.3	1.5
50	<0.1	0.7	<0.1	0.1	0.5	1.3
60	<0.1	0.8	0.1	0.1	0.5	1.5
70	<0.1	0.8	0.1	0.1	0.4	1.4
80	<0.1	0.8	0.1	<0.1	0.3	1.3
90	<0.1	0.9	0.1	0.1	0.4	1.6
100	<0.1	0.9	<0.1	0.1	0.5	1.5
110	<0.1	1.2	0.1	<0.1	0.6	1.9
120	<0.1	1.5	0.1	0.1	0.8	2.5
130	<0.1	1.6	0.1	0.1	0.7	2.5
140	0.0	1.1	<0.1	0.2	0.9	2.3
150	<0.1	1.5	<0.1	0.2	1.1	2.8
160	<0.1	1.5	0.1	0.1	1.1	2.8
170	0.0	1.5	0.1	0.3	1.0	2.9
180	0.1	2.4	0.1	0.6	1.1	4.3
190	<0.1	2.0	<0.1	0.4	1.3	3.8
200	<0.1	1.3	<0.1	0.4	0.9	2.7
210	<0.1	1.2	0.1	0.2	1.1	2.6
220	<0.1	0.9	0.1	0.1	0.8	2.0
230	<0.1	0.9	0.1	0.2	0.9	2.0
240	0.1	0.9	0.1	0.1	1.1	2.3
250	<0.1	1.0	0.1	0.2	1.1	2.4

TABLE 2.3.15 (Continued)

Wind Direction	Turbulence Class I	II	III	IV	V	All Classes
260	<0.1	0.9	<0.1	0.2	1.1	2.2
270	<0.1	1.3	0.1	0.4	1.5	3.3
280	<0.1	1.8	0.1	0.5	1.2	3.5
290	0.0	1.8	<0.1	0.7	1.4	4.0
300	<0.1	2.3	0.1	0.9	1.5	4.8
310	<0.1	2.4	0.1	1.2	1.5	5.3
320	<0.1	2.3	0.1	0.9	1.5	4.8
330	<0.1	3.0	0.2	1.2	1.5	6.0
340	<0.1	2.4	0.2	0.8	1.1	4.6
350	<0.1	1.6	0.1	0.8	0.9	2.9
360	<0.1	1.3	0.1	0.4	0.9	2.7
All	0.9	51.2	2.8	11.7	33.4	100.0

TABLE 2.3.16

MEAN ANNUAL WIND SPEEDS

AT

VARIOUS LEVELS

PEACH BOTTOM WEATHER STATIONS NOS. 1 AND 2

(MPH)

Period: August, 1967 - July, 1969

Turbulence Class	Nominal 30-Ft El 153	Nominal 100-Ft El 211	Hill Pole Nominal 40-Ft El 302	Nominal 75-Ft El 443	Nominal 320-Ft El 688	River Tower Nominal 50-Ft El 164
I	1	1	4	2	2	2
II	4	6	6	7	11	8
III	2	3	5	4	4	4
IV	8	11	9	11	18	11
V	1	1	1	4	8	2
All	3	4	4	6	11	6

TABLE 2.3.17

PERCENTAGE FREQUENCY OF WIND SPEEDS

BY TURBULENCE CLASSES

LOCATION W1 (NOMINAL 30-FT LEVEL, EL 152 MSL)

Period: August, 1967-July, 1969

Speed (mph)	CLASS I	II	III	IV	V	All
<1	1.79	13.85	1.48	0.39	22.55	40.05
2	0.50	8.39	0.59	0.52	5.39	15.38
3	0.29	6.33	0.43	0.54	2.41	10.00
4	0.09	5.48	0.28	0.51	1.59	7.94
5	0.02	4.10	0.20	0.63	0.33	5.27
6	0.01	3.12	0.16	0.62	0.15	4.07
7	0.01	3.50	0.08	0.93	0.08	4.60
8	0.00	2.35	0.04	0.61	0.02	3.02
9	0.01	1.95	0.03	0.73	0.01	2.73
10	0.01	1.28	0.04	0.78	0.00	2.10
11	0.00	1.14	0.01	0.65	0.01	1.81
12	0.00	0.55	0.01	0.27	0.03	0.85
13	0.00	0.50	0.00	0.43	0.01	0.94
14	0.00	0.10	0.00	0.17	0.00	0.27

TABLE 2.3.17 (Continued)

Speed (mph)	CLASS I	II	III	IV	V	All
15	0.00	0.11	0.00	0.25	0.00	0.36
16	0.00	0.06	0.00	0.16	0.00	0.22
17	0.00	0.04	0.00	0.17	0.00	0.20
18	0.00	0.01	0.00	0.05	0.00	0.06
19+	0.00	0.03	0.00	0.09	0.00	0.12
SUM	2.70	52.80	3.30	8.50	32.50	100.00

TABLE 2.3.18

PERCENTAGE FREQUENCY OF WIND SPEEDS

BY TURBULENCE CLASSES

LOCATION W2 (NOMINAL 100-FT LEVEL, EL 211 FT MSL)

Period: August, 1967-July, 1969

Speed (mph)	CLASS I	II	III	IV	V	All
1	1.77	5.58	.58	.11	23.24	31.68
2	.60	5.75	.49	.05	3.43	10.33
3	.36	5.49	.59	.06	1.59	8.10
4	.14	5.92	.34	.18	1.37	7.95
5	.09	5.32	.39	.26	.61	6.67
6	.02	5.33	.16	.53	.56	6.59
7	0.00	4.29	.18	.62	.19	5.28
8	0.00	3.97	.12	.71	.14	4.94
9	0.00	2.67	.06	.67	.04	3.43
10	0.00	2.61	.04	.76	.02	3.43
11	0.00	2.00	.02	.62	.01	2.65
12	0.00	1.43	0.00	.67	0.00	2.10
13	0.00	1.32	.01	.75	.01	2.08
14	0.00	.71	.01	.45	0.00	1.16

TABLE 2.3.18 (Continued)

Speed (mph)	CLASS I	II	III	IV	V	All
15	0.00	.69	.01	.60	0.00	1.30
16	0.00	.35	0.00	.34	0.00	.69
17	0.00	.27	0.00	.30	0.00	.57
18	0.00	.11	0.00	.12	0.00	.23
19	0.00	.24	0.00	.58	0.00	.82
SUM	2.90	54.00	3.30	8.30	31.20	100.00

TABLE 2.3.19

PERCENTAGE FREQUENCY OF WIND SPEEDS

BY TURBULENCE CLASSES

LOCATION W3 (HILL POLE, EL 302 FT MSL)

Period: August, 1967-July, 1969

Speed (mph)	CLASS I	II	III	IV	V	All
<1	.72	5.63	.49	.10	19.29	26.21
2	.39	5.82	.37	.25	5.42	12.26
3	.33	5.53	.33	.34	2.76	9.29
4	.31	6.65	.39	.49	2.10	9.95
5	.27	5.47	.33	.68	.85	7.59
6	.21	5.12	.37	.74	.59	7.04
7	.17	4.65	.28	1.06	.28	6.43
8	.08	3.62	.27	.69	.12	4.79
9	.06	2.73	.14	.71	.08	3.71
10	.02	2.01	.08	.72	.06	2.90
11	.05	1.60	.07	.68	.04	2.43
12	.01	1.17	.03	.43	.03	1.66
13	.04	1.15	.05	.63	.01	1.87
14	.01	.68	.02	.31	0.00	1.03

TABLE 2.3.19 (Continued)

Speed (mph)	CLASS I	II	III	IV	V	All
15	.02	.68	.05	.33	0.00	1.07
16	.01	.33	.01	.21	0.00	.56
17	.01	.21	0.00	.17	0.00	.39
18	0.00	.14	0.00	.10	0.00	.24
19+	.01	.30	.02	.24	.01	.58
SUM	2.70	53.50	3.20	8.80	31.60	100.00

TABLE 2.3.20

PERCENTAGE FREQUENCY OF WIND SPEEDS

BY TURBULENCE CLASSES

LOCATION W4 (NOMINAL 75-FT LEVEL, EL 443 FT MSL)

Period: August, 1967-July, 1969

Speed (mph)	CLASS I	II	III	IV	V	All
<1	.48	3.45	.63	.15	9.13	13.84
2	.40	3.44	.56	.14	4.31	8.85
3	.12	3.92	.39	.16	3.58	8.18
4	.07	4.18	.36	.33	3.97	8.90
5	.03	4.03	.25	.43	2.67	7.41
6	.01	4.49	.24	.52	2.85	8.11
7	.02	4.79	.22	.68	2.10	7.82
8	.02	4.06	.12	.92	1.97	7.08
9	0.00	3.22	.09	.97	1.07	5.34
10	0.00	3.34	.05	.93	.77	5.10
11	.01	3.21	.04	1.18	.49	4.93
12	0.00	2.00	.02	.66	.29	2.97
13	0.00	2.22	.03	1.00	.11	3.36
14	0.00	.93	0.00	.46	.07	1.46

TABLE 2.3.20 (Continued)

Speed (mph)	CLASS I	II	III	IV	V	All
15	.01	1.53	.01	.90	.03	2.48
16	0.00	.68	0.00	.33	.01	1.01
17	0.00	.80	0.00	.44	0.00	1.24
18	0.00	.23	0.00	.16	0.00	.39
19+	0.00	.68	0.00	.83	.01	1.52
SUM	1.10	51.20	3.00	11.10	33.40	100.00

TABLE 2.3.21

PERCENTAGE FREQUENCY OF WIND SPEEDS

BY TURBULENCE CLASSES

LOCATION W6 (NOMINAL 320-FT LEVEL, EL 688 FT MSL)

Period: August, 1967-July, 1969

Speed (mph)	CLASS I	II	III	IV	V	All
<1	.30	.45	.44	.02	2.11	3.32
2	.26	.90	.39	0.00	1.64	3.19
3	.19	1.05	.35	.01	1.52	3.13
4	.13	1.91	.38	.01	2.29	4.72
5	.03	2.12	.26	.03	1.98	4.42
6	.04	2.98	.23	.05	2.98	6.28
7	.02	3.08	.20	.02	2.34	5.66
8	.02	4.37	.26	.11	2.92	7.68
9	0.00	3.13	.09	.07	1.85	5.14
10	.01	3.82	.08	.17	2.43	6.52
11	0.00	3.48	.06	.29	2.13	5.96
12	0.00	3.87	.03	.40	2.15	6.45
13	0.00	3.36	.02	.66	1.70	5.74
14	0.00	2.67	.01	.70	1.61	4.99
15	0.00	2.85	0.00	.86	1.18	4.90

TABLE 2.3.21 (Continued)

Speed (mph)	CLASS I	II	III	IV	V	All
16	0.00	2.30	0.00	1.00	1.13	4.42
17	0.00	2.04	0.00	1.20	.59	3.82
18	0.00	1.28	0.00	1.01	.56	2.84
19+	0.00	5.31	.02	4.84	.65	10.81
SUM	1.00	50.90	2.80	11.40	33.70	100.00

TABLE 2.3.22

PERCENTAGE FREQUENCY OF WIND SPEEDS

BY TURBULENCE CLASSES

LOCATION W7 (RIVER TOWER, EL 164 FT MSL)

Period: August, 1967-July, 1969

Speed (mph)	CLASS I	II	III	IV	V	All
<1	.64	8.72	1.15	1.22	12.17	23.90
2	.25	3.20	.42	.20	7.10	11.19
3	.12	2.97	.19	.16	3.46	6.90
4	.13	3.75	.29	.27	3.75	8.19
5	.03	3.31	.14	.39	2.04	5.92
6	.02	4.18	.23	.65	1.82	6.90
7	.01	4.29	.14	.67	.90	6.01
8	.03	4.11	.13	.74	.91	5.92
9	0.00	2.95	.07	.47	.39	3.89
10	.01	2.82	.02	.50	.31	3.66
11	0.00	2.59	.03	.56	.10	3.27
12	0.00	2.11	.01	.40	.11	2.64
13	0.00	2.19	.01	.52	.06	2.78
14	0.00	1.12	.02	.40	.01	1.56

TABLE 2.3.22 (Continued)

Speed (mph)	CLASS I	II	III	IV	V	All
15	0.00	1.39	0.00	.41	.01	1.82
16	0.00	.93	0.00	.19	.01	1.13
17	0.00	.94	0.00	.38	.02	1.34
18	0.00	.53	0.00	.14	0.00	.67
19+	0.00	1.55	0.00	.77	0.00	2.31
SUM	1.20	53.60	2.80	9.00	33.10	100.00

TABLE 2.3.23

PERCENTAGE FREQUENCY

OF LAPSE RATES

PEACH BOTTOM WEATHER STATION NO. 1

Period: August, 1967-July, 1969

Lapse Rate Group (T_{100}-T_{20}) (°F)

Month	≤ -1.7	-1.6 to -0.5	-0.4 to +0.5	+0.6 to +1.5	+1.6 to +2.5	+2.6 to +3.5	+3.5 to +4.5	≥ +4.6
Jan	2	20	53	14	6	3	2	<1
Feb	1	19	45	14	9	6	4	2
Mar	1	24	40	24	7	3	1	<1
Apr	3	18	48	12	8	4	5	2
May	<1	18	50	11	8	6	4	3
Jun	<1	7	55	18	11	5	2	2
Jul	0	4	42	19	16	11	5	3
Aug	6	12	44	14	11	6	3	4
Sep	6	13	36	8	12	13	8	4
Oct	3	6	39	22	10	10	6	4
Nov	1	12	50	17	12	4	2	2
Dec	1	11	57	14	9	4	2	2
Annual	2	14	47	15	10	6	4	2

TABLE 2.3.24

PERCENTAGE FREQUENCY
OF LAPSE RATES
PEACH BOTTOM WEATHER STATION NO. 2

Period: August, 1967-July, 1969

Lapse Rate Group (T_{320}-T_{75}) (°F)

Month	≤ -1.7	-1.6 to -0.5	-0.4 to +0.5	+0.6 to +1.5	+1.6 to +2.5	+2.6 to +3.5	+3.5 to +4.5	≥ +4.6
Jan	4	65	20	4	1	2	2	2
Feb	12	64	14	4	2	2	<1	2
Mar	12	52	18	8	3	2	2	3
Apr	15	52	16	6	4	2	1	4
May	20	45	14	7	5	2	2	5
Jun*	30	40	16	5	5	2	1	1
Jul*	26	44	10	7	7	4	2	<1
Aug*	5	64	18	6	2	3	2	0
Sep	14	39	14	8	8	6	6	5
Oct	12	42	18	9	8	5	4	2
Nov	13	40	18	6	6	5	4	8
Dec	4	65	16	6	3	3	1	2
Annual	14	51	16	6	4	3	2	4

*Only one year's data included.

TABLE 2.3.25

STEADINESS FACTORS

PEACH BOTTOM WEATHER STATION NO. 1

NOMINAL 100-FT LEVEL (EL 211 FT MSL)

Period: August, 1967-July, 1969

Meteoro-logical Condition	Duration	Return Period (Months) S→1.0	S = 0.9	S = 0.8	Preferred Direction and Speed (mph)	
All	8 hr	5	<1	<1	SE-NW	1
All	12 hr	7	1	1	SE-NW	1
All	24 hr	15	2	<1	SE-NW	2
All	2 days	32	3	<1	SE-NW	2
All	4 days	60	17	4	SE-NW	3
All	8 days	160	55	17	NW-SE	4
All	16 days	330	120	37	NW-SE	4
All	30 days	900	300	95	NW-SE	4
Stable	8 hr	7	1	<1	WNW-SE	1
Stable	12 hr	18	3	<1	WNW-SE	1
Stable	24 hr	48	15	5	WNW-SE	2
Stable	48 hr	450	210	100	WNW-SE	2

(A steadiness value (S)→1.0 implies almost no variation of the mean wind direction; value of 0.9, no more than 18° fluctuation; 0.8, no more than 36°).

TABLE 2.3.26

STEADINESS FACTORS
PEACH BOTTOM WEATHER STATION NO. 2
NOMINAL 320-FT LEVEL (EL 688 FT MSL)

Period: August, 1967-July, 1969

Meteoro-logical Condition	Duration	Return Period (Months) S→1.0	S = 0.9	S = 0.8	Preferred Direction and Speed (mph)
All	8 hr	5	<1	<1	NW-SE 3
All	12 hr	7	1	<1	NW-SE 3
All	24 hr	15	1	<1	NW-SE 3
All	2 days	25	3	<1	NW-SE 4
All	4 days	65	15	3	NW-SE 4
All	8 days	140	52	20	NW-SE 6
All	16 days	260	115	47	NW-SE 6
All	30 days	700	270	05	NW-SE 6
Stable	8 hr	8	<1	<1	NW-SE 3
Stable	12 hr	30	4	1	NW-SE 3
Stable	24 hr	63	22	7	NW-SE 4
Stable	48 hr	650	320	160	NW-SE 4

(A steadiness value (S)→1.0 implies almost no variation of the mean wind direction; a value of 0.9, no more than 18° fluctuation; 0.8, no more than 36°.)

TABLE 2.3.27

BIVANE MEASUREMENTS

PEACH BOTTOM WEATHER STATION NO. 2

NOMINAL 150-FT LEVEL (EL 518 FT MSL)

Period: August, 1967 - July, 1969*

Mean Values

Turbulence Class	Angular Direction Range (°)		Standard Deviation(σ) (°)		
	Azimuth	Elevation	Azimuth	Elevation	σ_e/σ_a
II	27	15	9	5	.55
III	>36	>36	>12	>12	1
IV	22	15	7	5	.69
V	10	6	3	2	.66

Modal Values

II	25	14	8	5	.62
III	>36	>36	>12	>12	1
IV	23	15	8	5	.62
V	5	3	2	1	.50

*Ten individual months of data from this period covering eight different calendar months are included.

TABLE 2.3.28

LEAST FAVORABLE METEOROLOGICAL CONDITIONS

Elevated Release

Time After Accident	% of Period Affected	Wind Speed (m/sec)	Turbulence Class	Type of Model
0-8 hr	100	1	V	Centerline
8-24 hr	100	2	V	22 1/2° Sector
1-4 days	50	2	V	22 1/2° Sector
	50	5	IV	
4-30 days	10	2	V	22 1/2° Sector
	10	4	II	
	10	5	IV	

Ground Release

0-8 hr	100	1/2	V	Centerline
8-24 hr	100	1	V	22 1/2° Sector
1-4 days	50	1	V	22 1/2° Sector
	50	2	II	
4-30 days	10	1	V	22 1/2° Sector
	10	2	II	
	10	3	IV	

Table 2.3.29

Peach Bottom
Joint Frequency Distribution
1984-1988
Tower 2
320' wind
316'-33' Delta T

		Wind Direction Category																	
	Wind Speed Category[1]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Calm	Total
A	1 (Calm)																	0.000	0.000
	2	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.007
	3	0.014	0.021	0.054	0.091	0.203	0.103	0.009	0.005	0.000	0.005	0.005	0.000	0.002	0.000	0.000	0.002		0.513
	4	0.000	0.021	0.047	0.068	0.107	0.103	0.047	0.005	0.028	0.016	0.012	0.016	0.019	0.021	0.005	0.019		0.532
	5	0.005	0.009	0.021	0.042	0.016	0.007	0.030	0.000	0.016	0.007	0.005	0.007	0.049	0.021	0.007	0.035		0.278
	6	0.005	0.005	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.005	0.033	0.005	0.000	0.002		0.058
	7	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.012	0.002	0.002		0.028
	Subtotal	0.023	0.056	0.121	0.203	0.334	0.217	0.086	0.009	0.044	0.028	0.021	0.033	0.107	0.058	0.014	0.061	0.000	1.416
B	1 (Calm)																	0.000	0.000
	2	0.000	0.005	0.005	0.021	0.012	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.047
	3	0.030	0.054	0.042	0.058	0.131	0.068	0.023	0.007	0.007	0.009	0.007	0.002	0.009	0.007	0.009	0.007		0.471
	4	0.009	0.035	0.030	0.035	0.028	0.058	0.063	0.019	0.058	0.033	0.030	0.019	0.049	0.021	0.005	0.051		0.543
	5	0.023	0.007	0.005	0.002	0.002	0.005	0.019	0.019	0.072	0.021	0.014	0.044	0.063	0.047	0.021	0.077		0.441
	6	0.002	0.005	0.002	0.000	0.000	0.002	0.002	0.002	0.012	0.005	0.002	0.005	0.028	0.033	0.009	0.012		0.121
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.014	0.016	0.000	0.000		0.035
	Subtotal	0.065	0.105	0.084	0.117	0.173	0.133	0.112	0.047	0.152	0.068	0.054	0.072	0.163	0.124	0.044	0.147	0.000	1.658
C	1 (Calm)																	0.000	0.000
	2	0.000	0.012	0.028	0.035	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.077
	3	0.072	0.051	0.065	0.086	0.117	0.152	0.033	0.028	0.044	0.012	0.016	0.007	0.012	0.012	0.007	0.051		0.765
	4	0.098	0.044	0.021	0.040	0.033	0.061	0.145	0.051	0.168	0.086	0.070	0.061	0.098	0.061	0.061	0.233		1.330
	5	0.042	0.019	0.009	0.007	0.007	0.009	0.026	0.023	0.156	0.056	0.049	0.072	0.131	0.138	0.082	0.217		1.043
	6	0.009	0.002	0.000	0.000	0.002	0.005	0.000	0.002	0.021	0.000	0.009	0.009	0.068	0.070	0.065	0.040		0.303
	7	0.002	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.002	0.030	0.063	0.014	0.000		0.126
	Subtotal	0.224	0.138	0.124	0.168	0.161	0.226	0.203	0.105	0.392	0.154	0.147	0.152	0.338	0.343	0.229	0.541	0.000	3.643
D	1 (Calm)																	0.005	0.005
	2	0.138	0.135	0.252	0.278	0.268	0.201	0.105	0.082	0.096	0.054	0.075	0.035	0.061	0.089	0.084	0.117		2.067
	3	0.770	0.492	0.555	0.784	1.015	0.709	0.791	0.567	0.700	0.446	0.362	0.299	0.329	0.226	0.450	0.898		9.391
	4	1.215	0.814	0.585	0.648	0.772	0.718	1.115	1.087	1.651	0.991	0.669	0.492	0.702	0.828	1.264	2.165		15.719
	5	0.924	0.359	0.198	0.156	0.308	0.327	0.376	0.275	1.124	0.387	0.294	0.443	0.921	1.572	2.423	2.141		12.229
	6	0.170	0.063	0.030	0.026	0.075	0.061	0.033	0.026	0.231	0.037	0.037	0.051	0.525	1.045	1.267	0.564		4.241
	7	0.035	0.016	0.028	0.005	0.019	0.005	0.016	0.016	0.068	0.021	0.007	0.014	0.210	0.352	0.429	0.147		1.388
	Subtotal	3.252	1.880	1.649	1.896	2.456	2.020	2.435	2.053	3.870	1.936	1.444	1.334	2.748	4.112	5.918	6.032	0.005	45.039
E	1 (Calm)																	0.014	0.014
	2	0.140	0.103	0.084	0.142	0.140	0.140	0.142	0.138	0.163	0.131	0.138	0.126	0.126	0.084	0.091	0.079	0.000	1.966
	3	0.548	0.383	0.350	0.511	0.660	0.467	0.805	0.725	1.015	0.746	0.655	0.436	0.404	0.322	0.397	0.474		8.896
	4	0.856	0.469	0.364	0.236	0.376	0.599	0.814	1.033	2.078	1.346	0.826	0.693	0.921	0.826	1.211	1.199		13.846
	5	0.364	0.089	0.061	0.026	0.135	0.147	0.229	0.385	1.204	0.532	0.504	0.632	1.250	1.360	1.518	1.092		9.526
	6	0.054	0.019	0.019	0.009	0.028	0.049	0.037	0.026	0.149	0.044	0.042	0.070	0.182	0.259	0.208	0.100		1.295
	7	0.016	0.002	0.002	0.002	0.047	0.009	0.028	0.005	0.014	0.009	0.005	0.002	0.021	0.028	0.014	0.023		0.229
	Subtotal	1.978	1.064	0.879	0.926	1.386	1.411	2.055	2.312	4.623	2.808	2.169	1.959	2.904	2.878	3.438	2.967	0.014	35.772
F	1 (Calm)																	0.012	0.012
	2	0.061	0.044	0.051	0.061	0.072	0.054	0.065	0.075	0.054	0.075	0.075	0.077	0.070	0.065	0.061	0.051		1.010
	3	0.231	0.089	0.079	0.068	0.079	0.121	0.189	0.210	0.313	0.329	0.364	0.273	0.198	0.154	0.219	0.226		3.142
	4	0.189	0.058	0.030	0.019	0.030	0.056	0.112	0.184	0.303	0.259	0.366	0.413	0.462	0.327	0.415	0.294		3.517
	5	0.009	0.002	0.002	0.000	0.000	0.005	0.016	0.019	0.103	0.054	0.091	0.254	0.392	0.322	0.210	0.075		1.553
	6	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.042	0.056	0.042	0.000	0.012		0.161
	7	0.000	0.000	0.000	0.000	0.009	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.012
	Subtotal	0.492	0.194	0.163	0.147	0.191	0.238	0.383	0.487	0.772	0.723	0.896	1.059	1.178	0.910	0.905	0.658	0.012	9.407
G	1 (Calm)																	0.000	0.000
	2	0.026	0.033	0.026	0.023	0.030	0.012	0.009	0.021	0.040	0.021	0.014	0.042	0.030	0.033	0.030	0.044		0.434
	3	0.110	0.044	0.051	0.044	0.030	0.014	0.065	0.023	0.079	0.072	0.084	0.079	0.093	0.082	0.163	0.138		1.173
	4	0.037	0.012	0.009	0.005	0.005	0.005	0.019	0.014	0.023	0.049	0.119	0.163	0.161	0.103	0.215	0.198		1.136
	5	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.005	0.002	0.019	0.061	0.091	0.091	0.021	0.012		0.308
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.005	0.000		0.009
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.002		0.005
	Subtotal	0.175	0.089	0.086	0.072	0.065	0.030	0.096	0.061	0.147	0.145	0.236	0.348	0.380	0.313	0.429	0.394	0.000	3.065
	Total	6.209	3.524	3.107	3.529	4.765	4.276	5.369	5.073	10.000	5.862	4.966	4.957	7.819	8.738	10.977	10.800	0.030	100.00

Notes:
1) Wind Speed Categories defined as follows:

Category	Wind Speed (mph)
1 (Calm)	<0.5
2	>=0.5 to <3.5
3	>=3.5 to <7.5
4	>=7.5 to <12.5
5	>=12.5 to <18.5
6	>=18.5 to <24
7	>=24

Table 2.3.29

Peach Bottom
Joint Frequency Distribution
1984-1988
Tower 2
75' wind
150'-33' Delta T

		Wind Direction																	
	Wind Speed Category[1]	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Calm	Total
1 (A)	1 (Calm)																	0.000	0.000
	2	0.033	0.135	0.242	0.298	0.172	0.061	0.026	0.005	0.002	0.002	0.002	0.005	0.000	0.000	0.002	0.007		0.993
	3	0.193	0.322	0.352	0.301	0.368	0.364	0.168	0.086	0.082	0.047	0.086	0.061	0.091	0.054	0.037	0.165		2.776
	4	0.126	0.086	0.012	0.000	0.002	0.124	0.065	0.093	0.226	0.128	0.124	0.138	0.249	0.126	0.156	0.394		2.049
	5	0.021	0.012	0.000	0.000	0.000	0.005	0.002	0.016	0.072	0.012	0.021	0.028	0.133	0.058	0.051	0.082		0.513
	6	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.002	0.009	0.026	0.005	0.000	0.002		0.051
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.007	0.000	0.000	0.000		0.009
	Subtotal	**0.375**	**0.555**	**0.606**	**0.599**	**0.543**	**0.552**	**0.261**	**0.200**	**0.385**	**0.191**	**0.235**	**0.242**	**0.506**	**0.242**	**0.247**	**0.650**	**0.000**	6.391
2 (B)	1 (Calm)																	0.002	0.002
	2	0.035	0.065	0.144	0.128	0.114	0.049	0.026	0.019	0.007	0.002	0.002	0.005	0.007	0.007	0.007	0.012		0.629
	3	0.179	0.184	0.103	0.086	0.131	0.140	0.142	0.098	0.117	0.082	0.089	0.054	0.100	0.054	0.065	0.172		1.795
	4	0.168	0.070	0.000	0.000	0.012	0.014	0.068	0.119	0.333	0.126	0.110	0.114	0.163	0.193	0.205	0.473		2.158
	5	0.019	0.002	0.000	0.000	0.000	0.007	0.000	0.028	0.100	0.023	0.023	0.021	0.131	0.110	0.114	0.107		0.685
	6	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.005	0.000	0.002	0.000	0.007	0.023	0.007	0.005		0.058
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	Subtotal	**0.406**	**0.324**	**0.247**	**0.214**	**0.256**	**0.210**	**0.226**	**0.266**	**0.562**	**0.233**	**0.226**	**0.193**	**0.408**	**0.387**	**0.399**	**0.769**	**0.002**	5.328
3 (C)	1 (Calm)																	0.000	0.000
	2	0.030	0.054	0.068	0.084	0.068	0.033	0.005	0.005	0.009	0.000	0.002	0.005	0.005	0.005	0.002	0.012		0.386
	3	0.086	0.070	0.047	0.049	0.065	0.075	0.075	0.096	0.105	0.049	0.033	0.035	0.061	0.033	0.072	0.144		1.093
	4	0.077	0.019	0.002	0.002	0.009	0.007	0.019	0.051	0.182	0.086	0.068	0.061	0.105	0.105	0.154	0.343		1.289
	5	0.016	0.007	0.000	0.000	0.000	0.000	0.000	0.016	0.047	0.007	0.014	0.014	0.084	0.103	0.110	0.089		0.506
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.009	0.016	0.016	0.007		0.054
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002		0.002
	Subtotal	**0.210**	**0.149**	**0.117**	**0.135**	**0.142**	**0.114**	**0.098**	**0.170**	**0.345**	**0.142**	**0.117**	**0.114**	**0.263**	**0.261**	**0.354**	**0.597**	**0.000**	3.328
4 (D)	1 (Calm)																	0.012	0.012
	2	0.261	0.457	0.641	0.739	0.585	0.301	0.231	0.245	0.233	0.117	0.121	0.112	0.151	0.107	0.140	0.161		4.801
	3	0.823	0.757	0.636	0.468	0.508	0.557	0.862	1.119	1.042	0.492	0.326	0.347	0.468	0.562	0.797	1.023		10.788
	4	0.886	0.308	0.056	0.019	0.065	0.186	0.375	0.522	1.009	0.375	0.301	0.385	0.825	1.503	2.112	2.032		10.959
	5	0.142	0.077	0.007	0.000	0.000	0.016	0.023	0.061	0.198	0.056	0.037	0.082	0.527	0.860	1.168	0.667		3.918
	6	0.012	0.009	0.000	0.000	0.000	0.000	0.000	0.002	0.019	0.007	0.002	0.005	0.068	0.054	0.107	0.049		0.333
	7	0.005	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.005		0.019
	Subtotal	**2.128**	**1.608**	**1.342**	**1.228**	**1.158**	**1.060**	**1.492**	**1.948**	**2.498**	**1.046**	**0.788**	**0.930**	**2.042**	**3.086**	**4.326**	**3.936**	**0.012**	30.629
5 (E)	1 (Calm)																	0.033	0.033
	2	0.464	0.527	0.806	0.909	1.007	0.795	0.823	0.820	0.818	0.489	0.382	0.387	0.417	0.333	0.394	0.312		9.684
	3	0.977	0.655	0.473	0.510	0.722	0.825	1.212	1.729	1.997	1.212	0.841	0.921	1.287	1.487	1.545	1.100		17.494
	4	0.534	0.147	0.049	0.051	0.075	0.200	0.289	0.382	0.895	0.352	0.312	0.643	1.473	1.729	1.838	1.217		9.987
	5	0.033	0.026	0.000	0.000	0.005	0.023	0.019	0.030	0.135	0.019	0.014	0.033	0.172	0.177	0.184	0.149		1.018
	6	0.012	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.007	0.002	0.009	0.009	0.005		0.056
	7	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.016		0.021
	Subtotal	**2.021**	**1.356**	**1.328**	**1.471**	**1.809**	**1.844**	**2.342**	**2.962**	**3.855**	**2.072**	**1.550**	**1.990**	**3.351**	**3.738**	**3.771**	**2.799**	**0.033**	38.292
6 (F)	1 (Calm)																	0.012	0.012
	2	0.294	0.231	0.231	0.177	0.338	0.385	0.399	0.266	0.273	0.172	0.259	0.284	0.401	0.366	0.399	0.319		4.792
	3	0.105	0.057	0.019	0.012	0.040	0.161	0.198	0.163	0.247	0.198	0.333	0.594	0.881	0.678	0.618	0.315		4.598
	4	0.005	0.000	0.000	0.009	0.002	0.000	0.002	0.009	0.014	0.014	0.068	0.373	0.347	0.147	0.103	0.044		1.137
	5	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.002		0.008
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	Subtotal	**0.403**	**0.288**	**0.249**	**0.198**	**0.380**	**0.548**	**0.599**	**0.438**	**0.534**	**0.385**	**0.660**	**1.254**	**1.631**	**1.191**	**1.119**	**0.681**	**0.012**	10.548
7 (G)	1 (Calm)																	0.019	0.019
	2	0.093	0.044	0.047	0.063	0.107	0.126	0.149	0.086	0.070	0.070	0.131	0.184	0.431	0.487	0.452	0.207		2.748
	3	0.033	0.000	0.000	0.000	0.007	0.037	0.049	0.033	0.016	0.021	0.086	0.361	0.813	0.713	0.263	0.075		2.508
	4	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.007	0.063	0.089	0.033	0.012	0.002		0.210
	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
7 (G)	Subtotal	**0.126**	**0.044**	**0.047**	**0.063**	**0.114**	**0.163**	**0.200**	**0.119**	**0.086**	**0.093**	**0.224**	**0.608**	**1.333**	**1.233**	**0.727**	**0.284**	**0.019**	5.484
	Total	**5.668**	**4.305**	**3.936**	**3.908**	**4.403**	**4.491**	**5.218**	**6.104**	**8.264**	**4.162**	**3.799**	**5.332**	**9.535**	**10.138**	**10.942**	**9.716**	**0.077**	**100.00**

Notes:
(1) Wind Speed Categories defined as follows:

Category	Wind Speed (mph)
1 (Calm)	<0.5
2	>=0.5 to <3.5
3	>=3.5 to <7.5
4	>=7.5 to <12.5
5	>=12.5 to <18.5
6	>=18.5 to <24
7	>=24

Table 2.3.29

Peach Bottom
Joint Frequency Distribution
1984-1988
Tower 2
33' wind
150'-33' Delta T

		Wind Direction																	
	Wind Speed Category[1]	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Calm	Total
1 (A)	1 (Calm)																	0.000	0.000
	2	0.206	0.313	0.330	0.334	0.238	0.185	0.117	0.075	0.019	0.007	0.009	0.016	0.035	0.037	0.056	0.094		2.071
	3	0.393	0.189	0.072	0.065	0.103	0.227	0.255	0.185	0.166	0.101	0.126	0.091	0.217	0.243	0.180	0.472		3.086
	4	0.065	0.002	0.002	0.000	0.000	0.019	0.014	0.068	0.229	0.072	0.091	0.065	0.136	0.084	0.058	0.210		1.118
	5	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.030	0.002	0.007	0.002	0.009	0.019	0.007	0.002		0.094
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	7	0.000	0.002	0.002	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.009
	Subtotal	**0.666**	**0.507**	**0.407**	**0.400**	**0.346**	**0.430**	**0.386**	**0.339**	**0.444**	**0.182**	**0.234**	**0.175**	**0.397**	**0.383**	**0.302**	**0.779**	**0.000**	6.378
2 (B)	1 (Calm)																	0.000	0.000
	2	0.140	0.131	0.150	0.157	0.143	0.103	0.054	0.030	0.028	0.005	0.014	0.014	0.035	0.028	0.021	0.089		1.141
	3	0.337	0.094	0.026	0.035	0.028	0.072	0.131	0.168	0.213	0.105	0.150	0.098	0.150	0.166	0.159	0.388		2.319
	4	0.089	0.005	0.000	0.000	0.002	0.014	0.021	0.079	0.339	0.108	0.065	0.056	0.119	0.166	0.208	0.393		1.665
	5	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.051	0.002	0.007	0.000	0.005	0.037	0.049	0.021		0.194
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000		0.002
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.002
	Subtotal	**0.570**	**0.229**	**0.175**	**0.192**	**0.173**	**0.189**	**0.208**	**0.295**	**0.631**	**0.220**	**0.236**	**0.168**	**0.309**	**0.400**	**0.437**	**0.891**	**0.000**	5.323
3 (C)	1 (Calm)																	0.000	0.000
	2	0.075	0.108	0.061	0.112	0.082	0.063	0.026	0.012	0.014	0.000	0.012	0.009	0.014	0.016	0.021	0.077		0.701
	3	0.136	0.023	0.007	0.019	0.021	0.023	0.077	0.124	0.154	0.056	0.056	0.049	0.098	0.087	0.108	0.292		1.330
	4	0.037	0.002	0.000	0.000	0.002	0.002	0.012	0.040	0.175	0.072	0.051	0.051	0.082	0.124	0.187	0.292		1.132
	5	0.002	0.000	0.000	0.000	0.000	0.002	0.000	0.007	0.019	0.000	0.000	0.000	0.007	0.028	0.047	0.037		0.150
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.002
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	Subtotal	**0.250**	**0.133**	**0.068**	**0.131**	**0.105**	**0.091**	**0.115**	**0.185**	**0.362**	**0.129**	**0.119**	**0.110**	**0.201**	**0.255**	**0.362**	**0.699**	**0.000**	3.315
4 (D)	1 (Calm)																	0.019	0.019
	2	0.909	0.790	1.022	0.743	0.692	0.409	0.360	0.535	0.414	0.215	0.182	0.245	0.285	0.299	0.449	0.556		8.109
	3	1.335	0.374	0.164	0.082	0.152	0.339	0.891	1.384	1.272	0.545	0.440	0.409	0.694	1.010	1.730	2.156		12.966
	4	0.514	0.019	0.000	0.000	0.005	0.019	0.180	0.351	0.760	0.252	0.182	0.173	0.500	1.344	2.156	1.852		8.306
	5	0.054	0.000	0.000	0.000	0.000	0.000	0.005	0.028	0.105	0.023	0.012	0.009	0.101	0.133	0.395	0.309		1.174
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.002	0.000	0.000		0.007
	7	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007		0.012
	Subtotal	**2.817**	**1.183**	**1.176**	**0.825**	**0.849**	**0.767**	**1.435**	**2.298**	**2.551**	**1.040**	**0.816**	**0.837**	**1.580**	**2.789**	**4.730**	**4.879**	**0.019**	30.591
5 (E)	1 (Calm)																	0.126	0.126
	2	1.209	0.973	0.970	0.895	1.204	1.099	1.269	1.403	1.482	0.877	0.760	0.923	1.047	1.164	1.424	0.998		17.698
	3	1.047	0.215	0.178	0.173	0.248	0.414	0.923	1.583	1.802	0.914	0.757	1.015	1.562	2.347	2.216	1.779		17.174
	4	0.171	0.009	0.002	0.000	0.014	0.040	0.122	0.166	0.472	0.126	0.108	0.119	0.288	0.451	0.601	0.493		3.182
	5	0.009	0.000	0.000	0.000	0.000	0.000	0.002	0.014	0.058	0.009	0.000	0.000	0.014	0.019	0.021	0.023		0.171
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002		0.005
	7	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014		0.016
	Subtotal	**2.438**	**1.197**	**1.150**	**1.068**	**1.466**	**1.552**	**2.317**	**3.165**	**3.818**	**1.926**	**1.625**	**2.057**	**2.911**	**3.981**	**4.262**	**3.310**	**0.126**	38.371
6 (F)	1 (Calm)																	0.061	0.061
	2	0.304	0.189	0.173	0.215	0.421	0.524	0.302	0.231	0.283	0.458	0.687	1.054	1.169	0.973	0.774	0.379		8.136
	3	0.016	0.000	0.012	0.005	0.007	0.033	0.056	0.042	0.115	0.108	0.227	0.589	0.498	0.318	0.213	0.089		2.326
	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.007	0.000	0.002	0.002	0.005		0.019
	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	Subtotal	**0.320**	**0.189**	**0.185**	**0.220**	**0.428**	**0.556**	**0.358**	**0.274**	**0.397**	**0.566**	**0.916**	**1.651**	**1.667**	**1.293**	**0.989**	**0.472**	**0.061**	10.541
7 (G)	1 (Calm)																	0.035	0.035
	2	0.082	0.070	0.068	0.115	0.206	0.129	0.075	0.063	0.054	0.077	0.388	1.150	0.994	0.547	0.278	0.136		4.430
	3	0.002	0.009	0.000	0.000	0.007	0.012	0.005	0.000	0.000	0.016	0.138	0.594	0.166	0.037	0.016	0.007		1.010
	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.002		0.005
	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	Subtotal	**0.084**	**0.079**	**0.068**	**0.115**	**0.213**	**0.140**	**0.079**	**0.063**	**0.054**	**0.094**	**0.526**	**1.746**	**1.160**	**0.584**	**0.295**	**0.145**	**0.035**	5.480
	Total	**7.147**	**3.518**	**3.229**	**2.950**	**3.579**	**3.727**	**4.898**	**6.619**	**8.257**	**4.157**	**4.472**	**6.745**	**8.225**	**9.686**	**11.376**	**11.175**	**0.241**	**100.00**

Category	Wind Speed (mph)
1 (Calm)	
2	<0.5
3	>=0.5 to <3.5
4	>=3.5 to <7.5
5	>=7.5 to <12.5
6	>=12.5 to <18.5
7	>=18.5 to <24
	>=24

Table 2.3.29

Peach Bottom
Joint Frequency Distribution
1984-1988
Tower 1A
92' wind
89'-33' Delta T

		Wind Direction Category																	
	Wind Speed Category[1]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Calm	Total
1 (A)	1 (Calm)																	0.005	0.005
	2	0.136	0.180	0.263	0.397	0.795	0.524	0.180	0.046	0.021	0.000	0.014	0.018	0.025	0.005	0.016	0.042		2.663
	3	0.744	0.305	0.268	0.321	0.732	1.476	1.841	0.407	0.069	0.028	0.032	0.116	0.187	0.083	0.134	0.614		7.357
	4	0.511	0.074	0.044	0.060	0.111	0.511	0.467	0.069	0.000	0.000	0.000	0.000	0.275	0.344	0.513	2.281		5.179
	5	0.116	0.007	0.009	0.007	0.000	0.042	0.009	0.000	0.000	0.000	0.000	0.000	0.039	0.136	0.312	0.910		1.587
	6	0.014	0.000	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.051		0.069
	7	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012		0.014
	Subtotal	**1.520**	**0.566**	**0.587**	**0.785**	**1.638**	**2.557**	**2.497**	**0.462**	**0.090**	**0.028**	**0.046**	**0.134**	**0.527**	**0.568**	**0.975**	**3.890**	**0.005**	**16.875**
2 (B)	1 (Calm)																	0.000	0.000
	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	Subtotal	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
3 (C)	1 (Calm)																	0.000	0.000
	2	0.053	0.074	0.079	0.109	0.224	0.233	0.118	0.049	0.012	0.009	0.007	0.016	0.018	0.009	0.009	0.025		1.044
	3	0.273	0.129	0.120	0.159	0.316	0.541	0.684	0.150	0.023	0.014	0.032	0.125	0.245	0.134	0.139	0.358		3.442
	4	0.166	0.014	0.072	0.023	0.090	0.213	0.164	0.002	0.000	0.000	0.000	0.002	0.291	0.476	0.487	0.767		2.767
	5	0.032	0.000	0.002	0.007	0.000	0.032	0.018	0.000	0.000	0.000	0.000	0.000	0.032	0.196	0.173	0.273		0.767
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.007	0.018		0.032
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000		0.005
	Subtotal	**0.524**	**0.217**	**0.273**	**0.298**	**0.631**	**1.019**	**0.986**	**0.201**	**0.035**	**0.023**	**0.039**	**0.143**	**0.589**	**0.822**	**0.815**	**1.441**	**0.000**	**8.057**
4 (D)	1 (Calm)																	0.002	0.002
	2	0.171	0.104	0.139	0.185	0.437	0.626	0.857	0.303	0.127	0.083	0.104	0.159	0.176	0.069	0.051	0.076		3.666
	3	0.434	0.330	0.377	0.379	0.705	0.961	1.954	0.573	0.092	0.046	0.060	0.360	1.120	0.836	0.788	0.804		9.820
	4	0.282	0.062	0.104	0.058	0.203	0.400	0.464	0.012	0.000	0.002	0.005	0.028	0.887	2.134	1.749	1.074		7.464
	5	0.042	0.009	0.012	0.002	0.035	0.065	0.032	0.002	0.000	0.000	0.000	0.000	0.085	0.383	0.377	0.217		1.261
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.007	0.007	0.021		0.053
	7	0.000	0.002	0.005	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.002		0.018
	Subtotal	**0.929**	**0.508**	**0.635**	**0.624**	**1.381**	**2.051**	**3.310**	**0.889**	**0.219**	**0.132**	**0.169**	**0.550**	**2.287**	**3.433**	**2.971**	**2.195**	**0.002**	**22.285**
5 (E)	1 (Calm)																	0.021	0.021
	2	0.155	0.083	0.132	0.092	0.261	0.765	1.668	0.617	0.282	0.203	0.229	0.326	0.314	0.129	0.122	0.132		5.509
	3	0.213	0.125	0.178	0.146	0.231	0.286	1.287	0.483	0.083	0.037	0.060	0.444	1.157	1.146	0.640	0.353		6.868
	4	0.189	0.035	0.035	0.049	0.127	0.173	0.141	0.028	0.000	0.002	0.000	0.021	0.187	0.832	0.490	0.367		2.675
	5	0.023	0.000	0.000	0.000	0.032	0.032	0.012	0.000	0.000	0.000	0.000	0.000	0.009	0.035	0.035	0.021		0.199
	6	0.000	0.000	0.000	0.000	0.002	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005	0.000	0.000		0.016
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.002	0.000	0.000	0.000		0.007
	Subtotal	**0.580**	**0.243**	**0.344**	**0.286**	**0.654**	**1.264**	**3.107**	**1.127**	**0.370**	**0.243**	**0.289**	**0.790**	**1.672**	**2.146**	**1.287**	**0.873**	**0.021**	**15.295**
6 (F)	1 (Calm)																	0.032	0.032
	2	0.099	0.062	0.060	0.090	0.180	0.550	1.481	0.783	0.397	0.277	0.316	0.390	0.407	0.199	0.166	0.152		5.611
	3	0.072	0.016	0.049	0.039	0.037	0.083	0.464	0.277	0.074	0.028	0.069	0.688	0.973	0.709	0.397	0.185		4.160
	4	0.014	0.002	0.005	0.005	0.039	0.014	0.000	0.000	0.000	0.000	0.002	0.032	0.113	0.152	0.079	0.058		0.515
	5	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.002	0.005		0.023
	6	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.005
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	Subtotal	**0.185**	**0.081**	**0.113**	**0.134**	**0.273**	**0.647**	**1.945**	**1.060**	**0.471**	**0.305**	**0.388**	**1.111**	**1.495**	**1.063**	**0.644**	**0.400**	**0.032**	**10.347**
7 (G)	1 (Calm)																	0.113	0.113
	2	0.116	0.099	0.083	0.074	0.182	0.485	1.970	2.453	2.354	1.622	1.608	2.146	1.707	0.587	0.326	0.199		16.011
	3	0.037	0.007	0.002	0.009	0.012	0.028	0.243	0.215	0.109	0.067	0.182	3.883	3.987	0.908	0.349	0.118		10.155
	4	0.014	0.000	0.000	0.000	0.000	0.002	0.012	0.000	0.000	0.000	0.000	0.208	0.432	0.141	0.032	0.023		0.864
	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	Subtotal	**0.166**	**0.106**	**0.085**	**0.083**	**0.194**	**0.515**	**2.225**	**2.668**	**2.462**	**1.689**	**1.790**	**6.237**	**6.126**	**1.635**	**0.707**	**0.340**	**0.113**	**27.143**
	Total	**3.904**	**1.721**	**2.037**	**2.211**	**4.770**	**8.053**	**14.070**	**6.408**	**3.647**	**2.419**	**2.721**	**8.965**	**12.696**	**9.667**	**7.399**	**9.138**	**0.173**	**100.00**

Notes:
(1) Wind Speed Categories defined as follows:

Category	Wind Speed (mph)
2	>=0.5 to <3.5
3	>=3.5 to <7.5
4	>=7.5 to <12.5
5	>=12.5 to <18.5
6	>=18.5 to <24
7	>=24

Table 2.3.29

Peach Bottom
Joint Frequency Distribution
1984-1988
Tower 1A/River Tower
45' River Tower Wind
09-33' Tower 1A Delta T

		Wind Direction Category																	
	Wind Speed Category[1]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Calm	Total
1 (A)	1 (Calm)																	0.000	
	2	0.209	0.197	0.193	0.209	0.290	0.314	0.293	0.119	0.138	0.074	0.069	0.078	0.088	0.100	0.076	0.169		2.616
	3	0.371	0.243	0.193	0.243	0.469	0.744	1.004	0.390	0.164	0.081	0.040	0.031	0.067	0.081	0.388	0.388		4.895
	4	0.530	0.105	0.086	0.086	0.157	0.207	0.685	0.692	0.373	0.083	0.076	0.074	0.126	0.166	0.828	0.994		5.268
	5	0.295	0.043	0.012	0.010	0.002	0.024	0.048	0.390	0.155	0.024	0.002	0.005	0.074	0.226	0.832	1.101		3.242
	6	0.069	0.000	0.002	0.000	0.000	0.005	0.000	0.029	0.000	0.002	0.000	0.000	0.000	0.059	0.350	0.276		0.792
	7	0.002	0.007	0.002	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.095	0.040		0.164
	Subtotal	**1.477**	**0.595**	**0.488**	**0.547**	**0.920**	**1.294**	**2.031**	**1.620**	**0.830**	**0.264**	**0.188**	**0.188**	**0.354**	**0.645**	**2.569**	**2.968**	**0.000**	16.977
2 (B)	1 (Calm)																	0.000	0.000
	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	Subtotal	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	0.000
3 (C)	1 (Calm)																	0.002	0.002
	2	0.083	0.078	0.078	0.069	0.086	0.105	0.114	0.045	0.031	0.010	0.012	0.024	0.024	0.031	0.057	0.074		0.920
	3	0.162	0.088	0.100	0.164	0.269	0.288	0.326	0.133	0.064	0.043	0.038	0.036	0.055	0.057	0.214	0.186		2.221
	4	0.238	0.081	0.083	0.024	0.109	0.193	0.245	0.226	0.143	0.040	0.100	0.076	0.145	0.226	0.354	0.326		2.609
	5	0.136	0.010	0.012	0.002	0.002	0.036	0.048	0.124	0.029	0.007	0.012	0.010	0.059	0.319	0.516	0.400		1.720
	6	0.007	0.000	0.002	0.000	0.000	0.005	0.002	0.019	0.000	0.002	0.000	0.002	0.002	0.140	0.197	0.126		0.507
	7	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.014	0.074	0.038		0.131
	Subtotal	**0.626**	**0.257**	**0.278**	**0.259**	**0.466**	**0.626**	**0.735**	**0.549**	**0.266**	**0.102**	**0.162**	**0.147**	**0.285**	**0.787**	**1.413**	**1.149**	**0.002**	8.110
4 (D)	1 (Calm)																	0.002	0.002
	2	0.219	0.147	0.166	0.193	0.219	0.221	0.245	0.114	0.081	0.040	0.059	0.067	0.078	0.095	0.145	0.166		2.255
	3	0.407	0.243	0.376	0.390	0.516	0.635	0.856	0.390	0.274	0.150	0.166	0.197	0.240	0.295	0.521	0.407		6.062
	4	0.495	0.205	0.124	0.114	0.290	0.499	0.704	0.873	0.354	0.136	0.171	0.202	0.459	0.854	1.163	0.685		7.328
	5	0.181	0.052	0.017	0.007	0.052	0.107	0.105	0.383	0.050	0.033	0.033	0.026	0.212	1.334	1.325	0.756		4.714
	6	0.021	0.005	0.000	0.000	0.005	0.010	0.017	0.088	0.002	0.000	0.000	0.000	0.014	0.293	0.642	0.274		1.370
	7	0.005	0.002	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.040	0.159	0.071		0.283
	Subtotal	**1.327**	**0.654**	**0.683**	**0.704**	**1.082**	**1.472**	**1.929**	**1.848**	**0.802**	**0.359**	**0.430**	**0.492**	**1.004**	**2.911**	**3.955**	**2.359**	**0.002**	22.014
5 (E)	1 (Calm)																	0.010	0.010
	2	0.250	0.143	0.107	0.133	0.152	0.259	0.369	0.188	0.088	0.107	0.145	0.117	0.155	0.147	0.195	0.383		2.937
	3	0.364	0.140	0.164	0.221	0.224	0.423	0.813	0.516	0.364	0.121	0.216	0.221	0.323	0.359	0.599	0.359		5.430
	4	0.390	0.095	0.071	0.055	0.100	0.283	0.469	0.790	0.233	0.057	0.071	0.050	0.174	0.728	0.909	0.428		4.902
	5	0.105	0.017	0.000	0.005	0.059	0.055	0.048	0.245	0.040	0.002	0.002	0.002	0.017	0.314	0.516	0.254		1.681
	6	0.005	0.000	0.000	0.000	0.012	0.000	0.002	0.052	0.014	0.000	0.000	0.000	0.000	0.031	0.105	0.045		0.266
	7	0.005	0.002	0.000	0.000	0.000	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.007	0.002		0.038
	Subtotal	**1.118**	**0.397**	**0.342**	**0.414**	**0.547**	**1.025**	**1.703**	**1.791**	**0.740**	**0.288**	**0.435**	**0.390**	**0.668**	**1.593**	**2.331**	**1.472**	**0.010**	15.264
6 (F)	1 (Calm)																	0.010	0.010
	2	0.216	0.124	0.114	0.100	0.143	0.228	0.397	0.283	0.235	0.121	0.178	0.209	0.288	0.235	0.411	0.419		3.703
	3	0.214	0.067	0.086	0.045	0.100	0.235	0.542	0.590	0.304	0.105	0.126	0.195	0.304	0.404	0.518	0.352		4.188
	4	0.083	0.012	0.019	0.019	0.012	0.071	0.159	0.435	0.157	0.033	0.010	0.026	0.050	0.369	0.542	0.221		2.219
	5	0.002	0.000	0.000	0.002	0.029	0.000	0.000	0.043	0.012	0.000	0.000	0.000	0.002	0.031	0.057	0.048		0.226
	6	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.005		0.014
	7	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.005	0.000		0.014
	Subtotal	**0.516**	**0.202**	**0.219**	**0.166**	**0.288**	**0.538**	**1.099**	**1.351**	**0.709**	**0.259**	**0.314**	**0.430**	**0.654**	**1.039**	**1.536**	**1.044**	**0.010**	10.374
7 (G)	1 (Calm)																	0.010	0.010
	2	0.459	0.181	0.150	0.193	0.212	0.314	0.637	0.747	0.849	0.649	1.056	1.413	2.195	1.900	2.174	1.403		14.532
	3	0.331	0.112	0.088	0.031	0.114	0.269	0.744	0.747	0.557	0.335	0.483	0.840	1.888	1.425	1.741	1.089		10.793
	4	0.098	0.007	0.014	0.000	0.000	0.059	0.052	0.147	0.076	0.017	0.007	0.017	0.143	0.447	0.509	0.169		1.762
	5	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.021	0.012	0.000	0.000	0.002	0.000	0.012	0.026	0.017		0.093
	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.007
	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.010	0.019	0.021	0.007	0.002		0.064
	Subtotal	**0.887**	**0.302**	**0.252**	**0.224**	**0.326**	**0.642**	**1.434**	**1.667**	**1.498**	**1.001**	**1.548**	**2.281**	**4.245**	**3.805**	**4.457**	**2.680**	**0.010**	27.251
	Total	**5.951**	**2.407**	**2.262**	**2.314**	**3.629**	**5.596**	**8.931**	**8.826**	**4.845**	**2.274**	**3.078**	**3.929**	**7.211**	**10.781**	**16.261**	**11.673**	**0.033**	**100.00**

Notes:
(1) Wind Speed Categories defined as follows:

Category	Wind Speed (mph)
1 (Calm)	<0.5
2	>=0.5 to <3.5
3	>=3.5 to <7.5
4	>=7.5 to <12.5
5	>=12.5 to <18.5
6	>=18.5 to <24
7	>=24

2.4 HYDROLOGY

2.4.1 General

Security-Related Information
Text Withheld Under 10 CFR 2.390

The Susquehanna River has been extensively developed for hydroelectric power generation. It is used as a source of domestic water for a number of communities, and for recreational purposes by a moderate number of boaters and fishermen.

2.4.2 Land Area Ground Hydrology

2.4.2.1 Introduction

This section presents the results of the hydrologic investigation made in connection with environmental studies at the PBAPS site, and presents the results of field explorations conducted for this phase of the work.

Publications were reviewed, organizations contacted, and individuals interviewed to obtain information which, combined with field observations and tests, provides the basis for the conclusions presented. These conclusions consider both:

1. The effects of the station upon the natural surface and subsurface ground water conditions.

2. The effect of normal, flood, and drought conditions on the station.

2.4.2.2 Surface Water

2.4.2.2.1 Regional

Southeastern Pennsylvania is, for the most part, drained by the Delaware and Susquehanna Rivers and their tributaries. The major surface stream in the area is the Susquehanna River, which originates at Lake Otsego in New York and terminates in the Chesapeake Bay. Most of the streams in the area drain into the Susquehanna River Basin. The Peach Bottom site is located about 14 mi northwest of the river's mouth at the head of the Chesapeake Bay.

Observed flows in the Susquehanna River near the site ranged from a minimum daily average (1964) of 1,400 cfs to a peak (1972) of 972,000 cfs. Average discharge is 36,200 cfs. Peak flows in the upper Susquehanna River are controlled by several flood control dams (Table 2.4.7).

The Peach Bottom site is located on the west bank of the pond formed by Conowingo Dam. The normal pool elevation at Conowingo

Dam is between +104 ft and +109.25 ft (C.D.). During the flood of 1936, the river stage at the site was approximately Elevation +113 ft (C.D.).

Minimum pool levels are established prior to expected flood flows when the water level is lowered as much as 10 ft to provide storage capacity during flood conditions.

Plant grade is established at Elevation +116 ft (C.D.). Consequently, because of the available freeboard, inundation of the site is considered improbable, even under flood conditions.

During the Hurricane Agnes record flood of 1972 the water level rose to Elevation 114.2 ft (C.D.), exclusive of waves and run-up, which is still 1.8 ft below plant grade.

Average annual values for precipitation in the Susquehanna River Basin have been compiled for a period of 68 years (through 1955) at York, Pennsylvania, about 28 miles northwest of the site. The annual precipitation recorded for the period is subject to wide variation, ranging from a low of 22.9 inches to a high of 55.9 inches. Average annual precipitation for the period of record is 40.4 inches. The water loss through evaporation and absorption by the soil is estimated to be about 22 inches (55 percent) and the runoff into streams and rivers approximately 18 inches. The maximum and minimum mean monthly precipitations are 4.25 inches in July and 2.70 inches in November, respectively. Similar records have been kept at Conowingo Dam. The mean monthly maximum, mean monthly minimum, and mean annual precipitation during a 25 year of record at Conowingo Dam are 4.80 inches, 2.87 inches, and 45.44 inches, respectively.

2.4.2.2.2 Site

The Peach Bottom site is located in a rural, sparsely populated area within the Susquehanna River Basin. The area surrounding the site is characterized by broad ridgetops and steep hillsides. Topography of the area ranges from about Elevation +110 ft (C.D.) at the river to above +400 ft (C.D.) beyond the property limits. This relatively rugged topography results in well-dissected drainage courses which are apparently unrelated to geologic structure. It is believed that the stream courses existed prior to the geologic uplift of the region.

The major surficial drainage course within the property limits is Rock Run, which flows in a general easterly direction into Conowingo Pond just south of Unit 1.

Rock Run is a perennial stream dividing the property into two sections. The watershed area of the creek is approximately 4 sq mi. Due to its limited drainage area and steep banks, Rock Run presents no flood danger to the proposed construction. About two-thirds of the runoff within the property limits is diverted by means of perennial and intermittent streams into Rock Run and subsequently into Conowingo Pond. The remaining runoff flows directly into the pond.

The amount of runoff in the area is estimated to average 18 in/yr, about 45 percent of the annual precipitation. Numerous factors control the amount of runoff. Among these are:

1. The type, intensity, and duration of the precipitation.

2. The temperature in the watershed area.

3. The amount and type of vegetal cover.

4. The topography of the drainage area.

5. The permeability of the upper soils.

Although the site area is covered with dense vegetation, the site topography is more rugged than that in the surrounding area. Comparing the site characteristics to those of the surrounding area, the site runoff is about the same or slightly greater than the estimated area runoff.

2.4.2.3 Ground Water

2.4.2.3.1 Regional

The region includes two greatly different ground water provinces which correspond to the two major physiographic divisions known as the Piedmont Province (in which the site is situated) and the Coastal Plain Province. The Fall Zone separates the two provinces.

The Coastal Plain is underlain by an alternating sequence of impermeable silt and clay strata and permeable sand and gravel beds, forming a series of aquicludes and aquifers. The Piedmont Province comprises a separate and topographically higher ground water province. There is essentially no hydrologic connection between the Piedmont and Coastal Plain Provinces with respect to ground water occurrence and water use.

In the Piedmont Province within the region, the overall water table gradients and ground water discharge are toward the Delaware River Basin, the southeast geographic boundary of the Piedmont. However, other major drainage basins within the area, such as the Susquehanna River, may locally reverse the overall hydrologic trend.

The rocks of the southeastern Piedmont Province generally furnish small supplies of potable water. Most wells in the region yield only small quantities of water. These wells are sufficient for domestic needs, but generally are inadequate for public or industrial use. Most of the wells are less than 100 ft deep, and obtain water from fractures and crevices in the zone of weathered rock. About half the wells in the region yield from 5 to 20 gpm and about one-quarter yield from 20 to 100 gpm. The remaining wells yield less than 5 gpm. Yields in excess of 100 gpm are extremely rare.

Two small groups of summer cottages are located near Conowingo Pond. One is located less than 1 mi north and the other 1 1/2 mi south of the Peach Bottom site. Domestic water supplies for these residents are obtained from shallow overburden wells which yield less than 10 gpm. PBAPS has several closed groundwater wells and four wells that provide non-potable water to remote facilities. One well is at the North Substation and one is at the Salt Storage Facility at the North Substation. No information is available on the depth or capacity of either well. A third well is in the Upper North Parking Lot. It is 200 feet deep and provides 6 gpm. It is used occasionally for washing hands or rinsing equipment. The fourth well, at the South Substation, is 300 feet deep and provides 1 gpm to a toilet at the substation.

Most of the ground water recovered in the region is soft, but some is moderately hard and contains iron in undesirable amounts. The small available ground water supplies are derived from precipitation that soaks into and through the soil and weathered rock in limited areas surrounding each well. The water percolates into drilled wells through fissures and cracks that thin out and disappear with increasing depth in the bedrock.

Ground water moves in the overburden and rock fissures in the direction of the nearest stream or spring. The ground water flows under phreatic conditions and tends to support the perennial flow of the many streams in the region. Throughout most of their lengths, the streams, therefore, generally act as drains rather than as sources of ground water. They would act as sources of

recharge only where pumping of wells reverses the natural direction of ground water movement. The reversal of ground water movement in the area due to wells is unlikely since:

1. The population is rather sparse.

2. Most of the land is undeveloped or used for agricultural purposes.

3. There is little industry.

4. The major water sources are surficial.

5. Wells are relatively unproductive and influence only a limited area, resulting in little, if any, recharge from the local streams.

The movement of ground water in the area generally follows the topography and is toward and into the Susquehanna River Valley. The occurrence of springs in a number of places in the slopes facing the river confirms that the movement of ground water is away from the upland areas and toward the river.

2.4.2.3.2 Site

Water level observations made in the borings drilled for this investigation indicate that the ground water table at the site slopes downward to the east and roughly follows the ground surface topography. The direction of ground water flow is toward Conowingo Pond. The overall gradient of the water table is approximately 15 percent, but local variations were observed.

The water table ranges from over 100 ft below the ground surface in the higher western portion of the plant area to pond level at the easterly limit of the site. The ground water levels recorded at the site ranged from about Elevation +109 ft (C.D.) to Elevation +250 ft (C.D). The pond level during this same observation period was approximately Elevation +109 ft (C.D.). It is anticipated that in the area adjacent to the pond the ground water levels will vary with changes in the pond level, but that inland the phreatic will be relatively unaffected by moderate variations in the pond level.

Field permeability tests were conducted at specific horizons in seven test borings drilled during this investigation. The field permeability tests included both pump-in tests and bailing tests. The test results are presented in Tables 2.4.1 through 2.4.3. The

test results were extremely erratic and reflect the influence of spacing, width, and continuity of the joints, fractures, and weathered rock seams on the gross permeability of the rock mass. The unfractured relatively fresh rock appears to be impermeable.

Based upon field observations and the field testing program, it is believed that the joints and seams in the rock are neither continuous nor interconnected. The volume of water contained in the rock within a seam is therefore limited. Consequently, the measured permeability during a field test would be expected to decrease as the water drains from the water bearing zone within the rock. The field permeability test results confirm this supposition. The permeability data, therefore, should be used in a qualitative manner and should be considered accurate as to order of magnitude only.

The measured permeability in the Peters Creek schist ranged from under 0.1 ft/day in the relatively unweathered zone to greater than 20 ft/day in the highly weathered and fractured material.

The results of the near-surface percolation tests performed in the overburden soils were relatively consistent and reflect the similarity of the natural residual soils throughout the site area. The measured permeability of the overburden generally ranged from 0.1 to 0.3 ft/day. However, occasional pockets of more permeable soil were observed.

The rate of ground water flow at the site is dependent upon the permeability of the residual natural soils and the frequency of fissures and fractures in the underlying rock. The rate of flow is usually slow because of the moderate gradients involved.

Temperature measurements of the ground water in the borings, as indicated in Table 2.4.4, ranged from 51°F to 53°F during the winter of 1966-67, the period of the field explorations. During the same period, the temperature of the water in Conowingo Pond was 34°F.

Peach Bottom began installation of groundwater monitoring wells in 2006 in accordance with the Nuclear Energy Institute (NEI) document NEI 07-07, "Industry Ground Water Protection Initiative." A total of 31 groundwater monitoring wells were installed between 2006 and 2011. The monitoring wells are installed in the overburden and bedrock. Well depths range from 6.5' to 105'.

NEI 07-07 requires an initial hydrogeological study. This was completed in 2006. Periodic updates to the station's hydrogeology are also required.

2.4.2.4 Conclusions

The direction of ground water movement in the area is toward Conowingo Pond. Joints and fractures in the rock at the site appear to be of limited extent. Since the rate of ground water movement is largely controlled by the number and arrangements of joints and fractures in the rock, the amount of flow will be small. The overlying natural soil is not very permeable and would limit recharge to the underlying rock.

There are no known deep aquifers of any extent in the region and the bedrock becomes sounder with depth. The possibility of ground water flow inland from the site is highly improbable.

No drinking wells are located down-gradient from the plant area. The hydrologic characteristics of the site and surrounding area and the pattern of ground water use indicate that accidental discharge of radioactive fluids on or below the ground surface would have no adverse effect on existing or potential local ground water use. Fluids will run off or percolate in the direction of Conowingo Pond. Ground water monitoring wells are located down-gradient from the plant area.

2.4.3 River Hydrology

2.4.3.1 Introduction

The Susquehanna River drains an area of 27,000 sq mi upstream from the Peach Bottom site. Observed flows near the site since 1929 have ranged from a minimum daily average (1964) of 1,400 cfs to a maximum peak of 972,000 cfs (1972). The average flow is 36,200 cfs. The temperature of the water during July and August has averaged somewhat less than 80°F, while the lowest temperature ever is about 34°F.

The concentration of liquid radioactive releases were studied, and it was concluded that even under the lowest flow conditions of record, the radioactivity concentration in the pond will not be excessive.

The maximum flood of record occurred in June of 1972 when a flow of 972,000 cfs was measured. Units 2 and 3 have been designed to

be safely shut down in the event of occurrence of the probable maximum flood of 1,750,000 cfs.

2.4.3.2 Stream Flow

The flows of the Susquehanna River are unregulated except for the minor influences of the three run-of-the-river hydro plants and one pumped storage hydro plant 4 mi upstream of Units 2 and 3. Measured flows at Conowingo have ranged from a minimum daily average of 1,400 cfs in 1964 to a maximum of 972,000 cfs (peak) in 1972. The ratio of maximum to minimum of more than 500 to 1 is typical of unregulated streams in the eastern United States. The mean flow of the Susquehanna is 36,200 cfs. This is 1.34 cfs per sq mi or 18 in of runoff annually, which is about normal for a large watershed on which some 40 in of rain falls annually. The major gaging stations and the drainage areas above them are shown in Figure 2.4.1. The average monthly and annual river flows and the maximum and minimum average daily discharge in each month for the period 1929-1980 are shown in Table 2.4.5. Figure 2.4.2 is a duration curve which indicates the percentages of total time the river flows exceeded any magnitude. In Table 2.4.6 are listed for each month the minimum average 7-day flows at Conowingo.

The lowest minimum daily average unregulated river flows were recorded during the 1930-32 drought (1,450 cfs) and during 1962-64 (1,400 cfs). The minimum flows next in order are 1,775 cfs in the 1941 drought, 1,800 cfs in the 1966 drought, and 2,125 cfs in the 1939 drought. All other minimum daily averages exceed 2,400 cfs and the average of all minimum daily averages is 3,700 cfs. The river flow exceeds 5,000 cfs about 90 percent of the time. Future regulations of the river will undoubtedly increase the minimum discharges. However, the extent of the increase is unpredictable because of the many uncertainties as to future policy with regard to water resource conservation and development in the Susquehanna Basin.

The maximum discharge of 972,000 cfs (peak) which occurred in the 1972 flood caused by Hurricane Agnes is considered a rare occurrence. How much greater the flow might be in some future flood if the river were left unregulated is a matter of conjecture. In view of the control measures described below, it is reasonable to assume that a future discharge in excess of 972,000 cfs (peak) at Conowingo Dam is extremely unlikely. The three dams on the lower Susquehanna River passed the 1972 flood without difficulty.

The average of the peak annual discharges (1929 through 1980) is 290,000 cfs. Once in about 20 yr, on the average, the peak, unregulated discharge might exceed 550,000 cfs.

Since World War II, the U.S. Corps of Engineers has worked continuously on flood control and water resources problems of the Susquehanna Basin. Reports on the West Branch and on the North Branch of the Susquehanna River were published in 1954[6] and 1957[7], respectively. The report on the Raystown Branch of the Juniata River appeared in 1962[8]. The status of water resources development in Baltimore District was published in 1965[9,10]. In all, 14 major dams have been completed on tributaries of the Susquehanna River; one is partially completed, six others have been authorized but not started, and one additional very large storage project has been given considerable study.

Table 2.4.7 gives some of the details of these dams and Figure 2.4.3 shows their locations.

The recent progress in the construction of flood control reservoirs in the Susquehanna Basin is believed to warrant an assumption that it is exceedingly improbable that Conowingo Dam will in the future have to pass a flood greater than that of 1972.

2.4.3.3 Factors Influencing the Concentration of Radioactivity in Conowingo Pond After Release

After release of the diluted liquid radwaste from the Peach Bottom discharge canal, the concentration of radioactivity in the pond continues to decrease by several mechanisms. These include radioactive decay and mixing of the discharged water with additional pond water. An adjustable jet type discharge from the canal (which will maintain the discharge velocity between 5 and 7 fps) has been adopted to enhance this mixing with pond water. Operation of the Muddy Run pumped storage hydroelectric plant also speeds mixing by reversing the normal downstream flow during the pumping cycle at river flows below about 13,000 cfs.

In order to estimate further dilution of liquid radwaste by pond water after release from the discharge canal, an extensive series of tests were run as part of the original license application under the supervision of Dr. D. W. Pritchard, Director of the Chesapeake Bay Institute of the Johns Hopkins University, utilizing the hydraulic model of Conowingo Pond located at the Alden Research Laboratories of Worcester Polytechnic Institute. This same model was used to study the dissipation of heat from the circulating water effluent released to Conowingo Pond.

Dilutions were determined in the model tests by introducing Rhodamine B dye as a fluorescent tracer into the modeled Peach Bottom discharge canal under various conditions and measuring the

dye concentration in grab samples taken at numerous sampling stations throughout the pond model at appropriate times during the tests. Dye concentrations in the samples were measured with a Turner Fluorometer.

Initially, dye dilutions obtained with the model were confirmed to adequately represent Conowingo Pond by comparing model results with actual dye studies performed in Conowingo Pond in 1960 under corresponding flow conditions.

To determine dilutions in the pond under both normal and abnormal conditions, two series of model tests were run, one representing a continuous steady-state release of radioactivity and the other representing a sudden release of a larger quantity of radioactivity over a relatively short period of time, about 1 hr.

All model tests in which Units 2 and 3 were simulated were conducted over a period of time (about 6 hr) representing 2 weeks of plant operation with dye concentration measurements being taken throughout the second week. Since the flow schedules for the operation of the hydroelectric plants are repeated on a weekly cycle, this ensured that the flows in the model represented the same cyclic history pattern as Conowingo Pond.

The steady-state tests were run over a range of natural river flows in the Susquehanna varying from 0 (no flow through either Holtwood Dam or Conowingo Dam) to 150,000 cfs. In tests utilizing natural flows, all hydroelectric stations (Holtwood, Conowingo, and Muddy Run) were operated according to their combined planned programmed operating schedule, which is coordinated to use the available river flow most efficiently. The operating schedule appropriate for the particular flow utilized in each test was followed. Tests were run at zero flow with both Muddy Run operating and Muddy Run shut down.

In the steady-state tests, dye was continuously introduced into the heated condenser discharge water. In the other series of tests, a slug of dye was dumped into the Peach Bottom circulating water discharge canal at a time representing the beginning of the second week of plant operation; this sudden release was superimposed on a steady-state release of dye similar to that used in the earlier series of tests.

Results of the steady-state model tests indicate that at natural river flows below about 13,000 cfs (which occur about 30 percent of the time), some of the condenser circulating discharge water from Units 2 and 3 re-enters the plant circulating water intake.

The alternating pumping and generation cycles of Muddy Run were found to cause corresponding cyclic fluctuations in the concentration of radioactivity in the plant circulating water intake at low flow, the highest concentration resulting from the pumping cycles as would be expected. The lower the natural river flow, the more pronounced was the effect. From model tests at zero flow and 5,000 cfs flow, it is possible to predict that under the most extreme condition of continuous low flow on record (an average flow of 2,500 cfs for 84 consecutive days in 1964), the concentration of radioactive materials, neglecting decay, released to the pond from the circulating water discharge canal of Units 2 and 3 would be about 2.8 times what it would be if there were no recirculation. This value is based on the radioactivity being continuously released at a steady rate over the entire period of low flow.

This is a conservative approach since liquid radwaste will normally be discharged during only a portion of each day; in addition, radioactive decay will occur to reduce the buildup of radioactivity in the pond over a period of time. Decay was not simulated in the dye tests, nor was credit given for decay in calculating the results. The factor of 2.8 is additionally conservative because this represents the worst point in the weekly cycle of hydro plant operation and persists for only a few hours. An average factor for the entire 7-day cycle period is about 1.8 for this worst continuous low flow condition on record.

Based on the dye tests described above, the maximum concentrations of radioactivity both at Peach Bottom and at the public water intakes for various natural river flows are listed in Table 2.4.8 for the continuous release of 1 millicurie/day of liquid radwaste to the discharge canal with full circulating water flow in Units 2 and 3. Very little variation in concentration was found anywhere in the pond below Peach Bottom for a given river flow. The highest concentration found at any water intake from a 1-millicurie/day continuous release is 2.2×10^{-10} μCi/cc or about 0.0022 of the maximum permissible concentration even under the worst condition of low flow on record. This amount of radioactivity is small compared to 1.2×10^{-8} μCi/cc, the average monthly concentration of total gross beta activity in the Susquehanna River at Conowingo reported by the U.S. Public Health Service from May, 1960 (when Conowingo became a part of the National Water Quality Network) through November, 1967. The concentration of total gross beta activity during this period reached a peak on the order of 6×10^{-8} μCi/cc in 1962 due to

fallout from bomb testing and has averaged about 5 x 10^{-9} μCi/cc between 1965 and 1967.

Similar measurements reported by the National Water Quality Network on samples taken at Holtwood Dam indicate that the total gross beta activity (on dissolved and suspended material) of river water averaged about 1.6 x 10^{-8} μCi/cc from November, 1961 through January 1969 and averaged 8 x 10^{-9} μCi/cc between January 1966 and January 1969.

It is concluded, therefore, that liquid radwaste routinely discharged to Conowingo Pond from Peach Bottom Units 2 and 3 will not result in excessive concentration of radioactivity in the pond.

Results of the slug tests on the model allow prediction of the concentration of radioactivity which would be present at various locations throughout Conowingo Pond in the unlikely event that a quantity of radioactivity were inadvertently released to the discharge canal over a short period of time. Release to the environment of a large quantity of radwaste, such as the emptying of a tank, is considered not credible because all outdoor tanks containing radioactive liquids which might flow to the pond are contained in watertight structures to prevent such an event. (See Sec. 9.2.4.1) An inadvertent slug release of an undiked tank outside the radwaste enclosure has been considered; the results show that even this would produce no significant risk to the public.

The quantity of radioactive material contained in any outside tanks that are not surrounded by liners, dikes, or walls capable of holding the tank contents and that do not have tank overflows and surrounding area drains connected to the liquid radwaste treatment system shall be limited in total activity to ensure that the permissible concentration limits at any offsite water intake cannot be exceeded by a sudden release of the tank (see Table 9.2.7b). This also applies to outside tanks contained within structures that can no longer perform their design function of holding the tank content to prevent a release to the environment.

The maximum concentrations occurring both at Peach Bottom and at the public water intakes resulting from the sudden release of a total of 1 Ci to the discharge canal are shown in Table 2.4.9. The 1-Ci basis for this table was selected to simplify the calculation of concentrations resulting from the release of any quantity of radioactivity. Table 9.2.7b uses the data in Table 2.4.9 to illustrate the maximum effect (MPC) to any supply intake

resulting from release of expected inventories in outside undiked tanks. For example, even if a total expected inventory of 3.8 curies in an undiked tank outside the radwaste area were inadvertently released to the discharge canal, the highest resulting concentration at any supply intake would be 3.8 times that shown in Table 2.4.9 (about 0.6 x 10^{-7} μCi/cc) or 3.8 times that shown in Table 9.2.7b (about 0.6 maximum permissible concentration {MPC} on an unidentified basis) at Conowingo with a 150,000 cfs flow. At the Peach Bottom intake even with a 2,500 cfs flow (lowest extended average flow on record), the concentration would be about 0.95 x 10^{-7} μCi/cc or 0.95 MPC on an unidentified basis.

It is considered not credible that an uncontrolled release to the pond of an entire inventory of an outside tank located within a watertight structure that is at least 500 ft. from the water's edge can occur. Considering that any outside tank not contained within watertight structures shall contain limited radioactive inventories to mitigate the effect of a postulated failure, it is concluded that the permissible concentration limits at the water intakes cannot be exceeded through the sudden release of radioactivity from the Peach Bottom station.

The model tests on the sudden release of radioactivity also provided information on the times at which various concentrations will occur throughout the pond. The time after a slug release that the maximum concentration occurs at the various intakes is listed in Table 2.4.9. At the Chester water intake, the time to reach maximum concentration varies from 144 hr (8.7 days) at a river flow of 2,500 cfs to 4 hr at 50,000 cfs. At high flows, exceeding about 100,000 cfs, none of the released activity would reach the Chester water intake. At the Baltimore water intake and Conowingo tailrace, the times to reach the maximum concentration are slightly longer.

After the maximum concentration is reached, concentrations decrease with time. An estimate of the rate of decrease can be obtained from the data in Table 2.4.10, which presents the times required for the concentration in the pond to decrease to various fractions of complete mixing, i.e., to various fractions of 2.8 x 10^{-9} μCi/cc, the concentration which would result if 1 Ci were uniformly mixed in the entire static volume of water in Conowingo Pond at mean water level. This information allows estimation of the concentration in the pond versus time resulting from a sudden slug release of radioactivity.

Taken together, the hydraulic model tests have provided an excellent understanding of the effects of either a steady-state or sudden slug release of radioactivity and have demonstrated that even under the worst low flow conditions on record, the radioactivity released from Peach Bottom Units 2 and 3 will not result in excessive concentrations in Conowingo Pond.

2.4.3.4 Temperature

Temperature records kept for 10 yr by the Conowingo Power Company show an average July and August water temperature of somewhat less than 80°F. The minimum winter temperature of the river water is 34°F. These temperatures are measured approximately 70 ft below the water surface.

2.4.3.5 Floods

2.4.3.5.1 River and Dams

Security-Related Information
Text Withheld Under 10 CFR 2.390

2.4.3.5.2 Flood History

Data on historic floods of the Susquehanna River at Harrisburg, Pennsylvania have been compiled in several reports by the Commonwealth of Pennsylvania and the U.S. Geological Survey. Continuous gage - height records are available since 1874. In accordance with experience in many river basins in the eastern United States, the greatest flood peak discharges of the Susquehanna River vary approximately as the square root of the contributing drainage areas. This relationship gives a basis for estimating flood peaks at Conowingo from the long flood history at Harrisburg. As the drainage area at Harrisburg is 89 percent of that at Conowingo, and using the square root relationship, the estimates of flood discharges at the latter point should be approximately 6 percent larger than the recorded discharge at Harrisburg.

In 1972, Hurricane Agnes caused a peak flood flow of 972,000 cfs, which is the maximum flood of record.

The second largest flood occurred on March 19, 1936, when a peak flow of 740,000 cfs was recorded at Harrisburg, Pennsylvania. An estimate was made at that time by the licensee that the peak flow at Conowingo was 875,000 cfs. This estimate has since been refined by examination of the peak flows in the tributaries below Harrisburg and combining this incremental flow with the measured Harrisburg peak of 740,000 cfs. A model study of the Conowingo spillway conducted at the Alden Research Laboratory of Worcester Polytechnic Institute determined discharge coefficients somewhat less than those used in 1936. By applying these recently developed coefficients, it is estimated that the 1936 flood peak at Conowingo was about 839,000 cfs.

The third largest flood at Harrisburg occurred on June 2, 1889, with a discharge of 654,000 cfs. This flood was caused by a great rain alone; the March, 1936 flood resulted from both rain and melting snow; and the 1972 flood was caused by a hurricane. Of the six greatest floods at Harrisburg, three were floods early in March, presumably with snow-melt contributions, while the remaining three floods were from rain alone in late May or early June. A chronological listing of known floods at Harrisburg is given in Table 2.4.11. The corresponding discharges at Conowingo would be about 6 percent greater than those at Harrisburg.

2.4.3.5.3 Flood Studies or Flood Design Considerations

The water elevation attained in the vicinity of the Peach Bottom site during the flood of March, 1936 is reported by local residents to be about Elevation +111.5 ft (C.D.). Backwater computations performed by the firm of Tippetts-Abbett-McCarthy-Stratton (TAMS) Hydrologic Consultants, utilizing high water marks recorded upstream and downsteam from the site by the U.S. Geological Survey, have estimated the 1936 flood level at the Peach Bottom site to be Elevation +113 ft (C.D.). The recurrence interval for this flood is estimated as once in 250 yr.

The conventional portions of the PBAPS generally are protected against flood up to plant grade Elevation +116 ft (C.D.). This corresponds to a flood flow of about 1,000,000 cfs which has a recurrence interval estimated as once in 1,000 yr. The Circulating Water Pump Structure contains open grating in the operating floor at Elevation +112.0 ft. (C.D.), which could subject circulating water system components to flooding conditions at flood levels less than Elevation +116 ft. (C.D.). Section 2.4.3.5.5 describes the actions to be taken in the event that flood levels approach Elevation +112.0 ft. (C.D.)

Critical equipment, systems, and structures essential to a safe shutdown of the reactor are flood protected to Elevation +135 ft (C.D.). This design level provides protection against the most severe combination of the following conditions occurring simultaneously, and still provides over 1 ft of freeboard protection:

1. Probable Maximum Flood (PMF) - peak flow 1,750,000 cfs.

2. Failure of Holtwood Dam.

3. Wind-generated waves.

The PMF was determined by the U.S. Army Corps of Engineers, Baltimore District, utilizing the probable maximum precipitation (PMP) estimated by the U.S. Weather Bureau over the Susquehanna River watershed above Harrisburg, Pennsylvania, and reported in their Hydrometeorological Report No. 40. Tributary hydrographs were developed by the Corps of Engineers using sub-basin rainfall and appropriate unit-hydrographs. Inflows from sub-basins were combined and routed downstream. In developing tributary hydrographs no allowance was made for storm travel across the

basin, which has a long axis of about 300 mi in a southwest-northeast direction and a short axis of about 150 mi in a north-west-southeast direction. The assumption of simultaneous rainfall over such a large area (24,100 sq mi) constitutes an indeterminate but significant factor of safety.

In the flood studies performed by TAMS, it was assumed that the PMF hydrograph at Conowingo Dam is the same as that at Harrisburg, or a peak discharge of 1,750,000 cfs. In 1936 no flood control dams were in existence on this reach of river. The total drainage area of the eight flood control reservoirs constructed since then plus the controlled areas of additional projects authorized for construction total about 10 percent of the drainage area above Conowingo Dam. The effect of the reservoirs on a maximum flood would not necessarily be equivalent to the percentage of the controlled area, but would be significant. Therefore, the PMF hydrograph devised for Harrisburg was considered to be applicable to Conowingo Dam.

2.4.3.5.4 Conowingo Dam

Security-Related Information
Text Withheld Under 10 CFR 2.390

2.4.3.5.4.1 Spillway and Gates

Security-Related Information
Text Withheld Under 10 CFR 2.390

Security-Related Information
Text Withheld Under 10 CFR 2.390

2.4.3.5.4.2 Gate Operation

Security-Related Information
Text Withheld Under 10 CFR 2.390

Security-Related Information
Text Withheld Under 10 CFR 2.390

Security-Related Information
Text Withheld Under 10 CFR 2.390

2.4.3.5.5 Emergency Shutdown due to a High or Low Water Level in the Conowingo Pond

Security-Related Information
Text Withheld Under 10 CFR 2.390

Security-Related Information
Text Withheld Under 10 CFR 2.390

Low Water Level - Units 2 and 3

Security-Related Information
Text Withheld Under 10 CFR 2.390

Security-Related Information
Text Withheld Under 10 CFR 2.390

2.4.3.5.6 Wind-Generated Waves and Wave Run-Up

The height of wind-generated waves was computed using the greatest weighted average fetch, 2.0 mi, that will produce the most severe effect at the plant site. Wind velocities were measured at the site from 1967 to 1969. To supplement this short record, wind velocities at other points in the general area with longer history were examined.

At Philadelphia International Airport, with a 25-yr record, the fastest mile measured was 73 mph. At Harrisburg, Pennsylvania, with a 30-yr record, the fastest mile was measured at 68 mph. In both cases the direction was west. A sustained wind over a period of about 20 min is necessary for generation of fully developed waves at Peach Bottom. It is estimated that the maximum 20-min average velocity would be about 80 percent of the peak. From a consideration of the surrounding conditions, recorded wind velocities, wind direction, effect of topography, and time required for waves to develop, a 45-mph wind on a 2-mi fetch was used in computing a wave height of 2.7 ft, measured from trough to tip. The tip is assumed to be two-thirds of the wave height above still water. Superimposing an additional 1.8 ft of wind-generated

waves on the conditions assumed previously yields a peak elevation top of wave tip of Elevation +133.8 ft (C.D.). Compared to the protection level provided of Elevation +135.0 ft (C.D.), this leaves additional freeboard of 1.2 ft.

This margin of freeboard, together with the conservative assumptions used in computing the water level under hypothesized PMF conditions, is considered more than adequate for the safety criteria of the plant.

The maximum wave of the spectrum analyzed is estimated to be approximately 1.67 times the significant wave height, or 4.5 ft high. Only a small percentage (1 percent) of all waves reach this maximum height.

Wave run-up is defined as the height above still-water level to which a wave rises when it encounters an obstruction. At Peach Bottom the obstructions encountered are the vertical walls of the various buildings. One of the parameters necessary to determine the height of wave run-up is the ratio of the depth of still water to the wave height. Previous wave studies indicate that as this ratio increases above about 3.0, the height of run-up decreases. In estimating run-up at this site, a ratio of depth of still water to height of wave of 3.0 was used, although under design conditions the actual ratio was 4.0 for structures away from the shore and about 10.0 for the pump structure located at the shoreline. The wave run-up heights estimated are, therefore, greater than the height that might occur. It is estimated that the significant waves will run up 3.5 ft and the maximum waves 5.4 ft. The maximum wave run-up superimposed on the steady-state PMF Elevation +131.5 ft (C.D.) results in an Elevation of +136.9 ft (C.D.).

2.4.3.5.7 Safe Shutdown of Structures and Components for Units 2 and 3 due to Run-up of the Maximum Wave Superimposed on the Probable Maximum Flood Water Level

Structures

The following describes the structures required for safe shutdown of Units 2 and 3, assuming that no accident occurs concurrently. In addition, the radwaste building is flood protected to Elevation +135.0 ft (C.D.) but is not required for safe plant shutdown.

1. Reactor Building

   This structure has a minimum number of doors below Elevation +135.0 ft (C.D.). They are watertight. The structure is sealed to Elevation +135.0 ft (C.D.). Reactor building doors above Elevation +135.0 ft (C.D.) are weatherstripped for leaktightness as secondary containment. Since these doors are well on the shoreside of the structures, maximum waves are not expected. Even if an excessive wave were to reach these doors which are the most vulnerable part of the building envelope, no significant inflow is anticipated. Small amounts of water which might leak through the doors' weatherstripping would be handled by the building drainage system and pumped out.

2. Main Control Room Complex

   The control room and cable spreading room are well above the flood level. The emergency switchgear room is at Elevation +135.0 ft (C.D.), well above the maximum still-water level of +132.0 ft (C.D.) (paragraph 2.4.3.5.4.2). Since it is inside the turbine building, no wave run-up effects are anticipated. The turbine building will be allowed to flood to equalize the water level to avoid excessive unbalanced hydrostatic loads on the exterior walls.

3. Diesel-Generator Building

   This structure has watertight doors to above Elevation +138.0 ft (C.D.) or more than 1.1 ft above the maximum wave run-up.

4. Pump Structure

   The parapet around the roof of the critical pump area is at Elevation +137.5 ft (C.D.) or 0.6 ft above the estimated maximum wave run-up of Elevation +136.9 ft (C.D.).

5. Emergency Heat Sink Facility Including Cooling Tower

   This structure has one weathertight door below the maximum wave run-up elevation and is sealed against flooding to above this height (except for the door). All

equipment required for safe shutdown is protected by the structures described above.

Components

Components required for safe shutdown of Units 2 and 3 include the following:

1. Reactor vessel and internals
2. Control rod drive system (portion essential for scram)
3. Recirculation piping system
4. RCICS
5. RHRS
6. High-pressure service water system
7. Emergency cooling system
8. Emergency service water system
9. Standby power systems
10. Instrumentation and controls
    a. Reactor level instrumentation
    b. Reactor pressure instrumentation.

For drawings of structures and components, see Drawings C-84 Sheet 1, M-2 through M-7 and Figures 12.1.1, and 12.2.1.

The structures required for safe shutdown were statically checked for hydrostatic pressures caused by PMF with no loss of function. The pump structure was further investigated for the effects of floating objects weighing 10,000 lb, 50 ft long by 2.5 ft in diameter, traveling at 5.0 fps and impinging upon it, and the bottom slab was checked for pressure differentials caused by the PMF.

The elevation of the cooling water intake invert at the screen structure is +84.0 ft (C.D.).

At the pump structure, the water intake invert is +79.83 ft (C.D.) (Drawing C-84 Sheet 1). For location on-site refer to Drawing C-1.

Watertight doors are provided at all structures; waterproofing is installed to Elevation +135.0 ft (C.D.), and any penetration in the exterior walls is sealed to ensure leaktightness necessary to plant safety. For further discussions, see FSAR Section 12.0, "Structures and Shielding."

2.4.4 Uses of River

2.4.4.1 Introduction

The reach of the Susquehanna River impounded by Conowingo Dam is part of an extensive hydroelectric development.
There are six existing water supply intakes on the Susquehanna River downstream from the Peach Bottom site.

The Conowingo Pond is used by a moderate number of boaters and fishermen during the recreation season.

2.4.4.2 Industrial Use

Along the lower 35 mi, where the river flows between steep hills, are located four major hydroelectric plants: Safe Harbor, Holtwood, Muddy Run, and Conowingo. The Conowingo Dam is approximately 9 mi downstream from the site while the Holtwood Dam is 6 mi upstream. The pumped storage facility at Muddy Run which uses the Conowingo Pond as a lower reservoir is located 4 mi upstream.

During low flows, the hydroelectric plants are operated intermittently to meet peak daily demands. Conowingo Pond is scheduled to be full on Monday morning and lowered by intermittent operation through the week to the point that it will just fill over the weekend. At high flows the hydroelectric plants operate on the base load and peaks are carried by steam electric generating units.

2.4.4.3 Public Use

The generally steep shoreline of the Susquehanna River restricts access to a limited number of locations for water related recreational activities by the public. In the vicinity of the upriver property line of the plant site, the Township Commissioners had been granted permission and operated a boat

launching area; however, this permission was terminated at the beginning of plant construction. Upon completion of Units 2 and 3, a new upriver boat launching facility with operation under control of the licensee was constructed. The river is at least 7,200 ft wide at this point, and, especially in the summer, boaters are attracted to the area.

The river below Peach Bottom can presently be used as a source of water supply for the city of Havre de Grace, the Perry Point Veterans' Hospital, the Conowingo Village, the city of Baltimore, the city of Chester, and the Bainbridge Naval Training Station, which in turn supplies water to the town of Port Deposit, Maryland.

The two largest potential water users are the city of Baltimore and the city of Chester. The intake for the city of Baltimore is located about 1,000 ft upstream of Conowingo Dam, with a 38-mi pipeline bringing the water to an existing reservoir. The city of Baltimore can presently withdraw up to 150 million gal of water per day from Conowingo Pond. The city first diverted Susquehanna River water on January 12, 1966. Since 1970, water has been diverted very sparingly, mostly for test purposes.

The intake for the Chester Water Authority, which supplies water to the city of Chester, is located about 7 mi upstream of Conowingo Dam. The Chester Water Authority can withdraw up to 32 million gal of water per day from Conowingo Pond. The Authority first diverted Susquehanna River Water on November 6, 1970. Since mid-1971, water has been diverted very sparingly, mostly for test purposes.

The quality of water in the lower river is good, as indicated by the uses for water supply, recreation, and sport fishing.

2.4 HYDROLOGY

REFERENCES

1. Hall, George M., "Ground Water in Southeastern Pennsylvania," Pennsylvania Topographic and Geologic Survey, Bulletin W2, 1934.

2. U.S. Weather Bureau, 1964, "Climatography of the United States," Number 86-15 Maryland and Pennsylvania, 1951 through 1960.

3. U.S. Weather Bureau, 1964, "Climatography of the United States," Number 86-32 Pennsylvania, 1951 through 1960.

4. Lohman, S.W., "Ground Water Resources of Pennsylvania," Pennsylvania Topographic and Geologic Survey, Bulletin W7.

5. "Final Hazards Summary Report," Part C - Volume 1, Site and Environmental Information, PECO Energy Company (PECO), formerly, Philadelphia Electric Company.

6. "West Branch of the Susquehanna River, Pa.," Report of the District Engineer, Baltimore District, U.S. Corps of Engineers, February 29, 1952. Published 1954 as House Document 25, 84th Congress, 1st Session.

7. "North Branch of the Susquehanna River and Tributaries, New York and Pennsylvania," Report of the District Engineer, Baltimore District, U.S. Corps of Engineers, December 30, 1950. Published as House Document 394, 84th Congress, 2nd Session.

8. "Juniata River and Tributaries, Pa.," Report of the District Engineer, Baltimore District, U.S. Corps of Engineers, June 30, 1961. Published 1962 as House Document 565, 87th Congress, 2nd Session.

9. "Water Resources Development by the U.S. Army Corps of Engineers in Pennsylvania," U.S. Army Engineer Division, North Atlantic, January 1, 1965.

10. "Water Resources Development by The U.S. Army Corps of Engineers in New York," U.S. Army Engineer Division, North Atlantic, January 1, 1965.

11. Supplemental Agreement to the PECO Energy Company (PECO), formerly the Philadelphia Electric Company, AEC Contract No. AT(40-1)2586.

TABLE 2.4.1

FIELD PERMEABILITY TEST DATA

PUMP-IN TESTS

Boring H-11
Ground Surface Elevation = 238.0 ft
Elevation of Static Water Table = 164 ft

Elevation of Bottom of Boring (ft)	Material	Depth of Boring Below Casing (ft)	Head (ft)	Flow (gpm)	Calculated Permeability (ft/day)
232	Light brown silt with little fine to coarse gravel	2	6	.043	0.3
227	Light brown silt with little fine to coarse gravel	2	11	6.0	22.4
223	Light brown silt with little fine to coarse gravel	1	15 1/2	.028	0.1
217 3/4	Light brown silt and fine gravel	1 1/4	20 1/2	.090	0.2
203 1/2	Peters Creek schist (moderately weathered)	5 1/2	32 3/4	.20	0.1
198	P.C.S. (moderately weathered)	11	35 1/2	1.3	0.5
194	P.C.S. (moderately weathered)	15	37 1/2	10	2.6

KEY: P.C.S. = Peters Creek schist

TABLE 2.4.1 (Continued)

Elevation of Bottom of Boring (ft)	Material	Depth of Boring Below Casing (ft)	Head (ft)	Flow (gpm)	Calculated Permeability (ft/day)
189	P.C.S. (moderately weathered)	20	40	2.0	0.4
183 1/2	P.C.S. (highly weathered)	25 1/2	42 3/4	30	4.4
178 1/4	P.C.S. (highly weathered)	30 3/4	45 1/2	28	3.3
173 1/2	P.C.S. (moderately weathered)	35 1/2	47 3/4	25	2.5
168	P.C.S. (moderately weathered)	41	50 1/2	23	2.0
164	P.C.S. (moderately weathered)	45	52 1/2	23	1.8
159	P.C.S. (moderately weathered)	50	55	23	1.5
153 1/2	P.C.S. (moderately weathered)	55 1/2	57 3/4	24	1.4
148 1/2	P.C.S. (moderately weathered)	60 1/2	60 1/4	38	2.0
143 1/2	P.C.S. (moderately weathered)	65 1/2	62 3/4	42	2.0
138 1/2	P.C.S. (moderately weathered)	70 1/2	65 1/4	36	1.5
133 1/2	P.C.S. (moderately weathered)	75 1/2	67 3/4	40	1.5
128 1/2	P.C.S. (moderately weathered)	80 1/2	70 1/4	45	1.5
123 1/2	P.C.S. (unweathered)	85 1/2	72 3/4	47	1.5

TABLE 2.4.1 (Continued)

Elevation of Bottom of Boring (ft)	Material	Depth of Boring Below Casing (ft)	Head (ft)	Flow (gpm)	Calculated Permeability (ft/day)
118 1/2	P.C.S. (unweathered)	90 1/2	75	51	1.5
113 1/2	P.C.S. (unweathered)	95 1/2	75	62	1.7
108 1/2	P.C.S. (unweathered)	100 1/2	75	56	1.5
103 1/2	P.C.S. (unweathered)	105 1/2	75	57	1.5
98 1/2	P.C.S. (unweathered)	110 1/2	75	56	1.4
93 1/2	P.C.S. (unweathered)	115 1/2	75	59	1.4
88 1/2	P.C.S. (unweathered)	120 1/2	75	66	1.5
85	P.C.S. (unweathered)	124	75	62	1.4
80 1/4	P.C.S. (unweathered)	128 3/4	75	45	1.0
75 1/4	P.C.S. (unweathered)	133 3/4	75	52	1.1
70 3/4	P.C.S. (unweathered)	138 1/4	75	52	1.1
65 1/2	P.C.S. (unweathered)	143 1/2	75	49	1.0
61	P.C.S. (unweathered)	148	75	71	1.4
54 1/2	P.C.S. (unweathered)	154 1/2	75	57	1.1

TABLE 2.4.1 (Continued)

Ground Surface Elevation = 217.4 ft
Elevation of Static Water Table = ± 161 ft

Elevation of Bottom of Boring (ft)	Material	Depth of Boring Below Casing (ft)	Head (ft)	Flow (gpm)	Calculated Permeability (ft/day)
50 1/4	P.C.S. (unweathered)	158 3/4	75	56	1.0
205	Gray silt and fine to coarse gravel	2	11	31	115.0
200 1/2	P.C.S. (highly weathered)	1 1/2	15 3/4	.218	0.7
193 1/2	P.C.S. (highly weathered)	8 1/2	19 1/4	26	20.0
188 1/2	P.C.S. (highly weathered)	13 1/2	21 3/4	30	14.0
183 1/2	P.C.S. (highly weathered)	18 1/2	24 1/4	46	16.0
178 1/2	P.C.S. (highly weathered)	23 1/2	26 3/4	56	14.0
173 1/2	P.C.S. (highly weathered)	28 1/2	29 1/4	31	6.2
168 1/2	P.C.S. (highly weathered)	33 1/2	31 3/4	24	3.9
163 1/2	P.C.S. (highly weathered)	38 1/2	34 1/4	24	3.2
158 1/2	P.C.S. (highly weathered)	43 1/2	36 3/4	44	4.9
155	P.C.S. (unweathered)	47	38 1/2	52	5.1
152	P.C.S. (unweathered)	50	40	52	4.7
147	P.C.S (unweathered)	55	42 1/2	70	5.4

TABLE 2.4.1 (Continued)

Elevation of Bottom of Boring (ft)	Material	Depth of Boring Below Casing (ft)	Head (ft)	Flow (gpm)	Calculated Permeability (ft/day)
142	P.C.S (unweathered)	60	45	82	5.6
137	P.C.S. (unweathered)	65	45	86	5.5
132	P.C.S. (unweathered)	70	50	94	5.1
127	P.C.S. (unweathered)	75	52 1/2	97	4.8
122	P.C.S. (unweathered)	80	55	112	4.9
117	P.C.S. (unweathered)	85	55 3/4	75	3.1
113 1/2	P.C.S. (unweathered)	88 1/2	55 3/4	72	2.8
106 1/2	P.C.S. (unweathered)	95 1/2	55 3/4	84	3.2
101 1/2	P.C.S. (unweathered)	97 1/2	52 3/4	68	2.7
96 1/2	P.C.S. (unweathered)	102 1/2	52 3/4	66	2.5
91 1/2	P.C.S. (unweathered)	107 1/2	52 3/4	76	2.8
86 1/2	P.C.S. (unweathered)	112 1/2	52 3/4	72	2.5
81 1/2	P.C.S. (unweathered)	117 1/2	52 3/4	78	2.6
76 1/2	P.C.S. (unweathered)	122 1/2	52 3/4	75	2.6

TABLE 2.4.1 (Continued)

Elevation of Bottom of Boring (ft)	Material	Depth of Boring Below Casing (ft)	Head (ft)	Flow (gpm)	Calculated Permeability (ft/day)
71 1/2	P.C.S. (unweathered)	127 1/2	52 3/4	71	2.2
66 1/2	P.C.S. (unweathered)	132 1/2	52 3/4	70	2.2
61 1/2	P.C.S. (unweathered)	137 1/2	52 3/4	69	2.0
55 1/2	P.C.S. (unweathered)	142 1/2	52 3/4	66	1.9
51 1/2	P.C.S. (unweathered)	147 1/2	52 3/4	75	2.1

TABLE 2.4.2

FIELD PERMEABILITY TEST DATE

PUMP-OUT TESTS

	Elapsed Time After Completion Of Bailing (min)	Depth To Water Surface (ft)
Boring H-3	1/4	57.3
Ground Surface Elevation = 249.4 ft	1 1/2	55.6
Depth to Bottom of Boring = 85 ft	2 1/2	55.2
Depth to Static Water Level = 52.0 ft	3 1/2	54.7
	4 1/2	54.4
	5 1/2	54.1
	6 1/2	53.8
	7 1/2	53.7

Average Permeability = 0.3 ft/day

Boring H-3	1/2	57.0
Ground Surface Elevation = 249.4 ft	1	56.5
Depth to Bottom of Boring = 95 ft	2	55.8
Depth to Static Water Level = 52.0 ft	2 1/2	55.7
	3	55.3
	4	55.1
	5	54.7
	10	53.8
	15	53.6
	20	53.5
	25	53.4
	30	53.2

Average Permeability = 0.3 ft/day

TABLE 2.4.2 (Continued)

	Elapsed Time After Completion Of Bailing (min)	Depth To Water Surface (ft)
Boring H-8	1	70.9
Ground Surface Elevation = 219.4 ft	2	70.3
Depth to Bottom of Boring = 95 ft	3	69.8
Depth to Static Water Level = 47.0 ft	4	69.0
	5	68.3
	6	67.7
	7	67.2
	8	66.6
	9	66.0
	10	65.5
	15	62.7
	20	60.2
	25	58.6
	31	57.8
	40	57.0
	50	56.6
	290	47.5
Average Permeability = 0.03 ft/day		
Boring H-18	3/4	88.0
Ground Surface Elevation = 217.6 ft	2	85.7
Depth to Bottom of Boring = 97.5 ft	3	84.4
Depth to Static Water Level = 74.9 ft	4	83.2
	5	82.2
	6	81.5
	8	80.5
	10	79.9
	15	79.0
	20	78.4
	25	78.1
	30	77.7
Average Permeability = 0.1 ft/day		

TABLE 2.4.2 (Continued)

	Elapsed Time After Completion Of Bailing (min)	Depth To Water Surface (ft)
Boring H-18	1	59.8
Ground Surface Elevation = 217.6 ft	2	59.0
Depth to Bottom of Boring = 136.5 ft	3	58.6
Depth to Static Water Level = 53.3 ft	4	58.3
	5	58.1
	10	57.4
	15	56.8
	30	56.0

Average Permeability = 0.1 ft/day

Boring H-19	1/2	85.4
Ground Surface Elevation = 211 ft	1	84.5
Depth to Bottom of Boring = 115 ft	2	83.9
Depth to Static Water Level = 79.3 ft	3	83.4
	4	82.9
	5	82.7
	6	82.4
	7	82.3
	8	82.2
	9	82.1
	10	82.0
	15	81.9
	20	81.8
	25	81.8
	30	81.8

Average Permeability = 0.2 ft/day

TABLE 2.4.2 (Continued)

	Elapsed Time After Completion Of Bailing (min)	Depth To Water Surface (ft)
Boring H-45	0	33.0
Ground Surface Elevation = 148 ft	1	22.8
Depth to Bottom of Boring = 50.0 ft	2	22.6
Depth to Static Water Level = 22.0 ft	3	22.5
	4	22.5
	5	22.5
	6	22.4
	11	22.4
	16	22.4

Average Permeability = 0.2 ft/day

TABLE 2.4.3

PERCOLATION TEST DATA

Test	Soil Type	Time for Water Level to Fall 1" (min)	Soil Absorptivity (ft/day)
A	Reddish-brown sandy silt with some fine to coarse gravel	9 1/2	0.23
B	Light brown silt with little fine to coarse gravel	70	0.08
C	Light brown silt with little fine to coarse gravel	29	0.11
D	Light brown silt with little fine to coarse gravel	135	0.07
E	Brown sandy silt with a trace of roots	27	0.12
F	Brown sandy silt with a trace of roots	48	0.09
G	Light brown sandy silt with little fine to coarse gravel	73	0.08
H	Light brown sandy silt with little fine to coarse gravel	80	0.08
I	Dark brown organic silt with a trace of roots	42	0.09
J	Dark brown organic silt with a trace of roots	26	0.12

TABLE 2.4.4

WATER TEMPERATURE DATA

Boring	Depth of Measurement (ft)	Temperature (°F)
H-1	200	51
H-3	100	51
H-8	90	52
H-11	140	51
H-15	90	52
H-17	130	51
H-19	90	52
H-21	80	51
H-23	70	51
H-28	60	51
H-32	45	51
H-35	55	51
H-45	25	53
H-47	45	52
H-65	85	51
H-67	60	52
H-71	35	53
H-77	75	52
Reservoir	0	34
Reservoir	5	34
Reservoir	15	34

TABLE 2.4.5

NATURAL RIVER FLOW OF THE SUSQUEHANNA RIVER AT CONOWINGO DAM

MAXIMUM AVERAGE DAILY FLOW (cfs)

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	
JAN.	90,600	113,400	9,450	92,400	52,975	109,525	184,300	51,175	249,150	103,325	JAN.
FEB.	128,475	179,750	21,125	84,725	92,075	17,025	65,275	59,800	109,930	92,175	FEB.
MAR.	254,950	145,375	153,450	112,825	189,000	125,625	141,550	756,000	62,875	115,250	MAR.
APR.	224,400	84,575	130,850	248,775	181,660	146,150	135,625	133,950	234,350	108,375	APR.
MAY	177,050	33,950	132,225	169,900	110,650	32,625	138,400	32,250	149,200	47,500	MAY
JUNE	48,525	42,275	44,575	16,400	48,250	25,800	19,800	19,375	48,750	29,725	JUNE
JULY	17,750	19,300	34,200	17,275	32,500	21,325	185,325	14,000	28,450	32,300	JULY
AUG.	6,500	4,275	13,600	6,300	303,925	18,100	20,775	11,575	74,550	17,925	AUG.
SEPT.	8,600	8,125	8,875	4,575	117,900	128,150	11,050	9,800	36,925	70,725	SEPT.
OCT.	76,600	3,750	6,350	65,575	26,500	65,825	15,475	20,175	144,125	19,750	OCT.
NOV.	109,675	3,800	7,750	115,250	24,725	49,460	105,625	120,725	127,475	32,075	NOV.
DEC.	99,925	9,550	47,950	40,650	46,625	266,625	82,250	68,600	162,350	127,750	DEC.

MINIMUM AVERAGE DAILY FLOW (cfs)

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	
JAN.	7,800	18,050	3,050	19,850	18,325	9,050	12,450	15,625	46,000	12,400	JAN.
FEB.	8,750	16,575	3,875	17,625	10,175	6,175	14,750	13,450	30,125	36,225	FEB.
MAR.	42,450	42,300	13,525	13,760	20,850	6,375	51,676	78,800	24,550	27,775	MAR.
APR.	36,350	29,275	25,150	23,400	39,525	22,650	30,850	28,500	33,325	31,075	APR.
MAY	42,300	15,050	26,550	17,225	33,700	12,150	14,950	13,375	28,175	16,700	MAY
JUNE	11,250	13,375	10,500	9,400	9,550	7,525	9,425	8,700	13,200	8,850	JUNE
JULY	7,100	4,100	7,000	5,425	6,225	4,175	8,000	3,350	7,425	8,725	JULY
AUG.	3,275	2,075	5,250	3,525	5,925	5,125	6,175	3,575	6,925	6,225	AUG.
SEPT.	3,400	2,785	3,175	1,450	17,950	5,050	4,400	2,950	6,900	3,600	SEPT.
OCT.	6,425	1,600	2,450	2,060	8,925	8,750	3,375	4,275	4,375	6,250	OCT.
NOV.	18,375	1,800	2,950	26,450	8,800	11,175	11,150	9,075	22,850	7,850	NOV.
DEC.	12,975	1,900	4,850	6,500	8,325	19,075	12,125	8,050	12,450	13,300	DEC.

AVERAGE DAILY FLOW (cfs)

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	
JAN.	16,491	46,783	5,305	44,744	28,906	46,393	44,968	29,456	101,650	37,358	JAN.
FEB.	20,271	35,502	9,659	41,863	25,394	11,447	30,717	19,022	50,648	58,938	FEB.
MAR.	102,185	74,910	33,126	34,210	78,658	39,341	85,286	251,865	39,869	63,380	MAR.
APR.	113,268	52,793	72,844	91,308	96,591	81,236	66,772	76,978	91,484	50,295	APR.
MAY	74,323	23,472	66,048	48,627	56,666	20,794	49,483	20,962	55,004	26,658	MAY
JUNE	20,334	22,179	22,984	12,203	23,143	12,211	13,971	12,347	21,496	16,377	JUNE
JULY	10,512	10,234	16,417	9,402	13,390	6,862	35,202	6,631	13,703	15,987	JULY
AUG.	4,965	3,274	2,127	4,777	44,844	7,425	12,506	6,509	20,511	11,151	AUG.
SEPT.	5,334	4,101	5,372	2,845	39,124	28,152	6,932	5,095	14,711	16,596	SEPT.
OCT.	27,365	2,794	3,988	21,819	14,047	19,658	5,058	9,745	32,680	9,778	OCT.
NOV.	34,025	2,880	4,362	54,357	15,562	26,065	38,111	29,563	52,878	13,900	NOV.
DEC.	35,145	4,628	17,204	18,244	23,370	54,365	35,016	37,110	41,821	46,130	DEC.
YEARLY	38,727	23,630	20,423	32,075	38,308	29,496	30,375	42,107	44,705	30,296	YEARLY

TABLE 2.4.5 (Continued)

MAXIMUM AVERAGE DAILY FLOW (cfs)

	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
JAN.	33,750	19,250	138,850	34,350	455,150	61,475	71,825	173,225	87,050	35,650	JAN.
FEB.	213,500	33,850	34,975	44,750	144,700	47,325	157,700	29,425	99,250	118,075	FEB.
MAR.	153,725	199,125	87,925	223,200	188,500	187,425	259,275	216,025	120,400	267,175	MAR.
APR.	128,175	465,200	253,925	110,775	263,700	151,875	101,475	42,025	209,950	323,775	APR.
MAY	39,500	75,675	22,125	315,200	167,025	204,875	166,550	487,650	135,250	93,040	MAY
JUNE	15,550	66,425	49,700	50,550	81,875	52,175	60,900	204,850	85,600	47,575	JUNE
JULY	10,850	22,275	17,500	68,825	17,400	28,150	52,475	39,275	59,075	31,425	JULY
AUG.	9,275	12,500	13,300	72,200	9,575	9,475	40,900	32,950	24,825	15,775	AUG.
SEPT.	6,725	41,300	8,925	34,500	7,100	9,200	85,950	18,925	26,325	6,475	SEPT.
OCT.	15,900	14,600	4,200	69,325	89,900	20,325	71,125	47,775	6,475	9,900	OCT.
NOV.	21,350	44,225	11,200	88,875	178,375	19,050	170,925	30,875	47,975	57,125	NOV.
DEC.	29,125	152,150	115,200	358,050	20,775	54,875	161,225	15,325	23,700	167,250	DEC.

MINIMUM AVERAGE DAILY FLOW (cfs)

	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
JAN.	10,225	5,925	15,375	9,500	27,400	8,400	9,275	17,450	21,625	7,400	JAN.
FEB.	43,800	6,150	13,275	14,575	21,400	7,575	9,875	12,175	10,450	7,725	FEB.
MAR.	38,300	14,650	16,050	19,975	30,250	24,025	61,825	48,675	10,250	30,375	MAR.
APR.	42,125	68,700	24,275	22,325	26,300	38,625	27,675	14,150	43,700	50,600	APR.
MAY	13,800	23,425	8,550	16,100	41,150	28,125	46,875	12,050	48,475	48,725	MAY
JUNE	8,250	12,575	7,400	13,725	13,750	14,600	21,600	26,600	17,050	18,600	JUNE
JULY	3,875	8,275	5,025	7,850	7,275	5,700	11,375	9,575	14,700	12,000	JULY
AUG.	2,975	4,750	3,875	11,474	5,400	3,650	9,450	9,225	11,500	7,175	AUG.
SEPT.	2,125	7,300	1,825	6,675	2,575	3,450	9,000	5,275	6,375	3,400	SEPT.
OCT.	3,625	6,000	1,775	12,325	3,300	4,575	18,975	8,975	4,000	4,025	OCT.
NOV.	6,225	7,675	4,450	22,425	21,525	6,275	22,950	9,750	5,775	4,775	NOV.
DEC.	5,950	14,000	6,125	10,525	6,700	13,950	16,100	9,575	9,900	15,975	DEC.

AVERAGE DAILY FLOW (cfs)

	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
JAN.	19,930	10,091	36,935	20,031	83,346	19,050	24,805	55,145	46,998	16,945	JAN.
FEB.	87,799	15,097	20,278	25,701	56,674	19,272	38,843	19,314	32,406	40,292	FEB.
MAR.	84,639	53,711	43,743	87,694	84,227	82,356	152,845	95,331	49,240	104,332	MAR.
APR.	74,261	212,656	82,737	68,560	74,747	74,934	53,655	22,651	75,694	102,792	APR.
MAY	21,982	41,983	13,999	59,842	91,886	67,339	83,624	85,326	88,050	71,542	MAY
JUNE	10,687	29,597	17,236	23,070	36,404	29,060	34,560	77,967	46,614	28,235	JUNE
JULY	6,968	14,581	9,636	18,514	10,700	10,852	25,217	20,536	35,508	18,210	JULY
AUG.	5,627	7,015	7,460	22,312	7,014	5,062	19,829	17,327	17,174	12,097	AUG.
SEPT.	3,214	15,548	4,581	11,528	4,371	5,478	29,930	8,009	12,504	5,165	SEPT.
OCT.	6,484	8,983	3,013	35,598	15,460	9,451	37,590	21,111	5,170	6,556	OCT.
NOV.	12,527	24,881	7,169	41,451	48,154	10,102	63,944	15,167	23,717	25,287	NOV.
DEC.	11,338	41,175	23,552	51,607	12,581	24,029	53,393	12,406	17,593	37,615	DEC.
YEARLY	28,788	39,610	22,528	39,242	43,797	29,749	51,319	37,762	*37,575	39,068	YEARLY

*wtd. avg.

TABLE 2.4.5 (C0ntinued)

MAXIMUM AVERAGE DAILY FLOW (cfs)

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	
JAN.	234,000	141,175	133,475	218,075	170,750	57,725	152,075	24,300	124,500	72,600	JAN.
FEB.	102,150	125,225	172,650	137,800	95,650	106,575	98,700	101,975	61,500	116,900	FEB.
MAR.	68,775	300,825	103,675	343,550	225,900	234,525	180,225	336,900	95,900	152,600	MAR.
APR.	91,025	226,325	269,975	196,850	100,150	117,325	72,725	221,900	255,600	284,400	APR.
MAY	53,450	63,475	49,400	171,375	129,050	158,525	57,050	98,000	62,500	185,000	MAY
JUNE	28,100	73,450	83,875	65,075	170,600	52,175	29,700	42,300	19,400	44,100	JUNE
JULY	23,425	16,825	33,075	22,000	13,700	10,025	8,250	40,400	14,600	32,900	JULY
AUG.	9,375	36,150	12,850	14,100	10,100	7,750	123,875	55,500	6,100	28,500	AUG.
SEPT.	13,600	49,200	15,425	46,225	8,800	9,875	19,350	22,300	6,200	25,300	SEPT.
OCT.	11,875	68,075	7,375	6,825	6,800	43,350	264,500	32,900	7,600	26,300	OCT.
NOV.	17,925	430,025	33,325	177,025	18,525	42,475	125,725	144,100	16,000	36,500	NOV.
DEC.	77,500	297,350	73,875	204,925	45,775	79,275	35,050	133,000	136,700	35,600	DEC.

MINIMUM AVERAGE DAILY FLOW (cfs)

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	
JAN.	37,950	27,675	22,900	34,350	18,600	4,025	8,025	9,175	10,300	13,800	JAN.
FEB.	32,875	27,875	51,425	20,150	31,750	10,825	7,625	15,350	22,700	10,100	FEB.
MAR.	24,525	10,900	56,825	21,025	36,925	34,250	53,050	51,300	37,200	41,300	MAR.
APR.	31,475	37,250	43,700	49,350	43,525	30,325	28,925	48,400	41,600	73,400	APR.
MAY	16,300	29,700	15,500	28,475	37,450	18,425	9,450	23,800	17,700	20,600	MAY
JUNE	7,100	12,525	11,725	9,350	11,475	9,200	7,700	17,300	9,300	14,500	JUNE
JULY	6,575	10,800	12,475	6,925	5,500	3,400	2,925	15,800	4,900	10,800	JULY
AUG.	4,325	4,475	5,250	6,675	3,375	3,400	2,500	9,700	3,200	9,900	AUG.
SEPT.	4,725	7,600	3,650	5,575	2,650	3,150	3,875	10,300	2,600	5,700	SEPT.
OCT.	6,025	7,100	3,450	4,000	3,050	3,050	8,300	9,500	3,900	6,900	OCT.
NOV.	7,500	12,650	9,475	3,675	3,725	7,825	28,150	17,000	4,200	14,900	NOV.
DEC.	10,325	16,400	14,500	19,550	10,525	16,075	8,900	16,300	7,300	10,900	DEC.

AVERAGE DAILY FLOW (cfs)

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	
JAN.	94,809	60,907	71,649	93,910	64,433	14,826	41,751	14,366	37,684	37,623	JAN.
FEB.	62,086	55,354	91,358	56,384	49,443	43,151	31,255	51,056	38,150	23,368	FEB.
MAR.	41,314	76,879	75,547	94,203	76,886	67,445	104,589	101,758	55,552	78,890	MAR.
APR.	55,788	90,644	90,294	95,460	64,520	53,887	42,253	102,113	105,260	140,150	APR.
MAY	34,927	43,733	25,977	71,523	68,586	56,727	20,454	53,023	30,600	74,297	MAY
JUNE	12,464	34,334	28,825	22,797	44,892	23,213	15,068	24,457	12,677	25,353	JUNE
JULY	11,059	13,754	18,684	14,010	9,197	6,650	5,443	26,165	7,823	19,613	JULY
AUG.	6,215	12,811	8,679	9,699	6,263	5,010	24,233	21,513	4,451	14,945	AUG.
SEPT.	7,170	20,048	6,270	13,755	5,076	5,618	9,011	16,673	4,133	11,380	SEPT.
OCT.	8,185	20,828	5,296	5,447	4,125	10,945	57,728	16,777	5,187	12,639	OCT.
NOV.	11,135	72,423	22,347	27,875	8,188	19,278	52,547	36,328	8,993	23,400	NOV.
DEC.	32,948	92,252	39,743	53,692	25,895	34,842	19,433	61,752	43,552	18,832	DEC.
YEARLY	31,365	49,404	40,389	46,563	35,625	28,466	35,089	43,832	29,505	40,041	YEARLY

TABLE 2.4.5 (C0ntinued)

MAXIMUM AVERAGE DAILY FLOW (cfs)

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	
JAN.	213,500	105,000	13,800	77,100	44,300	166,600	38,500	37,800	67,800	26,600	59,900	JAN.
FEB.	112,200	132,500	385,900	109,800	21,300	62,400	106,400	234,900	53,200	109,300	69,200	FEB.
MAR.	93,800	155,400	262,400	147,100	232,900	470,100	66,400	152,800	176,300	192,800	88,900	MAR.
APR.	174,600	377,900	226,800	252,100	151,200	136,400	68,200	76,000	146,300	62,100	123,600	APR.
MAY	120,100	138,100	92,000	47,300	50,600	179,000	45,500	86,600	102,200	134,700	57,600	MAY
JUNE	22,500	118,600	39,100	12,000	31,900	17,500	18,100	31,100	31,300	133,700	41,500	JUNE
JULY	10,000	23,000	23,300	5,900	10,700	10,000	7,900	6,700	23,700	63,600	41,100	JULY
AUG.	8,500	21,800	20,800	9,800	7,700	7,300	6,500	6,100	39,300	9,300	35,600	AUG.
SEPT.	19,900	56,700	17,300	7,500	7,700	3,800	7,500	8,400	23,100	39,900	9,800	SEPT.
OCT.	61,600	14,300	6,200	45,300	3,900	4,300	14,400	9,300	70,500	12,200	6,800	OCT.
NOV.	162,200	14,600	24,000	60,100	12,700	7,000	17,400	66,300	94,500	12,880	55,500	NOV.
DEC.	155,800	12,300	24,400	41,000	36,800	22,300	21,700	63,000	72,300	80,800	97,600	DEC.

MINIMUM AVERAGE DAILY FLOW (cfs)

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	
JAN.	9,600	22,300	7,800	10,400	7,500	8,200	8,300	4,900	7,400	11,400	14,900	JAN.
FEB.	22,200	19,700	7,600	11,700	10,400	13,200	8,400	6,100	9,100	12,200	15,500	FEB.
MAR.	23,100	18,100	55,000	30,100	10,100	14,000	23,400	42,700	14,900	12,500	8,900	MAR.
APR.	33,000	28,500	45,100	35,600	24,600	44,900	36,100	20,900	37,300	15,600	34,600	APR.
MAY	14,200	20,300	25,000	11,000	18,900	11,900	11,400	32,000	30,400	18,800	20,000	MAY
JUNE	7,000	23,600	17,400	5,700	8,000	6,100	4,600	3,100	12,400	22,200	10,800	JUNE
JULY	5,600	7,900	9,500	2,900	5,000	3,800	2,500	2,700	10,400	7,700	5,200	JULY
AUG.	3,300	6,200	6,700	2,700	2,900	2,400	2,400	2,200	8,400	3,300	6,000	AUG.
SEPT.	2,600	5,800	4,200	2,400	2,300	1,400	3,000	1,800	6,200	3,900	2,800	SEPT.
OCT.	4,700	7,000	3,300	7,300	1,600	1,800	6,000	3,400	7,600	4,200	3,200	OCT.
NOV.	21,400	8,100	3,400	9,500	1,900	1,500	6,400	3,500	25,000	8,900	4,500	NOV.
DEC.	27,400	2,800	9,000	8,100	7,100	3,000	11,000	11,700	23,100	12,100	10,200	DEC.

AVERAGE DAILY FLOW (cfs)

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	
JAN.	41,577	49,619	10,697	30,055	21,021	44,900	18,300	17,400	19,745	18,500	22,600	JAN.
FEB.	42,875	49,924	64,217	27,104	15,839	29,200	43,100	53,400	29,646	40,500	27,400	FEB.
MAR.	56,009	27,955	98,026	84,139	105,006	132,500	40,600	73,300	80,094	55,300	27,900	MAR.
APR.	75,853	127,766	110,900	111,373	51,410	70,100	54,500	33,700	61,127	33,500	56,800	APR.
MAY	36,177	75,448	53,819	24,223	31,313	47,800	27,700	54,097	63,044	217,060	32,900	MAY
JUNE	11,806	49,083	25,197	9,123	18,350	10,500	9,400	15,600	18,030	22,500	19,200	JUNE
JULY	7,380	15,493	13,903	4,010	6,797	6,000	3,900	11,400	14,684	18,200	14,900	JULY
AUG.	5,542	14,252	12,303	4,587	4,548	4,200	4,300	3,400	20,674	6,500	18,000	AUG.
SEPT.	6,717	22,970	8,017	4,083	3,973	2,300	4,300	4,900	10,020	13,600	6,300	SEPT.
OCT.	17,413	9,613	4,313	17,897	2,639	2,900	9,700	5,600	25,842	6,760	5,000	OCT.
NOV.	40,883	11,097	8,767	29,123	6,597	3,200	10,400	10,800	42,007	41,700	25,900	NOV.
DEC.	69,545	7,977	14,548	20,026	18,565	8,200	15,000	29,500	46,290	32,800	31,100	DEC.
YEARLY	34,315	38,433	35,392	30,479	23,838	30,150	20,100	26,091	35,934	42,243	24,000	YEARLY

TABLE 2.4.5 (C0ntinued)

MAXIMUM AVERAGE DAILY FLOW (cfs)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	
JAN.	28,500	48,100	69,800	92,300	122,700	125,600	167,000	15,300	211,100	260,500	47,500	JAN.
FEB.	164,400	199,300	50,200	204,200	102,600	369,300	239,300	125,100	88,200	213,800	17,000	FEB.
MAR.	145,900	218,300	319,700	152,300	126,500	159,700	119,700	207,000	271,300	444,000	215,200	MAR.
APR.	335,700	99,300	225,600	163,000	200,200	74,100	89,700	222,100	168,800	91,200	198,700	APR.
MAY	66,200	77,400	139,500	86,600	88,700	106,900	49,900	49,300	223,600	99,900	96,700	MAY
JUN.	35,300	24,300	969,400	66,200	24,800	92,600	118,600	17,200	38,500	64,900	23,500	JUN
JUL.	57,000	11,400	165,000	47,300	64,300	34,600	34,600	27,600	24,300	16,900	17,500	JUL.
AUG.	17,700	39,400	16,400	25,500	20,400	13,300	41,000	16,600	38,500	28,600	10,200	AUG.
SEPT.	12,500	13,400	8,800	34,500	42,300	583,300	17,200	150,600	17,700	77,400	8,400	SEPT.
OCT.	47,500	22,900	9,600	39,000	15,300	142,900	243,300	171,500	16,400	109,000	10,900	OCT.
NOV.	139,200	39,600	121,800	56,000	37,800	78,900	72,900	156,300	18,400	161,400	26,100	NOV.
DEC.	56,500	147,300	212,000	201,400	116,400	47,900	46,000	163,500	60,300	99,800	26,000	DEC.

MINIMUM AVERAGE DAILY FLOW (cfs)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	
JAN.	12,500	13,300	31,700	24,400	32,400	30,400	15,900	7,700	29,000	24,800	12,500	JAN.
FEB.	28,300	11,600	16,500	22,500	23,000	21,100	36,000	7,400	19,100	13,500	5,900	FEB.
MAR.	27,400	42,100	54,600	19,300	38,900	38,400	37,400	69,700	15,200	53,100	6,900	MAR.
APR.	71,900	29,400	45,200	34,900	30,600	30,300	22,700	25,400	35,100	34,500	37,500	APR.
MAY	25,000	23,900	27,200	37,600	21,700	28,800	20,400	10,800	24,200	18,100	20,800	MAY
JUNE	12,100	7,200	25,200	22,500	11,400	21,600	17,800	8,400	14,900	9,000	10,300	JUNE
JULY	11,300	5,300	18,100	11,400	8,300	13,000	13,400	9,600	8,500	7,600	6,100	JULY
AUG.	5,800	4,200	7,900	8,000	5,200	5,800	10,200	8,100	7,500	9,000	4,600	AUG.
SEPT.	3,500	5,200	4,900	6,700	9,500	10,600	4,900	4,400	5,700	11,400	2,800	SEPT.
OCT.	6,300	4,700	5,100	6,900	4,200	24,600	16,000	35,200	6,900	21,100	2,200	OCT.
NOV.	19,400	9,600	7,000	12,100	6,900	22,000	16,000	26,700	8,200	19,700	4,400	NOV.
DEC.	30,800	27,200	46,200	32,500	26,000	23,300	12,600	29,900	16,300	19,400	6,000	DEC.

AVERAGE DAILY FLOW (cfs)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	
JAN.	18,700	27,100	44,300	49,000	69,500	51,600	47,800	10,990	83,100	97,100	25,700	JAN.
FEB.	67,200	72,300	30,600	60,500	45,600	81,200	97,000	23,330	33,500	44,900	11,900	FEB.
MAR.	50,300	99,700	108,300	62,000	58,800	78,000	61,000	120,800	110,400	135,800	68,000	MAR.
APR.	132,800	60,500	87,100	77,200	89,200	47,400	41,500	82,600	89,200	61,000	101,500	APR.
MAY	41,200	43,800	68,900	57,900	38,200	55,900	32,800	27,400	79,200	41,500	44,800	MAY
JUNE	20,400	14,800	179,800	36,100	18,600	42,300	36,300	11,300	26,000	24,800	16,700	JUNE
JULY	20,400	7,300	60,900	21,100	20,500	20,300	23,400	17,500	14,000	12,000	10,600	JULY
AUG.	10,600	14,300	12,200	13,800	9,900	9,600	19,500	12,000	15,800	15,000	7,800	AUG.
SEPT.	8,060	10,500	7,000	15,600	20,100	81,400	11,900	32,100	10,400	28,300	4,300	SEPT.
OCT.	17,400	10,700	7,200	13,100	10,900	64,300	77,700	69,900	10,800	45,900	4,600	OCT.
NOV.	56,000	17,600	53,200	25,700	21,900	39,600	34,700	63,400	12,800	46,300	9,900	NOV.
DEC.	41,000	57,000	101,000	86,300	51,400	35,300	23,800	85,700	30,200	41,600	15,500	DEC.
YEARLY	40,338	36,300	63,375	43,190	37,880	50,575	42,280	63,910	42,950	49,520	26,775	YEARLY

SOURCE: Conowingo Hydroelectric Station Flow Records.

TABLE 2.4.6

MINIMUM AVERAGE 7-DAY FLOWS AT CONOWINGO

FOR THE VARIOUS MONTHS OF THE YEAR

(With 1-day overlap into adjacent month)

Month	Year of Minimum	Period of Minimum	Minimum 7-Day Natural River Flows at Conowingo (cfs)
January	1931	January 22 to 28	4,604
February	1931	February 5 to 11	5,136
March	1901	February 28 to March 6	7,840
April	1946	April 25 to May 1	15,468
May	1941	May 26 to June 1	9,150
June	1965	June 25 to July 1	5,086
July	1965	July 25 to 31	2,900
August	1966	August 26 to September 1	2,686
September	1964	September 13 to 19	1,871
October	1963	October 25 to 31	2,329
November	1964	November 17 to November 23	2,357
December	1930	November 30 to December 6	2,918

TABLE 2.4.7

DAMS AND RESERVOIRS ON TRIBUTARIES OF THE SUSQUEHANNA RIVER

Name of Dam	Name of Tributary	Purpose	Owner	Drainage Area (sq mi)	Flood Storage (acre-ft)	Height (ft)
	COMPLETE AND IN OPERATION					
Indian Rock	Cadorus Cr.	Flood C.	USA	94	28,000	83
Stevenson	First Fork Cr.	Flood C.	Penna.	243	78,950	167
Almond	Canacadea	Flood C.	USA	56	14,800	90
Arkport	Canisteo R.	Flood C.	USA	31	7,900	113
Whitney Pt.	Otselio R.	Flood C.	USA	255	86,440	95
East Sidney	Ouleout Cr.	Flood C.	USA	102	33,500	146
Bush	Kettle Cr.	Flood C.	USA	226	75,000	165
Stillwater	Lackawanna R.	Flood C.	USA	36.8	11,800	77
Curwensville	West Branch	Flood C.	USA	365	118,500	131
Aylesworth	Aylesworth Cr.	Flood C.	USA	6.2	1,900	85.5
Sayers	Bald Eagle Cr.	Flood C.	USA	339	99,000	100
Tioga	Tioga R.	Flood C.	USA	280	125,000*	125
Hammond	Crooked Cr.	Flood C.	USA	122	125,000*	107
Raystown	Raystown Bra.	Flood C.	USA	960	225,000	225
	PARTIALLY COMPLETE					
Cowanesque	Cowanesque R.	Flood C.	USA	299	95,700	145
	AUTHORIZED - NOT STARTED					
Copes Corner	Butternut Cr.	Flood C.	USA	118	37,900	75
Davenport Center	Charlotte Cr.	Flood C.	USA	164	52,500	100
Genegantslet	Genegantslet Cr.	Flood C.	USA	95	30,200	104
S. Plymouth	Canasawacta	Flood C.	USA	58	18,500	125
West Oneonta	Otega Cr.	Flood C.	USA	108	34,500	86
Fall Brook	Fall Brook	Flood C.	USA	4.1	1,400	67

NOTE: Under study, but not authorized, are many dams which are part of a comprehensive study of water resources development for the Susquehanna River Basin by the U.S. Army Corps of Engineers.

*Combined reservoir because of connecting channel through saddle in ridge separating the Tioga River and Crooked Creek Basin.

TABLE 2.4.8

MAXIMUM CONCENTRATION IN CONOWINGO POND FROM A ONE-MILLICURIE/DAY

STEADY-STATE DISCHARGE FROM PEACH BOTTOM UNITS 2 AND 3*

(Based on modelling described in Section 2.4.3.3)

Average River Flow (cfs)	Peach Bottom Cooling Water Intake (μCi/cc)	Peach Bottom Cooling Water Discharge (μCi/cc)	Chester Water Intake (μCi/cc)	Baltimore Water Intake (μCi/cc)	Conowingo Discharge (Average) (μCi/cc)
2,500	2.2×10^{-10}	3.5×10^{-10}	1.6×10^{-10}	1.6×10^{-10}	1.6×10^{-10}
5,000	1.1×10^{-10}	2.3×10^{-10}	0.8×10^{-10}	0.8×10^{-10}	0.8×10^{-10}
10,000	0.6×10^{-10}	1.8×10^{-10}	0.5×10^{-10}	0.5×10^{-10}	0.4×10^{-10}
15,000	0	1.2×10^{-10}	0.4×10^{-10}	0.4×10^{-10}	0.3×10^{-10}
25,000	0	1.2×10^{-10}	0.20×10^{-10}	0.17×10^{-10}	0.16×10^{-10}
50,000	0	1.2×10^{-10}	0.14×10^{-10}	0.13×10^{-10}	0.08×10^{-10}
100,000	0	1.2×10^{-10}	0.04×10^{-10}	0.08×10^{-10}	0.04×10^{-10}
150,000	0	1.2×10^{-10}	0.01×10^{-10}	0.06×10^{-10}	0.03×10^{-10}

*Based on a condenser circulating water flow of 3,350 cfs (1,500,000 gpm) with all six circulating water pumps operating.

TABLE 2.4.9

MAXIMUM CONCENTRATION RESULTING FROM AN ARBITRARY ONE-CURIE

SLUG RELEASE INTO THE PEACH BOTTOM DISCHARGE CANAL*

(Based on modelling described in Section 2.4.3.3)

Average River Flow (cfs)	Peach Bottom Cooling Water Intake		Chester Water Intake	
	Maximum Concentration (μCi/cc)	Time of Maximum Concentration (hr after release)	Maximum Concentration (μCi/cc)	Time of Maximum Concentration (hr after release)
2,500	2.5×10^{-8}	12	1.4×10^{-8}	144
5,000	2.0×10^{-8}	12	6.6×10^{-9}	70
10,000	1.0×10^{-8}	12	3.1×10^{-9}	33
15,000	0	-	2.0×10^{-9}	21
25,000	0	-	1.0×10^{-9}	11
50,000	0	-	3.0×10^{-9}	4
100,000	0	-	0	-
150,000	0	-	0	-

Average River Flow (cfs)	Baltimore Water Intake		Conowingo Powerhouse Tailrace	
	Maximum Concentration (μCi/cc)	Time of Maximum Concentration (hr after release)	Maximum Concentration (μCi/cc)	Time of Maximum Concentration (hr after release)
2,500	0.7×10^{-9}	208	5.0×10^{-10}	193
5,000	0.8×10^{-9}	110	8.0×10^{-10}	100
10,000	0.8×10^{-9}	61	1.3×10^{-9}	53
15,000	0.9×10^{-9}	45	1.8×10^{-9}	38
25,000	1.1×10^{-9}	31	2.3×10^{-9}	25
50,000	1.4×10^{-9}	22	5.2×10^{-9}	16
100,000	2.1×10^{-9}	17	1.0×10^{-8}	12
150,000	2.9×10^{-9}	15	1.5×10^{-8}	10

*Based on a condenser circulating water flow of 3350 cfs (1,500,000 gpm) with all six circulating water pumps operating.

TABLE 2.4.10

TIME IN DAYS AFTER RELEASE TO REACH VARIOUS CONCENTRATIONS FOR

AN ARBITRARY ONE-CURIE SLUG RELEASE FROM THE PEACH BOTTOM DISCHARGE*

(Based on modelling described in Section 2.4.3.3)

Average River Flow (cfs)	Peach Bottom Cooling Water Intake (Concentration - μCi/cc)				Chester Water Intake (Concentration - μCi/cc)			
	2.8×10^{-9}	1.4×10^{-9}	2.8×10^{-10}	2.8×10^{-11}	2.8×10^{-9}	1.4×10^{-9}	2.8×10^{-10}	2.8×10^{-11}
2,500	13	47	142	277	7	47	142	277
5,000	10	27	75	142	7	27	75	142
10,000	7	17	41	75	7	17	41	75
15,000	-	-	-	-	-	8	21	47
25,000	-	-	-	-	-	-	10	25
50,000	-	-	-	-	-	-	0.3	8
100,000	-	-	-	-	-	-	-	-
150,000	-	-	-	-	-	-	-	-

Average River Flow (cfs)	Baltimore Water Intake (Concentration - μCi/cc)				Conowingo Powerhouse Tailrace (Concentration - μCi/cc)			
	2.8×10^{-9}	1.4×10^{-9}	2.8×10^{-10}	2.8×10^{-11}	2.8×10^{-9}	1.4×10^{-9}	2.8×10^{-10}	2.8×10^{-11}
2,500	-	-	152	287	-	-	152	287
5,000	-	-	85	152	-	-	85	152
10,000	-	-	51	85	-	-	51	85
15,000	-	-	33	55	-	18	33	55
25,000	-	-	19	31	-	11	19	31
50,000	-	0.9	8	13	3	5.5	8	13
100,000	-	0.9	2.8	4.5	1.2	2.8	3	4.5
150,000	-	0.8	1.0	1.5	0.6	0.7	1.0	1.5

*If 1 Ci were uniformly mixed with the entire static volume of Conowingo Pond at mean water elevation, a concentration of about 2.8×10^{-9} μCi/cc would result. No credit for radioactive decay has been included.

TABLE 2.4.11

CHRONOLOGICAL LIST OF FLOODS PEAK DISCHARGES

FOR SUSQUEHANNA RIVER AT HARRISBURG, PA.

Year	Date	Discharge (cfs)	Year	Date	Discharge (cfs)
1786	Oct. 5	482,000	1925	Feb. 13	379,000
1846	Mar. 15	482,000	1926	Nov. 17	323,000
1865	Mar. 18	573,000	1927	Mar. 23	208,000
1868	Mar. 19	417,000	1928	May 2	252,000
1886	Jan. 6	385,000	1929	Mar. 17	235,000
1889	June 2	654,000	1930	Feb. 28	177,000
1891	Feb. 19	408,000	1931	Mar. 31	153,000
1892	April 5	270,000	1932	April 2	245,000
1893	May 5	324,000	1933	Aug. 25	269,000
1894	May 22	613,000	1934	Dec. 2	242,000
1895	April 11	230,000	1935	July 11	187,000
1896	April 1	265,000	1936	Mar. 19	740,000
1897	Mar. 26	180,000	1937	Jan. 24	231,000
1898	Mar. 24	315,000	1938	Dec. 20	178,000
1899	Mar. 6	228,000	1939	Feb. 23	210,000
1900	Mar. 2	238,000	1940	April 2	418,000
1901	Nov. 28	249,000	1941	April 7	244,000
1902	Mar. 3	449,000	1942	May 24	290,000
1903	Mar. 2	276,000	1943	Jan. 1	412,000
1904	Mar. 8	298,000	1944	May 9	212,000
1905	Mar. 21	306,000	1945	Mar. 5	252,000
1905	Dec. 4	210,000	1946	May 29	494,000
1907	Mar. 15	247,000	1947	April 7	214,000
1908	Mar. 20	297,000	1948	April 16	308,000
1909	May 2	297,000	1949	Jan. 1	220,000
1910	Mar. 3	332,000	1950	Nov. 27	416,000
1911	Jan. 16	178,000	1951	April 1	266,000
1912	April 4	249,000	1952	Mar. 13	324,000
1913	Mar. 28	402,000	1953	Mar. 26	216,000
1914	Mar. 30	358,000	1954	Mar. 3	242,000
1915	Feb. 26	286,000	1955	Mar. 6	177,000
1916	Mar. 29	379,000	1956	Mar. 10	338,000
1917	Mar. 29	155,000	1957	April 7	250,000
1918	Mar. 16	288,000	1958	April 9	281,000
1919	May 23	294,000	1959	Jan. 24	230,000
1920	May 13	423,000	1960	April 2	382,000
1921	Nov. 30	278,000	1961	Feb. 27	392,000
1922	Mar. 9	192,000	1962	April 2	270,000

TABLE 2.4.11 (Continued)

Year	Date	Discharge (cfs)	Year	Date	Discharge (cfs)
1923	Mar. 6	261,000	1963	Mar. 28	249,000
1924	April 8	324,000	1964	Mar. 12	484,000
1965	Feb. 11	136,000	1973	Feb. 4	209,000
1966	Feb. 15	265,000	1974	Dec. 29	205,000
1967	Mar. 17	182,000	1975	Sept. 27	529,000
1968	Mar. 24	202,000	1976	Feb. 19	239,000
1969	April 8	127,000	1977	Oct. 10	254,000
1970	April 4	343,000	1978	Mar. 24	252,000
1971	Mar. 1	224,000	1979	Mar. 7	416,000
1972	June 24	1,020,000	1980	Mar. 23	205,000

2.5 GEOLOGY AND SEISMOLOGY

2.5.1 Introduction

This subsection presents the geologic and seismologic studies performed by Dames & Moore. The site is located adjacent to and west of the Conowingo Pond in Peach Bottom Township, York County, Pennsylvania, approximately 2 1/2 mi north of the Pennsylvania-Maryland state line. Conowingo Pond is formed by the backwater of Conowingo Dam located on the Susquehanna River approximately 9 mi downstream from the site. The location of the site with respect to surrounding topographical features is shown in Drawing C-1.

The geologic and seismologic studies which were performed to develop data for site evaluation purposes are described in this subsection. The results of these studies were used in formulating the conclusions regarding site suitability which are presented in paragraphs 2.5.2 and 2.5.3.

2.5.1.1 Field Explorations

Field explorations of the site and environs were performed by Dames and Moore. The field investigation program consisted of the following:

1. A test boring program
2. A geologic survey of the site and surrounding area
3. Geophysical surveys
4. Micromotion measurements.

2.5.1.1.1 Test Borings

More than 100 test borings were drilled. Undisturbed soil samples of the overburden and NX-size cores of the underlying rock were extracted from the borings and subjected to appropriate laboratory tests to evaluate the physical properties of the soil and underlying rock.

The drilling program is discussed in subsection 2.7, "Foundation Analysis," and representative boring logs are shown in Figures 2.7.2 through 2.7.9.

2.5.1.1.2 Geologic Survey

The geologic features of the site and its environs were studied by Dames and Moore. The geologic studies included geologic mapping of the site, geologic reconnaissance of the site and its environs, a study of the surface water and ground water conditions of the site and surrounding area, a literature research, and interviews with prominent local geologists.

2.5.1.1.3 Seismic Refraction Survey

A seismic refraction survey was undertaken to evaluate the depth to bedrock, the compressional wave velocities in the bedrock, and the compressional wave velocities in the soil overburden. Dynamite blasts near each end of the profile line were used as an energy source. The velocities obtained reflect the variations in local topography and subsurface stratification at the site.

2.5.1.1.4 Micromotion Measurements

Micromotion measurements were made with an instrument that measures the ambient background motion at the site and its response to natural vibration generators, such as wind and waves. The data obtained are useful in evaluating the dynamic properties of the subsurface materials. The magnitude of movement in the bedrock at the site was so small that no discernible data were obtained. This absence of measurable ground vibrations usually occurs when relatively sound rock is present at shallow depths below the ground surface.

2.5.1.2 Laboratory Tests

Representative rock cores extracted from the test borings were subjected to a comprehensive laboratory testing program to evaluate the physical characteristics of the rock encountered at the site. Laboratory tests included:

1. Unconfined compression tests
2. Tensile tests
3. Shockscope tests.

2.5.1.2.1 Unconfined Compression Tests

The strength of the underlying rock formation was evaluated by subjecting representative rock samples to unconfined compression tests. The results of several unconfined compression tests are shown on some of the boring logs, Figures 2.7.4, 2.7.5, 2.7.6, 2.7.7, and 2.7.9.

2.5.1.2.2 Tensile Tests

Standard tensile tests were performed by subjecting selected rock samples to an axial tensile load. A uniform rate of loading was applied until failure occurred. The results of some of the tensile tests are presented in Table 2.5.1.

2.5.1.2.3 Shockscope Tests

In the shockscope tests performed, the samples are subjected to a physical shock under a range of confining pressures, and the time necessary for the shock wave to travel the length of the sample is measured using an oscilloscope. The velocity of compressional wave propagation is then computed. Since this velocity is proportional to the dynamic modulus of elasticity of the sample, the data also are used in evaluating dynamic elastic properties. The results of the tests are presented in Table 2.5.2.

2.5.2 Geology

2.5.2.1 Introduction

This subsection presents the results of the geologic studies performed by Dames and Moore for the PBAPS. Descriptions and the results of the field explorations and laboratory tests performed in conjunction with the geologic studies are presented in paragraph 2.5.1.

2.5.2.1.1 Summary

The results of the geologic studies subsequently presented may be summarized as follows:

1. The geology of the region is relatively complex, making specific stratigraphic and structural relationships somewhat conjectural.

2. Bedrock at the site is the Peters Creek schist, a metamorphosed sedimentary rock of Precambrian or early Paleozoic age. Overburden is a residual sandy silt and gravel derived by weathering of the underlying schist. Zones of highly weathered rock separate the overburden and the fresh hard rock.

3. No active fault is known or suspected in the vicinity of the site. Known faults in the area have been inactive for at least 140 million yr.

4. Adequate foundation support for major structures is available from the Peters Creek formation. Lighter structures can be adequately supported in the overburden.

5. There is no geologic feature of the site or surrounding area which adversely affects the intended use of the site.

2.5.2.1.2 Geological Program

The geologic program of investigation conducted for the site included:

1. A thorough review of pertinent geological literature (published and unpublished) and interviews with university, state, and federal geologists.

2. A thorough geologic survey and analysis of the site and surrounding area including interpretation of maps and aerial photographs.

3. An investigation of subsurface soil, rock, and ground water conditions by means of a test boring program, geophysical surveys, and other related field studies.

The results of the geological investigation are described in the following paragraphs.

2.5.2.2 Regional Geology

2.5.2.2.1 Physiography

The site lies within the Piedmont Upland Section of the Piedmont Physiographic Province of the Appalachian Highlands. The northeast-southwest trending Piedmont Province is an eroded

plateau of low relief and rolling topography. The surface of the plateau slopes to the southeast. The Piedmont is divided into an upland and a lowland section. The upland section is underlain by metamorphosed sedimentary and crystalline rocks of Paleozoic and Precambrian age. The rocks are relatively resistant to erosion and support an uneven hilly surface. The higher hills are capped by Cambrian quartzites and Precambrian crystalline rocks, while broad valleys characterize areas underlain by limestone and calcareous shales. The less rugged lowland section to the north and west of the Piedmont uplands is formed largely on relatively soft shales and sandstones of Triassic age.

In Pennsylvania, the upland section occupies the southeastern portion of the state, extending northward from the Maryland-Pennsylvania border a maximum of 30 mi.

The Triassic Lowland Section of the Piedmont Province, located approximately 30 mi north of the site, is about 10 mi wide and trends diagonally across the southeastern portion of the state. Ridges in the Triassic lowland trend northeast-southwest along the strike of the more resistant bedrock formations. Higher and more rugged terrain exists where these formations have been intruded by diabase dikes and sills.

The Fall Zone, which represents the physiographic boundary between the Piedmont Province and the Atlantic Coastal Plain Province, is located about 20 mi southeast of the site at its closest approach.

2.5.2.2.2 Stratigraphy

The bedrock in the northern provinces of the Appalachian Highlands is primarily unmetamorphosed sedimentary rocks which range in age from Cambrian to Pennsylvanian. The Triassic Lowland Section contains unmetamorphosed sandstones, shales, and conglomerates that have been intruded by igneous sills and dikes. A series of Ordovician, Cambrian, and Precambrian limestones, quartzites, and schists occur in the Conestoga Valley Section of the Piedmont Province between the Triassic lowland and Piedmont upland.

The rocks of the Piedmont upland are of Precambrian and Early Paleozoic age and are known collectively as the Glenarm Series. They are metamorphosed sedimentary rocks and include, in order of decreasing age, the Wissahickon and Peters Creek schists, Cardiff conglomerate, and Peach Bottom slate.

2.5.2.2.3 Structure

The rocks of the Piedmont Province are highly folded and often faulted. Folding and faulting have been mapped in the northern part of the Pennsylvania Piedmont where the complex structural conditions are exposed. Toward the southern part of the Piedmont, structural relationships are not as well known because of the much higher degree of metamorphism. However, the structural trends can be traced from the north and northeast into the general vicinity of the site and further southward.

The dominant structural feature of the region is the Regional Appalachian Orogenic Belt. This belt is marked by the northeast-southwest orientation of the axes and lineation of most of the structural features and stratigraphic contacts.

Two major fault systems are prevalent in the region: faults of Paleozoic age or older, and faults of Triassic age. The Paleozoic faults are largely thrust faults and occurred during early Paleozoic regional metamorphism or during the late Paleozoic Appalachian Orogeny. The thrust sheets are relatively thin and generally exhibit movement to the northwest. The north-south trending faults at their flanks are tears. These faults do not involve younger Mesozoic or Cenozoic strata and are completely healed.
In the Piedmont uplands, some of the major thrust faults are transected by Triassic age diabase dikes which show no displacement. Similar relationships of Triassic dikes crossing Paleozoic faults are found in the Reading Prong area north of the site. Based on the absence of displacement of the Triassic diabase dikes, it is evident that the last movement along these faults occurred probably 200 million yr ago and certainly no later than 140 million yr ago.

The Triassic faults are normal or strike slip faults that occurred during late Triassic or early Jurassic times. Most of these faults are located near the Triassic lowlands, about 30 mi from the site, and are of limited significance.

A zone of Paleozoic faults trending through the vicinity of the Peach Bottom site has been inferred. One of these faults is associated with the Peach Bottom Syncline, the closest structure to the site. The syncline is a narrow, tightly folded structure which trends in a northeast-southwest direction. Its axis, and that of its associated fault, is located approximately 1 mi south of the site.

Other faults, with traces roughly parallel to that of the Peach Bottom fault, have been mapped to the northwest and southeast of the site. The closest of these mapped faults lies approximately 4 mi from the site.

Studies indicate that the Peach Bottom fault, and the similar nearby faults, have been completely healed.

The most recent fault movement in the region is believed to have occurred during Mesozoic times approximately 140 to 200 million yr ago. Early activity has been traced to the Devonian Period with possible movement as early as late Ordovician times, some 440 to 460 million yr ago.

2.5.2.2.4 Geologic History

The history of the Piedmont Province is complex and not completely understood. Intense metamorphic deformation occurred in Precambrian times, approximately one billion years ago. Sedimentary and igneous rocks were altered and the Baltimore gneiss domes were formed. During late Precambrian time, sediments of the Glenarm Series were deposited in a geosyncline that was developing parallel to the already established regional northeast-southwest trend. The cumulative thickness of the Glenarm sediments is estimated to be 10,000 to 20,000 ft.

The geosyncline containing the Glenarm sediments was deeply downwarped and subjected to intense thrusts originating from the south and southeast. These tectonic forces resulted in regional metamorphism and folding of the Glenarm sediments during late Ordovician time. Simultaneously, the Baltimore gneiss basement was uplifted, subjecting the Glenarm sediments to further deformation and faulting.

Major metamorphism occurred during Late Devonian or Early Mississippian time and most of the presently observed lineations and fabric were imparted to the gneisses and schists of the Glenarm strata. Deep-seated crustal blocks moved from the southeast to the northwest folding the crustal sediments of the Piedmont in this region. This resulted in the attitude change of the beds and schistosity from horizontal in the northwest to vertical or overturned in the southeast. Major faulting and folding occurred during this time.

The last major tectonic movements in the region occurred in late Permian time during the Appalachian Revolution. The Appalachian

Mountain system was gently and broadly uplifted and folded. Since that time, the Piedmont Upland Section has been continually subjected to erosion.

Elongated crustal blocks, down-faulted in relation to the surrounding rocks, were formed and filled with sediments during the Triassic period. These areas, called grabens, were subsequently intruded by diabase dikes and sills. No movement along any fault system has been recognized in the region since Triassic time.

Post-Triassic geological history of the Piedmont Province is one of progressive erosion. Since Triassic time, the area has been continuously above sea level and deposition has been restricted to alluvium along some of the larger streams. By the beginning of Cretaceous time, all of the rocks, including the hardest and most resistant, had been eroded to a level gently rolling surface. At the beginning of Tertiary time, this surface was uplifted and subjected to renewed erosion.

2.5.2.3 Site Geology

2.5.2.3.1 General

The site is located within the outcrop zone of the Peters Creek schist, the most extensive formation in the area. Younger formations in the surrounding area are the Cardiff conglomerate and the Peach Bottom slate. The most significant structural feature in the site area is the Peach Bottom syncline. The Peach Bottom slate forms the core of the syncline. The Cardiff conglomerate underlies the slate and outcrops around it except on the northwest face.

2.5.2.3.2 Physiography

The original site topography was characterized by rugged, heavily wooded terrain. Original elevations ranged from about 400 ft in the western portion of the site to about 110 ft near Conowingo Pond. The ground surface generally sloped rather steeply in an easterly direction toward the river.

The most prominent site features include Unit 1, the Susquehanna River, and Rock Run Creek. Rock Run Creek is a minor tributary of the Susquehanna and is located south of Units 2 and 3.

2.5.2.3.3 Stratigraphy

The site lies within the outcrop zone of the Peters Creek schist. The Susquehanna River cuts across the regional strike of the bedrock in the Piedmont upland and the Peters Creek schist is exposed for about 12 mi along the banks of the river. The schist extends about 35 mi northeast of the site and 20 mi southwest of the site where it grades into related rocks of the Glenarm Series. Recent studies of the Piedmont Province suggest that the Peters Creek schist is possibly a sandy member of the Wissahickon formation.

The Cardiff conglomerate and the Peach Bottom slate lie within and comprise the Peach Bottom Syncline. They are quite limited in areal extent and outcrop approximately 1 mi south of the site. The Cardiff conglomerate, which overlies the Peters Creek schist, is a conglomeratic quartzite containing sheared quartz pebbles in a matrix of fine-grained quartz, chlorite, and mica-rich sands. The Peach Bottom slate, which overlies the Cardiff conglomerate, is a fine-grained, blue-black slate with lenses and seams of quartzite. The slate exhibits strong cleavage.

The site is mantled by residual soils derived by weathering of the underlying schist. These soils are compact and consist of sandy silt and silty sand with gravel. The underlying Peters Creek schist is a greenish-gray to white chlorite schist interbedded with seams and bands of quartzite that range up to 6 ft in thickness.

The upper zone of the bedrock formation has been greatly altered by weathering to essentially a friable material containing ribs of relatively unweathered rock. The interface between the overlying residual soil and the highly weathered rock is transitional. Although rock structure generally is evident in the highly weathered material, some of it has been destroyed by the weathering process. The zone of severe weathering ranges in thickness from less than 10 ft to more than 60 ft. However, this zone is generally limited to thicknesses of 25 ft or less. The greatest thicknesses of highly weathered rock were encountered in the higher western portion of the construction area.

Below the highly weathered zone the schist becomes harder and fresher. The relatively fresh rock surface was encountered at depths ranging from about 15 ft below original grade, near the Susquehanna River, to greater than 80 ft below grade in the higher

western portion of the construction area. Contours of the surface of the relatively fresh rock are shown in Figure 2.7.1.

2.5.2.3.4 Structure

The nearest significant structure to the site is the Peach Bottom Syncline. The Peach Bottom Syncline, located approximately 1 mi south of the site, is a narrow, elongated, tightly folded syncline, approximately 16 mi long and with an average width of 1/2 mi. The Peach Bottom slate forms the core of the syncline. The Cardiff conglomerate underlies the slate and outcrops around it except on the northwest face. The Peach Bottom slate is faulted against the Peters Creek schist for a distance of 9 mi. The closest approach of this faulting to the site is about 1 mi to the south. The fault has been inactive for at least 140 million yr.

In the site area, the Peters Creek formation is characterized by thin lenticular bedding and strong flow cleavage resulting in a well developed schistosity.

A major cut into the formation was made in conjunction with the plant construction and is shown in Figure 2.7.1. Recent mapping of the schist exposed in this cut indicates that, along the long face of the cut in the vicinity of Units 2 and 3, the predominant strike of the schistosity is between North 55 deg East and North 65 deg East. The strike of the schistosity rotates to about North 35 deg East near the northern end of the cut and to about North 40 deg East near the southern end of the cut. The dip of the schistosity is between 60 and 70 deg to the southeast throughout the site.

The exposed rocks exhibit different jointing patterns on either side of about Plant Coordinate North 1350. The following "major" joint patterns were mapped in the area south of Plant Coordinate North 1350:

Strike	Dip
North 50 deg West	60 deg (East)
North 20 deg West	67 deg (West)
North 30 deg East	Near Vertical
North 60 deg West	Near Vertical

In addition to the joint patterns listed above, other minor features are apparent. Neither the major nor the minor joints appear to be continuous over large areas. The effect of the jointing is to produce numerous, rather small, blocks of rocks.

North of Plant Coordinate North 1350, the principal joint systems are:

Strike	Dip
North 50 deg West	Near Vertical
North 80 deg West	0 to 10 deg (North)

Additional minor joint patterns have been mapped, but they are discontinuous and considered to be unimportant.

During early site reviews for Fulton Generating Station in 1978, a previously undetected shear zone and diabase dike were mapped in the vicinity of the Peach Bottom site by Stone & Webster Engineering Company. Investigation and analysis by both Stone & Webster and Dames & Moore concluded that these geological features were a common occurrence for the region and were of no consequence due to the age of the features. Analysis report was forwarded to the NRC per letter from S. L. Daltroff to J. F. Stolz dated November 30, 1982.

2.5.2.3.5 River Geology

The PBAPS is located adjacent to and on the west bank of the Susquehanna River, about 14 mi north of the river's mouth at Chesapeake Bay. The Susquehanna, from its source in Lake Otsego, New York, to the head of Chesapeake Bay is 422 mi long and drains an area of about 27,500 sq mi. Approximately 27,000 sq mi of this area is upriver from Peach Bottom.

The Susquehanna is a transverse river which crosses three different geologic regions distinguished from one another on the basis of age, character, and structure of the rocks and the physiography. These regions are (from north to south) the Appalachian Plateau, the Mountainous Area (which includes the Valley and Ridge, Great Valley, and Blue Ridge Provinces), and the Piedmont.

The quantity of water carried by the river is small in comparison to the size of its valley, the river being in this sense an underfit stream. This is probably due to the fact that at one

time during the last period of glacial retreat, drainage from the New York Finger Lakes went chiefly southward through the Susquehanna Valley, producing much larger flows than the river presently carries. These periods of higher flow are thought to be responsible for a stretch of depositional terraces and wide flood plains visible between Falmouth and Columbia, Pennsylvania, about 35 and 23 mi, respectively, upstream of the Peach Bottom site. Terracing is not evident south of Columbia, probably because of the relatively steep-sided valley cut through the Piedmont uplands in which the site is located.

The course of the river has been largely controlled by variations in the resistance to erosion of the bedrock which it crosses. The lower 35-mi stretch of the river is relatively straight, indicative of the similar types of rock found in this area. Rocky islands in the river, representing isolated areas of more resistant rock, are numerous. The fall of the river in this area is about 4 to 5 ft per mi.

Three dams have been constructed since 1910 in the lower 35 mi of the river. These are, from north to south, the Safe Harbor, Holtwood, and Conowingo Dams. The Peach Bottom site is located 9 mi above Conowingo Dam and 6 mi below Holtwood Dam.

Conowingo Pond, formed by Conowingo Dam, varies in width from about 0.6 to 1.5 mi and is slightly less than 1 1/2 mi wide in the site area. The pond contains about 246,000 acre-feet (82 billion gal) of water. Normal pond elevation is between 104 ft and 109.25 ft C.D. The top 10 ft (80,000 acre-feet) of water in the pond are used as pondage to regulate power generation. River flows at Conowingo Dam, which became operational in 1928, have ranged from a maximum of 972,000 cfs to a minimum of 1,400 cfs, averaging 37,400 cfs. This flow represents about 18 in of runoff from the basin out of an average area rainfall of approximately 40 in annually.

The depth of water near and upstream of the site area is variable, but averages about 12 to 15 ft. About 1 mi downstream from the site, the water depth increases rapidly, reaching a maximum depth of over 100 ft near Conowingo Dam.

A line of borings drilled in the river extending out from the plant site encountered an average sediment thickness of about 10 ft. The sediments consist primarily of fine sand and silt with occasional clayey zones. Sediment deposition in the pond for the first 20 yr after construction of Conowingo Dam amounted to about 7 ft.

Bedrock underlying the river sediments near the site consists of the same Peters Creek schist encountered in the plant area. The schist is erratically weathered along planes of foliation in a manner similar to that observed in the rock exposed at the site.

2.5.2.3.6 Conclusions

The site is underlain at shallow depths by competent Peters Creek schist, a metamorphosed sedimentary rock of Precambrian or early Paleozoic age. The rock provides excellent foundation support for the facility. The site is located in the structurally complex Piedmont Province. The nearest fault to the site is associated with the Peach Bottom Syncline and passes about 1 mi south of the site.

This fault and other regional faults have been inactive for 140 to 200 million yr.

Detailed analysis of the geology of the site and surrounding areas has revealed no geologic condition which would preclude construction and operation of a nuclear power station at this location.

2.5.3 Seismology

2.5.3.1 Introduction

This subsection of the report presents the results of the engineering seismology studies performed by Dames and Moore.

2.5.3.1.1 Summary

The site lies in a region which has experienced a moderate amount of minor earthquake activity. Most of the reported earthquakes have occurred in the Piedmont Province in which the site is located. Some minor shocks have occurred in a northeast-southwest trend along the Fall Zone, the physiographic boundary between the Piedmont and the Coastal Plain to the southeast. Some scattered activity has occurred in the Coastal Plain.

Based on the seismic history and the geologic structure of the region, no significant earthquake ground motion is expected at the site during the life of the facility. Despite demonstrative evidence to the contrary, consideration was given to the remote possibility that geologic structure in the epicentral areas of the significant regional earthquakes could exist in the site area.

Thus, it has been hypothesized that a maximum credible earthquake (MCE) equivalent to the 1871 Wilmington, Delaware earthquake (maximum Intensity VII*) occurs near the site resulting in a maximum horizontal ground acceleration at foundation level of 12 percent of gravity. Such an event is highly improbable and this hypothesis is conservative.

Class I facilities have been designed to remain operable for horizontal earthquake ground accelerations equal to 5 percent of gravity (design earthquake).

2.5.3.2 Program of Investigation

To develop a seismic design criteria for the plant, a comprehensive program of investigation was performed. The investigation included:

1. A comprehensive study of the geologic structure and tectonic history of the region.

2. A review of the seismic history of the region primarily based on a literature search.

3. Evaluation of the seismicity of the region considering the relationship of historic earthquakes to known geologic features, tectonics, and earthquake mechanisms.

4. Field geophysical measurements to evaluate pertinent physical properties of the bedrock at the site.

5. Selection of appropriate design earthquakes and MCE's.

6. An estimate of the maximum level of ground motion to be expected at the site due to the occurrence of the design earthquakes and MCE's.

7. Presentation of the seismic design criteria in the form of response spectra.

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*All intensity values in this report refer to the Modified Mercalli Intensity scale of 1931, revised. The intensity scale is a means of reporting the size of an earthquake in terms of its perceptible effect. Class I structures are founded on competent Peters Creek schist. Class I facilities have been designed to permit safe shutdown in the event of an MCE.

2.5.3.3 Geologic and Tectonic Background

2.5.3.3.1 Regional Geology

The site is located in the Piedmont Uplands Section of the Piedmont Physiographic Province. The uplands is a northeast-southwest trending belt of structurally complex schist, gneisses, slates, and conglomerates with some igneous intrusions. The uplands is bounded by the Triassic Lowland and Conestoga Valley Sections to the northwest and the Coastal Plain Province to the southeast.

The rocks of the Piedmont uplands are of Precambrian and Paleozoic age and are known collectively as the Glenarm Series. They are metamorphosed sedimentary rocks and include, in order of decreasing age, Wissahickon and Peters Creek schists, Cardiff conglomerate, and Peach Bottom slate.

The Piedmont rocks are highly folded and often faulted. Folding and faulting have been mapped in the northern part of the Pennsylvania Piedmont where the complex structural conditions are exposed. Toward the southern part of the Piedmont, structural relationships are not as well exposed because of the much higher degree of metamorphism. However, the structural trends can be traced from the north and northeast into the general vicinity of the site and southward.

The dominant structural feature of the region is the Regional Appalachian Orogenic Belt. This belt is marked by the northeast-southwest orientation of the axes and lineation of most of the structural features and stratigraphic contacts.

Two major fault systems prevalent in the region are faults of Paleozoic age or older, and faults of Triassic age. The Paleozoic faults are largely thrust faults and occurred during early Paleozoic regional metamorphism or during the later Paleozoic Appalachian Orogeny. The thrust sheets are relatively thin and generally exhibit movement to the northwest. The north-south trending faults at their flanks are tears. These faults do not involve younger Mesozoic or Cenozoic strata and are completely healed.
In the Piedmont uplands, some of the major thrust faults are transected by Triassic age diabase dikes which show no displacement. Similar relationships of Triassic dikes crossing Paleozoic faults are found in the Reading Prong area north of the site. The last movement along these faults probably occurred 200

million yr ago and certainly no later than 140 million yr ago, based on the absence of displacement of the Triassic diabase dikes. The Triassic faults are normal or strike slip faults that occurred during late Triassic or early Jurassic times. Most of these faults are located in and near the Triassic lowlands, about 30 mi from the site, and are of limited significance.

2.5.3.3.2 Site Geology

The site is mantled by residual soils derived by weathering of the underlying schist. These soils are compact and consist of sandy silt and silty sand with gravel. The residual soils range in thickness from 0 to about 40 ft and are underlain by the Peters Creek formation.

At the site, the Peters Creek is a greenish-gray to white chlorite schist interbedded with seams and bands of quartzite that range up to 6 ft in thickness. The upper part of the Peters Creek formation has been altered by weathering. The zones of severe weathering are generally limited to thicknesses of 25 ft or less, although excavation in the western portion of the construction area encountered highly weathered rock to depths in excess of 65 ft below the original rock surface. A few seams within the bedrock exhibit a high degree of weathering to known depths of up to 200 ft. These weathered zones are relatively thin and generally parallel the schistosity of the rock.

Below the highly weathered zone, the rock is fresher and harder. The relatively fresh, hard rock occurs at depths ranging from approximately 15 to 80 ft below the original ground surface. The greater depths of weathering were generally encountered in the higher, western portion of the construction area. Compressional wave velocities in the Peters Creek formation range from under 7,000 fps in the highly weathered zone to over 16,000 fps in the relatively fresh rock.

A zone of Paleozoic faults trending through the vicinity of the Peach Bottom site has been inferred. One of these faults is associated with the Peach Bottom Syncline, the closest structure to the site.

The Peach Bottom Syncline is a narrow, tightly folded syncline which trends in a northeast-southwest direction. Its axis, and that of its associated fault, are located approximately 1 mi south of the site.

Other faults with traces roughly parallel to that of the Peach Bottom fault have been mapped to the northwest and southeast of the site. The closest of these mapped faults lies approximately 4 mi from the site.

Studies indicate that the Peach Bottom fault, and the similar nearby faults, have been completely healed.

The most recent fault movement in the region is believed to have occurred during Mesozoic time between 140 and 200 million yr ago. Earlier activity has been traced to the Devonian Period with possible movement as early as late Ordovician times, some 440 to 460 million yr ago.

2.5.3.4 Seismicity

2.5.3.4.1 General

The site is located in an area which has experienced a moderate amount of minor earthquake activity. The record of earthquake occurrence in southeastern Pennsylvania and the surrounding areas date back to the early 18th Century. Many earthquakes have been reported since that time and some of these caused minor structural damage; however, none can be considered to be of great or catastrophic proportion. Since this region has had a relatively large and well-distributed population since the early 18th Century, it is probable that any major earthquake activity (Intensity VIII or larger) since that time would have been reported in local newspapers, private journals, or diaries. The absence of such documentation is indicative of the absence of major earthquake activity in the region during this period.

2.5.3.4.2 Regional Relationship of Tectonics to Earthquakes

Most of the earthquake activity in southeastern Pennsylvania and the surrounding area occurs in the Piedmont, west of the Fall Zone. The trend of epicenters in the region is generally northeast-southwest, parallel to the trend of geologic structure in the Piedmont. Most of the areas of activity can be related to known faulting or other geologic features.

There also appears to be a pattern of minor seismicity trending in a northeast-southwest direction, in a narrow belt roughly along the axis of the Fall Zone.

To the southeast of the Fall Zone, there is scattered earthquake activity within the Coastal Plain. Since little is known of the

tectonics of the basement rock in the Coastal Plain, it is not possible to relate these reported earthquakes to documented tectonic features. It is believed that the bedrock in the Coastal Plain is similar to that exposed in the Piedmont, and thus the more significant earthquake activity would probably be related to structures in the bedrock. However, there is no major active faulting in the region.

2.5.3.4.3 Regional Seismicity

The zone of major earthquake activity closest to the site is the St. Lawrence River Valley Region, whose closest approach is about 350 mi to the northwest. The St. Lawrence River Valley is a major rift valley formed of a downfaulted graben structure. The tectonic development of the St. Lawrence River Valley is completely dissimilar to the tectonic development of the Piedmont.

The major earthquakes of the St. Lawrence River Valley (shocks in 1663 and 1925 with maximum intensities as great as IX or X) had their epicenters near Quebec, over 550 mi northeast of the site. These earthquakes were felt over the entire eastern section of Canada and the United States and probably had an intensity of about IV in the site area.

Earthquakes near Charleston, South Carolina, in 1886 are the only major earthquakes recorded in the Coastal Plain of the eastern United States. These shocks, which had a maximum intensity of about IX, had their epicenters about 550 mi southeast of the site. It is probable that these shocks were felt in the site area with an intensity of about III. It is believed that these earthquakes are related to local faulting in the basement rock near Charleston.

Although no major earthquakes have had epicenters closer than about 350 mi to the site, many earthquakes of low to moderate intensity have originated in the region surrounding the site. Most shocks in the region have occurred in a narrow zone within the Piedmont Province, parallel to the Fall Zone. No other trend of epicenters appears to exist in the region.

The largest earthquakes reported in the area had epicentral intensities of VII. Of the two Intensity VII shocks recorded, the closer occurred in October, 1871 near Wilmington, Delaware about 40 mi east of the site, causing some minor damage near its epicenter. The other Intensity VII shock was recorded about 100 mi from the site near Wilkes-Barre, Pennsylvania in February, 1954.

In addition to the above-described shocks, seven earthquakes with epicentral intensities of VI have occurred in this area.

The epicentral locations of all known earthquakes of Intensity V or greater originating in the region surrounding the site are shown in Figure 2.5.1. A list of earthquakes of Intensity V or greater which have occurred within about 100 mi of Peach Bottom is presented in Table 2.5.3.

2.5.3.4.4 Local Seismicity

Five significant earthquakes have been recorded within a radius of 50 mi of the site. One was of Intensity VII; two shocks had epicentral intensities of VI; and two were recorded with maximum intensities of V.

The earthquakes closest to the site occurred in southeast Pennsylvania on March 8, 1889 about 25 mi northeast of the site (Intensity V), and in Harford County, Maryland in March, 1883 some 20 mi southwest of the site (Intensity IV-V). The 1889 earthquake was felt in an area of about 4,000 sq mi but did no significant damage. The series of 1883 Harford County earthquakes were local shocks causing no structural damage.

Three other shocks originated about 35 to 40 mi from the site. The largest of these originated near Wilmington, Delaware on October 5, 1871 and probably was felt in the vicinity of the site. The magnitude of this shock is estimated at about 5 or slightly higher on the Richter Scale.

Although several of the aforementioned shocks probably were felt in the locality of the site, no damaging effects were experienced. The ground motion at the site expected from a shock similar to any of the historical shocks would not cause damage to reasonably well-built structures.

On an historical basis, it would appear that the site may experience earthquake motion during the life of the plant facilities, but no damage would be expected in even moderately well-designed structures.

2.5.3.5 Site Seismic Evaluation

2.5.3.5.1 Selection of Maximum Credible Earthquake

On the basis of the seismic history of the area, it does not appear likely that the site would be subjected to significant earthquake ground motion during the life of the facility. However, in order to establish criteria for the MCE, the degree of ground motion which is remotely possible, considering both the seismic history and geologic structure of the region and site area, was examined. The MCE has been considered to be the largest shock in the region at the closest epicentral distance to the site consistent with geologic structure.

The largest recorded earthquake in the region surrounding the site was the 1871 Wilmington, Delaware Intensity VII shock. Although it is likely that the 1871 Wilmington shock was related to readjustment along the Fall Zone, it may be related to a faulted area several miles north of Wilmington. It is possible that this faulted area may be related to the series of faults inferred to pass through the vicinity of the site.

Although the possibility is considered remote, the effect of a shock as large as the 1871 Wilmington (Magnitude 5 to 5 1/2) earthquake occurring as close to the site as the Peach Bottom Fault was investigated. It is estimated that this maximum credible shock could produce ground accelerations at the plant site as high as 12 percent of gravity. The Class I facilities are designed in accordance with this MCE criterion of 12 percent of gravity.

2.5.3.5.2 Selection of Design Earthquake

On the basis of the seismic history of the area, the Class I facilities are designed to withstand ground accelerations which could result from a shock of about the same size as the earthquakes of 1871 (Wilmington), 1883 (Harford County), or 1889 (southeast Pennsylvania) at the closest approach to the site of their related geologic structure.

It has been estimated that the magnitude of the 1871 Wilmington shock was about 5 or slightly larger. The maximum ground acceleration at the site due to a recurrence of this shock at an epicentral distance of 20 mi (the closest approach of the Fall Zone to the site) would be less than 5 percent of gravity.

The magnitudes of the 1883 Harford County shocks and the 1889 southeast Pennsylvania shock were estimated to be less than 4. It has been estimated that ground motion at the site due to a Magnitude 4 earthquake about 17 mi from the site would be insignificant.

Based upon this study of the earthquake activity in the vicinity of the site and considering the nature of the proposed facilities, the major structures were designed to accept ground accelerations of 5 percent of gravity for the design earthquake condition.

2.5.3.6 Seismic Design Criteria

2.5.3.6.1 Response Spectra

The seismic Class I structures were designed in accordance with the response spectra illustrated in Figures C.3.1 and C.3.2, Appendix C, "Structural Design Criteria."

TABLE 2.5.1

ROCK TENSILE TEST DATA

Boring	Depth (ft)	Tensile Strength (psi)
H-1	147	418
H-13	182.5	362
H-13	183	966
H-13	183.5	573
H-31A	40	110
H-65	91	528
H-65	92.5	343

TABLE 2.5.2

SHOCKSCOPE TEST RESULTS

Boring	Depth (ft)	Material	Confining Pressure (psf)	Velocity of Compressional Wave Propagation (fps)	Average Dynamic Modulus Elasticity (psi)
H-1	130	Peters	0	15,580	10.2×10^6
		Creek	2,000	17,980	
		Schist	4,000	17,980	
			6,000	18,690	
H-32	19	Peters	0	8,330	1.8×10^6
		Creek	2,000	8,740	
		Schist	4,000	8,740	
			6,000	8,740	
H-32	29	Peters	0	13,160	6.9×10^6
		Creek	2,000	14,340	
		Schist	4,000	14,340	
			6,000	15,770	
H-32	79	Peters	0	16,390	10.4×10^6
		Creek	2,000	18,210	
		Schist	4,000	18,210	
			6,000	18,210	
H-35	16	Peters	0	5,460	0.8×10^6
		Creek	2,000	5,690	
		Schist	4,000	5,690	
			6,000	5,940	
H-35	20	Peters	0	10,570	5.1×10^6
		Creek	2,000	12,920	
		Schist	4,000	12,920	
			6,000	12,920	
H-35	39	Peters	0	15,670	9.3×10^6
		Creek	2,000	17,240	
		Schist	4,000	17,240	
			6,000	17,240	
H-35	65	Peters	0	14,220	8.1×10^6
		Creek	2,000	15,500	
		Schist	4,000	15,500	
			6,000	17,060	
H-47	35	Peters	0	7,850	2.1×10^6
		Creek	2,000	9,160	
		Schist	4,000	9,160	
			6,000	10,990	
H-47	43	Peters	0	12,750	6.9×10^6
		Creek	2,000	14,880	
		Schist	4,000	14,880	
			6,000	14,880	

TABLE 2.5.3

SIGNIFICANT EARTHQUAKES WITHIN ABOUT 100 MILES OF PEACH BOTTOM, PENNSYLVANIA

(Intensity V or Greater)

EPICENTRAL LOCATION

Year	Date	Time*	Intensity (Modified) Mercalli)	Locality	N.Lat.	W.Long.	Distance From Site (mi)	Perceptible Area (sq mi)
1871	Oct 9	09:40	VII	Wilmington, Delaware	39.7	75.5	45	--
1877	Sept 10	09:59	IV-V	Delaware Valley	40.3	74.9	85	300
1879	Mar 25	19:30	IV-V	Delaware River	39.2	75.5	55	600
1883	Mar 11	18:57	IV-V	Harford County, Maryland	39.5	76.4	20	Local
	Mar 12	00:00 01:00	IV-V	Harford Conty, Maryland	39.5	76.4	20	Local
1884	May 31	--	V	Allentown, Pennsylvania	40.6	75.5	75	Local
1885	Jan 2	21:16	V	Maryland and Virginia	39.2	77.5	75	3,500
1889	Mar 8	18:40	V	Southeast Pennsylvania	40	76	25	4,000
1895	Sept 1	06:09	VI	New Jersey	40.7	74.8	105	35,000
1906	May 8	12:41	V	Delaware	38.7	75.7	80	400
1908	May 31	12:42	VI	Allentown, Pennsylvania	40.6	75.5	75	Local
1909	April 2	02:25	V-VI	Virginia, West Virginia, Maryland and Pennsylvania	39.4	78.0	95	2,500
1921	Jan 26	18:40	V	New Jersey	40	75	70	150
1933	Jan 24	21:00	V	Near Trenton, New Jersey	40.2	74.7	90	600
1938	July 15	17:45	VI	Southern Blair County, Pa.	40.4	78.2	110	100
	Aug 22	22:36	V	Central New Jersey	40.1	74.5	95	5,000
1939	Nov 14	21:54	V	Salem County, New Jersey	39.6	75.2	60	6,000
1954	Jan 7	02:25	VI	Sinking Spring, Pennsylvania	40.3	76.0	40	--
	Feb 21	15:00	VII	Wilkes-Barre, Pennsylvania	41.2	75.9	100	Local
	Feb 23	22:55	VI	Wilkes-Barre, Pennsylvania	41.2	75.9	100	Local
1957	Mar 23	14:03	VI	West-Central New Jersey	40-3/4	75-3/4	105	--
1961	Sept 14	21:17	V	Lehigh Valley, Pennsylvania	40-3/4	75-1/2	80	Local
	Dec 27	12:06	V	Pennsylvania-New Jersey Border	40-1/2	74-3/4	85	--
1964	May 12	01:45	VI	Near Cornwall, Pennsylvania	40.2	76.5	33	--

*Using 24-hour clock

2.6 ENVIRONMENTAL RADIATION MONITORING PROGRAM

2.6.1 General

In conjunction with Unit 1, the HTGR located at the PBAPS, a pre-operational environmental radiation survey was conducted between March, 1960 and February, 1966 at which time this reactor first achieved criticality. Nuclear Science and Engineering Corporation, who began monitoring in March, 1960, and Combustion Engineering, Inc., who began monitoring in July, 1962, were employed as the consultants to the licensee for collecting and analyzing various samples. The objective of the program was to acquire quantitative data for the concentrations of radioactivity in environmental media in the vicinity of the reactor site prior to the operation of the HTGR.

An environmental radiation monitoring program similar in scope to that carried out prior to February, 1966 has continued since that time in order to acquire similar data after the initial operation of Unit 1. The program was expanded with the advent of Units 2 and 3 in order to continue monitoring environmental radioactivity levels in the Peach Bottom area.

The Environmental Radiation Monitoring Program as presented in the original FSAR (Section 2.6.2) is historical. The facility's Technical Specifications define the current Radiological Environmental Monitoring Program (REMP). The Offsite Dose Calculation Manual (ODCM) expands upon the REMP as defined by the facility's Technical Specifications and contains up-to-date information on the program. Monitoring is performed at onsite and offsite locations as described in the ODCM. The results of the REMP are reported in the Annual Radiological Environmental Operation Report. This report also includes the results of the annual land census.

2.6.2 Pre-operational Radiation Monitoring Program Description

Twelve environmental sampling stations (1 through 12), whose locations are shown in Figures 2.6.1 and 2.6.2, have been utilized in both the Unit 1 pre-operational and post-operational environmental survey through 1973. This program was also used as part of the pre-operational radiation monitoring program for Units 2 and 3.

Two of the environmental monitoring stations now have more than one instrument of a type. At the site, Station 1, one gamma

scintillation detector and one rain gauge collector are located near the base of Weather Tower No. 1, designated Station 1A, and another instrument of each type, installed in October, 1967 and August, 1967, respectively, is located near the base of the microwave tower, designated Station 1B. These towers are shown in Figure 2.3.1. In addition, two air particulate samplers are located side by side at the bases of Weather Tower No. 1, and a third, 1B, is located at the base of the Microwave Tower. Of these, the original sampler, 1A, has been operated by Nuclear Science & Engineering Corporation, International Chemical and Nuclear Corporation (who acquired Nuclear Science and Engineering Corporation in 1967), Interex Corporation, and Chem Waste Management, Inc. (who acquired Interex Corporation in 1981). The second sampler, 1Z, placed in service in July 1962, has been operated by Combustion Engineering and Radiation Management Corporation. The 1B sampler has been operated by International Chemical and Nuclear Corporation, Interex Corporation, and Chem Waste Management, Inc., since it was placed in service in November 1967. Two air particulate samplers are now located side by side on top of the power house at Conowingo Dam, Station 4; the second station, 4B, began operation in May 1962.

The pre-operational environmental program for Units 2 and 3 was carried out through August 8, 1973 by Combustion Engineering, Inc., Nuclear Science and Engineering Corporation, followed by International Chemical and Nuclear Corporation (with work performed by ICN/Tracerlab, Chemical and Radioisotope Division since early 1969). Since mid-1972 Interex Corporation and Radiation Management Corporation continued the program. This is documented in references 1, 2, and 3. These reports have been previously submitted to the NRC and are made part of the PBAPS Updated FSAR by reference.

This environmental program is designed to monitor various types of pertinent materials in the food chains of both animals and humans. Samples are taken of the atmospheric, terrestrial, and aquatic environment, using those media which are sensitive indicators of changes in the environmental radioactivity such as particulate matter in air, water, soil, and sediment as well as those which could enter the human food chain such as potable water, milk, vegetation, and fish. The program also monitors the general levels of radioactivity in the environment in a number of substances in which radioactivity would likely be found if it were present. Each type of sample is analyzed for the type or types of gross radioactivity or the particular isotope(s) of biological significance most likely to be present in that type of sample.

With the advent of Units 2 and 3, the Peach Bottom radiation monitoring program was reviewed and revised to include additional monitoring directed toward the gaseous and liquid discharges by the BWR units. These revisions did not affect the Combustion Engineering program.

As a part of the expanded monitoring program, the Radiation Management Corporation of Philadelphia was retained to monitor the tritium in environmental water samples and to monitor ambient gamma doses by use of thermoluminescent dosimeters (TLD) at a number of locations both on- and off-site as listed in the referenced reports. Additional analyses were added to the Radiation Management Corporation's portion of the program, including fish, vegetation, milk, and soil. Analyses included gamma spec, gross beta and alpha, K-40, I-131, and strontium. Tritium measurements began September 24, 1970. The TLD measurements began May 25, 1971 at eight locations and expanded to 35 locations as they became available. The gamma dose monitoring station locations were chosen after a careful study of the Peach Bottom area meteorological, topographic, and demographic data.

The licensee periodically reviews its Peach Bottom environmental radiation monitoring program and continues to cooperate with appropriate governmental agencies by providing them with periodic reports on the program results.

2.6.3 Pre-operational Radiation Monitoring Program Results

Results of the Pre-operational Peach Bottom Environmental Program are summarized in the referenced reports. Maximum and minimum values are reported for the entire Pre-operational Period through August 1973, and mean values are reported for each year for each type of sample analysis performed. The types and levels of activity detected in these samples indicated the presence of only naturally occurring radionuclides and those which have resulted from the testing of nuclear weapons.

The general levels of radioactivity at the site and in the surrounding regions were found to be generally low at the beginning of the survey period, but rose rapidly in 1961 due to weapons testing, and continued at a relatively high level through 1962 and into 1963. From late 1963 through 1967, dispersions and decay generally reduced activity levels to the 1960 levels. Radioactivity levels again rose in 1968 through 1971 due to additional weapons testing throughout the world, then decreased again in 1972 and 1973.

These trends can best be seen in the levels of radioactivity in particulate matter in the atmosphere. Annual maximum, annual minimum, annual mean, and monthly mean values of filterable air particulate radioactivity measured at the site area and Philadelphia stations are presented in the reference section of the Interex Corporation Report. Comparisons are made with similar values at Harrisburg, Pennsylvania and Trenton, New Jersey, reported by the U.S. Public Health Service in their series of "Radiological Health and Data Reports." It can be seen that the levels of radioactivity vs. time are similar in all four widely separated regions, indicating that the general levels of air particulate radioactivity are the same throughout this section of the United States.

Correlation with Public Health Service data since mid-1967 is not as good as in earlier years because the Public Health Service data changed from a sensitive laboratory analysis to a less sensitive field measurement at that time and because the Public Health Service data has been rounded off to the nearest pci/cu m beginning in early 1968.

2.6.4 Additional Cooperative Monitoring Programs

In conjunction with the Peach Bottom environmental radiation monitoring program, the licensee began participating in 1960 in what was formerly known as the National Water Quality Network Program begun by the U.S. Public Health Service of the Department of Health, Education, and Welfare and now continued under the Water Quality Office of the Environmental Protection Agency. Participation in this program consists of using the Conowingo Hydroelectric Power Plant as a sampling station in the network. A duplicate sample of surface water from Holtwood Dam is also provided to the network. Cooperation in this program is being continued to assist in establishing the background environmental radiation levels both upstream and downstream of the Peach Bottom plant.

The AEC contracted with the Commonwealth of Pennsylvania, Office of Radiological Health to perform a 3-yr radiological monitoring program at Peach Bottom and two other nuclear plants in Pennsylvania. The program began in 1971 and was aimed at monitoring onsite radwaste handling and the concentrations of radioactivity in the environment surrounding the stations. The NRC continued this program through 1981. The licensee is cooperating with the Commonwealth by providing them access to the company facilities and by providing radiation monitoring samples taken under the surveillance of Commonwealth personnel.

Each year since 1960 the licensee has filed two reports with the NRC which outline the tests conducted and results obtained. The most recent reports are as follows:

1. Radiological Regional Environmental Monitoring Program for Peach Bottom Atomic Power Station, Report No. 17, January 1, 1981 through December 31, 1981, Radiation Management Corporation, May 1982.

2. Environs Radiation Monitoring Program for Peach Bottom Atomic Power Station, Report No. 39, January 1, 1981 through December 31, 1981, Chemical Waste Management Inc., May 1982.

Other reports for previous years are on file with the NRC.

The environmental radiation monitoring program is adjusted year to year to sample and define any new concerns that may develop. The reports submitted each year outline the program and sampling points for that year.

2.6 ENVIRONMENTAL RADIATION MONITORING PROGRAM

REFERENCES

1. Pre-operational Radiological Environmental Monitoring Report for Units 2 and 3, Peach Bottom Atomic Power Station, September 1970 to August 1973, Radiation Management Corporation, dated January 1974.

2. Environs Radiation Monitoring Program Pre-operational Summary Report for Units 2 and 3, Peach Bottom Atomic Power Station, February 5, 1966 through August 8, 1973, Interex Corporation, dated June 1977.

3. Radiation Monitoring Program for Peach Bottom Atomic Power Station, Operational Reports Nos. 15-32, January to June 1966 (No. 15) through January to December 1974 (No. 32), Combustion Engineering, Inc.

2.7 FOUNDATION ANALYSIS

2.7.1 General

The foundation analysis for the construction of Units 2 and 3 was performed in three parts:

1. Field explorations.

2. Laboratory tests.

3. Establishment of foundation design criteria.

2.7.2 Field Explorations

Along with, and in addition to, the geologic and seismic explorations, detailed foundation investigations including borings were carried out for use in the design of the foundations for the structures.

2.7.2.1 Test Borings

Prior to the construction of Unit 1, 38 borings were drilled in the general plant area. The results of this previous work were considered in the foundation analysis for Units 2 and 3.

Subsurface conditions were further explored by drilling 115 additional test borings. The majority of the test borings were located in the vicinity of Units 2 and 3. The locations of these test borings and test pits are shown on the Boring Plan, Figure 2.7.1. A number of borings were located within Conowingo Pond in the vicinity of the discharge canal and cooling towers.

Most of the borings in the higher portions of the site extended into the bedrock and were drilled to depths on the order of 100 to 200 ft below the ground surface. The borings drilled in the lower area near Conowingo Pond generally penetrated to depths ranging from 20 to 60 ft below the ground surface. The borings drilled within the Conowingo Pond usually were terminated at the rock surface, although rock was cored in a number of these borings.

Disturbed and undisturbed soil samples, suitable for laboratory testing, were extracted from the test borings, examined, and subjected to appropriate laboratory tests.

All rock cores extracted from the test borings were examined with regard to type of rock, strike and dip, fractures, seams, joints,

and other pertinent physical characteristics. Selected core samples were subjected to appropriate laboratory tests.

Figures 2.7.2 through 2.7.9 show some of the Boring Logs which are representative of the borings taken and describe the soils and bedrock encountered at the plant site.

2.7.2.2 Field Permeability Tests

A series of pump-in, pump-out, and percolation tests were performed to obtain estimates of the permeability of the in situ materials at predetermined depths. The data obtained from these tests were used to establish dewatering requirements during excavating for the foundations.

2.7.3 Laboratory Tests

Representative undisturbed soil samples and rock cores extracted from the test borings were subjected to a comprehensive laboratory testing program to evaluate the physical and chemical characteristics of the soils and rock encountered at the site. The laboratory program included the following tests:

1. Static Tests
    a. Direct shear
    b. Unconfined compression
    c. Triaxial compression
    d. Rock tensile
    e. Brazilian rock tensile
    f. Confined compression (consolidation)
2. Dynamic Tests
    a. Triaxial compression
    b. Shockscope
3. Other Physical Tests
    a. Moisture and density

b. Particle-size

c. Atterberg limits

d. Compaction

4. Chemical Tests

a. pH values

b. Soluble sulphates

c. Ground water analyses

2.7.4 Subsurface Conditions

The results of the field exploration program indicate that the plant area is underlain by three basically different, but related, materials. These are, in order of increasing depth:

1. Surficial sandy silt and silty sand with gravel (residual decomposed rock).

2. Highly weathered rock.

3. Relatively fresh rock.

The southeast corner of the construction area is covered by up to 20 ft of silt, sand, and gravel fill containing construction debris. Underlying the fill in this area, and at the surface in the remaining site area, is compact silty sand and sandy silt containing gravel. This soil is the product of decomposition of the bedrock. The residual soil ranges from 0 thickness at locations where the underlying rock crops out to about 40 ft.

Underlying the residual soil is highly weathered Peters Creek schist. This formation is a greenish-gray to white metamorphic rock consisting of chlorite schist interbedded with thin bands of quartzite. The schistosity and cleavage planes dip to the southeast at about 60 to 70 deg. The highly weathered zone ranges in thickness from less than 10 to greater than 60 ft. The rock generally grades less weathered with depth, although thin seams of weathered rock were observed at depths in excess of 200 ft below the ground surface.

The surface of the relatively fresh rock was encountered in the plant area at elevations ranging from about 100 to 200 ft. (All

elevations are referred to Conowingo Datum.) This surface generally follows the topography, sloping downward toward the Susquehanna River. Contours of the surface of the relatively fresh rock are shown in Figure 2.7.1. The contours are based on the results of the subsurface investigations and were prepared by interpolating between borings.

2.7.5 General Foundation Criteria

2.7.5.1 General

The results of this investigation indicated that the compact residual soil, the weathered rock, and the relatively fresh rock are all suitable for foundations for the plant facilities. Although anticipated movements would be very small, individual structures are founded on a single type of foundation material (i.e., either soil or rock, but not both) in order to minimize differential foundation movement.

Spread or mat foundations are used for support of all facilities in the plant area. Pile foundations are required for support of certain structures installed in and near Conowingo Pond.

To obtain greater bearing capacity and less foundation movement, foundations are founded in the relatively fresh rock rather than the overlying weathered rock.

The base of each of the major structures is founded below the surface of the relatively fresh rock. Other less critical facilities are founded above the fresh rock surface on either the highly weathered rock, the compact residual soils, or compacted structural fill.

2.7.5.2 Spread or Mat Foundations

Based upon the results of the laboratory tests and engineering analyses, the following general criteria were used in developing foundation designs:

1. Spread or mat foundations installed at shallow depths within controlled compacted fill can be designed utilizing bearing pressures of up to 1 1/2 tons per sq ft, depending on the depth and least width of the foundation, settlement restrictions, and quality of the fill.
2. Spread or mat foundations established within the compact residual soils at a depth of at least 4 ft below lowest

adjacent grade can be proportioned using bearing pressures of up to 3 tons per sq ft.

3. Spread or mat foundations installed in the weathered rock can be designed utilizing bearing pressures of up to 5 tons per sq ft.

4. Spread or mat foundations established on relatively fresh rock (or lean concrete fill placed over fresh rock) can be designed utilizing bearing pressures of up to 20 tons per sq ft.

   The recommended bearing pressures apply to the total of all design loads, dead and live, and refer to the pressure which can be imposed in excess of the pressure imposed by the adjacent overburden. Specific foundation design for each of the structures is discussed in subsequent paragraphs.

2.7.5.3 Pile Foundations

Little or no compact residual soil was encountered in the test borings in and near the Susquehanna River. Consequently, the structures located in this area are supported on pile foundations.

Steel H bearing pile foundations support certain auxiliary structures. The piles are driven to refusal and derive their support from the Peters Creek formation. The pile foundations are designed for a maximum load of 60 tons per pile.

The piles support only gravity loads. No credit was taken for the influence of the piles on the lateral dynamic characteristics of the structure or equipment response.

All piles, including those for Class I structures, are of materials for which physical and chemical tests verified their compliance with the material specifications. Pile driving was done under Quality Control by Bechtel field forces. Pile driving records, material, identification, and inspection reports were maintained. All piles are protected by the plant cathodic protection system.

2.7.6 Foundations for Structures

2.7.6.1 General

The results of foundation studies based on the field explorations and laboratory tests are presented, and the specific criteria for the foundation design for various structures are established.

2.7.6.2 Design Considerations

The plant facilities include four major structures: the reactor buildings, the radwaste building, and the turbine building. Auxiliary structures include the diesel-generator building, the stack, the administration building, the emergency cooling tower, shop, and warehouse, the water treatment building, and the boiler house. Marine structures are located in the area of Conowingo Pond. These structures include the pump structure (for service and circulating water intake), the cooling towers, the offshore embankments, and additional structures such as the intake screen structure, the cooling tower pump structure, the discharge control structure, the bridge structure, and the on-site storage radwaste facility.

A detailed description of foundations provided for the structures is given in the following paragraphs.

Figure 2.7.1 shows the locations of the major plant structures in relation to the test borings drilled in the plant area.

2.7.6.3 Major Structures

The reactor buildings are constructed in the western portion of the construction area, as shown in Figure 2.7.1. The lowest floor of these structures is founded at Elevation 87.0 ft. In order to reach this elevation, excavation ranging from about 80 to 160 ft was required. The drywells are installed on rock pedestals, at Elevation 104.0 ft, in the central portion of the buildings. The pedestals are 65 ft in diameter.

The base of these structures is 50 to 100 ft below the surface of the relatively fresh rock. Consequently, it was anticipated that the rock at the foundation depth would be sound. However, since the exploration program revealed that occasional thin, nearly vertical seams of weathered rock exist to great depths below the relatively fresh rock surface, the rock exposed at foundation level was carefully examined by an experienced engineering geologist to determine where it was necessary to remove the

weathered rock seams to some depth below foundation level. Any over-excavated material was replaced with lean concrete.

A slab of lean concrete, at least 3 in thick, protected the exposed surface against deterioration of the foundation rock. The concrete mat foundation for the structures rests on the lean concrete slab with a waterproofing membrane between them.

Shears are resisted by rock pedestals and passive pressures at ends of walls and miscellaneous keys formed by depressed slabs in the radwaste and turbine buildings. The governing load combination (D + L + E) results in a shear key value of 5,500 psf.

The maximum shear stress in the rock due to the imposed vertical load as well as the direct horizontal shears is small in comparison with the ultimate shear strength of the rock as indicated by laboratory tests performed by Dames & Moore. The shear strength of the rock, based on the test data, is approximately 72,000 psf (paragraph 2.9.8).

A Dames & Moore engineering geologist was in attendance at the site during foundation construction. He inspected the quality of the rock before, during, and after excavation, and ascertained that it was sound and free of defects.

The estimated total settlement that the containment buildings will experience consists of elastic deformations of less than 1/2 in under the design loads. Since these structures consist primarily of dead load, most of the elastic deformation occurs during construction. Post-construction movement is expected to be small, less than 1/4 in.

The radioactive waste handling building is constructed on rock between the two containment structures. The floor of this building is founded at Elevation 91.5 ft, about 70 to 90 ft below the surface of the relatively fresh rock.

The estimated elastic movements of the radwaste building are less than 1/4 in due to the design floor load.

The turbine-generator building is constructed east of the reactor buildings. The mat foundations beneath the turbine-generators are founded generally at Elevation 106 ft 6 in. A lightly loaded concrete floor slab covers the remaining area in turbine-generator building.

The Unit 3 turbine mat is founded at depths ranging from 10 to 60 ft below the fresh rock surface. The Unit 2 turbine mat is founded below or near the surface of the fresh rock.

The estimated elastic deformation of the foundation rock is about 1/4 in or less beneath the turbine mats.

The circulating water discharge tunnel is constructed adjacent to and below the western edge of the turbine mats. During construction of the tunnel, blasting operations were controlled so that the foundation rock beneath the turbine mats in this area would not be adversely affected.

The foundations for the walls and columns of the turbine building are installed generally at about Elevation 90.0 ft in the relatively fresh rock.

2.7.6.4 Auxiliary Structures

The foundation of all areas of the radwaste on-site storage facility with the exception of the DAW storage, staging and dock areas, are supported on mat foundations. The structural loads in the DAW storage, staging and dock areas are transmitted to spread footings located at least 4 feet below grade on either compacted fill or competent soil.

All other auxiliary buildings referred to in paragraph 2.7.6.2 are supported on pile foundations except the boiler house, the stack and the emergency cooling tower north of the reactor building, which is supported on spread footings on the fresh rock. Among these, the only seismic Class I structures are the diesel-generator building, the stack and the emergency cooling tower. The pile foundations were necessary since these structures are located either in the reclaimed area of Conowingo Pond or in the backfilled areas where the rock was excavated during plant construction.

2.7.6.5 Marine Structures

2.7.6.5.1 Pump Structure

The pump structure for service and circulating water intake is located within Conowingo Pond, and its face is 200 to 300 ft from the original shoreline. The location of this facility is shown in relation to the onshore facilities in Figure 2.7.1. The structure is nominally 80 ft by 250 ft in plan dimensions. The base of most of the structure is at Elevation 77.0 ft.

The borings drilled in the vicinity of this structure indicate that relatively fresh rock ranges from Elevation 78 to 82 ft. The base of most of the structure (at Elevation 77.0 ft) is installed within the relatively fresh rock.

2.7.6.5.2 Cooling Towers

Cooling towers are located south-southeast of the intake structure within the pond area.
Borings drilled in this area encountered from 6 to 12 ft of soft clay and silty soils overlying the bedrock. The cooling towers are installed on rock fill embankment.

Satisfactory support for the cooling towers, which are founded at Elevation 111.0 ft, was achieved by proper control over the fill placement and by the utilization of a surcharge program. This method avoided excessive settlement of the cooling towers due to the underlying strata of soft clay and silty soils.

2.7.6.5.3 Offshore Embankments

The embankments extend about 1 mi downstream and about 1,200 ft upstream from the circulating water pump structure. Final grade at the surface of the embankment is approximately Elevation 116.0 ft.

Borings drilled near the embankments indicate that subsurface conditions are similar to those encountered in the area of the cooling towers. Approximately 25 to 30 ft of fill was required to construct the embankments. The required fill was obtained from excavations in the inland construction area and consist of both soil and rock fragments.

The embankments were constructed in the same manner previously described for fill placement for support of the cooling towers, and have side slopes of one vertical to one and one-half horizontal. However, no surcharge was required for these embankments.

2.7.6.5.4 Additional Structures

The intake screen structure, cooling tower pump structure, discharge control structure, and bridge structure are also located within the pond area and are supported on rock.

2.8 SITE PREPARATION

2.8.1 General

Preparation of the Peach Bottom site for Units 2 and 3 consisted primarily of excavating over 1,500,000 cu yd of soil and rock and of cutting the major slopes in portions of the site. The construction of the major slopes, blasting techniques, dewatering, and backfilling, is discussed in the following paragraphs.

2.8.2 Major Slopes

2.8.2.1 General

One of the most important aspects of the site preparation was the cutting of stable slopes on the west and north sides of the site. Because of the significant height and close proximity of these slopes to the structures, as shown on the Plot Plan, Drawing C-2, extensive stability studies were performed to evaluate the steepest angle at which the slopes could be safely cut. The studies consisted of evaluating, both qualitatively and quantitatively, all apparent factors which could affect the stability of the slopes. Some of these factors are the strength of the material, the zones of weak material which are present along the planes of schistosity, the prominent joint systems, the ground water, and seismic effects. The two quantitative methods of stability analysis which were used are the modified method of slices and the sliding block method.

The material in which the slopes are constructed was classified into three general zones for the purpose of performing the stability studies. These zones are soil, weathered rock, and relatively fresh rock. The zones are illustrated in Figures 2.8.1 and 2.8.2.

A review of the safety evaluation of the slopes as constructed is covered by subsection 2.9, "Slope Stability."

2.8.2.1.1 Soil

The soil overburden in the vicinity of the top of the cut slopes extends to an average depth of about 20 ft. The soil is residual and consists of decomposed weathered schist. Occasional bands of relatively hard schist and quartz are present. Analyses indicated that the residual soil would be stable in a cut slope at an angle of one and one-half horizontal to one vertical, and they have been successfully cut to this slope.

2.8.2.1.2 Weathered Rock

This zone is present below the soil in the cut slopes. The thickness of this zone varies from roughly 5 to 75 ft. The material in this zone consists of moderately hard schist with many seams of soft highly weathered rock. Most of the highly weathered seams are less than 6 ft in width and constitute less than 25 percent of the material in this zone. The material in the seams increases in hardness and strength with depth.

The highly weathered seams occur parallel to the schistosity. The dip of the schistosity ranges from 60 to 70 deg toward the southeast. Prominent joints are also present in this material. However, field studies indicate that most of the joints are tight and have soft seams.

A cut slope of one-half horizontal to one vertical was initially recommended for this zone. It became apparent during excavation that much of the zone was more highly weathered than the borings had indicated and it was decided to flatten the slope in this region to 1 on 1. Figures 2.8.1 and 2.8.2 show the cut slope as constructed.

2.8.2.1.3 Relatively Fresh Rock

Relatively fresh rock is exposed in the lower portion of the slopes. This material is primarily hard schist with only a few seams of weathered rock parallel to the schistosity. Most of these seams are very narrow. Cut slopes of one-half horizontal to one vertical were recommended in this material.

The one-half horizontal to one vertical slope on the north side of the site is roughly parallel to the schistosity, and the recommended slope has been cut. On the west side of the site, the cut slope is nearly normal to the strike of the schistosity, and some weathered areas have been encountered which have ravelled and slightly flattened. The one-half to one slopes proved to be satisfactory.

2.8.2.2 Benches

Benches were used for the major cut slopes to provide access to the slopes and to provide a means for catching rock fragments that might fall from the slopes above. A distance of 40 to 50 ft corresponding generally to the levels of changing material was chosen for the vertical distance between benches. A width of 12

ft was selected for the benches as the narrowest, which would provide easy access to the slopes. The upper bench between the soil and weathered rock slopes is stable and is performing its desired function. A concrete lined ditch has been constructed against the toe of the soil slope to collect the water falling on the seeded slope and convey it to the south for disposal. The bench between the weathered and fresh rock slopes is very irregular because of the aforementioned flattening of some portions of the lower slope.

2.8.3 Surface Ravelling and Rock Falls

Exposure of the cut face of the rock slopes indicates that some parts of the Peters Creek schist weather more rapidly than others. The most rapid weathering occurs in the most fractured material. The effect of weathering is to cause ravelling of the surface and debris to fall from the slope. The ravelling tends to undercut the quartzite seams present in the Peters Creek schist and to locally oversteepen the slope. Thus the possibility of minor rock falls must be considered.

Surface ravelling presents no danger to the reactor facilities. However, there is concern for the safety of the personnel and some equipment in the event of a rock fall. Consequently, a protective chain-link fence at the base of the slope is provided and barriers are built around equipment as required.

2.8.4 Rock Blasting

Blasting studies, including a field testing program, were made prior to general production blasting in order to develop blasting techniques and to set limits on the seismic disturbances which could be tolerated by existing structures. Blasting was carried out successfully with no significant disturbances to Unit 1 operations.

The test blasting program was conducted at the site in a pit about 750 ft north of Unit 1. The most significant information developed from the test program was blast attenuation curves. These curves are shown in Figure 2.8.3.

As developed for the test program, the criteria that the particle velocity at Unit 1 should not exceed 1 ips and that the particle acceleration should not exceed 5 percent of gravity were used as a guide for the initial blasting operations.

Specialized techniques were used during the blasting operation to reduce the transmission of seismic energy.

Presplitting was successfully used to obtain stable steep cuts where desirable.

All blasting operations were observed by an engineering geologist from Dames and Moore, and monitored using Sprengnether seismograph recording equipment. The specialized blasting procedures were modified, as required, in the field considering the actual conditions which were encountered.

2.8.5 Dewatering

Ground water was encountered in a number of places in the cut slopes and in the foundation area.

The slopes intersect the original ground water table. This results in seeps and springs occurring at many of the open joints and at a few of the zones containing highly weathered material. The locations of these seeps and springs changed as the excavation deepened. The ground water table may ultimately stabilize to intersect the cut slope near the toe.

Even where springs are not present, the ground water surface may be close enough to the surface of the cut slopes to introduce uplift forces and seepage pressures and thereby reduce the resistance to sliding along joint surfaces. To minimize the possibility of detrimental ground water pressures, long horizontal drains are installed in the slopes. The drains have been observed to be effective.

Selected drain holes also accommodate rock strain measuring instrumentation. The instrumentation is described in paragraph 2.9.9.

A small amount of dewatering was required in the deep foundation area. Sump pumps installed in the excavation were adequate for dewatering purposes. Most of the water came from the river side with only a minor quantity coming from the ground water in the area to the west. The river water could enter the excavation through joints and seams of weathered material in the rock, through newly placed fill material, and through the river-deposited silt overlying the bedrock in this area.

2.8.6 Backfilling

In general, material for required backfilling operations was available in sufficient quantities from the higher portions of the site. The upper residual soil zone contains suitable material for backfill where soil is required. All soil backfill and other fill which is utilized for structural support is compacted to a density of at least 95 percent of the maximum density obtainable by the American Association of State Highway Officials (AASHO) Method of Compaction (T-180). In certain areas, particularly around the circulating water pipes, and adjacent to deep walls, imported backfill was used.

In general, the two rock zones provided material of adequate quality and size for general rock fill and rip-rap purposes. The rock tended to break along schistosity planes and form long tabular pieces. Care was taken to minimize the breakup of the rock used.

2.9 SLOPE STABILITY

2.9.1 General

The slopes to the west of Units 2 and 3 are cut into the Peters Creek schist. The material in the cut grades from an overburden of soils derived by weathering of the underlying schist, through a zone of material which is weathered to various degrees, into sound and relatively fresh rock. The upland at the north end of the slope is at about Elevation 300.0 ft (C.D.) with the main toe of the excavation at about Elevation 135.0 ft. Portions of the excavation for the reactor extend to about Elevation 90.0. This subsection is concerned with the long-term stability of the main cut slopes.

The slope stability analyses discussed herein were performed by Dames and Moore.

2.9.2 Rock Character

Bedrock at the site is the Peters Creek schist. The rock is greenish-gray to white, foliated, chlorite schist interbedded with seams and bands of quartzite that range up to 6 ft in thickness.

The upper zone of the bedrock formation has been altered by weathering to a friable material containing ribs of relatively unweathered rock. The interface between the overlying residual soil and the highly weathered rock is irregular and slopes upward to the north. Hard, fresh schist is found below the highly weathered zone.

The Peters Creek formation is characterized by thin lenticular bedding and strong flow cleavage resulting in a well developed schistosity. Mapping of the exposed areas of the schist indicates that along the long face of the cut in the vicinity of Units 2 and 3, the predominant strike of the schistosity and cleavage partings parallel to the schistosity is between North 55 deg East and North 65 deg East. The strike of the schistosity rotates to about North 35 deg East as the northern end of the cut is approached, and rotates to about North 40 deg East in the neighborhood of the south end of the cut. The dip of the schistosity is between 60 and 70 deg to the southeast over the entire site.

There is a general change in the character of the rock exposed in the face of the cut at about Plant Coordinate North 1350; to the north, the material is sound and relatively unweathered while to the south the rock is moderately to severely weathered and highly

jointed. South of Plant Coordinate North 1350, the jointing and fracturing is so extensive that small blocks have been formed and the stability of the slope is expected to be governed by the mass movement of a blocky, particulate mass of rock.

The following "major" joint patterns were mapped in the area south of Plant Coordinate North 1350 (Figure 2.7.1):

Strike	Dip
North 50 deg West	60 deg (East)
North 20 deg West	67 deg (West)
North 30 deg East	Near vertical
North 60 deg West	Near vertical

In addition to the joint patterns listed above, other minor fractures are apparent. Neither the major nor the minor joints appear to be continuous over large areas. The effect of the jointing is to produce numerous, rather small, blocks of rock.

North of Plant Coordinate North 1350 (Figure 2.7.1), the principal joint systems are:

Strike	Dip
North 30 deg West	Near vertical
North 80 deg West	0 to 10 deg (North)

Additional minor joint patterns have been mapped, but they are discontinuous and considered to be unimportant with respect to the overall stability of the slopes.

As anticipated, the rock slopes have been found to be water-bearing. Ground water seepage is evident at several points along the slope. During the early stage of construction, a series of drains was installed in the slopes and individual flows as large as 1 to 2 gpm have been measured at the drains. The water is flowing from joint planes and from the planes of foliation. Readings after completion of the slope indicate very small water flow, less than 1/2 gpm per drain.

2.9.3 Geometry of Constructed Slopes

The slopes incorporated in the plant design are shown in Table 2.9.1.

An inspection of the slopes was made in order to determine if the as-built slope angles conform to the design angles. The field measurements revealed that the as-built slopes are in general agreement with the design slopes.

Local areas of oversteepening and some areas of overhanging rock were noted between Elevations 135.0 ft and 165.0 ft and Plant Coordinates North 900 and North 1400. In areas where the oversteepened rock was loose and blocky, the loose material was removed.

2.9.4 Stability Analysis

In order to evaluate the stability of a rock mass, it is necessary to consider the possibility that failure will take place by sliding of individual, large blocks of rock formed by intersecting foliation and fracture surfaces, and also the possibility that the rock mass is sufficiently fractured that it can act much like a soil mass and fail along some deep, curved, surface of sliding. For cuts in most rocks, it is unnecessary to consider failure due to over-stressing of the intact material because its strength is too high to present any stability problems.

Graphical and analytical techniques are available for the solution of the sliding block problem, provided that the structure of the rock mass is known and there is some information about the shearing resistance of the rock along fracture surfaces. Similarly, the possibility of a deep-seated failure along a curved surface of sliding can be evaluated by graphical and analytical techniques. Because failure along curved surfaces of sliding involves movements along fracture surfaces that may be arbitrarily oriented, a statistically valid value of the gross shearing resistance of the fractured rock mass must be introduced into the analysis. This value of the shear strength is different from the value utilized in the sliding block analysis.

A valuable indication of the stability of a rock slope can be obtained through use of the recently developed method of finite elements. This method permits evaluation of the elastic response of a discontinuous medium to stresses produced by such factors as excavation and earthquakes. Although it is an elastic analysis,

it does provide an indication of the overall stability of the slope and the potential modes by which failure could occur.

2.9.5 Rock Properties

A large number of compression and tension tests were performed on the rock cores extracted from the borings drilled at the site. The results of these tests indicate that the Peters Creek schist exhibits the average strength properties shown in Table 2.9.2.

2.9.6 Sliding Block Analyses

The rock structure at this site is favorably oriented and almost precludes the possibility of major movements of large blocks. The orientation of the major joint systems north of Plant Coordinate North 1350 and the direction of the strike of the plane of schistosity are such that no sliding wedges of significant dimensions are formed by the intersection of inclined joints. Instead, massive, stable blocks are produced by the intersection of the schistosity and the joints. In the northwest corner of the excavation, the cut face is nearly parallel to the plane of schistosity. However, in this area, the face of the slope has been cut at an angle equal to or flatter than the minimum 60 deg southeast dip of the schist. Therefore, there is little likelihood of any large-scale instability due to sliding along the planes of schistosity and fracture.

South of Plant Coordinate North 1350, the intersections of the joint systems form small blocks that are considered in the next paragraph.

2.9.7 Curved Surface of Sliding Analyses

Failure along a curved surface of sliding was considered to be possible in the area south of Plant Coordinate North 1350. In this region, the rock is moderately to severely weathered. The stability of the slope was analyzed by assuming that failure will occur along a circular surface of sliding. A computer solution, employing the "Method of Slices," was used to find the failure surface having the minimum factor of safety.

The analyses included a horizontal seismic acceleration of 0.12g and a vertical acceleration of 0.08g. The ground water table was assumed to be at Elevation 250.0 ft at a distance of about 400 ft from the toe of the cut, which is the highest level observed in the borings in this area, and to decline toward the face of the cut at a slope of 4 horizontal to 1 vertical.

The conservative shear strength parameters listed in Table 2.9.3 were assumed for the soil-rock system. A measure of the degree of conservatism applied in the analyses can be obtained by comparing the parameters in Table 2.9.3 with the rock properties given in Table 2.9.2. The soil-rock profile used in the analysis is shown in Figure 2.9.1.

Assuming the worst condition for the stability of the slope occurs, and using the conservative strength parameters presented in Table 2.9.3, the factor of safety exceeds 1.7 in the absence of earthquake stresses, and exceeds 1.4 when earthquake conditions are considered.
The stability of the jointed rock in the less weathered zone was also investigated by considering near-circular failure surfaces that follow pre-existing joint planes. Once again, conservative shear strength parameters were assumed and an adequate factor of safety, larger than that obtained from the circular-surface analysis, was found.

It is concluded that deep-seated failures along curved surfaces of sliding are extremely improbable.

2.9.8 Finite Element Analyses

Analyses of the elastic stresses and associated deflections of the rock slope were performed using the methods of finite elements. A portion of the slope south of Plant Coordinate North 1350 was modeled as a 4-layer system to reflect the decrease in weathering with depth below the ground surface. A horizontal acceleration of 0.12g and a vertical acceleration of 0.08g were introduced in the analyses.

The slope geometry and finite element mesh that were used are shown in Figure 2.9.2. The conservative parameters that were considered in the finite element analyses are listed in Table 2.9.4.

The results of the analyses are presented graphically on Figures 2.9.3, 2.9.4, and 2.9.5. The contours of maximum principal stress are shown in Figure 2.9.3 and the contours of minimum principal stress are shown in Figure 2.9.4. The directions of the principal stresses at selected points are indicated in Figure 2.9.5.

Examination of Figures 2.9.3, 2.9.4, and 2.9.5 reveals the expected concentration of compressive stress at the toe of the slope. A small tension zone was indicated in an area several

hundred feet from the face of the slope. This tension zone is an "end effect" common to this type of analysis and does not represent a true tension zone. This zone occurs sufficiently far from the cut face to have no effect on the calculated stresses in the critical area near the face of the slope.

The highest value of the maximum principal stress, found near the toe of the slope, was 27,000 psf (about 187 psi). At the same point, the minor principal stress was 3,600 psf (25 psi) and the maximum shearing stress was 11,700 psf (81 psi). However, the shear strength of the rock, at this critical point and along the critical failure surface, is estimated from the test data to be at least 72,000 psf (500 psi).

Evaluation of the results of the finite element analyses leads to the conclusion that, even under severe earthquake conditions, there is a large margin of safety against deep-seated failure of the rock material.

2.9.9 Bore Hole Extensometers

Twenty-four bore hole extensometers, 35 to 80 ft long, were installed in the slope in June, 1968 to monitor the movements of the rock. The observations to January, 1970 indicate that some very small surface movements are occurring.

These movements of less than 1/10 in appear to be primarily at the rock surface and do not indicate deep-seated movement of the rock mass. Several shallow extensometers, 8 ft in length, have been installed and confirm that these minor movements are confined to the slope surface.

2.9.10 Conclusions

The stability analyses indicate that the rock slopes are stable as constructed. No evidence of deep-seated instability has been found nor is there any indication that massive blocks will slide off the backslope.

TABLE 2.9.1

DESIGN SLOPES

Material	Slope
Residual Soil Overburden	1 1/2 horizontal : 1 vertical
Weathered Rock	1 horizontal : 1 vertical
Relatively Fresh, Unweathered Rock	1/2 horizontal*: 1 vertical

*In those areas where the toe of the cut is parallel to the strike of the schistosity, the slope follows the plane of the schistosity.

TABLE 2.9.2

ROCK PROPERTIES

	Average Compressive Strength (psi)	Angle of Shearing Resistance (deg)	Cohesion Intercept (psi)
Failure through intact material	20,000	50	3,500
Failure along plane of schistosity	2,500	45	500

TABLE 2.9.3

PARAMETERS USED IN CURVED SURFACE STABILITY ANALYSES

Material	Elevation (ft)	Density (pcf)	Angle of Internal Friction (deg)	Cohesion Intercept (psi)
Soil Overburden	Above 232	135	29*	0
Highly Weathered Schist	232 to 172	140	34	9
Moderately Weathered Schist	172 to 120	150	40	17
Unweathered Schist	Below 120	170	45	25

*Conservative value used in analyzing stability of overall slope.

The actual angle of internal friction is appreciably higher and adequate to minimize local sloughing even under earthquake conditions.

TABLE 2.9.4

PARAMETERS USED IN FINITE ELEMENT ANALYSES

Material	Density (pcf)	Modulus of Elasticity (psi)	Poisson's Ratio
Soil Overburden	135	0.7×10^4	0.33
Highly Weathered Schist	140	0.1×10^6	0.30
Moderately Weathered Schist	150	0.3×10^6	0.30
Unweathered Schist	170	1.0×10^6	0.28

PBAPS

TABLE 2.2.17

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

5 TO 10 MILES

CIVIL DIVISION		COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DRUMORE TWP	5-10	N LANCASTER CO.	PA.	6.	N	5.6	2.2	40.4	79	83	87	115
MARTIC TWP.	5-10	N LANCASTER CO.	PA.	355.	N	8.1	6.2	78.3	470	497	484	688
PROVIDENCE	5-10	N LANCASTER CO.	PA.	7.	N	8.9	3.0	142.1	283	343	426	475
DRUMORE TWP	5-10	NNELANCASTER CO.	PA.	18.	NNE	6.2	7.7	40.5	282	298	313	413
E.DRUMORE T	5-10	NNELANCASTER CO.	PA.	28.	NNE	8.5	5.6	76.9	280	350	427	485
PROVIDENCE	5-10	NNELANCASTER CO.	PA.	15.	NNE	9.3	2.0	141.9	189	229	284	317
DRUMORE TWP	5-10	NELANCASTER CO.	PA.	44.	NE	5.3	0.9	40.7	34	36	38	50
E.DRUMORE T	5-10	NELANCASTER CO.	PA.	47.	NE	7.5	13.3	76.9	672	840	1025	1163
LIT.BRITAIN	5-10	NELANCASTER CO.	PA.	56.	NE	9.1	1.9	59.8	91	102	115	141
FULTON TWP	5-10	ENELANCASTER CO.	PA.	67.	ENE	5.9	2.9	63.0	133	159	180	220
LIT.BRITAIN	5-10	ENELANCASTER CO.	PA.	68.	ENE	8.5	10.9	59.8	518	580	654	803
FULTON TWP	5-10	E LANCASTER CO.	PA.	96.	E	5.5	2.9	63.0	133	159	180	220
LIT.BRITAIN	5-10	E LANCASTER CO.	PA.	90.	E	8.6	11.7	59.8	556	623	702	863
DIST.6 RSUN	5-10	ESECECIL CO.	MD.	114.	ESE	9.9	4.5	128.7	342	499	577	747
OAKWOOD A	5-10	ESECECIL CO.	MD.	116.	ESE	7.4	7.6	78.5	411	558	597	835
FULTON TWP	5-10	ESELANCASTER CO.	PA.	108.	ESE	5.8	4.3	62.9	199	239	270	331
DIST.6 RSUN	5-10	SECECIL CO.	MD.	128.	SE	9.7	3.1	128.5	239	349	403	522
OAKWOOD B	5-10	SECECIL CO.	MD.	135.	SE	7.3	9.5	78.5	514	697	746	1043
DISTRICT 5	5-10	SSEHARFORD CO.	MD.	153.	SSE	7.1	16.9	106.5	1161	1484	1797	2910
DISTRICT 5	5-10	S HARFORD CO.	MD.	179.	S	7.5	16.9	106.5	1160	1482	1795	2906
DISTRICT 5	5-10	SSWHARFORD CO.	MD.	201.	SSW	7.4	16.9	106.5	1160	1482	1795	2906
DISTRICT 5	5-10	SW HARFORD CO.	MD.	226.	SW	7.5	16.9	106.5	1160	1482	1795	2906
DISTRICT 4	5-10	WSWHARFORD CO.	MD.	245.	WSW	9.6	7.2	81.6	347	406	586	796
DISTRICT 5	5-10	WSWHARFORD CO.	MD.	245.	WSW	8.6	8.4	106.4	580	741	897	1453
FAWN GROVE	5-10	WSWYORK CO.	PA.	246.	WSW	8.5	0.0	*******	136	140	166	180
FAWN TWP	5-10	WSWYORK CO.	PA.	254.	WSW	8.5	1.5	45.1	67	64	66	82
PEACH BOT	5-10	WSWYORK CO.	PA.	252.	WSW	6.8	4.6	46.6	205	199	214	256
FAWN GROVE	5-10	W YORK CO.	PA.	266.	W	7.8	0.0	*******	106	109	129	140
FAWN TWP	5-10	W YORK CO.	PA.	269.	W	8.7	8.7	44.8	398	382	392	491
PEACH BOT	5-10	W YORK CO.	PA.	265.	W	6.5	7.6	46.6	340	331	356	426
FAWN TWP	5-10	WNWYORK CO.	PA.	284.	WNW	8.9	1.5	45.1	67	64	66	82
LCHANCEFORD	5-10	WNWYORK CO.	PA.	293.	WNW	7.3	15.0	41.0	555	555	617	713
LCHANCEFORD	5-10	NWYORK CO.	PA.	313.	NW	7.6	12.9	41.0	475	475	528	611
MARTIC TWP.	5-10	NNWLANCASTER CO.	PA.	337.	NNW	7.5	17.0	78.3	1294	1368	1332	1894
					TOTALS		252.1		14636	17405	20039	28183
					DENSITY				58.1	69.0	79.5	111.8

PBAPS

TABLE 2.2.18

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

10 TO 20 MILES

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
E.LAMPETER 10-20	N LANCASTER CO.	PA.	6.	N	19.1	14.3	433.0	3616	5179	6183	7172
LANCASTER CITY	LANCASTER CO.	PA.	354.	N	19.4	6.9	8360.9	63774	61055	57690	84549
LANCASTER T10-20	N LANCASTER CO.	PA.	352.	N	18.0	4.9	1693.2	5490	8020	8267	11106
MARTIC TWP.10-20	N LANCASTER CO.	PA.	352.	N	11.0	4.6	78.3	352	372	362	515
PEQUEA TWP 10-20	N LANCASTER CO.	PA.	355.	N	13.8	11.8	229.1	1534	2192	2702	3035
PROVIDENCE 10-20	N LANCASTER CO.	PA.	3.	N	10.9	8.0	142.2	755	915	1137	1267
STRASBURG 10-20	N LANCASTER CO.	PA.	8.	N	13.3	2.9	130.7	283	312	382	432
WEST LAMPETER TWP	LANCASTER CO.	PA.	2.	N	16.3	15.9	400.9	4119	5520	6374	7644
BART TWP 10-20	NNELANCASTER CO.	PA.	33.	NNE	15.7	15.8	110.7	1286	1466	1746	2030
E.DRUMORE T10-20	NNELANCASTER CO.	PA.	31.	NNE	10.2	2.0	40.6	72	76	80	105
E.LAMPETER 10-20	NNELANCASTER CO.	PA.	15.	NNE	18.7	6.1	433.1	1550	2220	2651	3074
EDEN TWP 10-20	NNELANCASTER CO.	PA.	28.	NNE	13.0	6.1	81.5	325	373	494	517
PARADISE TP10-20	NNELANCASTER CO.	PA.	29.	NNE	17.7	16.6	202.8	2458	2952	3376	4088
PROVIDENCE 10-20	NNELANCASTER CO.	PA.	21.	NNE	11.1	7.0	142.1	661	801	995	1109
QUARRYVILLE BOROUGH	LANCASTER CO.	PA.	31.	NNE	11.0	1.1	1428.2	1187	1427	1571	1976
STRASBURG BOROUGH	LANCASTER CO.	PA.	17.	NNE	16.1	0.8	2371.2	1109	1416	1897	1961
STRASBURG T10-20	NNELANCASTER CO.	PA.	20.	NNE	14.6	16.6	130.8	1607	1769	2168	2450
BART TWP 10-20	NELANCASTER CO.	PA.	41.	NE	15.2	0.8	111.1	68	77	92	107
CHRISTIANA BOROUGH	LANCASTER CO.	PA.	47.	NE	19.9	0.5	2264.0	1043	1069	1132	1480
COLERAIN TP10-20	NELANCASTER CO.	PA.	49.	NE	13.1	10.2	56.4	384	526	574	728
E.DRUMORE T10-20	NELANCASTER CO.	PA.	46.	NE	10.1	3.6	40.5	133	140	147	194
EDEN TWP 10-20	NELANCASTER CO.	PA.	41.	NE	12.4	6.1	81.5	325	373	494	517
PARADISE TP10-20	NELANCASTER CO.	PA.	36.	NE	18.7	1.8	202.7	273	328	375	454
SADSBURY TP10-20	NELANCASTER CO.	PA.	49.	NE	17.7	18.4	77.1	877	1212	1420	1678
LOWER OXFORD TWP	CHESTER CO.	PA.	77.	ENE	15.7	18.9	104.7	1657	2007	1979	3712
UPPER OXFORD TWP	CHESTER CO.	PA.	71.	ENE	18.0	16.9	116.0	903	997	1961	1844
WEST FALLOWFIELD	CHESTER CO.	PA.	59.	ENE	19.1	18.2	93.1	1069	1425	1694	2636
COLERAIN TP10-20	ENELANCASTER CO.	PA.	67.	ENE	13.0	18.9	56.4	714	977	1067	1353
LIT.BRITAIN10-20	ENELANCASTER CO.	PA.	75.	ENE	10.9	1.4	59.7	64	72	81	100
SADSBURY TP10-20	ENELANCASTER CO.	PA.	59.	ENE	16.7	1.0	77.1	46	64	75	89
CALVERT 9 10-20	E CECIL CO.	MD.	100.	E	17.2	3.6	69.5	168	212	248	317
EAST NOTTINGHAM TWP	CHESTER CO.	PA.	88.	E	16.3	21.4	112.2	1748	2298	2402	4251
ELK TWP	CHESTER CO.	PA.	94.	E	19.6	10.8	60.1	462	539	649	997
OXFORD BOROUGH	CHESTER CO.	PA.	86.	E	16.6	1.6	2612.9	3091	3376	3658	6244
WEST NOTTINGHAM TWP	CHESTER CO.	PA.	96.	E	12.0	14.9	96.6	881	1137	1440	2103
LIT.BRITAIN10-20	E LANCASTER CO.	PA.	86.	E	10.6	1.4	59.7	64	72	81	100
NORTHEAST 510-20	ESECECIL CO.	MD.	120.	ESE	17.5	38.7	82.6	1545	2552	3195	3819
DIST.6 RSUN10-20	ESECECIL CO.	MD.	113.	ESE	12.2	17.5	128.6	1335	1947	2250	2913
RISING SUN TOWN	CECIL CO.	MD.	110.	ESE	11.6	0.0	*******	668	824	956	1233
CALVERT 9 10-20	ESECECIL CO.	MD.	107.	ESE	16.8	20.2	69.6	950	1201	1408	1797
NORTHEAST 510-20	SECECIL CO.	MD.	127.	SE	18.0	38.6	82.7	1544	2551	3194	3817
CHARLESTOWN TOWN	CECIL CO.	MD.	129.	SE	19.8	0.0	*******	551	711	721	1064
DIST.6 RSUN10-20	SECECIL CO.	MD.	128.	SE	11.4	6.3	128.6	479	699	808	1046
DIST. 7 PT DEPOSIT	CECIL CO.	MD.	136.	SE	15.0	33.1	307.7	5714	11498	10185	17205
PERRYVILLE TOWN	CECIL CO.	MD.	141.	SE	17.0	0.0	*******	679	674	2091	1009
PORT DEPOSIT TOWN	CECIL CO.	MD.	142.	SE	13.4	0.0	*******	1139	953	906	1426
DISTRICT 2 10-20	SSEHARFORD CO.	MD.	157.	SSE	13.7	96.5	159.3	9069	12201	15367	23926

TABLE 2.2.18 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
ABERDEEN TOWN	HARFORD CO.	MD.	163.	SSE	18.1	2.5	4950.0	2944	9679	12375	18980
DIST 6	HARFORD CO.	MD.	148.	SSE	17.0	2.2	4450.5	7809	8510	9791	16688
DISTRICT 2 10-20 S	HARFORD CO.	MD.	169.	S	18.7	10.7	159.3	1008	1356	1708	2659
DISTRICT 3 10-20 S	HARFORD CO.	MD.	180.	S	13.8	37.7	259.8	2972	5214	9798	10224
DISTRICT 3 10-20 SSW	HARFORD CO.	MD.	202.	SSW	15.0	56.6	259.8	4459	7821	14698	15337
BEL AIR TOWN	HARFORD CO.	MD.	195.	SSW	15.8	1.2	5255.8	2578	4300	6307	8432
DISTRICT 4 10-20 SSW	HARFORD CO.	MD.	213.	SSW	16.3	10.3	81.6	495	580	838	1137
DISTRICT 4 10-20 SW	HARFORD CO.	MD.	231.	SW	14.4	56.5	81.6	2726	3192	4610	6260
DISTRICT 4 10-20 WSW	HARFORD CO.	MD.	248.	WSW	14.4	28.8	81.6	1388	1625	2347	3187
FAWN GROVE 10-20 WSW	YORK CO.	PA.	254.	WSW	12.7	0.0	********	97	100	119	129
FAWN TWP 10-20 WSW	YORK CO.	PA.	257.	WSW	11.0	1.5	45.1	67	64	66	82
E.HOPEWELL 10-20 W	YORK CO.	PA.	279.	W	14.1	7.1	42.0	283	275	296	354
FAWN GROVE 10-20 W	YORK CO.	PA.	267.	W	12.2	0.0	********	58	60	71	77
FAWN TWP 10-20 W	YORK CO.	PA.	267.	W	12.2	14.6	44.9	664	638	655	821
HOPEWELL TWP	YORK CO.	PA.	271.	W	16.9	26.7	64.7	1305	1330	1728	1710
N.HOPEWELL 10-20 W	YORK CO.	PA.	280.	W	19.1	2.7	65.9	138	148	179	190
STEWARTSTOWN BORO	YORK CO.	PA.	269.	W	17.2	0.6	1928.3	1133	1164	1157	1497
CHANCEFORD 10-20 WNW	YORK CO.	PA.	299.	WNW	13.9	14.8	63.4	771	800	936	1028
CROSS ROADS BOROUGH	YORK CO.	PA.	284.	WNW	16.6	1.8	90.6	178	166	163	213
E.HOPEWELL 10-20 WNW	YORK CO.	PA.	286.	WNW	15.0	13.0	41.9	524	509	547	654
FAWN TWP 10-20 WNW	YORK CO.	PA.	282.	WNW	10.7	1.5	45.1	67	64	66	82
FELTON BOROUGH	YORK CO.	PA.	294.	WNW	16.9	0.6	708.3	429	430	425	553
LCHANCEFORD10-20 WNW	YORK CO.	PA.	295.	WNW	10.5	4.3	41.1	158	158	176	203
N.HOPEWELL 10-20 WNW	YORK CO.	PA.	287.	WNW	18.0	15.4	65.9	782	838	1014	1078
WINDSOR BOROUGH	YORK CO.	PA.	303.	WNW	19.8	0.4	3245.0	1126	1029	1298	1323
WINSOR TWP.10-20 WNW	YORK CO.	PA.	297.	WNW	18.7	14.9	237.4	1772	2513	3529	3231
WINTERSTOWN BOROUGH	YORK CO.	PA.	286.	WNW	19.3	2.3	184.3	298	349	424	449
CHANCEFORD 10-20 NW	YORK CO.	PA.	315.	NW	13.9	34.4	63.4	1798	1865	2183	2398
EAST PROSPECT BORO	YORK CO.	PA.	318.	NW	19.9	0.6	911.7	500	623	547	801
LCHANCEFORD10-20 NW	YORK CO.	PA.	311.	NW	10.4	4.3	41.1	158	158	176	203
LOWER WINDSOR TWP	YORK CO.	PA.	315.	NW	19.8	25.2	153.9	2934	3424	3879	4402
WINSOR TWP.10-20 NW	YORK CO.	PA.	306.	NW	18.7	13.2	237.4	1579	2238	3143	2877
CONESTOGA TWP	LANCASTER CO.	PA.	338.	NNW	13.2	15.4	158.9	2007	2230	2447	3088
LANCASTER 10-20 NNW	LANCASTER CO.	PA.	348.	NNW	18.2	1.2	1693.5	1369	2000	2062	2770
MANOR TWP	LANCASTER CO.	PA.	336.	NNW	17.5	47.2	207.0	4461	6939	9769	9609
MARTIC TWP.10-20 NNW	LANCASTER CO.	PA.	345.	NNW	10.3	2.2	78.1	165	174	169	241
MILLERSVILLE BORO	LANCASTER CO.	PA.	345.	NNW	17.6	1.3	4920.0	2551	3883	6396	5377
PEQUEA TWP 10-20 NNW	LANCASTER CO.	PA.	347.	NNW	15.5	1.3	229.5	170	243	300	337
WASHINGTON BOROUGH	LANCASTER CO.	PA.	327.	NNW	19.5	0.3	1416.7	483	450	425	623
				TOTALS		1037.5		182225	225916	265542	350493
				DENSITY				175.6	217.7	255.9	337.8

PBAPS

TABLE 2.2.19

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

20 TO 30 MILES

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
AKRON BOROUGH	LANCASTER CO.	PA.	7.	N	27.7	0.9	3498.9	1028	2167	3149	3001
EAST PETERSBURG BOR	LANCASTER CO.	PA.	349.	N	24.1	1.8	1892.8	1268	2053	3407	2843
EPHRATE BOROUGH	LANCASTER CO.	PA.	10.	N	29.4	2.1	4601.0	7027	7688	9662	10646
EPHRATE TWP	LANCASTER CO.	PA.	8.	N	29.3	17.6	200.7	3649	4321	3532	5984
LITITZ BOROUGH	LANCASTER CO.	PA.	356.	N	27.5	1.9	3722.1	5568	5987	7072	8291
MANHEIM TWP	LANCASTER CO.	PA.	358.	N	23.3	23.4	920.5	9289	14855	21539	20571
PENN TWP	LANCASTER CO.	PA.	351.	N	29.9	29.2	130.2	2734	3072	3801	4254
WARWICK TWP	LANCASTER CO.	PA.	360.	N	27.5	20.3	323.3	3273	4716	6562	6531
WEST EART TWP	LANCASTER CO.	PA.	10.	N	25.9	18.0	243.1	2957	3496	4375	4841
EARL TWP	LANCASTER CO.	PA.	20.	NNE	26.5	22.5	196.9	3232	3668	4430	5079
EAST EARL TWP	LANCASTER CO.	PA.	26.	NNE	28.5	23.6	200.0	3235	3723	4721	5156
LEACOCK TWP	LANCASTER CO.	PA.	24.	NNE	21.2	20.4	180.3	2578	3041	3678	4211
NEW HOLLAND BOROUGH	LANCASTER CO.	PA.	22.	NNE	25.4	1.4	2836.4	2602	3425	3971	4743
TERRE HILL BOROUGH	LANCASTER CO.	PA.	23.	NNE	29.9	0.5	2258.0	1000	1129	1129	1563
UPPER LEACOCK TWP	LANCASTER CO.	PA.	12.	NNE	22.4	18.4	351.0	3403	4549	6459	6299
ATGLEN BOROUGH	CHESTER CO.	PA.	51.	NE	20.4	0.7	1057.1	668	721	740	1334
PARKESBURG BOROUGH	CHESTER CO.	PA.	53.	NE	23.3	1.2	2250.8	2611	2759	2701	5103
SADSBURY TWP	CHESTER CO.	PA.	51.	NE	24.4	5.7	368.9	1502	981	2103	1815
VALLEY TWP	CHESTER CO.	PA.	55.	NE	27.2	6.3	601.7	3148	3101	3791	5736
WEST CALN TWP	CHESTER CO.	PA.	48.	NE	27.4	22.3	141.3	1485	2140	3152	3958
WEST SADSBURY TWP	CHESTER CO.	PA.	49.	NE	21.9	10.7	111.1	802	1102	1189	2038
POMEROY	CHESTER CO.	PA.	55.	NE	24.9	0.7	2087.1	0	1085	1461	2007
SALISBURY TWP	LANCASTER CO.	PA.	37.	NE	22.9	42.2	125.5	3932	4509	5294	6244
COATESVILLE CITY	CHESTER CO.	PA.	57.	ENE	28.5	1.4	8807.9	13826	12971	12331	23992
EAST FALLOWFIELD	CHESTER CO.	PA.	61.	ENE	28.0	15.7	222.1	1795	2745	3487	5077
HIGHLAND TWP	CHESTER CO.	PA.	60.	ENE	23.1	17.2	72.6	904	1029	1248	1903
LONDONDERRY TWP	CHESTER CO.	PA.	69.	ENE	22.3	11.5	80.0	595	718	920	1328
LONDON GROVE TWP	CHESTER CO.	PA.	78.	ENE	24.9	17.3	179.7	1844	2734	3109	5057
MODENA BOROUGH	CHESTER CO.	PA.	60.	ENE	28.6	0.4	2167.5	824	859	867	1589
PENN TWP	CHESTER CO.	PA.	78.	ENE	21.4	9.6	103.0	705	1097	989	2029
SOUTH COATESVILLE	CHESTER CO.	PA.	58.	ENE	28.0	1.8	879.4	1996	2032	1583	3758
WEST MARLBOROUGH TWP	CHESTER CO.	PA.	69.	ENE	26.4	17.2	53.3	786	901	917	1667
NEWARK CITY	NEW CASTLE CO.	DE.	101.	E	27.8	0.2	835.0	0	125	167	237
NEWARK CITY	NEW CASTLE CO.	DE.	101.	E	27.8	3.7	3618.1	6639	10046	13387	19040
NEWARK CITY	NEW CASTLE CO.	DE.	101.	E	27.8	1.9	864.7	92	1233	1643	2337
DIST. 4 FAIR HILL	CECIL CO.	MD.	100.	E	23.0	27.9	121.8	2044	2696	3399	4034
AVONDALE BOROUGH	CHESTER CO.	PA.	80.	E	26.1	0.5	2050.0	941	1016	1025	1879
FRANKLIN TWP	CHESTER CO.	PA.	89.	E	23.4	13.0	80.2	666	817	1043	1511
LONDON BRITAIN TWP	CHESTER CO.	PA.	91.	E	25.7	10.0	96.3	559	686	963	1269
NEW GARDEN TWP	CHESTER CO.	PA.	81.	E	27.8	15.9	261.2	3027	3718	4153	6877
NEW LONDON TWP	CHESTER CO.	PA.	87.	E	20.8	12.3	76.3	660	845	938	1563
WEST GROVE BOROUGH	CHESTER CO.	PA.	80.	E	23.8	0.6	3116.7	1521	1607	1870	2972
DISTRICT 11	NEW CASTLE CO.	DE.	111.	ESE	29.9	46.1	233.9	2507	8092	10783	15337
CHESAPEAKE CITY	CECIL CO.	MD.	123.	ESE	29.2	0.6	1718.3	1154	1104	1031	1652
DIST. 3 ELKTON	CECIL CO.	MD.	114.	ESE	24.5	39.5	209.4	3542	6721	8270	10057
ELKTON TOWN	CECIL CO.	MD.	114.	ESE	25.3	1.7	3154.1	5245	5989	5362	8962
NORTH EAST TOWN	CECIL CO.	MD.	122.	ESE	20.6	1.3	1398.5	1517	1628	1818	2436

TABLE 2.2.19 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DIST. 2 CHESAPEAKE	CECIL CO.	MD.	127.	SE	29.0	50.4	46.1	1264	1691	2321	2530
BETTERTON TOWN	KENT CO.	MD.	158.	SSE	29.2	0.0	*******	314	328	327	399
OLIVER-DT. 15	BALTIMORE CO.	MD.	189.	S	26.8	2.2	849.1	0	1426	1868	2324
DIST 1 ABINGDON	HARFORD CO.	MD.	185.	S	20.5	80.1	242.5	10188	12756	19426	25014
EDGEWOOD	HARFORD CO.	MD.	184.	S	23.4	0.4	21377.5	0	1670	8551	3275
DISTRICT 11	BALTIMORE CO.	MD.	203.	SSW	25.6	68.8	386.8	10450	17127	26614	27908
PARKVILLE-CARNEY	BALTIMORE CO.	MD.	210.	SSW	29.4	3.9	5877.4	0	17496	22922	28509
PARKVILLE-CARNEY	BALTIMORE CO.	MD.	208.	SSW	28.2	1.5	3018.0	0	3455	4527	5630
PARKVILLE-CARNEY	BALTIMORE CO.	MD.	207.	SSW	29.9	0.9	9148.9	0	6285	8234	10241
DISTRICT 8	BALTIMORE CO.	MD.	224.	SW	28.5	59.9	643.9	8708	10027	38568	16338
DISTRICT 10	BALTIMORE CO.	MD.	225.	SW	22.0	51.2	110.3	2588	3740	5647	6094
COCKEYSVILLE	BALTIMORE CO.	MD.	228.	SW	27.6	6.1	554.6	0	2582	3383	4207
TIMONIUM-DT. 8	BALTIMORE CO.	MD.	220.	SW	29.6	2.6	4433.8	0	8799	11528	14337
TIMONIUM-DT. 10	BALTIMORE CO.	MD.	218.	SW	29.9	0.8	5676.2	0	3466	4541	5648
DISTRICT 5	BALTIMORE CO.	MD.	244.	WSW	28.8	48.6	64.2	2106	2551	3120	4157
DISTRICT 6	BALTIMORE CO.	MD.	258.	WSW	24.3	37.2	55.8	1567	1627	2076	2651
DISTRICT 7	BALTIMORE CO.	MD.	246.	WSW	22.1	57.3	82.3	3413	4167	4714	6790
CODORUS TWP	YORK CO.	PA.	275.	W	27.9	32.9	84.0	2168	2394	2762	3078
GLEN ROCK BOROUGH	YORK CO.	PA.	276.	W	24.6	0.7	2285.7	1477	1546	1600	1988
NEW FREEDOM BOROUGH	YORK CO.	PA.	267.	W	22.9	1.8	830.6	1271	1395	1495	1794
RAILROAD BOROUGH	YORK CO.	PA.	270.	W	22.6	0.7	440.0	300	273	308	351
SHREWSBURY BOROUGH	YORK CO.	PA.	272.	W	21.8	0.4	4290.0	787	943	1716	1212
SHREWSBURY TWP	YORK CO.	PA.	272.	W	22.9	29.7	86.8	2163	2471	2578	3177
DALLASTOWN BOROUGH	YORK CO.	PA.	296.	WNW	22.0	0.8	4450.0	3304	3615	3560	4648
JACOBUS BOROUGH	YORK CO.	PA.	291.	WNW	24.9	0.9	1511.1	706	968	1360	1245
LOGANVILLE BOROUGH	YORK CO.	PA.	286.	WNW	24.2	0.9	1023.3	569	742	921	954
NEW SALEM BOROUGH	YORK CO.	PA.	290.	WNW	29.3	0.3	1280.0	333	350	384	450
NORTH CODORUS TWP	YORK CO.	PA.	284.	WNW	29.9	31.5	143.3	2787	3525	4514	4532
NORTH YORK BOROUGH	YORK CO.	PA.	302.	WNW	28.8	0.4	5080.0	2445	2290	2032	2944
RED LION BOROUGH	YORK CO.	PA.	299.	WNW	20.4	1.4	4032.1	5119	5594	5645	7192
SEVEN VALLEYS BORO	YORK CO.	PA.	284.	WNW	27.1	1.1	625.5	437	515	688	662
SPRINGFIELD TWP	YORK CO.	PA.	285.	WNW	24.8	25.5	87.1	1467	1751	2221	2251
SPRING GARDEN TWP	YORK CO.	PA.	297.	WNW	27.2	7.4	1681.5	8338	11387	12443	14640
WEST YORK BOROUGH	YORK CO.	PA.	297.	WNW	29.4	0.5	10628.0	5756	5526	5314	7105
YOE BOROUGH	YORK CO.	PA.	298.	WNW	22.1	0.3	2633.3	681	731	790	940
YORK CITY	YORK CO.	PA.	300.	WNW	28.0	4.5	11185.6	59953	54504	50335	70074
YORK TWP	YORK CO.	PA.	296.	WNW	23.3	24.4	520.6	4502	8506	12702	10936
MARIETTA BOROUGH	LANCASTER CO.	PA.	324.	NW	25.5	0.4	7095.0	2442	2385	2838	3303
HALLAM BOROUGH	YORK CO.	PA.	314.	NW	24.4	0.6	3041.7	976	1234	1825	1587
HELLAM TWP	YORK CO.	PA.	316.	NW	24.6	29.1	108.5	2081	2550	3158	3278
SPRINGETTSBURY TWP	YORK CO.	PA.	307.	NW	26.7	16.1	1204.9	5537	14232	19399	18298
WRIGHTSVILLE BORO	YORK CO.	PA.	323.	NW	23.1	4.3	620.5	2104	2345	2668	3015
YORKANA BOROUGH	YORK CO.	PA.	312.	NW	22.6	0.1	2620.0	229	251	262	323
COLUMBIA BOROUGH	LANCASTER CO.	PA.	328.	NNW	22.4	1.6	7023.1	11993	12075	11237	16721

TABLE 2.2.19 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
EAST DONEGAL TWP	LANCASTER CO.	PA.	326.	NNW	27.1	23.9	125.6	2642	3099	3003	4291
EAST HEMPFIELD TWP	LANCASTER CO.	PA.	345.	NNW	23.1	21.2	553.7	4322	6727	11739	9316
MANHEIM BOROUGH	LANCASTER CO.	PA.	347.	NNW	28.8	1.0	5434.0	4246	4790	5434	6633
MOUNT JOY BOROUGH	LANCASTER CO.	PA.	333.	NNW	27.1	1.2	4200.8	3006	3292	5041	4559
MOUNTVILLE BOROUGH	LANCASTER CO.	PA.	337.	NNW	21.0	0.6	2423.3	1064	1411	1454	1954
RAPHO TWP	LANCASTER CO.	PA.	341.	NNW	29.7	48.1	106.5	3865	4484	5121	6209
WEST HEMPFIELD TWP	LANCASTER CO.	PA.	335.	NNW	22.6	21.6	283.3	3578	5318	6119	7364
FLORIN E DRUMORE	LANCASTER CO.	PA.	331.	NNW	27.7	0.5	2276.0	817	1005	1138	1392
LANDISVILLE	LANCASTER CO.	PA.	342.	NNW	24.4	0.6	3190.0	0	1690	1914	2340
FLORIN MT JOY	LANCASTER CO.	PA.	332.	NNW	28.1	0.8	726.2	502	513	581	710
				TOTALS		1368.8		314945	431317	553887	646329
				DENSITY				230.1	315.1	404.7	472.2

TABLE 2.2.20

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

30 TO 40 MILES

CIVIL DIVISION	COUNTY	STATE	DIRECTION FROM SITE DEGREE	SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
CLAY TWP	LANCASTER CO.	PA.	4.	N	32.1	23.1	122.6	1793	2006	2832	2778
ELIZABETH TWP	LANCASTER CO.	PA.	356.	N	32.1	18.1	101.0	1164	1555	1828	2153
WEST COCALICO TWP	LANCASTER CO.	PA.	9.	N	35.4	27.7	153.3	2947	3608	4247	4996
HEIDELBERG TWP	LEBANON CO.	PA.	0.	N	37.7	24.7	114.7	2446	2597	2833	3031
SOUTH LEBANON TWP	LEBANON CO.	PA.	352.	N	39.0	20.4	326.9	4488	5617	6669	6555
ADAMSTOWN BOROUGH	BERKS CO.	PA.	19.	NNE	35.9	0.0	*******	20	16	1202	18
BRECKNOCK TWP	BERKS CO.	PA.	26.	NNE	36.0	17.2	113.7	1085	1499	1956	1646
CUMRU TWP	BERKS CO.	PA.	26.	NNE	39.9	21.4	391.0	5242	7250	8367	7960
MOHNTON BOROUGH	BERKS CO.	PA.	23.	NNE	39.4	0.7	3075.7	2004	2223	2153	2441
SOUTH HEIDELBERG	BERKS CO.	PA.	14.	NNE	39.7	13.7	233.4	3726	3771	3198	4140
BRECKNOCK TWP	LANCASTER CO.	PA.	23.	NNE	33.1	24.8	140.2	2226	2981	3478	4128
CAERNARVON TWP	LANCASTER CO.	PA.	31.	NNE	31.0	22.8	101.9	1673	1843	2323	2552
DENVER BOROUGH	LANCASTER CO.	PA.	12.	NNE	33.4	1.0	2248.0	1658	1875	2248	2596
EAST COCALICO TWP	LANCASTER CO.	PA.	15.	NNE	33.1	21.0	237.8	3044	3791	4993	5250
ADAMSTOWN BOROUGH	LANCASTER CO.	PA.	19.	NNE	35.3	1.4	949.3	1000	1174	1329	1626
CAERNARVON TWP	BERKS CO.	PA.	36.	NE	35.1	12.7	132.3	1105	1326	1680	1456
EAST BRANDYWINE TWP	CHESTER CO.	PA.	56.	NE	33.7	11.3	242.6	1108	1618	2741	2993
EAST NANTMEAL TWP	CHESTER CO.	PA.	48.	NE	38.4	16.4	52.3	665	730	858	1350
ELVERSON BOROUGH	CHESTER CO.	PA.	40.	NE	35.9	1.0	509.0	370	472	509	873
HONEY BROOK BOROUGH	CHESTER CO.	PA.	39.	NE	30.0	0.4	2787.5	864	1023	1115	1892
HONEYBROOK TWP	CHESTER CO.	PA.	42.	NE	30.8	25.0	115.3	1261	1584	2883	2930
UPPER UWCHLAN TWP	CHESTER CO.	PA.	53.	NE	37.4	12.0	83.0	761	909	996	1681
WALLACE TWP	CHESTER CO.	PA.	50.	NE	35.0	11.9	113.2	771	1065	1347	1970
WARWICK TWP	CHESTER CO.	PA.	43.	NE	39.8	19.2	86.8	1144	1436	1667	2656
WEST BRANDYWINE TWP	CHESTER CO.	PA.	51.	NE	31.3	13.3	204.0	1122	1675	2713	3098
WEST NANTMEAL TWP	CHESTER CO.	PA.	43.	NE	34.6	13.3	96.6	806	968	1285	1790
BIRMINGHAM TWP	CHESTER CO.	PA.	75.	ENE	36.9	6.2	134.5	429	453	834	838
CALN TWP	CHESTER CO.	PA.	58.	ENE	32.0	8.7	768.9	5779	6685	6689	12365
DOWNINGTOWN BOROUGH	CHESTER CO.	PA.	60.	ENE	34.7	1.8	4131.7	4948	5598	7437	10354
EAST BRADFORD TWP	CHESTER CO.	PA.	67.	ENE	36.1	15.2	214.5	1187	1713	3260	3168
EAST CALN TWP	CHESTER CO.	PA.	61.	ENE	36.1	4.0	434.7	403	758	1739	1402
EAST MARLBOROUGH	CHESTER CO.	PA.	74.	ENE	30.4	15.5	195.5	1868	2417	3031	4471
KENNETT SQUARE BORO	CHESTER CO.	PA.	79.	ENE	30.3	1.1	4432.7	3699	4355	4876	8055
NEWLIN TWP	CHESTER CO.	PA.	69.	ENE	30.8	12.1	121.0	957	1477	1464	2732
PENNSBURY TWP	CHESTER CO.	PA.	77.	ENE	35.3	10.2	172.8	686	936	1763	1731
POCOPSON TWP	CHESTER CO.	PA.	72.	ENE	33.7	8.2	189.8	475	1315	1556	2432
THORNBURY TWP	CHESTER CO.	PA.	73.	ENE	40.0	3.9	367.9	297	746	1435	1380
UWCHLAN TWP	CHESTER CO.	PA.	57.	ENE	37.9	10.5	521.2	761	995	5473	1840
WEST BRADFORD TWP	CHESTER CO.	PA.	65.	ENE	32.7	18.7	160.2	1530	1894	2996	3503
WEST CHESTER BORO	CHESTER CO.	PA.	69.	ENE	37.9	1.8	10722.8	15168	15705	19301	29049
WEST GOSHEN TWP	CHESTER CO.	PA.	65.	ENE	39.1	9.6	592.7	1970	4593	5690	8495
CHATWOOD	CHESTER CO.	PA.	69.	ENE	39.6	2.3	3116.5	1572	3621	7168	6698
WESTTOWN TWP	CHESTER CO.	PA.	72.	ENE	39.8	8.7	582.6	994	1947	5069	3601
WEST WHITELAND TWP	CHESTER CO.	PA.	62.	ENE	38.9	12.9	554.2	1573	4412	7149	8161
BIRMINGHAM TWP	DELAWARE CO.	PA.	79.	ENE	37.7	8.8	145.6	836	1093	1281	1410
DIST. 1 WILMINGTON	NEW CASTLE CO.	DE.	92.	E	38.6	6.1	1707.0	11515	7814	10413	14810
DIST. 2 WILMINGTON	NEW CASTLE CO.	DE.	90.	E	38.6	0.4	7031.9	35762	33772	45004	64008

TABLE 2.2.20 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DIST. 3 WILMINGTON	NEW CASTLE CO.	DE.	90.	E	37.5	1.8	13591.7	21417	18359	24465	34796
DIST. 4 WILMINGTON	NEW CASTLE CO.	DE.	92.	E	37.9	0.5	14376.0	9078	5394	7188	10223
DIST. 5 WILMINGTON	NEW CASTLE CO.	DE.	91.	E	37.1	1.5	27085.3	32584	30488	40628	57784
DISTRICT 7	NEW CASTLE CO.	DE.	89.	E	35.2	31.4	1653.1	25739	38651	51906	73824
ELSEMERE TOWN	NEW CASTLE CO.	DE.	92.	E	36.1	1.0	9753.0	5314	7319	9753	13872
NEWPORT TOWN	NEW CASTLE CO.	DE.	95.	E	35.2	0.2	8255.0	1171	1239	1651	2348
DISTRICT 8	NEW CASTLE CO.	DE.	91.	E	30.9	44.0	705.7	7677	23303	31053	44166
DISTRICT 9	NEW CASTLE CO.	DE.	100.	E	30.1	21.1	631.2	2418	9994	13318	18942
DISTRICT 10	NEW CASTLE CO.	DE.	100.	E	35.8	48.6	982.3	16428	35824	47739	67897
NEW CASTLE CITY	NEW CASTLE CO.	DE.	100.	E	37.5	1.9	3134.2	5396	4469	5955	8470
KENNETT TWP	CHESTER CO.	PA.	80.	E	31.7	15.4	220.4	2145	3026	3394	5597
DISTRICT 12	NEW CASTLE CO.	DE.	111.	ESE	35.4	30.6	75.9	1690	1743	2323	3303
DELAWARE CITY TOWN	NEW CASTLE CO.	DE.	109.	ESE	38.1	1.2	1840.8	1363	1658	2209	3142
DISTRICT 13	NEW CASTLE CO.	DE.	120.	ESE	36.0	65.3	51.0	2332	2501	3333	4740
ODESSA TOWN	NEW CASTLE CO.	DE.	123.	ESE	38.5	0.0	*******	467	526	701	997
MIDDLETOWN TOWN	NEW CASTLE CO.	DE.	126.	SE	36.3	1.9	1536.8	1755	2191	2920	4153
DISTRICT 14	NEW CASTLE CO.	DE.	129.	SE	39.6	56.9	49.2	1734	2100	2798	3980
TOWNSEND TOWN	NEW CASTLE CO.	DE.	129.	SE	39.6	0.0	*******	441	434	578	823
DIST. 1 CECILTON	CECIL CO.	MD.	140.	SE	30.8	79.7	26.1	1698	1919	2077	2871
CECILTON TOWN	CECIL CO.	MD.	139.	SE	32.4	0.0	*******	510	596	581	892
DIST. 1 MASSEYS	KENT CO.	MD.	143.	SE	38.6	70.1	27.3	1627	1943	1911	2363
CALENA TOWN	KENT CO.	MD.	144.	SE	35.5	0.0	*******	259	299	361	364
DIST. 2	KENT CO.	MD.	154.	SSE	35.0	70.0	26.3	1645	1797	1840	2186
DIST. 3 WORTON	KENT CO.	MD.	164.	SSE	32.8	46.2	35.3	1371	1591	1629	1935
DIST. 4 CHESTERTOWN	KENT CO.	MD.	164.	SSE	38.1	8.0	91.6	252	362	733	440
CHESTERTOWN TOWN	KENT CO.	MD.	164.	SSE	39.0	0.9	3862.2	3143	3602	3476	4381
DIST. 6 FAIRLEE	KENT CO.	MD.	173.	S	37.2	40.2	33.6	1102	1320	1352	1606
WARD NO. 1	BALTIMORE (CITY)	MD.	206.	SSW	36.7	0.0	*******	24831	21185	17000	21452
WARD NO. 2	BALTIMORE (CITY)	MD.	207.	SSW	36.8	0.0	*******	13924	10401	8300	10532
WARD NO. 3	BALTIMORE (CITY)	MD.	208.	SSW	37.0	0.0	*******	11892	7610	7700	7706
WARD NO. 4	BALTIMORE (CITY)	MD.	210.	SSW	37.2	0.0	*******	11649	7966	6600	8066
WARD NO. 5	BALTIMORE (CITY)	MD.	209.	SSW	36.6	0.0	*******	12423	8703	5400	8813
WARD NO. 6	BALTIMORE (CITY)	MD.	207.	SSW	36.1	0.0	*******	26708	20645	17400	20905
WARD NO. 7	BALTIMORE (CITY)	MD.	208.	SSW	35.8	0.0	*******	30261	24749	16600	25060
WARD NO. 8	BALTIMORE (CITY)	MD.	208.	SSW	36.1	0.0	*******	46400	47610	48400	48209
WARD NO. 9	BALTIMORE (CITY)	MD.	210.	SSW	34.7	0.0	*******	45094	44612	45400	45173
WARD NO. 10	BALTIMORE (CITY)	MD.	209.	SSW	36.2	0.0	*******	19804	16604	11700	16813
WARD NO. 11	BALTIMORE (CITY)	MD.	210.	SSW	36.6	0.0	*******	21370	11546	6200	11691
WARD NO. 12	BALTIMORE (CITY)	MD.	211.	SSW	35.3	0.0	*******	40278	34984	31700	35424
WARD NO. 13	BALTIMORE (CITY)	MD.	213.	SSW	35.7	0.0	*******	39417	37788	35200	38263
WARD NO. 14	BALTIMORE (CITY)	MD.	212.	SSW	36.7	0.0	*******	26499	22240	17200	22520
WARD NO. 16	BALTIMORE (CITY)	MD.	213.	SSW	37.8	0.0	*******	53771	51779	56200	52431
WARD NO. 17	BALTIMORE (CITY)	MD.	211.	SSW	37.1	0.0	*******	19991	13287	10500	13454
WARD NO. 18	BALTIMORE (CITY)	MD.	211.	SSW	37.7	0.0	*******	19688	15462	9000	15657
WARD NO. 19	BALTIMORE (CITY)	MD.	211.	SSW	38.0	0.0	*******	24717	20477	12900	20735
WARD NO. 20	BALTIMORE (CITY)	MD.	213.	SSW	38.8	0.0	*******	45419	46224	41900	46806
WARD NO. 21	BALTIMORE (CITY)	MD.	210.	SSW	38.5	0.0	*******	15976	13955	10200	14131

TABLE 2.2.20 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION FROM CENTER DEGREE	DIRECTION FROM CENTER SECTOR	DISTANCE FROM CENTER MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
WARD NO. 22	BALTIMORE (CITY)	MD.	209.	SSW	37.7	0.0	*******	10989	6475	2100	6556
WARD NO. 23	BALTIMORE (CITY)	MD.	209.	SSW	38.3	0.0	*******	12679	10159	8700	10287
WARD NO. 24	BALTIMORE (CITY)	MD.	207.	SSW	38.0	0.0	*******	17552	14803	13200	14989
WARD NO. 25	BALTIMORE (CITY)	MD.	208.	SSW	39.8	0.0	*******	50330	63511	64000	64310
WARD NO. 26	BALTIMORE (CITY)	MD.	205.	SSW	34.8	0.0	*******	73111	86636	91600	87726
WARD NO. 27	BALTIMORE (CITY)	MD.	213.	SSW	33.1	0.0	*******	127353	166283	180900	168375
DISTRICT 12	BALTIMORE CO.	MD.	200.	SSW	36.5	9.7	7449.6	40155	70659	72261	115135
DISTRICT 14	BALTIMORE CO.	MD.	203.	SSW	31.5	11.4	2045.9	16394	10662	23323	17373
OVERLEA	BALTIMORE CO.	MD.	205.	SSW	30.2	1.7	7697.6	0	10795	13086	17590
DISTRICT 15	BALTIMORE CO.	MD.	194.	SSW	32.7	66.4	451.0	64178	23283	29947	37938
DUNDALK	BALTIMORE CO.	MD.	198.	SSW	35.7	1.8	7286.7	0	11769	13116	19177
ESSEX	BALTIMORE CO.	MD.	198.	SSW	32.6	6.0	6365.5	0	35205	38193	57365
MIDDLE RIVER	BALTIMORE CO.	MD.	196.	SSW	30.6	2.4	8306.2	0	10825	19935	17639
LOCH RAVEN	BALTIMORE CO.	MD.	212.	SSW	30.4	3.4	8970.0	0	23278	30498	37930
SPARROWS POINT-FORT	BALTIMORE CO.	MD.	195.	SSW	38.3	3.6	4285.3	0	11775	15427	19187
WARD NO. 15	BALTIMORE (CITY)	MD.	215.	SW	36.9	0.0	*******	82038	78635	86200	79624
WARD NO. 28	BALTIMORE (CITY)	MD.	217.	SW	38.1	0.0	*******	25544	34695	43600	35132
DISTRICT 2	BALTIMORE CO.	MD.	227.	SW	39.2	43.9	1266.9	10467	11765	55618	19170
DISTRICT 3	BALTIMORE CO.	MD.	224.	SW	33.8	20.1	703.8	11072	8262	14146	13462
PIKESVILLE	BALTIMORE CO.	MD.	222.	SW	35.9	5.0	4831.8	0	18737	24159	30531
OWINGS-MILLS	BALTIMORE CO.	MD.	230.	SW	35.5	4.7	1566.0	0	3810	7360	6208
DISTRICT 9	BALTIMORE CO.	MD.	216.	SW	30.2	10.3	9938.5	40856	7070	102367	11520
WOODLAWN-DT. 1	BALTIMORE CO.	MD.	218.	SW	38.8	0.8	5756.2	0	3515	4605	5728
WOODLAWN-DT. 2	BALTIMORE CO.	MD.	221.	SW	38.2	5.2	3965.4	0	15739	20620	25646
GLYNDON-DT. 4	BALTIMORE CO.	MD.	234.	SW	35.6	5.4	1023.0	2077	4216	5524	6870
STONELEIGH-DT. 9	BALTIMORE CO.	MD.	214.	SW	31.6	2.5	8198.8	0	15645	20497	25493
TOWSON	BALTIMORE CO.	MD.	216.	SW	30.2	6.8	3678.1	0	19090	25011	31106
DISTRICT 4	BALTIMORE CO.	MD.	238.	WSW	34.3	52.6	443.6	7376	7578	23331	12348
DIST 4 WOOLERYS	CARROLL CO.	MD.	243.	WSW	38.9	46.2	141.4	3757	4368	6532	6225
MANCHESTER TOWN	CARROLL CO.	MD.	258.	WSW	33.3	0.2	7330.0	1027	1108	1466	1579
DIST 7 WESTMINSTER	CARROLL CO.	MD.	243.	WSW	38.9	45.5	199.9	4727	7052	9097	10050
DIST 8 HAMPSTEAD	CARROLL CO.	MD.	250.	WSW	34.2	31.1	139.2	1970	2714	4329	3868
HAMPSTEAD TOWN	CARROLL CO.	MD.	251.	WSW	32.5	0.0	*******	677	696	961	992
DIST 6 MANCHESTER	CARROLL CO.	MD.	260.	W	33.2	51.8	73.1	2715	3130	3787	4461
ABBOTTSTOWN BOROUGH	ADAMS CO.	PA.	281.	W	38.8	0.5	1104.0	538	561	552	703
BERWICK TWP	ADAMS CO.	PA.	281.	W	38.8	8.1	170.2	870	1102	1379	1382
CONEWAGO TWP	ADAMS CO.	PA.	273.	W	39.9	9.5	188.9	1158	1436	1795	1801
MIDWAY	ADAMS CO.	PA.	275.	W	39.1	1.1	1487.3	1271	1568	1636	1966
MCSHERRYSTOWN BORO	ADAMS CO.	PA.	275.	W	39.8	0.5	5546.0	2510	2839	2773	3560
HANOVER BOROUGH	YORK CO.	PA.	275.	W	37.9	3.1	5039.7	14048	15538	15623	19977
HEIDELBERG TWP	YORK CO.	PA.	278.	W	34.7	14.5	123.1	1138	1493	1785	1920
JEFFERSON BOROUGH	YORK CO.	PA.	278.	W	30.5	0.5	1080.0	449	447	540	575
MANHEIM TWP	YORK CO.	PA.	269.	W	31.2	22.9	68.4	1259	1435	1566	1845
PENN TWP	YORK CO.	PA.	275.	W	37.0	10.5	289.0	1964	2547	3034	3275
PARKVILLE	YORK CO.	PA.	273.	W	37.3	3.6	1422.2	3299	4516	5120	5806
WEST MANHEIM TWP	YORK CO.	PA.	268.	W	35.9	19.8	113.4	1535	1776	2246	2283
EAST BERLIN BOROUGH	ADAMS CO.	PA.	288.	WNW	39.7	0.7	1551.4	913	1037	1086	1300

TABLE 2.2.20 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DOVER BOROUGH	YORK CO.	PA.	299.	WNW	35.0	0.4	2920.0	809	975	1168	1254
DOVER TWP	YORK CO.	PA.	297.	WNW	35.6	42.8	209.7	3864	6399	8975	8227
JACKSON TWP	YORK CO.	PA.	288.	WNW	33.6	23.2	169.4	2548	2749	3931	3534
MANCHESTER TWP	YORK CO.	PA.	304.	WNW	30.4	16.4	425.5	3397	5519	6979	7096
PARADISE TWP	YORK CO.	PA.	287.	WNW	37.2	20.1	107.7	1476	1778	2165	2286
SPRING GROVE BORO	YORK CO.	PA.	284.	WNW	32.6	0.5	3338.0	1238	1675	1669	2154
WEST MANCHESTER TWP	YORK CO.	PA.	295.	WNW	30.7	20.0	612.8	5438	9505	12257	12220
LONDONDERRY TWP	DAUPHIN COUNTY	PA.	322.	NW	36.7	26.3	131.3	1595	3053	3453	3472
MIDDLETOWN BOROUGH	DAUPHIN COUNTY	PA.	321.	NW	39.1	1.8	5044.4	9184	11182	9080	12718
ROYALTON BOROUGH	DAUPHIN COUNTY	PA.	321.	NW	38.2	0.4	2600.0	1175	1128	1040	1283
CONOY TWP	LANCASTER CO.	PA.	319.	NW	31.3	18.4	107.4	1742	1867	1977	2585
WEST DONEGAL TWP	LANCASTER CO.	PA.	324.	NW	31.8	15.3	243.1	2335	3392	3719	4697
CONEWAGO TWP	YORK CO.	PA.	309.	NW	34.1	24.7	150.6	1877	2992	3719	3847
EAST MANCHESTER TWP	YORK CO.	PA.	314.	NW	31.3	16.8	103.3	1784	2253	1735	2897
GOLDSBORO BOROUGH	YORK CO.	PA.	317.	NW	37.6	0.4	1440.0	558	542	576	697
MANCHESTER BOROUGH	YORK CO.	PA.	311.	NW	31.7	0.4	5977.5	1264	1454	2391	1869
MOUNT WOLF BOROUGH	YORK CO.	PA.	312.	NW	31.1	0.6	3018.3	1164	1514	1811	1947
NEWBERRY TWP	YORK CO.	PA.	314,	NW	35.2	31.3	191.0	2998	4045	5978	5201
YORK HAVEN BOROUGH	YORK CO.	PA.	316.	NW	34.0	0.3	2236.7	743	736	671	946
CONEWAGO TWP	DAUPHIN COUNTY	PA.	330.	NNW	36.4	16.3	69.0	966	1353	1124	1539
ELIZABETHTOWN BORO	LANCASTER CO.	PA.	327.	NNW	32.3	2.0	4036.0	5083	6780	8072	9389
MOUNT JOY TWP	LANCASTER CO.	PA.	333.	NNW	31.1	28.6	147.8	2584	3622	4228	5016
CORNWALL BOROUGH	LEBANON CO.	PA.	348.	NNW	36.8	9.2	229.5	1760	1934	2111	2257
MOUNT CRETNA BORO	LEBANON CO.	PA.	342.	NNW	35.2	0.2	765.0	83	93	153	109
NORTH CORNWALL TWP	LEBANON CO.	PA.	346.	NNW	39.4	8.9	375.6	1090	1377	3343	1607
SOUTH ANNVILLE TWP	LEBANON CO.	PA.	341.	NNW	39.6	19.4	72.3	1104	1214	1403	1417
SOUTH LONDONDERRY	LEBANON CO.	PA.	337.	NNW	36.3	23.0	104.3	2146	1850	2399	2159
CAMPBELLTOWN	LEBANON CO.	PA.	335.	NNW	39.6	1.7	797.1	0	1061	1355	1238
WEST CORNWALL TWP	LEBANON CO.	PA.	345.	NNW	37.1	8.6	148.4	948	1020	1276	1190
				TOTALS		2097.4		1536719	1760986	2105839	2297832
				DENSITY				732.7	839.6	1004.0	1095.6

TABLE 2.2.21

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

40 TO 50 MILES

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
BERNVILLE BOROUGH	BERKS CO.	PA.	10.	N	47.2	0.4	2120.0	363	884	848	971
BETHEL TWP	BERKS CO.	PA.	358.	N	49.6	42.7	60.9	2038	2152	2600	2363
HEIDELBERG TWP	BERKS CO.	PA.	8.	N	42.4	13.9	90.9	945	1086	1263	1192
JEFFERSON TWP	BERKS CO.	PA.	7.	N	47.8	15.8	54.1	662	748	854	821
MARION TWP	BERKS CO.	PA.	4.	N	43.8	14.3	87.4	1033	1172	1250	1287
NORTH HEIDELBERG	BERKS CO.	PA.	10.	N	44.8	13.9	50.4	566	536	701	588
ROBESONIA BOROUGH	BERKS CO.	PA.	10.	N	41.4	0.9	1872.2	1590	1579	1685	1734
TULPEHOCKEN TWP	BERKS CO.	PA.	2.	N	47.4	23.1	77.5	1601	1583	1791	1738
WOMELADORF BOROUGH	BERKS CO.	PA.	6.	N	42.0	0.9	1723.3	1549	1471	1551	1615
BETHEL TWP	LEBANON CO.	PA.	351.	N	46.8	35.2	79.7	2302	2433	2804	2839
JACKSON TWP	LEBANON CO.	PA.	357.	N	43.3	24.7	137.2	2244	2778	3388	3242
MILLCREEK TWP	LEBANON CO.	PA.	2.	N	40.5	19.8	51.1	2442	947	1012	1105
NEWMANSTOWN	LEBANON CO.	PA.	4.	N	41.1	2.1	729.5	0	1459	1532	1703
MYERSTOWN BOROUGH	LEBANON CO.	PA.	357.	N	41.9	1.0	3645.0	3050	3268	3645	3814
NORTH LEBANON TWP	LEBANON CO.	PA.	349.	N	42.8	16.0	369.5	3436	4468	5912	5214
AVON	LEBANON CO.	PA.	352.	N	41.4	0.1	2340.0	0	245	234	286
RICHLAND BOROUGH	LEBANON CO.	PA.	1.	N	41.3	0.6	2406.7	1090	1276	1444	1489
AVON	LEBANON CO.	PA.	352.	N	41.4	0.4	2592.5	0	967	1037	1128
ALSACE TWP	BERKS CO.	PA.	27.	NNE	48.2	12.0	252.8	1782	2739	3034	3007
BERN TWP	BERKS CO.	PA.	18.	NNE	47.0	20.1	237.0	2308	3912	4764	4295
EXETER TWP	BERKS CO.	PA.	32.	NNE	45.0	24.1	440.1	5278	8488	10607	9319
KENHORST BOROUGH	BERKS CO.	PA.	25.	NNE	41.6	0.4	8705.0	2551	2815	3482	3091
LAURELDALE BOROUGH	BERKS CO.	PA.	23.	NNE	47.5	0.6	7531.7	3585	4051	4519	4448
LOWER ALSACE TWP	BERKS CO.	PA.	27.	NNE	45.7	4.9	1039.0	3718	4965	5091	5451
LOWER HEIDELBERG	BERKS CO.	PA.	16.	NNE	42.8	15.9	100.1	1368	1755	1592	1927
MOUNT PENN BOROUGH	BERKS CO.	PA.	28.	NNE	43.7	0.4	8662.5	3635	3574	3465	3924
MUHLENBERG TWP	BERKS CO.	PA.	22.	NNE	46.6	11.3	1211.8	7001	10955	13693	12028
OLEY TWP	BERKS CO.	PA.	32.	NNE	49.8	24.2	114.8	2144	2474	2778	2716
PENN TWP	BERKS CO.	PA.	13.	NNE	47.6	19.0	63.4	1215	1064	1205	1168
READING CITY	BERKS CO.	PA.	25.	NNE	43.8	9.6	9129.5	109320	98177	87643	107791
ROBESON TWP	BERKS CO.	PA.	31.	NNE	40.7	36.3	100.4	2893	3163	3644	3473
ST. LAWRENCE BORO	BERKS CO.	PA.	29.	NNE	44.7	1.1	1141.8	810	929	1256	1020
SHILLINGTON BOROUGH	BERKS CO.	PA.	23.	NNE	41.0	1.0	6249.0	5059	5639	6249	6191
SINKING SPRING BORO	BERKS CO.	PA.	18.	NNE	41.2	1.3	2201.5	1982	2244	2862	2464
SPRING TWP	BERKS CO.	PA.	20.	NNE	40.8	17.6	788.8	4867	8934	13883	9809
TEMPLE BOROUGH	BERKS CO.	PA.	22.	NNE	48.4	0.4	4167.5	1460	1633	1667	1793
WERNERSVILLE BORO	BERKS CO.	PA.	14.	NNE	40.6	0.6	2935.0	1280	1462	1761	1605
WEST LAWN BOROUGH	BERKS CO.	PA.	21.	NNE	41.4	0.2	9865.0	2144	2059	1973	2261
WEST READING BORO	BERKS CO.	PA.	23.	NNE	43.2	0.6	7630.0	5072	4538	4578	5422
WYOMISSING BOROUGH	BERKS CO.	PA.	22.	NNE	43.3	3.8	1877.9	4187	5044	7136	5538
WYOMISSING HILLS	BERKS CO.	PA.	21.	NNE	42.5	0.7	2491.4	646	1644	1744	1805
AMITY TWP	BERKS CO.	PA.	38.	NE	46.7	18.4	256.4	2019	2699	4718	2963
BIRDSBORO BOROUGH	BERKS CO.	PA.	35.	NE	42.5	1.4	2282.9	3158	3025	3196	3321
DOUGLASS TWP	BERKS CO.	PA.	40.	NE	47.8	13.6	216.5	1843	2668	2944	2929
UNION TWP	BERKS CO.	PA.	38.	NE	43.2	23.3	100.1	1668	2046	2332	2246
EAST COVENTRY TWP	CHESTER CO.	PA.	48.	NE	46.3	10.8	304.1	1499	2183	3284	4038
EAST PIKELAND TWP	CHESTER CO.	PA.	55.	NE	45.5	8.9	492.6	1395	2817	4384	5210

TABLE 2.2.21 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
EAST VINCENT TWP	CHESTER CO.	PA.	52.	NE	45.6	13.7	371.1	4576	5453	5084	10086
NORTH COVENTRY TWP	CHESTER CO.	PA.	44.	NE	44.8	12.0	329.7	1738	2517	3956	4656
SOUGH POTTSTOWN	CHESTER CO.	PA.	44.	NE	46.1	1.4	1952.9	1504	1850	2734	3422
SOUTH COVENTRY TWP	CHESTER CO.	PA.	47.	NE	42.8	7.9	192.2	863	1212	1518	2242
SPRING CITY BOROUGH	CHESTER CO.	PA.	53.	NE	47.9	0.8	4472.5	3258	3162	3578	5849
WEST VINCENT TWP	CHESTER CO.	PA.	52.	NE	41.9	17.6	107.4	1116	1431	1890	2647
LOWER POTTSGROVE	MONTGOMERY CO.	PA.	46.	NE	49.6	7.9	652.8	3389	3824	5157	6025
POTTSTOWN BOROUGH	MONTGOMERY CO.	PA.	44.	NE	47.2	4.8	5282.3	22589	26144	25355	41191
ROYERSFORD BOROUGH	MONTGOMERY CO.	PA.	53.	NE	48.8	1.0	4235.0	3862	3969	4235	6253
UPPER POTTSGROVE	MONTGOMERY CO.	PA.	43.	NE	49.3	5.2	476.3	1173	1987	2477	3131
UPPER PROVIDENCE	MONTGOMERY CO.	PA.	56.	NE	49.8	18.2	270.8	3423	4483	4928	7063
WEST POTTSGROVE TWP	MONTGOMERY CO.	PA.	42.	NE	47.6	2.4	184.2	483	736	442	1160
STOWE	MONTGOMERY CO.	PA.	43.	NE	46.2	1.1	3269.1	2524	2765	3596	4356
CHARLESTOWN TWP	CHESTER CO.	PA.	59.	ENE	44.4	12.6	280.0	854	1931	3528	3572
EAST GOSHEN TWP	CHESTER CO.	PA.	67.	ENE	41.6	10.3	498.8	1039	1694	5138	3133
EASTTOWN TWP	CHESTER CO.	PA.	66.	ENE	48.3	8.4	1138.7	3811	6907	9565	12776
EAST WHITELAND TWP	CHESTER CO.	PA.	62.	ENE	42.9	10.8	670.6	1740	5078	7242	9393
MALVERN BOROUGH	CHESTER CO.	PA.	64.	ENE	44.3	1.2	2152.5	1764	2268	2583	4195
PHOENIXVILLE BORO	CHESTER CO.	PA.	57.	ENE	47.4	2.4	6176.2	12932	13797	14823	25520
SCHUYLKILL TWP	CHESTER CO.	PA.	60.	ENE	47.7	10.2	566.6	3835	3461	5779	6402
TREDYFFRIN TWP	CHESTER CO.	PA.	64.	ENE	48.5	19.9	1172.7	7836	16004	23337	29602
WEST PIKELAND TWP	CHESTER CO.	PA.	56.	ENE	41.2	10.0	142.0	683	782	1420	1446
WILLISTOWN TWP	CHESTER CO.	PA.	69.	ENE	44.4	18.3	498.8	2709	6492	9128	12008
CHESTER HEIGHTS	DELAWARE CO.	PA.	78.	ENE	43.5	2.2	580.5	474	534	1277	689
CONCORD TWP	DELAWARE CO.	PA.	79.	ENE	41.2	13.8	332.8	1945	3149	4592	4063
EDGEMONT TWP	DELAWARE CO.	PA.	73.	ENE	45.0	9.8	139.6	1048	1404	1368	1812
MEDIA BOROUGH	DELAWARE CO.	PA.	77.	ENE	48.0	0.7	9205.7	5726	5803	6444	7488
MIDDLETOWN TWP	DELAWARE CO.	PA.	78.	ENE	48.1	13.6	946.9	6038	11256	12878	14524
NEWTOWN TWP	DELAWARE CO.	PA.	72.	ENE	48.4	10.2	1086.4	3518	9270	11081	11962
SWARTHMORE BOROUGH	DELAWARE CO.	PA.	79.	ENE	50.0	1.4	4397.1	4825	5753	6156	7424
THORNBURY TWP	DELAWARE CO.	PA.	74.	ENE	42.0	9.3	285.2	2101	2035	2652	2626
UPPER PROVIDENCE TWP	DELAWARE CO.	PA.	75.	ENE	48.2	5.9	1565.1	3598	6059	9234	7818
MONT CLARE	MONTGOMERY CO.	PA.	57.	ENE	48.4	0.6	2123.3	1063	1124	1274	1771
DISTRICT 6	NEW CASTLE CO.	DE.	86.	E	40.0	39.3	1922.3	22567	56692	75547	107448
BELLEFONTE TOWN	NEW CASTLE CO.	DE.	89.	E	40.9	0.2	10235.0	1472	1536	2047	2911
LOGAN TWP	GLOUCESTER CO.	NJ.	88.	E	49.5	26.6	69.2	2222	1924	1840	3276
OLDMANS TWP	SALEM CO.	NJ.	94.	E	45.2	21.7	96.2	1657	2913	2088	4272
PENNS GROVE BOROUGH	SALEM CO.	NJ.	93.	E	42.5	0.9	21136.7	6669	6176	19023	9057
PILESGROVE TWP	SALEM CO.	NJ.	98.	E	49.8	37.9	71.4	1942	2519	2706	3694
UPPER PENNS NECK	SALEM CO.	NJ.	95.	E	42.9	19.6	358.0	6717	7595	7016	11138
ASTON TWP	DELAWARE CO.	PA.	80.	E	45.4	5.8	2362.8	5576	10555	13704	13672
BETHEL TWP	DELAWARE CO.	PA.	82.	E	41.8	5.4	376.7	1283	1834	2034	2367
BROOKHAVEN BOROUGH	DELAWARE CO.	PA.	81.	E	47.3	1.7	4335.3	1042	5280	7370	6813
CHESTER CITY	DELAWARE CO.	PA.	83.	E	48.6	6.0	9388.5	66039	63658	56331	82143
CHESTER TWP	DELAWARE CO.	PA.	82.	E	46.6	1.4	4077.1	3547	3602	5708	4648
EDDYSTONE BOROUGH	DELAWARE CO.	PA.	82.	E	49.9	1.5	1804.0	3014	3006	2706	3879
LOWER CHICHESTER	DELAWARE CO.	PA.	84.	E	44.8	1.1	3644.5	2938	4460	4009	5755

TABLE 2.2.21 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
MARCUS HOOK BOROUGH	DELAWARE CO.	PA.	85.	E	45.3	1.6	1900.6	3843	3299	3041	4257
NETHER PROVIDENCE	DELAWARE CO.	PA.	80.	E	48.6	4.7	2903.0	6173	10380	13644	13394
PARKSIDE BOROUGH	DELAWARE CO.	PA.	81.	E	47.9	0.2	11715.0	1637	2426	2343	3130
ROSE VALLEY BORO	DELAWARE CO.	PA.	80.	E	47.7	0.7	1172.9	498	626	821	808
TRAINER BOROUGH	DELAWARE CO.	PA.	84.	E	46.1	1.3	1796.9	2001	2358	2336	3043
UPLAND BOROUGH	DELAWARE CO.	PA.	82.	E	47.7	0.7	5614.3	4081	4343	3930	5604
UPPER CHICHESTER	DELAWARE CO.	PA.	83.	E	44.2	6.8	1678.5	6997	9682	11414	12493
ELSINBORO TWP	SALEM CO.	NJ.	110.	ESE	44.5	14.2	84.8	674	1220	1204	1789
LOWER ALLOWAYS	SALEM CO.	NJ.	112.	ESE	46.3	52.8	26.5	1307	1293	1400	1896
MANNINGTON TWP	SALEM CO.	NJ.	102.	ESE	47.8	41.7	45.9	1686	2024	1913	2968
QUINTON TWP	SALEM CO.	NJ.	108.	ESE	49.6	26.3	97.6	1821	2440	2567	3578
SALEM CITY	SALEM CO.	NJ.	107.	ESE	44.5	2.7	2832.6	9050	8941	7648	13112
LOWER PENNS NECK	SALEM CO.	NJ.	101.	ESE	41.5	26.3	474.9	7376	10417	12491	15277
CLAYTON TOWN DT.1	KENT CO.	DE.	134.	SE	46.7	0.2	2860.0	299	409	572	832
SMYRNA TOWN	KENT CO.	DE.	132.	SE	47.3	0.9	5035.6	2346	3241	4532	6595
DISTRICT 3	KENT CO.	DE.	139.	SE	48.3	61.2	51.3	1673	2246	3141	4571
CLAYTON TOWN DT.3	KENT CO.	DE.	134.	SE	46.7	0.2	4330.0	526	619	866	1260
KENTON TOWN	KENT CO.	DE.	139.	SE	48.8	0.0	*******	211	249	348	507
DISTRICT 15	NEW CASTLE CO.	DE.	129.	SE	44.6	59.1	37.0	1321	1643	2189	3114
MILLINGTON TOWN	KENT CO.	MD.	146.	SSE	41.4	0.0	*******	356	334	435	406
DIST 1 DIXON	QUEEN ANNES CO.	MD.	151.	SSE	46.9	72.7	20.3	1355	1489	1476	1752
BARCLAY TOWN	QUEEN ANNES CO.	MD.	153.	SSE	47.6	0.0	*******	108	142	187	167
SUDLERSVILLE TOWN	QUEEN ANNES CO.	MD.	151.	SSE	45.1	0.0	*******	347	394	417	464
DIST 2 CHURCH HILL	QUEEN ANNES CO.	MD.	161.	SSE	43.9	53.3	30.0	1429	1292	1599	1521
CHURCH HILL TOWN	QUEEN ANNES CO.	MD.	160.	SSE	45.0	0.0	*******	271	263	247	310
DIST 3 CENTREVILLE	QUEEN ANNES CO.	MD.	167.	SSE	49.0	79.1	21.6	1558	1728	1711	2034
DIST 7 CRUMPTON	QUEEN ANNES CO.	MD.	154.	SSE	41.4	37.1	58.3	1331	1790	2163	2107
MILLINGTON TOWN	QUEEN ANNES CO.	MD.	147.	SSE	41.5	0.0	*******	0	74	39	87
DIST. 5 EDESVILLE	KENT CO.	MD.	176.	S	42.5	34.1	51.7	1946	1856	1764	2258
ROCK HALL TOWN	KENT CO.	MD.	178.	S	43.0	0.6	1875.0	786	1073	1125	1305
DIST. 7 POMONA	KENT CO.	MD.	169.	S	42.3	38.0	31.4	876	976	1193	1187
DISTRICT 3	ANNE ARUNDEL CO.	MD.	198.	SSW	46.4	104.1	851.7	22172	47369	88663	95303
RIVIERA BEACH	ANNE ARUNDEL CO.	MD.	197.	SSW	42.9	1.5	4976.0	1849	4902	7464	9862
DISTRICT 5	ANNE ARUNDEL CO.	MD.	207.	SSW	43.8	33.9	1795.5	24962	50214	60868	101027
GREEN HAVEN	ANNE ARUNDEL CO.	MD.	199.	SSW	45.2	0.4	4990.0	0	1302	1996	2620
ORCHARD BEACH	ANNE ARUNDEL CO.	MD.	198.	SSW	42.7	0.9	2881.1	1203	1691	2593	3402
SEVERNA PARK-ROUND	BANNE ARUNDEL CO.	MD.	197.	SSW	49.9	3.0	1905.3	1095	3728	5716	7500
DISTRICT 13	BALTIMORE CO.	MD.	209.	SSW	41.0	2.2	60.0	19205	521	132	849
ARBUTUS-DT. 13	BALTIMORE CO.	MD.	212.	SSW	42.0	5.9	3855.1	0	22053	22745	35934
LANSDOWNE-BALTIMORE	BALTIMORE CO.	MD.	210.	SSW	42.1	2.3	7380.9	0	13134	16976	21401
DIST 1 ELK RIDGE	HOWARD CO.	MD.	214.	SSW	45.7	19.4	495.5	4607	7262	9613	22666
DISTRICT 1	BALTIMORE CO.	MD.	216.	SW	42.6	16.4	546.5	29661	12573	8963	20487
CATONSVILLE	BALTIMORE CO.	MD.	217.	SW	41.1	6.3	8679.4	0	37372	54680	60896
ARBUTUS-DT. 1	BALTIMORE CO.	MD.	214.	SW	41.3	0.0	*******	0	349	457	569
DIST 5 FREEDOM	CARROLL CO.	MD.	235.	SW	43.0	28.7	351.1	6360	7285	10076	10382
DIST 2 ELLICOTT	HOWARD CO.	MD.	222.	SW	45.1	30.5	572.0	5235	9575	17445	29885
DIST 3	HOWARD CO.	MD.	228.	SW	47.2	44.3	82.8	2348	2721	3667	8493

TABLE 2.2.21 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DIST 2 UNIONTOWN	CARROLL CO.	MD.	257.	WSW	45.6	33.2	80.5	2134	2114	2672	3013
SYKESVILLE TOWN	CARROLL CO.	MD.	242.	WSW	42.1	0.2	6995.0	941	1196	1399	1704
WESTMINSTER CITY	CARROLL CO.	MD.	252.	WSW	40.5	0.9	8007.8	6140	6123	7207	8726
DIST 9 FRANKLIN	CARROLL CO.	MD.	244.	WSW	47.4	26.5	72.6	1186	1350	1925	1924
DIST 11 NEW WINDSOR	CARROLL CO.	MD.	250.	WSW	46.1	25.7	63.3	1239	1294	1626	1844
NEW WINDSOR TOWN	CARROLL CO.	MD.	251.	WSW	46.8	0.0	********	707	738	788	1052
DIST 12 UNION BR	CARROLL CO.	MD.	255.	WSW	49.3	7.2	107.5	691	816	774	1163
DIST 14 BERRETT	CARROLL CO.	MD.	239.	WSW	46.5	38.6	110.3	1921	2735	4258	3898
DIST 1 TANEYTOWN	CARROLL CO.	MD.	263.	W	48.3	40.7	59.2	1717	2084	2411	2970
TANEYTOWN CITY	CARROLL CO.	MD.	262.	W	48.4	2.5	692.4	1420	1519	1731	2165
DIST 3 MYERS	CARROLL CO.	MD.	263.	W	40.9	39.8	66.6	1844	2130	2651	3036
GERMANY TWP	ADAMS CO.	PA.	268.	W	43.5	11.5	113.7	954	1151	1308	1443
LITTLESTOWN BOROUGH	ADAMS CO.	PA.	269.	W	43.4	0.7	4322.9	2635	2756	3026	3456
MOUNT JOY TWP	ADAMS CO.	PA.	271.	W	47.6	25.8	69.6	1143	1380	1795	1730
MOUNT PLEASANT TWP	ADAMS CO.	PA.	276.	W	44.7	31.5	83.7	1867	2531	2636	3173
NEW OXFORD BOROUGH	ADAMS CO.	PA.	280.	W	42.4	0.5	2990.0	1366	1407	1495	1764
OXFORD TWP	ADAMS CO.	PA.	279.	W	41.4	10.0	180.8	1193	1581	1808	1982
STRABAN TWP	ADAMS CO.	PA.	280.	W	48.1	34.4	93.6	1941	2387	3221	2993
UNION TWP	ADAMS CO.	PA.	269.	W	40.8	17.8	83.1	908	1170	1479	1467
HAMILTON TWP	ADAMS CO.	PA.	283.	WNW	40.9	14.0	74.9	603	763	1048	957
HUNTINGTON TWP	ADAMS CO.	PA.	290.	WNW	48.8	25.0	59.4	1348	1491	1484	1869
LATIMORE TWP	ADAMS CO.	PA.	293.	WNW	46.6	22.0	50.2	910	1092	1105	1369
READING TWP	ADAMS CO.	PA.	288.	WNW	43.1	27.4	62.9	1138	1352	1724	1695
TYRONE TWP	ADAMS CO.	PA.	289.	WNW	45.5	21.6	59.8	1037	1186	1291	1487
YORK SPRINGS BORO	ADAMS CO.	PA.	291.	WNW	48.0	0.1	4670.0	413	384	467	481
CARROLL TWP	YORK CO.	PA.	302.	WNW	46.5	15.2	157.0	1002	1558	2386	2003
DILLSBURG BOROUGH	YORK CO.	PA.	301.	WNW	47.3	0.5	2882.0	1146	1322	1441	1700
FRANKLINTOWN BORO	YORK CO.	PA.	299.	WNW	45.9	0.2	1395.0	328	287	279	369
FRANKLIN TWP	YORK CO.	PA.	297.	WNW	47.4	18.8	85.0	958	1179	1598	1516
WARRINGTON TWP	YORK CO.	PA.	302.	WNW	40.9	35.8	69.7	1806	2041	2494	2624
WASHINGTON TWP	YORK CO.	PA.	295.	WNW	41.1	28.3	48.2	1066	1200	1365	1543
WELLSVILLE BOROUGH	YORK CO.	PA.	299.	WNW	41.0	0.2	1730.0	309	320	346	411
CAMP HILL BOROUGH	CUMBERLAND CO.	PA.	314.	NW	48.1	1.9	5226.8	5934	8559	9931	13230
LEMOYNE BOROUGH	CUMBERLAND CO.	PA.	315.	NW	47.1	1.5	3083.3	4605	4662	4625	7206
LOWER ALLEN TWP	CUMBERLAND CO.	PA.	312.	NW	47.1	9.9	1382.8	5115	11614	13690	17952
NEW CUMBERLAND BORO	CUMBERLAND CO.	PA.	315.	NW	45.7	1.7	5766.5	6204	9257	9803	14309
SHIREMANSTOWN BORO	CUMBERLAND CO.	PA.	311.	NW	48.4	0.3	5910.0	887	1212	1773	1873
UPPER ALLEN TWP	CUMBERLAND CO.	PA.	308.	NW	47.7	14.0	523.2	1594	2631	7325	4067
WEST FAIRVIEW BORO	CUMBERLAND CO.	PA.	316.	NW	49.6	0.3	4626.7	1896	1718	1388	2656
WORMLEYSBURG BORO	CUMBERLAND CO.	PA.	316.	NW	48.6	0.8	3990.0	1511	1794	3192	2773
HARRISBURG CITY	DAUPHIN COUNTY	PA.	317.	NW	47.5	11.6	5867.3	89544	79697	68061	90646
HIGHSPIRE BOROUGH	DAUPHIN COUNTY	PA.	319.	NW	41.3	0.6	4911.7	2799	2999	2947	3411
LOWER PAXTON TWP	DAUPHIN COUNTY	PA.	323.	NW	47.1	28.4	933.7	6546	17618	26517	20038
LOWER SWATARA TWP	DAUPHIN COUNTY	PA.	321.	NW	41.4	14.6	360.8	3557	4508	5267	5127
PAXTANG BOROUGH	DAUPHIN COUNTY	PA.	319.	NW	45.9	0.4	5400.0	1857	1916	2160	2179
PENBROOK BOROUGH	DAUPHIN COUNTY	PA.	319.	NW	47.2	0.5	7422.0	3691	3671	3711	4175
STEELTON BOROUGH	DAUPHIN COUNTY	PA.	318.	NW	43.7	3.3	2592.7	12574	11266	8556	12814

TABLE 2.2.21 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
SUSQUEHANNA TWP	DAUPHIN COUNTY	PA.	320.	NW	48.6	15.4	1104.4	11081	17474	17008	19875
SWATARA TWP	DAUPHIN COUNTY	PA.	320.	NW	44.3	14.6	1176.6	9350	14795	17178	16828
FAIRVIEW TWP	YORK CO.	PA.	314.	NW	42.6	36.2	255.5	5514	6530	9248	8395
LEWISBERRY BOROUGH	YORK CO.	PA.	310.	NW	40.7	0.1	4900.0	299	314	490	404
MONAGHAN TWP	YORK CO.	PA.	306.	NW	45.0	12.8	88.6	910	943	1134	1212
DERRY TWP	DAUPHIN COUNTY	PA.	331.	NNW	40.5	24.0	359.9	9993	5537	8638	6298
HERSHEY	DAUPHIN COUNTY	PA.	331.	NNW	41.4	3.1	2389.4	0	6851	7407	7792
EAST HANOVER TWP	DAUPHIN COUNTY	PA.	333.	NNW	46.7	39.1	79.1	1557	1535	3091	1746
HUMMELSTOWN BOROUGH	DAUPHIN COUNTY	PA.	326.	NNW	42.0	1.3	3633.1	3789	4474	4723	5089
SOUTH HANOVER TWP	DAUPHIN COUNTY	PA.	328.	NNW	43.7	11.5	169.0	1581	1841	1943	2094
WEST HANOVER TWP	DAUPHIN COUNTY	PA.	329.	NNW	47.4	22.7	194.1	1495	2770	4407	3151
ANNVILLE TWP	LEBANON CO.	PA.	342.	NNW	41.6	1.7	2767.1	3699	4264	4704	4976
CLEONA BOROUGH	LEBANON CO.	PA.	345.	NNW	41.4	0.9	2266.7	1483	1988	2040	2320
EAST HANOVER TWP	LEBANON CO.	PA.	339.	NNW	47.9	33.4	63.7	1842	2140	2127	2497
JONESTOWN BOROUGH	LEBANON CO.	PA.	346.	NNW	46.4	0.6	1590.0	853	813	954	949
LEBANON CITY	LEBANON CO.	PA.	349.	NNW	41.0	4.3	6644.6	28156	30045	28572	35061
NORTH ANNVILLE TWP	LEBANON CO.	PA.	341.	NNW	43.3	17.4	125.3	1517	1813	2180	2116
NORTH LONDONDERRY	LEBANON CO.	PA.	337.	NNW	42.8	11.2	245.7	961	1684	2752	1965
PALMYRA BOROUGH	LEBANON CO.	PA.	336.	NNW	41.7	1.4	5439.3	5910	6999	7615	8167
SWATARA TWP	LEBANON CO.	PA.	347.	NNW	46.7	20.6	116.8	1953	2164	2407	2525
UNION TWP	LEBANON CO.	PA.	344.	NNW	47.9	34.0	78.3	1787	1967	2661	2295
WEST LEBANON TWP	LEBANON CO.	PA.	347.	NNW	41.2	0.4	2465.0	1050	1054	986	1230
WEST LEBANON	LEBANON CO.	PA.	347.	NNW	41.2	0.5	2704.0	998	1247	1352	1455
				TOTALS		2812.9		926203	1197591	1414224	1733285
				DENSITY				329.3	425.7	502.8	616.2

PBAPS

TABLE 2.2.22

POPULATION OF MINOR CIVIL SUBDIVISIONS

PEACH BOTTOM UNITS 2 AND 3

SITE LATITUDE = 39.45.31.
LONGITUDE =76.16.12.
PEACH BOTTOM ATOMIC POWER STATION

50 TO 60 MILES

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
STRAUSATOWN BOROUGH	BERKS CO.	PA.	5.	N	50.8	0.2	2005.0	368	380	401	417
UPPER BERN TWP	BERKS CO.	PA.	10.	N	53.2	18.3	50.8	858	888	930	975
UPPER TULPEHOCKEN	BERKS CO.	PA.	6.	N	51.2	22.7	34.5	642	663	783	728
AUBURN BOROUGH	SCHUYLKILL CO.	PA.	9.	N	58.6	1.3	688.5	994	936	895	852
PINE GROVE BOROUGH	SCHUYLKILL CO.	PA.	354.	N	54.7	1.1	1997.3	2237	2267	2197	2064
PINE GROVE TWP	SCHUYLKILL CO.	PA.	352.	N	54.5	38.4	77.7	2871	2887	2985	2628
SOUTH MANHEIM TWP	SCHUYLKILL CO.	PA.	7.	N	57.8	21.1	36.5	641	650	771	592
TREMONT TWP	SCHUYLKILL CO.	PA.	351.	N	58.5	24.2	10.4	440	442	252	402
WASHINGTON TWP	SCHUYLKILL CO.	PA.	358.	N	55.6	30.2	49.6	1225	1292	1497	1176
WAYNE TWP	SCHUYLKILL CO.	PA.	2.	N	57.7	34.3	60.2	1568	1729	2065	1574
CENTERPORT BOROUGH	BERKS CO.	PA.	16.	NNE	52.2	0.2	1135.0	226	208	227	228
CENTRE TWP	BERKS CO.	PA.	16.	NNE	50.7	22.2	82.4	1622	1589	1830	1745
FLEETWOOD BOROUGH	BERKS CO.	PA.	27.	NNE	53.7	0.7	4377.1	2338	2647	3064	2906
HAMBURG BOROUGH	BERKS CO.	PA.	16.	NNE	56.9	2.1	1861.4	3805	3747	3909	4114
KUTZTOWN BOROUGH	BERKS CO.	PA.	27.	NNE	58.7	1.1	5470.0	3110	3312	6017	3636
LEESPORT BOROUGH	BERKS CO.	PA.	19.	NNE	50.0	0.8	1447.5	535	1138	1158	1249
LENHARTSVILLE BORO	BERKS CO.	PA.	20.	NNE	59.7	0.1	2200.0	229	209	220	229
LYONS BOROUGH	BERKS CO.	PA.	29.	NNE	56.7	0.4	1472.5	545	571	589	627
MAIDENCREEK TWP	BERKS CO.	PA.	20.	NNE	51.0	14.8	160.5	1951	2042	2376	2242
MAXATAWNY TWP	BERKS CO.	PA.	28.	NNE	59.6	26.4	105.6	2513	2885	2789	3168
UNTELAUNEE TWP	BERKS CO.	PA.	20.	NNE	50.1	9.5	165.1	1413	1109	1568	1218
PERRY TWP	BERKS CO.	PA.	19.	NNE	55.0	18.6	113.5	1272	1651	2112	1813
PIKE TWP	BERKS CO.	PA.	34.	NNE	53.4	14.3	60.6	639	754	867	828
RICHMOND TWP	BERKS CO.	PA.	24.	NNE	55.8	23.9	114.9	2030	2369	2745	2601
ROCKLAND TWP	BERKS CO.	PA.	30.	NNE	55.5	16.2	89.6	1166	1289	1452	1415
RUSCOMBMANOR TWP	BERKS CO.	PA.	27.	NNE	51.4	14.8	134.1	1538	1787	1985	1962
SHOEMAKERSVILLE BOR	BERKS CO.	PA.	17.	NNE	53.6	0.6	2378.3	1066	1464	1427	1607
TILDEN TWP	BERKS CO.	PA.	14.	NNE	55.9	18.2	97.9	1392	1784	1781	1959
TOPTON BOROUGH	BERKS CO.	PA.	30.	NNE	59.5	0.7	2491.4	1572	1684	1744	1849
WINDSOR TWP	BERKS CO.	PA.	17.	NNE	57.9	22.6	93.3	1330	1655	2108	1817
PORT CLINTON BORO	SCHUYLKILL CO.	PA.	13.	NNE	58.3	0.5	726.0	451	739	363	673
BALLY BOROUGH	BERKS CO.	PA.	39.	NE	57.2	0.5	2394.0	753	1033	1197	1134
BECHTELSVILLE BORO	BERKS CO.	PA.	39.	NE	54.3	0.5	1456.0	603	625	728	686
BOYERTOWN BOROUGH	BERKS CO.	PA.	41.	NE	51.5	0.8	5535.0	4074	4067	4428	4465
COLEBROOKDALE TWP	BERKS CO.	PA.	39.	NE	52.3	7.5	251.9	2224	1728	1889	1897
NEW BERLINVILLE	BERKS CO.	PA.	40.	NE	52.7	1.2	954.2	0	1151	1145	1264
DISTRICT TWP	BERKS CO.	PA.	35.	NE	57.0	11.6	64.8	480	570	752	626
EARL TWP	BERKS CO.	PA.	36.	NE	51.7	13.8	165.9	1470	1904	2290	2090
WASHINGTON TWP	BERKS CO.	PA.	38.	NE	56.5	14.1	161.2	1316	1637	2273	1797
COLLEGEVILLE BORO	MONTGOMERY CO.	PA.	56.	NE	52.3	1.6	1994.4	1900	2254	3191	3551
DOUGLASS TWP	MONTGOMERY CO.	PA.	42.	NE	53.3	16.2	257.8	2046	3083	4177	4857
GREENLANE BOROUGH	MONTGOMERY CO.	PA.	47.	NE	58.4	0.3	1810.0	550	582	543	917
LIMERICK TWP	MONTGOMERY CO.	PA.	50.	NE	50.9	23.8	233.4	3290	5110	5556	8051
LOWER FREDERICK TWP	MONTGOMERY CO.	PA.	49.	NE	55.0	8.5	295.9	1620	2108	2515	3321

TABLE 2.2.22 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
LOWER SALFORD TWP	MONTGOMERY CO.	PA.	53.	NE	58.1	14.7	340.7	2290	3389	5008	5340
MARLBOROUGH TWP	MONTGOMERY CO.	PA.	47.	NE	59.8	12.9	191.1	1432	1875	2465	2954
NEW HANOVER TWP	MONTGOMERY CO.	PA.	44.	NE	53.9	23.4	180.0	1745	3218	4211	5070
PERKIOMEN TWP	MONTGOMERY CO.	PA.	53.	NE	53.5	4.8	504.6	1211	1992	2422	3138
RED HILL BOROUGH	MONTGOMERY CO.	PA.	45.	NE	59.3	0.8	1501.2	914	1086	1201	1711
SCHWENKSVILLE BORO	MONTGOMERY CO.	PA.	51.	NE	54.7	0.3	2696.7	563	620	809	977
SKIPPACK TWP	MONTGOMERY CO.	PA.	55.	NE	55.2	14.0	379.7	3843	4729	5316	7451
TRAPPE BOROUGH	MONTGOMERY CO.	PA.	54.	NE	51.3	2.1	798.1	773	1264	1676	1991
UPPER FREDERICK TWP	MONTGOMERY CO.	PA.	47.	NE	55.3	10.5	135.0	891	1157	1418	1823
UPPER HANOVER TWP	MONTGOMERY CO.	PA.	43.	NE	59.5	22.0	123.7	1762	2293	2721	3613
UPPER SALFORD TWP	MONTGOMERY CO.	PA.	50.	NE	57.7	8.9	219.1	1119	1273	1950	2006
ALDAN BOROUGH	DELAWARE CO.	PA.	78.	ENE	53.2	0.6	8335.0	3430	4324	5001	5580
CLIFTON HEIGHTS	DELAWARE CO.	PA.	77.	ENE	53.0	0.6	13913.3	7549	8005	8348	10329
COLLINGDALE BOROUGH	DELAWARE CO.	PA.	78.	ENE	53.7	0.9	11783.3	8443	10268	10605	13250
COLWYN BOROUGH	DELAWARE CO.	PA.	79.	ENE	55.0	0.2	15845.0	2143	3074	3169	3967
DARBY BOROUGH	DELAWARE CO.	PA.	78.	ENE	54.7	0.8	17161.2	13154	14059	13729	18141
EAST LANSDOWNE	DELAWARE CO.	PA.	76.	ENE	54.6	0.2	15930.0	3527	3224	3186	4160
HAVERFORD TWP	DELAWARE CO.	PA.	73.	ENE	53.2	9.9	5568.9	39641	54019	55132	69705
LANSDOWNE BOROUGH	DELAWARE CO.	PA.	77.	ENE	54.3	1.2	11741.7	12169	12601	14090	16260
MARPLE TWP	DELAWARE CO.	PA.	73.	ENE	50.4	10.4	2407.7	4779	19722	25040	25449
MILLBORNE BOROUGH	DELAWARE CO.	PA.	75.	ENE	55.7	0.1	6370.0	901	793	637	1023
NORTON BOROUGH	DELAWARE CO.	PA.	78.	ENE	51.2	0.4	6505.0	1352	2207	2602	2848
RADNOR TWP	DELAWARE CO.	PA.	69.	ENE	51.6	13.7	2004.3	14709	21697	27459	27997
RUTLEDGE BOROUGH	DELAWARE CO.	PA.	79.	ENE	50.9	0.1	11670.0	919	947	1167	1222
SPRINGFIELD TWP	DELAWARE CO.	PA.	77.	ENE	51.2	6.3	4604.1	10917	26733	29006	34496
UPPER DARBY TWP	DELAWARE CO.	PA.	75.	ENE	54.5	7.8	12296.2	84951	93158	95910	120209
YEADON BOROUGH	DELAWARE CO.	PA.	77.	ENE	55.3	1.6	7585.0	11068	11610	12136	14981
BRIDGEPORT BOROUGH	MONTGOMERY CO.	PA.	64.	ENE	54.7	0.7	8042.9	5827	5306	5630	8360
CONSHOHOCKEN BORO	MONTGOMERY CO.	PA.	67.	ENE	55.8	1.0	10195.0	10922	10259	10195	16163
EAST NORRITON TWP	MONTGOMERY CO.	PA.	62.	ENE	56.5	6.0	1972.8	2987	7773	11837	12247
LOWER MERION TWP	MONTGOMERY CO.	PA.	72.	ENE	55.2	23.8	2663.5	48745	59420	63392	93619
LOWER PROVIDENCE	MONTGOMERY CO.	PA.	59.	ENE	52.4	15.5	978.6	5887	9955	15169	15684
NARBERTH BOROUGH	MONTGOMERY CO.	PA.	72.	ENE	56.1	0.5	10302.0	5407	5109	5151	8049
NORRISTOWN BOROUGH	MONTGOMERY CO.	PA.	63.	ENE	55.0	3.6	10602.5	38126	38925	38169	61328
PLYMOUTH TWP	MONTGOMERY CO.	PA.	65.	ENE	56.7	8.5	1985.4	5118	11430	16876	18008
TOWAMENCIN TWP	MONTGOMERY CO.	PA.	56.	ENE	59.6	9.6	493.5	1604	3724	4738	5867
UPPER MERION TWP	MONTGOMERY CO.	PA.	65.	ENE	53.7	17.9	1324.0	6404	17096	23699	26935
WEST CONSHOHOCKEN	MONTGOMERY CO.	PA.	67.	ENE	54.9	0.9	2437.8	2482	2254	2194	3551
WEST NORRITON TWP	MONTGOMERY CO.	PA.	61.	ENE	54.3	5.1	2042.0	4879	8342	12456	13143
WHITEMARSH TWP	MONTGOMERY CO.	PA.	66.	ENE	58.7	14.7	1080.7	5977	12286	15886	19357
WHITPAIN TWP	MONTGOMERY CO.	PA.	63.	ENE	59.7	12.9	720.5	3063	7331	9295	11550
WORCESTER TWP	MONTGOMERY CO.	PA.	58.	ENE	57.1	17.7	239.7	1939	3250	4243	5121
WARD NO. 7	PHILA. CO.	PA.	78.	ENE	59.9	0.4	44225.0	21741	17079	17690	18593
WARD NO. 15	PHILA. CO.	PA.	76.	ENE	59.9	1.0	37275.0	39887	35988	37275	39178
WARD NO. 21	PHILA. CO.	PA.	71.	ENE	58.8	8.0	5536.4	41409	42761	44291	46551
WARD NO. 24	PHILA. CO.	PA.	76.	ENE	58.6	4.0	15015.2	63391	57987	60061	63127
WARD NO. 26	PHILA. CO.	PA.	79.	ENE	59.4	1.4	32912.1	56517	44486	46077	48429

TABLE 2.2.22 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
WARD NO. 27	PHILA. CO.	PA.	77.	ENE	58.1	1.4	17475.7	30070	23621	24466	25715
WARD NO. 29	PHILA. CO.	PA.	75.	ENE	59.7	0.8	36576.2	30333	28250	29261	30754
WARD NO. 30	PHILA. CO.	PA.	78.	ENE	59.4	0.5	48738.0	27208	23527	24369	25612
WARD NO. 34	PHILA. CO.	PA.	75.	ENE	56.0	1.8	29287.2	50695	50896	52717	55407
WARD NO. 36	PHILA. CO.	PA.	78.	ENE	58.7	1.3	36097.7	52786	45306	46927	49322
WARD NO. 44	PHILA. CO.	PA.	76.	ENE	57.5	1.2	31469.2	41552	36459	37763	39691
WARD NO. 46	PHILA. CO.	PA.	76.	ENE	56.6	2.2	37957.7	88206	80623	83507	87769
WARD NO. 48	PHILA. CO.	PA.	79.	ENE	58.7	4.8	7431.5	31800	34439	35671	37492
WARD NO. 51	PHILA. CO.	PA.	77.	ENE	56.9	1.5	29569.3	45301	42822	44354	46618
WARD NO. 52	PHILA. CO.	PA.	75.	ENE	56.9	2.6	20813.5	56372	52246	54115	56877
EAST GREENWICH TWP	GLOUCESTER CO.	NJ.	88.	E	54.6	15.0	218.7	2336	2722	3280	4635
ELK TWP	GLOUCESTER CO.	NJ.	96.	E	59.6	19.9	136.0	2074	2635	2707	4487
GREENWICH TWP	GLOUCESTER CO.	NJ.	85.	E	52.6	10.9	520.7	606	1245	5676	2120
HARRISON TWP	GLOUCESTER CO.	NJ.	92.	E	56.6	19.4	137.2	2225	2410	2661	4104
MANTUA TWP	GLOUCESTER CO.	NJ.	90.	E	58.6	16.1	598.9	3548	7991	9643	13607
NATIONAL PARK BORO	GLOUCESTER CO.	NJ.	83.	E	58.3	1.5	2486.7	2419	3380	3730	5755
PAULSBORO BOROUGH	GLOUCESTER CO.	NJ.	84.	E	54.7	2.1	3849.5	7842	8121	8084	13828
SOUTH HARRISON TWP	GLOUCESTER CO.	NJ.	95.	E	53.6	15.8	77.6	868	974	1226	1658
SWEDESBORO BOROUGH	GLOUCESTER CO.	NJ.	92.	E	51.4	0.8	2858.7	2459	2449	2287	4170
WENONAH BOROUGH	GLOUCESTER CO.	NJ.	88.	E	59.9	1.0	2364.0	1511	2100	2364	3576
WEST DEPTFORD TWP	GLOUCESTER CO.	NJ.	84.	E	57.3	18.3	761.1	5446	11152	13928	18989
WOODBURY CITY	GLOUCESTER CO.	NJ.	85.	E	59.5	2.1	5908.6	10931	12453	12408	21204
WOODBURY HEIGHTS	GLOUCESTER CO.	NJ.	87.	E	59.4	1.2	3017.5	1373	1723	3621	2934
WOOLWICH TWP	GLOUCESTER CO.	NJ.	92.	E	51.3	21.3	53.8	1343	1235	1147	2103
GIBBSTOWN	GLOUCESTER CO.	NJ.	85.	E	52.2	1.2	3105.8	2546	2820	3727	4802
UPPER PITTSGROVE	SALEM CO.	NJ.	100.	E	56.1	43.4	66.5	2204	2715	2884	3982
WOODSTOWN BOROUGH	SALEM CO.	NJ.	98.	E	50.6	1.6	1960.6	2345	2942	3137	4314
DARBY TWP	DELAWARE CO.	PA.	79.	E	53.4	1.4	9427.1	3454	12598	13198	16256
FOLCROFT BOROUGH	DELAWARE CO.	PA.	80.	E	53.3	1.4	6864.3	1909	7013	9610	9049
GLENOLDEN BOROUGH	DELAWARE CO.	PA.	79.	E	52.8	1.0	8697.0	6450	7249	8697	9354
NORWOOD BOROUGH	DELAWARE CO.	PA.	80.	E	52.4	0.8	9036.2	5246	6729	7229	8683
PROSPECT PARK BORO	DELAWARE CO.	PA.	80.	E	51.8	0.7	10357.1	5834	6596	7250	8511
RIDLEY PARK BORO	DELAWARE CO.	PA.	81.	E	50.8	1.1	8204.5	4921	7387	9025	9532
RIDLEY TWP	DELAWARE CO.	PA.	80.	E	50.5	5.2	7516.3	17212	35738	39085	46115
SHARON HILL BORO	DELAWARE CO.	PA.	79.	E	53.9	0.8	9330.0	5464	7123	7464	9191
TINICUM TWP	DELAWARE CO.	PA.	82.	E	52.6	9.0	545.1	5314	4375	4906	5645
WARD NO. 40	PHILA. CO.	PA.	79.	E	56.0	6.6	9024.8	64556	57507	59564	62604
BRIDGETON CITY	CUMBERLAND CO.	NJ.	112.	ESE	59.5	6.4	3193.0	18378	20966	20435	31356
GREENWICH TWP	CUMBERLAND CO.	NJ.	117.	ESE	54.4	19.1	50.4	966	1086	963	1624
HOPEWELL TWP	CUMBERLAND CO.	NJ.	113.	ESE	57.6	31.4	126.4	2460	3586	3970	5363
SHILOH BOROUGH	CUMBERLAND CO.	NJ.	112.	ESE	55.3	1.0	573.0	427	554	573	829
STOW CREEK TWP	CUMBERLAND CO.	NJ.	113.	ESE	53.6	19.1	55.0	957	1010	1050	1511
UPPER DEERFIELD TWP	CUMBERLAND CO.	NJ.	108.	ESE	58.2	30.0	169.3	2919	4242	5079	6344
SEABROOK FARMS	CUMBERLAND CO.	NJ.	108.	ESE	58.7	1.9	825.8	2284	1798	1569	2689
ALLOWAY TWP	SALEM CO.	NJ.	105.	ESE	51.0	35.9	71.0	1792	2226	2550	3264
ELMER BOROUGH	SALEM CO.	NJ.	102.	ESE	59.5	0.8	1990.0	1460	1505	1592	2207
DISTRICT 1	KENT CO.	DE.	130.	SE	52.1	62.3	54.6	1777	2434	3403	4953

TABLE 2.2.22 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DISTRICT 2	KENT CO.	DE.	134.	SE	57.8	79.4	279.4	2557	15868	22188	32291
CHESWOLD TOWN DT.2	KENT CO.	DE.	136.	SE	52.0	0.0	*******	31	34	48	69
DOVER CITY	KENT CO.	DE.	136.	SE	57.0	0.5	3684.0	1141	1317	1842	2680
LEIPSIC TOWN	KENT CO.	DE.	132.	SE	53.7	0.0	*******	253	281	393	572
LITTLE CREEK TOWN	KENT CO.	DE.	133.	SE	60.0	0.0	*******	266	306	428	623
CHESWOLD TOWN DT.3	KENT CO.	DE.	136.	SE	52.0	0.0	*******	261	247	345	503
DISTRICT 4	KENT CO.	DE.	142.	SE	53.8	64.7	76.8	2416	3552	4967	7228
HARTLY TOWN	KENT CO.	DE.	144.	SE	50.4	0.0	*******	139	164	229	334
DISTRICT 5	KENT CO.	DE.	137.	SE	55.8	8.7	513.0	970	3192	4463	6496
DOVER CITY	KENT CO.	DE.	136.	SE	57.0	1.5	5530.7	5082	5933	8296	12074
CAMDEN TOWN	KENT CO.	DE.	139.	SE	58.8	0.4	3932.5	606	1125	1573	2289
WYOMING TOWN	KENT CO.	DE.	139.	SE	58.1	0.4	4097.5	911	1172	1639	2385
DIST 1 HENDERSON	CAROLINE CO.	MD.	151.	SSE	53.4	35.3	37.6	1197	1248	1326	1321
GOLDSBORO TOWN	CAROLINE CO.	MD.	153.	SSE	56.0	0.0	*******	198	204	231	216
HENDERSON TOWN	CAROLINE CO.	MD.	151.	SSE	54.2	0.0	*******	106	129	135	137
MARYDEL TOWN	CAROLINE CO.	MD.	148.	SSE	52.3	0.0	*******	110	130	176	138
TEMPLEVILLE TOWN	CAROLINE CO.	MD.	148.	SSE	50.4	0.0	*******	16	28	19	30
DIST 2 GREENSBORO	CAROLINE CO.	MD.	155.	SSE	59.0	50.5	32.6	1440	1545	1644	1635
GREENSBORO TOWN	CAROLINE CO.	MD.	155.	SSE	59.4	0.5	2346.0	1181	1160	1173	1228
DIST 7 RIDGELY	CAROLINE CO.	MD.	159.	SSE	58.9	26.4	40.2	1008	885	1060	937
RIDGELY TOWN	CAROLINE CO.	MD.	160.	SSE	59.7	0.0	*******	834	886	822	938
BRIDGETOWN TOWN	CAROLINE CO.	MD.	157.	SSE	54.2	0.0	*******	16	39	41	41
TEMPLEVILLE TOWN	QUEEN ANNES CO.	MD.	149.	SSE	50.1	0.0	*******	66	70	83	82
CENTREVILLE TOWN	QUEEN ANNES CO.	MD.	169.	SSE	50.3	1.6	1158.1	1804	1863	1853	2193
DIST 6 RUTHSBURG	QUEEN ANNES CO.	MD.	162.	SSE	53.8	56.8	13.7	1010	875	778	1030
HIGHLAND BEACH TOWN	ANNE ARUNDEL CO.	MD.	190.	S	58.0	0.0	*******	5	5	6	10
DIST 4 KENT ISLAND	QUEEN ANNES CO.	MD.	182.	S	53.7	42.7	89.7	2205	3114	3832	3665
DIST 5 QUEENSTOWN	QUEEN ANNES CO.	MD.	174.	S	54.9	64.6	54.3	2779	3020	3509	3554
QUEENSTOWN TOWN	QUEEN ANNES CO.	MD.	173.	S	53.4	0.0	*******	316	355	387	418
DISTRICT 2	ANNE ARUNDEL CO.	MD.	197.	SSW	55.0	77.9	324.9	24207	14077	25306	28322
DISTRICT 4	ANNE ARUNDEL CO.	MD.	206.	SSW	50.8	81.2	604.8	19509	35415	49109	71252
ODENTON	ANNE ARUNDEL CO.	MD.	207.	SSW	51.7	3.2	1871.6	1059	1914	5989	3851
DISTRICT 6	ANNE ARUNDEL CO.	MD.	193.	SSW	55.2	7.8	703.5	0	4621	5487	9297
ANNAPOLIS CITY	ANNE ARUNDEL CO.	MD.	193.	SSW	55.2	5.9	5015.6	10047	23385	29592	47049
WOODLAND BEACH	ANNE ARUNDEL CO.	MD.	195.	SSW	58.6	2.6	1093.8	0	1855	2844	3732
DIST 14 BOWIE	PR. GEORGES CO.	MD.	208.	SSW	59.0	34.2	376.7	3935	5587	12882	12042
BOWIE TOWN	PR. GEORGES CO.	MD.	207.	SSW	58.6	1.7	9575.9	860	1059	16279	2282
DIST 4 LISBON	HOWARD CO.	MD.	234.	SW	52.5	63.5	66.9	2828	3309	4250	10328
DIST 5 CLARKSVILLE	HOWARD CO.	MD.	223.	SW	52.2	57.3	236.2	2551	4119	13536	12856
DIST 6 GUELFORD	HOWARD CO.	MD.	216.	SW	51.0	35.2	320.6	4312	7825	11284	24423
SAVAGE	HOWARD CO.	MD.	215.	SW	51.8	0.9	2351.1	1238	1341	2116	4185
DIST 1 LAYTONSVILLE	MONTGOMERY CO.	MD.	230.	SW	59.2	43.6	72.5	1617	1937	3159	3581
LAYTONSVILLE TOWN	MONTGOMERY CO.	MD.	231.	SW	59.9	0.0	*******	132	196	293	362
DIST 5 COLESVILLE	MONTGOMERY CO.	MD.	219.	SW	59.9	40.3	1230.9	6773	20904	49605	38643
DIST 8 OLNEY	MONTGOMERY CO.	MD.	226.	SW	59.3	45.6	279.7	3491	5180	12754	9576
BROOKEVILLE TOWN	MONTGOMERY CO.	MD.	226.	SW	57.9	0.0	*******	117	140	136	259
DIST 1 VANSVILLE	PR. GEORGES CO.	MD.	214.	SW	59.6	20.0	979.7	3779	7192	19594	15501

TABLE 2.2.22 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DIST 10 LAUREL	PR. GEORGES CO.	MD.	215.	SW	56.0	10.6	1986.2	1541	2701	21054	5821
LAUREL TOWN	PR. GEORGES CO.	MD.	214.	SW	54.8	1.3	8096.2	4482	8503	10525	18326
DIST 10 MIDDLEBURG	CARROLL CO.	MD.	259.	WSW	52.3	20.9	62.5	1064	1080	1306	1539
UNION BRIDGE TOWN	CARROLL CO.	MD.	255.	WSW	50.0	0.0	*******	840	833	904	1187
DIST 13 MOUNT AIRY	CARROLL CO.	MD.	241.	WSW	52.3	15.6	115.1	992	1435	1795	2045
MOUNT AIRY TOWN	CARROLL CO.	MD.	240.	WSW	53.7	0.7	1872.9	838	985	1311	1404
DIST. 4 CREAGERS	FREDERICK CO.	MD.	258.	WSW	58.8	19.5	58.5	880	976	1140	1431
DIST. 8 LIBERTY	FREDERICK CO.	MD.	250.	WSW	54.9	22.3	56.4	1106	1123	1257	1647
DIST. 9 NEW MARKET	FREDERICK CO.	MD.	244.	WSW	60.0	49.8	91.7	2458	3238	4565	4748
NEW MARKET TOWN	FREDERICK CO.	MD.	244.	WSW	59.3	0.0	*******	301	358	339	525
DIST. 11 WOODSBORO	FREDERICK CO.	MD.	255.	WSW	57.0	27.4	61.6	1402	1503	1688	2204
WOODSBORO TOWN	FREDERICK CO.	MD.	255.	WSW	57.5	0.0	*******	427	430	439	631
DIST. 13	FREDERICK CO.	MD.	249.	WSW	59.7	19.0	81.9	920	1018	1556	1493
DIST. 17 JOHNSVILLE	FREDERICK CO.	MD.	254.	WSW	52.0	27.4	48.0	1225	1102	1314	1616
DIST. 18 WOODVILLE	FREDERICK CO.	MD.	243.	WSW	54.1	25.6	55.3	946	1081	1416	1585
MOUNT AIRY TOWN	FREDERICK CO.	MD.	241.	WSW	53.9	0.2	2570.0	223	367	514	538
DIST. 19 LINGANORE	FREDERICK CO.	MD.	248.	WSW	50.9	17.4	48.1	735	760	837	1114
DIST. 26	FREDERICK CO.	MD.	252.	WSW	59.9	14.4	57.4	599	739	827	1084
DIST 12 DAMASCUS	MONTGOMERY CO.	MD.	236.	WSW	59.4	32.1	198.5	2825	4488	6372	8296
DIST 5 EMMITSBURG	FREDERICK CO.	MD.	264.	W	55.7	46.1	84.5	3138	3205	3896	4699
EMMITSBURG TOWN	FREDERICK CO.	MD.	267.	W	56.1	0.5	3064.0	1261	1369	1532	2007
CUMBERLAND TWP	ADAMS CO.	PA.	276.	W	52.7	34.0	102.9	1999	2925	3497	3667
FAIRFIELD BOROUGH	ADAMS CO.	PA.	272.	W	58.2	0.5	1094.0	451	519	547	651
FRANKLIN TWP	ADAMS CO.	PA.	273.	W	56.1	70.2	39.1	2334	2483	2744	3113
FREEDOM TWP	ADAMS CO.	PA.	270.	W	52.6	14.2	39.1	464	470	555	589
GETTYSBURG BOROUGH	ADAMS CO.	PA.	276.	W	51.1	1.5	4850.0	7046	7960	7275	9981
HAMILTONBAN TWP	ADAMS CO.	PA.	273.	W	58.7	40.8	41.3	1673	1779	1686	2231
HIGHLAND TWP	ADAMS CO.	PA.	274.	W	55.8	11.9	55.6	409	546	662	685
LIBERTY TWP	ADAMS CO.	PA.	269.	W	58.2	21.6	49.8	608	724	1075	908
ARENDTSVILLE BORO	ADAMS CO.	PA.	282.	WNW	55.5	0.7	841.4	409	588	589	737
BENDERSVILLE BORO	ADAMS CO.	PA.	287.	WNW	54.0	0.4	1320.0	409	484	528	607
BIGLERVILLE BOROUGH	ADAMS CO.	PA.	283.	WNW	53.0	0.7	1395.7	870	923	977	1157
BUTLER TWP	ADAMS CO.	PA.	283.	WNW	52.3	23.6	74.4	1295	1504	1757	1886
MENALLEN TWP	ADAMS CO.	PA.	287.	WNW	54.0	43.0	45.0	1514	1827	1937	2291
CARLISLE BOROUGH	CUMBERLAND CO.	PA.	302.	WNW	57.8	3.5	5165.4	16812	16623	18079	25695
COOKE TWP	CUMBERLAND CO.	PA.	289.	WNW	57.5	20.4	3.5	36	16	71	25
DICKINSON TWP	CUMBERLAND CO.	PA.	297.	WNW	59.2	45.8	52.8	1936	2025	2416	3130
MONROE TWP	CUMBERLAND CO.	PA.	304.	WNW	51.0	26.8	124.1	1875	2298	3326	3552
MOUNT HOLLY SPRINGS	CUMBERLAND CO.	PA.	297.	WNW	54.8	0.3	6696.7	1701	1840	2009	2844
NORTH MIDDLETON TWP	CUMBERLAND CO.	PA.	304.	WNW	59.7	25.4	258.7	3208	5079	6572	7851
SOUTH MIDDLETON TWP	CUMBERLAND CO.	PA.	300.	WNW	55.6	48.4	124.0	4204	4242	6000	6557
BOILING SPRINGS	CUMBERLAND CO.	PA.	301.	WNW	53.0	2.6	585.0	0	1182	1521	1827
EAST PENNSBORO TWP	CUMBERLAND CO.	PA.	316.	NW	51.3	10.7	1162.6	5582	8977	12440	13876
HAMPDEN TWP	CUMBERLAND CO.	PA.	312.	NW	51.1	17.4	680.9	2095	6558	11847	10137
MECHANICSBURG BORO	CUMBERLAND CO.	PA.	308.	NW	50.1	1.8	5213.9	6786	8123	9385	12556
MIDDLESEX TWP	CUMBERLAND CO.	PA.	306.	NW	56.8	26.0	109.9	1632	2333	2857	3606
SILVER SPRING TWP	CUMBERLAND CO.	PA.	308.	NW	53.2	33.6	188.2	2509	4044	6324	6251

TABLE 2.2.22 (Continued)

CIVIL DIVISION	COUNTY	STATE	DIRECTION DEGREE	DIRECTION SECTOR	DISTANCE MILES	AREA SQ MILES	DENSITY 1970	POPULATION 1950	1960	1970	1980
DAUPHIN BOROUGH	DAUPHIN COUNTY	PA.	320.	NW	54.8	0.4	2495.0	667	638	998	726
HALIFAX TWP	DAUPHIN COUNTY	PA.	324.	NW	59.4	30.5	66.8	1424	1747	2038	1987
MIDDLE PAXTON TWP	DAUPHIN COUNTY	PA.	321.	NW	55.4	57.7	58.3	2155	3124	3362	3553
REED TWP	DAUPHIN COUNTY	PA.	320.	NW	58.8	8.6	30.1	246	251	259	285
DUNCANNON BOROUGH	PERRY CO.	PA.	317.	NW	59.5	0.4	4347.5	1852	1800	1739	1941
MARYSVILLE BOROUGH	PERRY CO.	PA.	319.	NW	53.4	2.2	1058.2	2158	2580	2328	2783
PENN TWP	PERRY CO.	PA.	316.	NW	59.2	22.7	100.0	1603	2072	2269	2235
RYE TWP	PERRY CO.	PA.	314.	NW	56.1	24.9	52.9	690	832	1316	897
WATTS TWP	PERRY CO.	PA.	314.	NW	53.2	12.4	49.4	425	520	613	561
ELIZABETHVILLE BORO	DAUPHIN COUNTY	PA.	331.	NNW	58.9	0.4	4072.5	1506	1455	1629	1655
JEFFERSON TWP	DAUPHIN COUNTY	PA.	337.	NNW	56.8	24.4	6.7	150	178	164	202
RUSH TWP	DAUPHIN COUNTY	PA.	338.	NNW	55.1	23.5	6.8	103	113	160	129
WAYNE TWP	DAUPHIN COUNTY	PA.	328.	NNW	57.2	13.9	36.9	363	432	513	491
WILLIAMSTOWN BORO	DAUPHIN COUNTY	PA.	342.	NNW	59.7	0.3	6396.7	2332	2097	1919	2385
WILLIAMS TWP	DAUPHIN COUNTY	PA.	341.	NNW	59.9	8.5	111.2	1109	951	945	1082
COLD SPRING TWP	LEBANON CO.	PA.	341.	NNW	54.1	20.4	5.7	67	71	117	83
PORTER TWP	SCHUYLKILL CO.	PA.	347.	NNW	59.3	17.9	141.1	3004	2738	2525	2492
TOWER CITY BOROUGH	SCHUYLKILL CO.	PA.	345.	NNW	59.2	0.6	2956.7	2054	1968	1774	1791
				TOTALS		3371.1		1564946	1797431	2111033	2439392
				DENSITY				464.2	533.2	626.2	723.6

TABLE 2.2.23

POPULATION DISTRIBUTION BETWEEN 5 MILES AND 60 MILES OF PEACH BOTTOM UNITS 2 AND 3 BY RADIAL INCREMENT AND DIRECTION FROM SITE

PEACH BOTTOM ATOMIC POWER STATION
POPULATION DISTRIBUTION AROUND SITE

DIRECTION		5.- 10.	10.- 20.	20.- 30.	30.- 40.	40.- 50.	50.- 60.	
N	1950	832	79923	36793	12838	24911	11844	167141
	1960	923	83565	48355	15383	29052	12134	189412
	1970	997	83097	63099	18409	33551	12776	211929
	1980	1278	115720	66962	19513	33129	11408	248010
NNE	1950	751	10255	16050	21678	174305	30743	253782
	1960	877	12500	19535	26423	182658	34633	276626
	1970	1024	14978	24388	31247	188626	40331	300594
	1980	1215	17310	27051	32357	200546	37886	316365
NE	1950	797	3103	14148	9977	62080	36869	126974
	1960	978	3725	16398	12806	74971	48748	157626
	1970	1178	4234	20431	17794	85808	59881	189326
	1980	1354	5158	28235	22689	118788	70730	246954
ENE	1950	651	4453	23275	45132	67539	1046287	1187337
	1960	739	5542	25086	60713	104801	1105391	1302272
	1970	834	6857	25451	88211	139499	1184691	1445543
	1980	1023	9734	46400	111685	168224	1359734	1696800
E	1950	689	6414	16149	176644	151915	172436	524247
	1960	782	7634	22789	219952	204904	221382	677443
	1970	882	8478	28588	292467	239658	248538	818611
	1980	1083	14012	41719	416737	303802	301208	1078561
ESE	1950	952	4498	13965	5852	21914	31643	78824
	1960	1296	6524	23534	6428	26335	36973	101090
	1970	1444	7809	27264	8566	27223	37781	110087
	1980	1913	9762	38444	12182	38620	55187	156108
SE	1950	753	10106	1264	8024	6376	16410	42933
	1960	1046	17086	1691	9482	8407	35625	73337
	1970	1149	17905	2321	11226	11648	49814	94063
	1980	1565	25567	2530	15446	16879	72497	134484
SSE	1950	1161	19822	314	6411	6755	8986	43449
	1960	1484	30390	328	7352	7506	9062	56122
	1970	1797	37533	327	7678	8274	9341	64950
	1980	2910	59594	399	8942	8848	9926	90619
S	1950	1160	3980	10188	1102	3608	5305	25343
	1960	1482	6570	15852	1320	3905	6494	35623
	1970	1795	11506	29845	1352	4082	7734	56314
	1980	2906	12883	30613	1606	4750	7647	60405
SSW	1950	1160	7532	10450	962853	75093	59617	1116705
	1960	1482	12701	44363	1033945	152176	87913	1332580
	1970	1795	21843	62297	1031786	216766	147488	1481975
	1980	2906	24906	72288	1175418	300564	177827	1753909
SW	1950	1160	2726	11296	172054	43604	32861	263701
	1960	1482	3192	28614	221179	69875	63347	387689
	1970	1795	4610	63667	409707	95288	148306	723373
	1980	2906	6260	46624	290490	130712	143861	620853
WSW	1950	1335	1552	7086	19534	14959	17781	62247
	1960	1550	1789	8345	23516	16366	21516	73082
	1970	1929	2532	9910	45716	20649	27560	108316
	1980	2767	3398	13598	35062	23324	33087	111236
W	1950	844	3581	8166	32754	16988	19383	81716
	1960	822	3615	9022	38388	20096	21980	93923
	1970	877	4086	10459	41836	23561	23469	104288
	1980	1057	4649	11600	49554	26179	28531	121570
WNW	1950	622	6105	96397	19683	12064	34269	169140
	1960	619	6856	100004	29637	14175	38631	189922
	1970	683	8578	102909	38230	17028	45782	213210
	1980	795	8814	128573	38071	18024	58159	252436
NW	1950	475	6969	13369	26419	175468	29824	252524
	1960	475	8308	22997	34158	203178	43599	312715
	1970	528	9928	30150	36150	214004	57775	348535
	1980	611	10681	29804	42159	249170	61394	393819
NNW	1950	1294	11206	36035	15764	68624	10688	143611
	1960	1368	15919	44404	20304	79186	10003	171184
	1970	1332	21568	52761	25464	88559	9746	199450
	1980	1894	22045	61489	25921	91726	10310	213385
RING TOTALS	1950	14636	182225	314945	1536719	926203	1564946	4539674
	1960	17405	225916	431317	1760986	1197591	1797431	5430646
	1970	20039	265542	553887	2105839	1414224	2111033	6470564
	1980	28183	350493	646329	2297832	1733285	2439392	7495514

PBAPS

TABLE 2.2.23.1

COMPARISON BETWEEN 1970 PROJECTED AND 1970 CENSUS POPULATION DISTRIBUTION BETWEEN 5 MILES AND 60 MILES OF THE PEACH BOTTOM UNITS 2 AND 3 BY RADIAL INCREMENT AND BY DIRECTION FROM SITE

PEACH BOTTOM ATOMIC POWER STATION
POPULATION DISTRIBUTION AROUND SITE

DIRECTION		5.- 10.	10.- 20.	20.- 30.	30.- 40.	40.- 50.	50.- 60.	
N	1960	923	83565	48355	15383	29052	12134	189412
	1970	997	83097	63099	18409	33551	12776	211929
	70-P	1045	94629	54758	17028	31129	11864	210453
	1980	1278	115720	66962	19513	33129	11408	248010
NNE	1960	877	12500	19535	26423	182658	34633	276626
	1970	1024	14978	24388	31247	188626	40331	300594
	70-P	993	14156	22121	28716	191917	36325	294228
	1980	1215	17310	27051	32357	200546	37886	316365
NE	1960	978	3725	16398	12806	74971	48748	157626
	1970	1178	4234	20431	17794	85808	59881	189326
	70-P	1108	4220	21116	16854	94229	58898	196425
	1980	1354	5158	28235	22689	118788	70730	246954
ENE	1960	739	5542	25086	60713	104801	1105391	1302272
	1970	834	6857	25451	88211	139499	1184691	1445543
	70-P	837	7225	33781	81510	130828	1215556	1469737
	1980	1023	9734	46400	111685	168224	1359734	1696800
E	1960	782	7634	22789	219952	204904	221382	677443
	1970	882	8478	28588	292467	239658	248538	818611
	70-P	886	10242	30224	293148	243925	256441	834866
	1980	1083	14012	41719	416737	303802	301208	1078561
ESE	1960	1296	6524	23534	6428	26335	36973	101090
	1970	1444	7809	27264	8566	27223	37781	110087
	70-P	1575	8047	29832	8566	31578	45945	125543
	1980	1913	9762	38444	12182	38620	55187	156108
SE	1960	1046	17086	1691	9482	8407	35625	73337
	1970	1149	17905	2321	11226	11648	49814	94063
	70-P	1291	21076	2086	11998	11648	49814	97913
	1980	1565	25567	2530	15446	16879	72497	134484
SSE	1960	1464	30390	328	7352	7506	9062	56122
	1970	1797	37533	327	7678	8274	9341	64950
	70-P	2138	43779	380	8525	8304	9708	72834
	1980	2910	59594	399	8942	8848	9926	90619
S	1960	1482	6570	15852	1320	3905	6494	35623
	1970	1795	11506	29845	1352	4082	7734	56314
	70-P	2135	9464	22650	1531	4528	7171	47479
	1980	2906	12883	30613	1606	4750	7647	60405
SSW	1960	1482	12701	44363	1033945	152176	87913	1332580
	1970	1795	21843	62297	1031786	216766	147488	1481975
	70-P	2135	18298	58122	1104870	227336	136153	1546914
	1980	2906	24906	72288	1175418	300564	177827	1753909
SW	1960	1482	3192	28614	221179	69875	63347	387689
	1970	1795	4610	63667	409707	95288	148306	723373
	70-P	2135	4599	37489	255497	97271	104192	501183
	1980	2906	6260	46624	290490	130712	143861	620853
WSW	1960	1550	1789	8345	23516	16366	21516	73082
	1970	1929	2532	9910	45716	20649	27580	108316
	70-P	2108	2526	10933	30011	20623	27423	93624
	1980	2767	3398	13598	35062	23324	33087	111236
W	1960	822	3615	9022	38388	20096	21980	93923
	1970	877	4086	10459	41836	23561	23469	104288
	70-P	929	4088	10205	43801	23428	25140	107591
	1980	1057	4649	11600	49554	26179	28531	121570
WNW	1960	619	6856	100004	29637	14175	38631	189922
	1970	683	8578	102909	38230	17028	45782	213210
	70-P	700	7755	113104	33516	16013	47714	218802
	1980	795	8814	128573	38071	18024	58159	252436
NW	1960	475	8308	22997	34158	203178	43599	312715
	1970	528	9928	30150	36150	214004	57775	348535
	70-P	537	9396	26013	37577	224183	51819	349525
	1980	611	10681	29804	42159	249170	61394	393819
NNW	1960	1368	15919	44404	20304	79186	10003	171184
	1970	1332	21568	52781	25464	88559	9746	199450
	70-P	1549	18027	50284	22490	85361	10163	187874
	1980	1894	22045	61489	25921	91726	10310	213385
RING TOTALS								
	1960	17405	225916	431317	1760986	1197591	1797431	5430646
	1970	20039	265542	553887	2105839	1414224	2111033	6470564
	70-P	22101	277527	523098	1995638	1442301	2094326	6354991
	1980	28183	350493	646329	2297832	1733285	2439392	7495514

1960

1970*

70-P**

1980

*1970 Census.

**1970 Projected. For sources, see Table 2.2.16.

PBAPS

TABLE 2.2.24

POPULATION DENSITY* BETWEEN 5 MILES AND 60 MILES

OF PEACH BOTTOM UNITS 2 AND 3

BY RADIAL INCREMENT AND BY DIRECTION FROM SITE

PEACH BOTTOM ATOMIC POWER STATION
POPULATION DENSITY DISTRIBUTION AROUND SITE

DIRECTION		5.- 10.	10.- 20.	20.- 30.	30.- 40.	40.- 50.	50.- 60.	
N	1950	73.4	1153.3	319.4	112.6	110.3	61.8	229.8
	1960	81.5	1205.8	419.7	134.9	128.7	63.3	260.4
	1970	88.0	1199.1	547.7	161.5	148.6	66.6	291.3
	1980	112.8	1669.8	581.3	171.2	146.7	59.5	340.9
NNE	1950	49.2	142.3	184.9	174.8	845.7	147.3	356.0
	1960	57.4	173.5	225.1	213.1	886.3	165.9	388.0
	1970	67.0	207.9	281.0	252.0	915.2	193.2	421.6
	1980	79.5	240.3	311.6	260.9	973.1	181.5	443.8
NE	1950	49.3	74.8	157.6	73.1	364.3	171.6	189.8
	1960	60.5	89.8	182.6	93.8	440.0	226.9	235.6
	1970	72.8	102.1	227.5	130.4	503.6	278.8	282.9
	1980	83.7	124.4	314.4	166.2	697.1	329.3	369.1
ENE	1950	47.2	59.2	252.7	281.7	393.6	4607.2	1604.4
	1960	53.6	73.7	272.4	379.0	610.7	4867.4	1759.8
	1970	60.5	91.1	276.3	550.6	812.9	5216.6	1953.4
	1980	74.2	129.4	503.8	697.2	980.3	5987.4	2292.9
E	1950	47.2	120.1	187.8	981.9	820.7	785.2	709.8
	1960	53.6	142.9	265.0	1222.6	1107.0	1008.1	917.2
	1970	60.4	158.7	332.4	1625.7	1294.7	1131.8	1108.3
	1980	74.2	262.3	485.1	2316.5	1641.3	1371.6	1460.2
ESE	1950	58.1	58.9	156.6	60.3	133.6	217.3	133.9
	1960	79.1	85.4	263.8	66.2	160.6	253.9	171.7
	1970	88.1	102.2	305.7	88.2	186.0	259.5	187.0
	1980	116.8	127.8	431.0	125.5	235.5	379.0	265.2
SE	1950	59.6	129.5	25.1	38.5	52.4	75.3	62.3
	1960	82.8	219.0	33.6	45.5	69.1	163.5	106.4
	1970	90.9	229.5	46.1	53.8	95.8	228.6	136.5
	1980	123.8	327.7	50.2	74.0	138.8	332.7	195.1
SSE	1950	68.8	195.9	****	51.2	27.9	52.5	66.2
	1960	87.9	300.4	****	58.8	31.0	53.0	85.5
	1970	106.5	371.0	****	61.4	34.2	54.6	98.9
	1980	172.4	589.0	****	71.5	36.5	58.0	138.0
S	1950	68.8	82.2	123.2	27.4	49.6	49.4	68.8
	1960	87.9	135.6	191.7	32.8	53.7	60.5	96.7
	1970	106.5	237.5	360.9	33.6	56.1	72.1	152.9
	1980	172.4	265.9	370.2	40.0	65.3	71.3	164.1
SSW	1950	68.8	110.7	139.1	9049.4	432.6	277.9	1706.2
	1960	87.9	186.7	590.7	9717.5	876.6	409.9	2036.0
	1970	106.5	321.0	829.5	9697.2	1248.7	687.6	2264.3
	1980	172.4	366.0	962.6	11047.2	1731.4	829.0	2679.8
SW	1950	68.8	48.3	93.7	1643.3	345.5	103.2	354.8
	1960	87.9	56.5	237.3	2112.5	553.7	199.0	521.7
	1970	106.5	81.6	527.9	3913.2	755.1	465.9	973.4
	1980	172.4	110.8	386.6	2774.5	1035.8	452.0	835.4
WSW	1950	61.6	51.4	49.5	111.2	113.1	60.8	78.3
	1960	71.5	59.2	58.3	133.9	123.7	73.6	91.9
	1970	89.0	83.8	69.3	260.3	156.1	94.4	136.2
	1980	127.7	112.4	95.0	199.7	176.3	113.2	139.9
W	1950	51.5	69.3	123.4	223.7	78.9	80.3	110.9
	1960	50.2	70.0	136.3	262.2	93.4	91.1	127.4
	1970	53.5	79.1	158.0	285.8	109.5	97.3	141.5
	1980	64.5	90.0	175.2	338.5	121.6	118.2	164.9
WNW	1950	37.7	88.6	964.9	158.6	57.7	141.8	222.5
	1960	37.5	99.5	1001.0	238.8	67.8	159.9	249.9
	1970	41.4	124.5	1030.1	308.1	81.4	189.5	280.5
	1980	48.2	127.9	1287.0	306.8	86.2	240.7	332.1
NW	1950	36.9	89.6	264.2	193.3	1038.9	119.6	362.8
	1960	36.9	106.9	454.5	249.9	1202.9	174.9	449.2
	1970	41.0	127.7	595.9	264.4	1267.0	231.7	500.7
	1980	47.5	137.4	589.0	308.4	1475.3	246.3	565.7
NNW	1950	76.1	162.7	297.6	133.7	300.9	97.3	216.6
	1960	80.4	231.1	366.7	172.2	347.2	91.0	258.2
	1970	78.3	313.1	435.8	216.0	388.2	88.7	300.9
	1980	111.3	320.0	507.8	219.9	402.1	93.8	321.9
	1950	58.1	175.6	230.1	732.7	329.3	464.2	415.0
	1960	69.0	217.7	315.1	839.6	425.7	533.2	496.4
	1970	79.5	255.9	404.7	1004.0	502.8	626.2	591.5
	1980	111.8	337.8	472.2	1095.6	616.2	723.6	685.2

*Densities are persons per square mile of land area.

Note: SSE 20-30 miles, no area is available for Betterton Town, Kent Co., Md. It is included in District 3 Worton, Kent Co., Md., in the 30-40 mile ring, SSE.

PBAPS

TABLE 2.2.24.1

COMPARISON BETWEEN 1970 PROJECTED AND 1970 CENSUS POPULATION DENSITY*

BETWEEN 5 MILES AND 60 MILES OF PEACH BOTTOM UNITS 2 AND 3

BY RADIAL INCREMENT AND BY DIRECTION FROM SITE

PEACH BOTTOM ATOMIC POWER STATION
POPULATION DENSITY DISTRIBUTION ARCUND SITE

DIRECTION		5.- 10.	10.- 20.	20.- 30.	30.- 40.	40.- 50.	50.- 60.	
N	1960	81.5	1205.8	419.7	134.9	128.7	63.3	260.4
	1970	88.0	1199.1	547.7	161.5	148.6	66.6	291.3
	70-P	92.2	1365.5	475.3	149.4	137.9	61.9	289.3
	1980	112.8	1669.8	581.3	171.2	146.7	59.5	340.9
NNE	1960	57.4	173.5	225.1	213.1	886.3	165.9	388.0
	1970	67.0	207.9	281.0	252.0	915.2	193.2	421.6
	70-P	65.0	196.5	254.9	231.6	931.2	174.1	412.7
	1980	79.5	240.3	311.6	260.9	973.1	181.5	443.8
NE	1960	60.5	89.8	182.6	93.8	440.0	226.9	235.6
	1970	72.8	102.1	227.5	130.4	503.6	278.8	282.9
	70-P	68.5	101.7	235.1	123.5	553.0	274.2	293.5
	1980	83.7	124.4	314.4	166.2	697.1	329.3	369.1
ENE	1960	53.6	73.7	272.4	379.0	610.7	4867.4	1759.8
	1970	60.5	91.1	276.3	550.6	812.9	5216.6	1953.4
	70-P	60.7	96.0	366.8	508.8	762.4	5352.5	1986.1
	1980	74.2	129.4	503.8	697.2	980.3	5987.4	2292.9
E	1960	53.6	142.9	265.0	1222.6	1107.0	1008.1	917.2
	1970	60.4	158.7	332.4	1625.7	1294.7	1131.8	1108.3
	70-P	60.7	191.7	351.4	1629.5	1317.8	1167.8	1130.3
	1980	74.2	262.3	485.1	2316.5	1641.3	1371.6	1460.2
ESE	1960	79.1	85.4	263.8	66.2	160.6	253.9	171.7
	1970	88.1	102.2	305.7	88.2	166.0	259.5	187.0
	70-P	96.1	105.3	334.4	88.2	192.5	315.6	213.3
	1980	116.8	127.8	431.0	125.5	235.5	379.0	265.2
SE	1960	82.8	219.0	33.6	45.5	69.1	163.5	106.4
	1970	90.9	229.5	46.1	53.8	95.8	228.6	136.5
	70-P	102.2	270.1	41.4	57.5	95.8	228.6	142.1
	1980	123.8	327.7	50.2	74.0	138.8	332.7	195.1
SSE	1960	87.9	300.4	****	58.8	31.0	53.0	85.5
	1970	106.5	371.0	****	61.4	34.2	54.6	98.9
	70-P	126.7	432.7	****	68.1	34.3	56.7	111.0
	1980	172.4	589.0	****	71.5	36.5	58.0	138.0
S	1960	87.9	135.6	191.7	32.8	53.7	60.5	96.7
	1970	106.5	237.5	360.9	33.6	56.1	72.1	152.9
	70-P	126.7	195.4	273.9	38.1	62.3	66.8	128.9
	1980	172.4	265.9	370.2	40.0	65.3	71.3	164.1
SSW	1960	87.9	186.7	590.7	9717.5	876.6	409.9	2036.0
	1970	106.5	321.0	829.5	9697.2	1248.7	687.6	2264.3
	70-P	126.7	268.9	773.9	10384.1	1309.5	634.7	2363.5
	1980	172.4	366.0	962.6	11047.2	1731.4	829.0	2679.8
SW	1960	87.9	56.5	237.3	2112.5	553.7	199.0	521.7
	1970	106.5	81.6	527.9	3913.2	755.1	465.9	973.4
	70-P	126.7	81.4	310.9	2440.3	770.8	327.3	674.4
	1980	172.4	110.8	386.6	2774.5	1035.8	452.0	835.4
WSW	1960	71.5	59.2	58.3	133.9	123.7	73.6	91.9
	1970	89.0	83.8	69.3	260.3	156.1	94.4	136.2
	70-P	97.3	83.6	76.4	170.9	155.9	93.8	117.7
	1980	127.7	112.4	95.0	199.7	176.3	113.2	139.9
W	1960	50.2	70.0	136.3	262.2	93.4	91.1	127.4
	1970	53.5	79.1	158.0	285.8	109.5	97.3	141.5
	70-P	56.7	79.1	154.2	299.2	108.9	104.2	146.0
	1980	64.5	90.0	175.2	338.5	121.6	118.2	164.9
WNW	1960	37.5	99.5	1001.0	238.8	67.8	159.9	249.9
	1970	41.4	124.5	1030.1	308.1	81.4	189.5	280.5
	70-P	42.4	112.5	1132.2	270.1	76.6	197.5	287.9
	1980	48.2	127.9	1287.0	306.8	86.2	240.7	332.1
NW	1960	36.9	106.9	454.5	249.9	1202.9	174.9	449.2
	1970	41.0	127.7	595.9	264.4	1267.0	231.7	500.7
	70-P	41.7	120.8	514.1	274.9	1327.3	207.9	502.1
	1980	47.5	137.4	589.0	308.4	1475.3	246.3	565.7
NNW	1960	80.4	231.1	366.7	172.2	347.2	91.0	258.2
	1970	78.3	313.1	435.8	216.0	388.2	88.7	300.9
	70-P	91.1	261.7	415.2	190.8	374.2	92.5	283.4
	1980	111.3	320.0	507.8	219.9	402.1	93.8	321.9
	1960	69.0	217.7	315.1	839.6	425.7	533.2	496.4
	1970	79.5	255.9	404.7	1004.0	502.8	626.2	591.5
	70-P	87.7	267.5	382.2	951.5	512.7	621.3	580.9
	1980	111.8	337.8	472.2	1095.6	616.2	723.6	685.2

1960

1970**

70-P***

1980

*Densities are persons per square mile of land area.

**1970 Census

***1970 Projected. For sources, see Table 2.2.16.

Note: SSE 20-30 miles, no area is available for Betterton Town, Kent Co., Md. It is included in District 3 Worton, Kent Co., Md., in the 30-40 mile ring, SSE.