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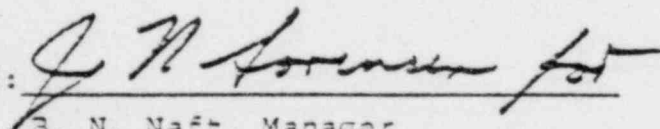
LIMERICK NUCLEAR GENERATING STATION
PRELIMINARY EVACUATION
TIME ESTIMATES

Prepared for
PHILADELPHIA ELECTRIC COMPANY

by

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TABLE OF CONTENTS

<u>Section and Title</u>	<u>Page No.</u>
LIST OF TABLES	iii
LIST OF FIGURES	iv
1.0 INTRODUCTION AND SUMMARY	1-1
1.1 <u>Introduction</u>	1-1
1.2 <u>Summary</u>	1-5
2.0 THE 10-MILE EMERGENCY PLANNING ZONE (EPZ)	2-1
2.1 <u>General Description and Site Location</u>	2-1
2.2 <u>Use of Lands and Waters in the 10-Mile EPZ</u>	2-5
2.3 <u>Population within the Emergency Planning Zone</u>	2-8
2.4 <u>Meteorology</u>	2-15
2.5 <u>Emergency Planning Zone Sectors</u>	2-17
2.6 <u>References</u>	2-19
3.0 METHODOLOGY	3-1
3.1 <u>Evacuation Time Estimates</u>	3-1
3.2 <u>Population of the Sectors of the EPZ</u>	3-2
3.3 <u>Evacuation Routes and Highway Capacities</u>	3-8
3.4 <u>Evacuation Highway Load Distribution</u>	3-13
3.5 <u>Evacuation Times</u>	3-18
3.6 <u>Adverse Weather</u>	3-24
3.7 <u>References</u>	3-27
4.0 SPECIAL FACILITIES	4-1
4.1 <u>Graterford Prison</u>	4-1
4.2 <u>Pottstown Memorial Medical Center</u>	4-3
4.3 <u>Nursing Homes</u>	4-6
4.4 <u>Pennhurst Center</u>	4-10

LIST OF TABLES

<u>Table No.</u>	<u>Title</u>	<u>Page No.</u>
1.1-1	Summary of Evacuation-Time Estimates	1-2
2.3-1	Montgomery County Population within EPZ	2-12
2.3.2	Chester County Population within EPZ	2-13
2.3.3	Berks County Population within EPZ	2-14
2.4-1	Monthly Snowfall	2-16
3.2-1	Population	3-3
3.4-1	Evacuation Times by Routes--NNW Sector	3-14
3.4-2	Evacuation Times by Routes--E Sector	3-15
3.4-3	Evacuation Times by Routes--S Sector	3-16
3.4-4	Evacuation Times by Routes--WSW Sector	3-17
3.5-1	Basic Evacuation Data - Transportation	3-21
4.2-1	List of Hospitals within the EPZ	4-5
4.3-1	Nursing Home Facilities within the EPZ	4-9

LIST OF FIGURES

<u>Figure No.</u>	<u>Title</u>	<u>Page No.</u>
1.1-1	Limerick 10-mile Emergency Population Zone Sectors	1-3
2.2-1	Site Location Map	2-4
3.2-1	Population Distribution by Sectors	3-5
3.2-2	Population Distribution by Township	3-6
3.2-3	Vehicle Distribution	3-8
3.3-1	Evacuation Routes in NNW Sector	3-9
3.3-2	Evacuation Routes in E Sector	3-10
3.3-3	Evacuation Routes in S Sector	3-11
3.3-4	Evacuation Routes in WSW Sector	3-12
3.5-1	Notification Time and Highway Movement Time	3-22
3.5-2	Evacuation Times by Sector	3-23
3.6-1	Notification Time and Highway Movement Time in Adverse Weather	3-25
3.6-2	Evacuation Time in Adverse Weather	3-26
4.4-1	Pennhurst Center Evacuee Loading Points	4-12

1.0 INTRODUCTION AND SUMMARY

1.1 Introduction

This report is a response to a generic letter from the NRC Emergency Preparedness Task Group to Philadelphia Electric Company (PECO) dated December 26, 1979. The NRC letter requests a preliminary estimate of the time required to evacuate a 10-mile radius from the Limerick plant.

At the outset it must be recognized that a comprehensive analysis of the factors requiring population evacuation as a result of an assumed hazard at the Limerick Nuclear Station cannot be completed until the final NRC/FEMA position is available, and the plans of the appropriate State and local agencies developed thereon. Accordingly, for the purpose of this preliminary estimate, it is necessary to make certain assumptions based upon generic information. For example, it is well recognized that there is little definitive data on traffic flow patterns in emergency conditions. The best study, and the one which is most current, is the Transportation Research Circular No. 212, [/] January 1980, published by the Transportation Research Board, the National Academy of Sciences. The circular itself recognizes the paucity of data.

We wish to emphasize that the Philadelphia Electric Company, of course, will update this information when the above conditions are satisfied and provide it in compliance with Appendix E.

[/] The circular supplements the Highway Capacity Manual of the NAS, Special Report 87, 1965.

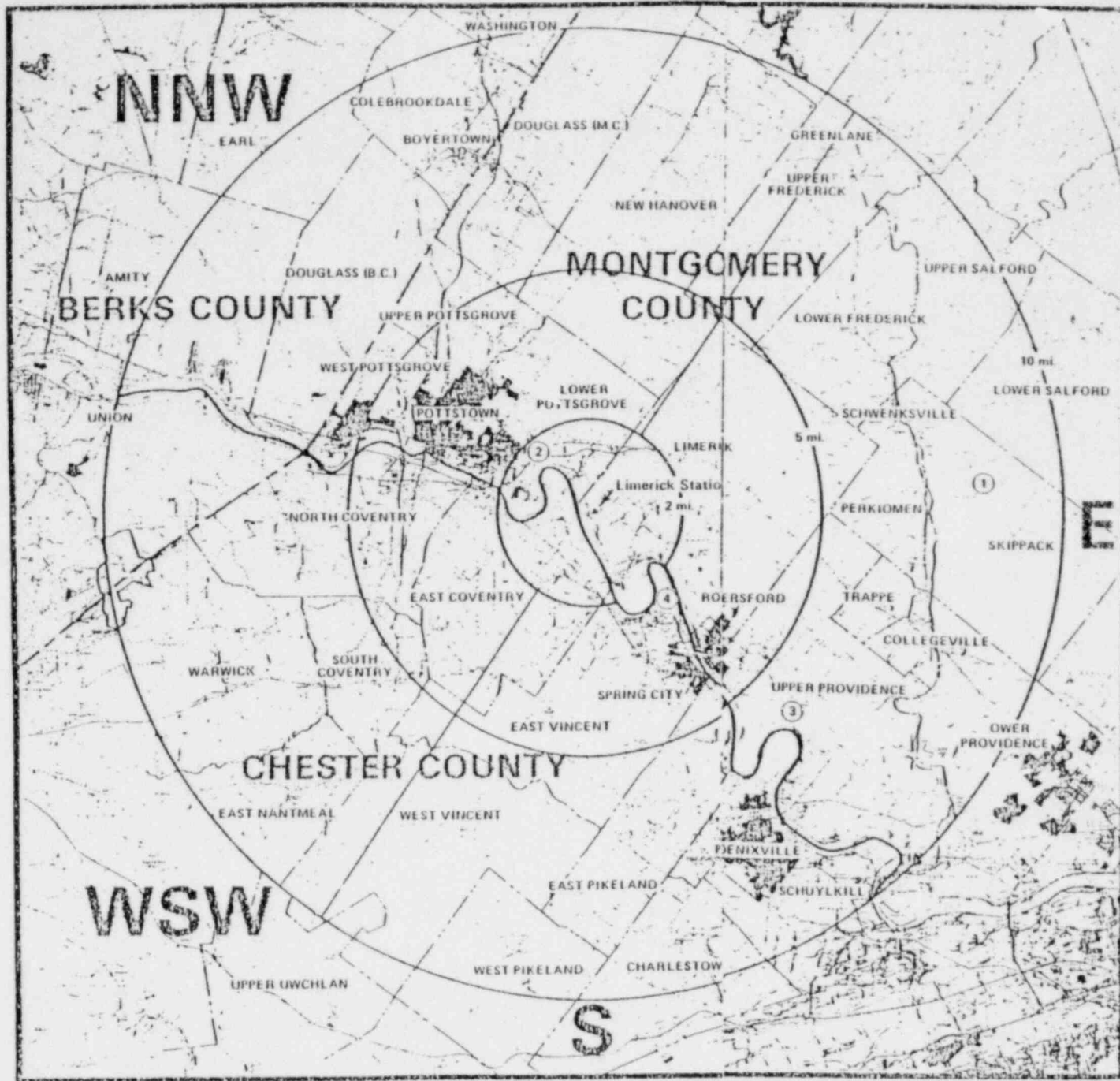
No standard models for making the requested preliminary estimates are currently provided by the NRC. We have, however, consulted the available data provided by the NRC and FEMA, particularly NUREG-0654, FEMA Rep. 1, and NUREG-0660. In preparing the analysis, NUS first consulted the available literature, particularly that listed in references to 3.7 infra. It also reviewed the existing demographic information, including that filed in the construction permit phase of this proceeding, and the updating of this material being prepared for submission in the Environmental Report, operating license stage for the Limerick facility. NUS also performed an analysis of evacuation times from the various sectors, using highway capacity information obtained from the Delaware Valley Regional Planning Commission, the Berks County Planning Commission, and techniques obtained from the 1965 U.S. Highway Capacity Manual, and the Pennsylvania Department of Transportation. NUS then conducted an on-site investigation and interviewed the appropriate State and local officials for their input and comments. Finally, NUS conducted an aerial inspection of the area and drove over some of the indicated evacuation routes.

A summary of the evacuation-time estimates is presented in Table 1.1-1. A composite map of the area around the station is presented in Figure 1.1-1. The 2-, 5-, and 10-mile sectors within the Emergency Planning Zone (EPZ), population centers, and evacuation routes are shown on this figure. More detailed maps for each sector are provided in the section on evacuation routes and highway capacities.

—/ All of the comments provided by these officials have been incorporated in this report to the extent feasible at this time. Obviously, all of these matters will be finally resolved in the final emergency plan.

TABLE 1.1-1
EVACUATION TIME ESTIMATES
BY SECTOR (Hours)

<u>Section and Weather</u>	<u>Notification</u>	<u>Highway Movement</u>	<u>Total</u>
<u>0-2 Miles</u>			
<u>Fair</u>			
NNW	.	1	2
E	1	1	2
S	1	1	2
WSW	1	1	2
<u>Foul</u>			
NNW	1.25	1.25	2.50
E	1.25	1.25	2.50
S	1.25	1.25	2.50
WSW	1.25	1.25	2.50
<u>0-5 Miles</u>			
<u>Fair</u>			
NNW	3	3	6
E	3	3	6
S	3	3	6
WSW	3	3	6
<u>Foul</u>			
NNW	3.75	3.75	7.50
E	3.75	3.75	7.50
S	3.75	3.75	7.50
WSW	3.75	3.75	7.50
<u>0-10 Miles</u>			
<u>Fair</u>			
NNW	5	4	9
E	5	4	9
S	5	4	9
WSW	5	3	8
<u>Foul</u>			
NNW	6.25	5	11.25
E	6.25	5	11.25
S	6.25	5	11.25
WSW	6.25	3.75	10



- ① STATE CORRECTIONAL INSTITUTE
- ② POTTSTOWN MEMORIAL MEDICAL CENTRE
- ③ MONTGOMERY COUNTY GERIATRIC AND REHABILITATION CENTRE
- ④ PENNHURST CENTRE

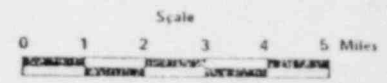


Figure 1.1.1
Limerick 10 Mile Emergency Planning Zone Sector

The NRC letter requested estimates for the EPZ in a 10-mile radius divided into 10 geometric sectors around the plant. Since the station is on the Schuylkill River, the sectors were modified slightly to accommodate local preliminary evacuation planning efforts.

After receipt of the NRC letter, Philadelphia Electric Company and NUS representatives met with officials from Montgomery and Chester counties to discuss evacuation considerations relative to the NRC letter. A PECO onsite representative also met with the Berks County Emergency Management Agency (EMA) and a regional Pennsylvania Emergency Management Agency (PEMA) official. During the course of this study, PECO and NUS representatives discussed emergency planning with various institutional and public officials. A draft of this report was presented and discussed at a meeting among PECO, NUS, PEMA, Montgomery County, Chester County, Berks County, and the Pennsylvania State Police. Comments from these organizations were solicited. As noted above, these comments have been incorporated herein to the extent possible at this time.

1.2 Summary

The total evacuation-time estimate for the entire 10-mile, 173,704 population is 9 hours in fair weather conditions and 11 hours and 15 minutes in adverse weather conditions.

These estimates are rooted in conservative assumptions and procedures including the rounding of fractions to the next higher whole number. For instance, in Perkiomen where the actual computed maximum local highway movement time is 3.8 hours, the estimate is rounded to 4 hours. Adverse weather estimates were then computed using these rounded-off local highway movement times. This conservatism is employed by the district traffic engineer who performed the evacuation time estimate for the Three Mile Island Generating Station EPZ. Where other procedures or assumptions were found to be more conservative than those employed at Three Mile Island, those assumptions were used, such as certain assumptions regarding highway capacities. These are discussed in Section 3.0 Methodology.

A future consideration in the Limerick EPZ is the fact that these estimates are based on existing highway systems even though the Schuylkill Expressway leg to Pottstown has just be rescheduled for completion in 1983 instead of 1985. Parts of the expressway are already open but were not used in forming these estimates. The Schuylkill Expressway will connect the Pottstown bypass to the Betzwood Bridge, thus providing a high-capacity modern expressway linking one of the most time consuming sectors in the Limerick EPZ with major highways outside the EPZ, thus reducing the evacuation time in that sector. Other conservative methods, such as the calculations for the number of vehicles, are discussed in Section 3.0,

Methodology. This section also provides all evacuation-time estimates and specific highway-capacity and evacuation-route information.

Section 2.0 is a description of the 10-mile EPZ, including a general description, land use, population by counties and sectors, meteorology, and a discussion on the way sectors were drawn.

Section 4.0 discusses the evacuation of a sample special facility from each of four different kinds of special facilities in the EPZ.

2.0 THE 10-MILE EMERGENCY PLANNING ZONE

2.1 General Description and Site Location

The 10-mile Emergency Planning Zone (EPZ) of the Limerick Generating Station is about 300 square miles, reaching into Montgomery, Chester, and Berks counties in southeastern Pennsylvania. The city limit of Philadelphia is 20.7 miles from the plant site and 10.7 miles from the 10-mile EPZ boundary. The northwestern boundary of the 10-mile EPZ is approximately 8 miles from the eastern boundary of the City of Reading. The Allentown, Bethlehem, and Easton population center is 16 miles north of the EPZ.⁽¹⁾

Overall, the 10-mile EPZ is rural and open, with suburban development. There are many large forests and hundreds of smaller clusters of woodlands. The predominant land use category is agricultural. The Delaware Valley Regional Planning Commission (DVRPC) estimates the ratio of available land to total usable land to be over 75% for Montgomery County and between 60% to 74.9% for the Chester County portions of this region. Available land is land that is not in some urban use, whereas usable land is available land that excludes swamps, water, streambeds, and steep hills.

The bulk of the residential development is concentrated in urban areas; however, most of the major and secondary roads surrounding these areas are developing suburban communities.

2.1.1 Topography of the Emergency Planning Zone

The topography within a 10-mile radius of the Limerick site is varied. Elevations range from 80 feet above mean sea level on the eastern boundary of the 10-mile radius at the confluence of the Schuylkill River and the Perkiomen Creek to 1,080 feet on the western boundary just west of Boyertown Borough.

The topography within a 5-mile radius of the Limerick site can be generally characterized as a gently rolling to hilly landform, dissected by the Schuylkill River, stream valleys, and runs leading into the Schuylkill River. There is an ample number of bridges crossing the Schuylkill River. Vehicle capacities at these crossings were examined specifically, and are reflected in the first time estimate. Most of these stream valleys are located below the 200-foot elevation.

The relative position of these rolling hills to the Schuylkill floodplain varies within the 5-mile radius. In the vicinity of the Limerick site, the hills fall rather sharply to a narrow floodplain on the north side of the Schuylkill River. In contrast, the other side the river has a floodplain nearly 0.5 mile in width. This situation is typical as the Schuylkill River wends its way through the area.

Most of the land within the 5-mile radius lies between 200 and 400 feet in elevation. There are seven isolated hills located in this 5-mile radius--five to the north and two to the south located generally 3 to 4 miles from the site. These hills are not seen as posing a barrier to evacuation. Most of the land within this 5-mile radius slopes toward the Schuylkill River and the Limerick site.

Slopes in this area are generally under 10% in grade, and therefore are not expected to be a limiting factor in vehicle movement away from the plant. Similar topographic characteristics can be found west and northwest in the 5- to 10-mile ring, although the hills are higher in elevation and steeper. In the 5- to 10-mile ring south of the site, elevations reach 800 feet in height with most land located between 400 to 600 feet.

2.1.2 Site Location

The Limerick Generating Station is on a 595-acre site that extends on both sides of the Schuylkill River into two counties and three townships in southeastern Pennsylvania. The plant itself is sited in Limerick Township of Montgomery County. The land portion of the site is 595 acres and the Schuylkill River, which traverses the site, is the boundary between Montgomery and Chester counties. The boundary of the closest and largest population center, the Borough of Pottstown, is 1.7 miles to the west northwest. Continuing in this direction, the limits of the Borough of Stowe are approximately 4.5 miles from the plant. Southeast of the site, the limits of the Borough of Royersford are approximately 3.4 miles away and the boundary of Spring City is approximately 3.1 miles from the plant. Phoenixville is approximately 7.1 miles from the plant, and the city limits of Philadelphia are approximately 20.7 miles away from the plant.

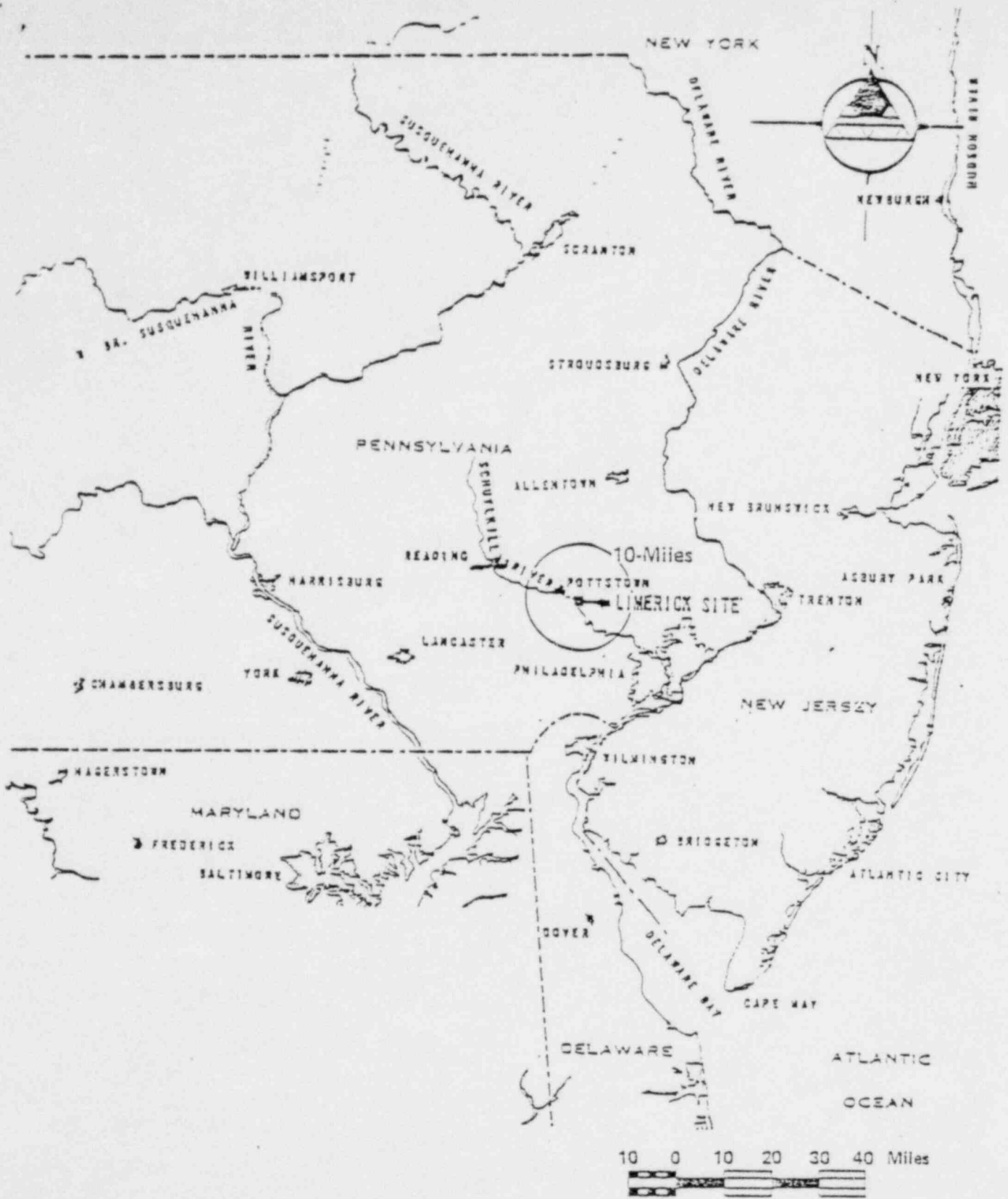


Figure 2.2-1
Site Location Map

The general land use character of the area within 5 miles of the Limerick site is rural and suburban and contains one major forest, located in northern Limerick and Lower Pottsgrove townships.

The predominant land use category within the 10-mile radius is agricultural. The agricultural industry in the vicinity of the Limerick site consists mainly of small independent farms producing small amounts of agricultural goods for local distribution. An agricultural land use survey in the vicinity of Limerick was performed in early 1976.

This survey used data from a door-to-door survey of farmers within 5 miles of the site, and published agricultural data for the area from 5 to 50 miles. The State of Pennsylvania had lost about 170,000 acres of farm land per year from 1960 through 1974.

The urban development and population concentration near Limerick lie outside a 2-mile ring and, historically, have been oriented along the Schuylkill River, with suburban growth spilling out over municipal boundaries. Pottstown Borough, with a 1977 population of 25,739, is the largest municipality within the 10-mile radius.

Industrial operations, for the most part, are clustered along the Schuylkill River, adjacent to rail lines, in the urban areas. The major industrial concentration is

in the West Pottsgrove, Pottstown, Lower Pottsgrove section of the Schuylkill River. Both Royersford and Spring City, located on opposite sides of the Schuylkill River, have a river-oriented industrial pattern. Phoenixville's industrial pattern parallels French Creek. Other industrial locations are found in smaller urban centers such as Boyertown, Collegeville, Trappe, East Coventry Township, and Linfield just east of the site.

There are 91 industries with ten or more employees within 5 miles of Limerick Generating Station, with a total work population of approximately 13,254. Nineteen of these industries are across the Schuylkill in Chester County and represent approximately 2,119 employees.

There are no major parks or recreational areas within 5 miles of the Limerick site. However, the Schuylkill River downstream of the site is utilized for recreational boating and fishing. The Hopewell Village National Historic Site is cut by the 10-mile radius southwest of the plant. Valley Forge State Park is approximately 1 mile beyond the 10-mile EPZ limit.

The 5-mile area contains the Eastern State Game Farm and State Game Refuge. The Eastern State Game Farm raised and released 60,000 pheasants between July 1, 1975 and June 30, 1976. No other wildlife is raised or released from this facility.

There is no other designated hunting area. However, small-game hunting is extensively pursued in almost all areas except where prohibited by Pennsylvania law.

The Countryside Swim Club is located approximately 1 mile from the site. Estimated average daily attendance during the swimming season is 400 people; it is likely that people at recreational sport sites, such as swimming pools, came in cars and would return home in cars parked at the site.

There is no commercial fishing or shellfishing industry throughout the entire length of the Schuylkill River. Furthermore, as a result of the river's physical restraints, future commercial fishing development is not anticipated.

The river downstream of the Limerick site is used for recreational boating and fishing. There are eight sites that are presently accessible for these purposes, and eight other potential downstream recreational areas within the 10-mile EPZ. Vincent Dam is the only boating recreation site within 2 miles of the site, or 3.3 river miles.

2.3 Population within the Emergency Planning Zone

The most recent figure for total population within the 10-mile radius extending into all three counties is 173,704.

Populations within the 2-, 5-, and 10-mile rings are as follows:

° 0 to 2 miles	5,932
° 2 to 5 miles	58,378
° 5 to 10 miles	<u>109,394</u>
Total	173,704

The source for the 2- to 5-mile population data is the Delaware Valley Regional Planning Commission (DVRPC).⁽²⁾

The population data for the 5- to 10-mile ring comes from two sources. All Montgomery and Chester county data come from the DVRPC. Berks County data come from the 1970 U.S. Census. The DVRPC does not keep data on Berks County because of jurisdictional limitations. The Berks County Planning Commission supplied 1970 U.S. Census data. The Berks County townships within the 10-mile EPZ lie outside the 5-mile limit.

Only portions of each county are within the 10-mile radius. For the purpose of this study, the population within the EPZ on a county basis is as follows:

° Montgomery County	100,328
° Chester County	53,276
° Berks County	<u>20,100</u>
Total	173,704

Population densities are greatest along the Schuylkill River where the largest boroughs in the EPZ occur. The Borough of Pottstown is the largest population center within the entire EPZ with a population of 25,739, according to 1977 data from the Delaware Valley Regional Planning Commission (DVRPC). Located northwest of the plant, the closest boundary of the borough is 1.7 miles away and the most distant borough boundary is approximately 4.2 miles away. Most of the town area is 3 miles from the plant.

To the southeast, Royersford Borough, Montgomery County, and Spring City, Chester County, are inside the 5-mile limit with populations of 4,932, and 3,786, respectively. Phoenixville, the only other large population center within the 10-mile EPZ, has a population of 14,880.

Where the 10-mile EPZ cuts through a population center, the inhabitants of those communities are included in the evacuation estimates. This holds true for population centers such as Green Lane and Sumneytown northeast of the plant, Monocacy Station to the northwest, and the Lower Providence area along the Schuylkill River and Perkiomen Creek. The ten evacuation sectors used in this report are discussed in detail in the Emergency Planning Zone Sectors section.

Growth in Montgomery County as a whole appears to have been leveling off. The DVRPC shows a 1970 population of 624,000 and projects an increase of 26,000 to a new total of 650,000 in 1990. Rural Chester County had a 1970 population of 278,000 and the DVRPC projects a total population of 320,000 in 1990, an increase of 42,000 during

the 20-year period. The 1977 average family sizes for the
Montgomery, Chester, and Berks counties are 3.38, 3.16,⁽³⁾
and 3.0,⁽⁴⁾ respectively. However, for estimating purposes,
3.0 was used for all counties, thus rendering a more conser-
vative approach in the determination of the number of vehicles
(refer to Section 3.0, Methodology).

TABLE 2.3-1
MONTGOMERY COUNTY POPULATION
WITHIN EPZ*

<u>Municipality</u>	<u>Population</u>
Pottstown Borough	25,739
Lower Pottsgrove Township	6,681
Limerick Township	5,441
Royersford Borough	4,932
Upper Pottsgrove Township	2,589
West Pottsgrove Township	4,015
Douglass Township	4,950
New Hanover Township	4,004
Upper Frederick Township	1,409
Lower Frederick Township	2,436
Green Lane Borough	685
Upper Salford Township	1,800
Schwenksville Borough	810
Perkiomen Township	2,661
Skippack Township	5,131
Upper Providence Township	9,199
Trappe Borough	1,959
Collegeville Borough	3,281
Lower Providence Township (19,833 x 0.5**) =	9,917
Lower Salford Township (8,147 x 0.33**) =	2,689
 TOTAL	 100,328

* From DVRPC, 1977 Data Bank Report, Reference 2.

** Fraction indicates the amount of the township's population to be within the Limerick EPZ.

TABLE 2.3-2
CHESTER COUNTY POPULATION
WITHIN EPZ*

<u>Municipality</u>	<u>Population</u>
North Coventry	7,142
East Coventry	3,774
South Coventry	1,063
Warwick	1,468
East Nantmeal	944
East Vincent	4,226
West Vincent	1,866
East Pikeland	4,346
West Pikeland	1,697
Schuylkill	5,762
Phoenixville	14,880
Charlestown	2,172
Upper Uwchlan(1,353x0.11**) =	150
Spring City	<u>3,786</u>
 TOTAL	 53,276

* Population within 10-mile radius from DVRPC, 1977 Data Bank Report, Reference 2.

** Fraction indicates the amount of the township's population estimated to be within the Limerick EPZ.

TABLE 2.3-3
 BERKS COUNTY POPULATION
 WITHIN EPZ*

<u>Municipality</u>	<u>Population</u>
Colebrookdale	3,034
Washington (2,273 x 0.25**) =	568
Douglass	2,944
Earl (2,290 x 0.5**) =	1,146
Amity	5,648
Union	2,332
Boyertown	<u>4,428</u>
 TOTAL	 20,100

* Population within 10-mile radius, 1970 Census Data from Berks County Planning Commission, Reference 4.

** Fractions indicate the amount of the township's population estimated to be within the Limerick EPZ.

The climate of Montgomery and Chester counties and the southeastern portion of Berks County is characterized by warm, humid summers, and moderately cold winters. The average temperature of the three-county area is approximately 55°F. Temperatures below 0°F and above 100°F are rare; average daily maximum temperatures range from 87°F in July to 40°F in January, and average daily minimum temperatures range from 23°F in January and February to 65°F in July and August. The average annual precipitation is 45 inches and is rather uniformly distributed throughout the year, with only small differences between the wettest and driest months. These weather conditions are due in large measure to the protection given by the Allegheny Mountains to the west.

For information on normal and maximum monthly snowfalls and greatest 24-hour snowfalls at Reading and in Philadelphia, refer to Table 2.4-1.

TABLE 2.4-1

MONTHLY SNOWFALL
1931 through 1967*
(In Inches)

<u>Month</u>	<u>At Philadelphia International Airport</u>		<u>At Reading Airport</u>	
	<u>Normal</u>	<u>Maximum</u>	<u>Normal</u>	<u>Maximum</u>
January	5.6	19.7	8.4	24.3
February	5.7	17.8	8.8	21.0
March	4.1	13.4	5.5	21.5
April	0.1	3.0	0.4	4.8
May	T**	T	T	T
June	---	---	--	---
July	---	---	---	---
August	---	---	--	---
September	---	---	---	---
October	T	T	T	T
November	0.8	8.8	1.1	11.5
December	4.2	17.5	6.4	27.1
TOTAL	20.5		30.6	

* From applicant's Environmental Report--Construction Permit Stage, (Revised), Limerick Generating Station, Philadelphia Electric Company, May 1972.

** Trace of precipitation.

NOTE: Readings's greatest snowfall:

Monthly: 27.1 inches, December 1966
24-Hours: 18.7 inches, February 1958

Philadelphia's greatest snowfall:

Monthly: 31.5 inches, February 1899
24-Hours: 21.0 inches, December 1909

The NRC request seeks a format containing two 180-sectors at 2 miles, four 90-sectors at 5 miles, and four 90-sectors at 10 miles. The request also suggests that population centers be kept intact "to the extent practical."

In the Limerick EPZ, the Schuylkill River is the predominant topographical feature and the boundary between Montgomery and Chester counties. As such, it is an important factor in local evacuation planning. The only river crossings used in the evacuation plan are the three crossings in Pottstown that are used to evacuate about 40% of the population of Pottstown on Highway 422. This limited access highway returns to the north bank of the Schuylkill River in Berks County.

Therefore, for this report, the NRC sector format for evacuation time estimates has been modified to comply with this local evacuation planning approach. In doing so, the resulting sectors divide into practical land areas which conform to the planning needs of the Limerick EPZ. Refer to Figure 1.1-1 in the summary of this report and to the individual sector maps in the methodology section for details of evacuation routes in each sector.

In doing so, the resulting sectors represent practical and manageable land areas that conform to the planning needs of the Limerick EPZ. The sectors are approximate designations, not crisply defined boundaries which theoreticians may use to divide the area for evacuation purposes.

For these reasons, the sectors and the populations within them are defined best by the townships of which they are composed. With this understanding, the sector maps in this report may be applied realistically. For the detailed breakdown of populations and cars by sector, refer to the methodology section of this report.

Where the 10-mile limit is seen to divide populated areas, population estimates for those sectors were adjusted to include those areas. Places falling into this category include Washington in the north and parts of Lower Providence Township.

1. Final Environmental Statement Related to the Proposed Limerick Generating Station Units 1 and 2, Philadelphia Electric Company, Docket Numbers 50-352 and 50-353, United States Atomic Energy Commission, Directorate of Licensing, 1973.
2. "1977 Data Bank for Transportation Planning," Delaware Valley Planning Commission, Philadelphia, Pennsylvania, October 1979.
3. Personal Communication between Jack Berkley, NUS Corporation and Don Shanis, DVRPC, February 27, 1980.
4. Berks County Data Book, Berks County Planning Commission, Reading, Pennsylvania, June 1979.

Evacuation Time Estimates

Pertinent census data and highway capacity information were given to NUS by the Delaware Valley Regional Planning Commission (DVRPC) and Berks County Planning Commission (BCPC). This information is used to determine highway movement times from the various sectors.

The notification times are based on a previous study⁽¹⁾ which modeled the evacuation time as the sum of a delay time and an actual travel time. The delay time, which was evaluated from statistical data,⁽²⁾ is used as the notification time in this report.

The evacuation time is the sum of the longest highway movement time in a sector and the notification time.

3.2 Population of the Sectors of the EPZ

The populations of each sector are listed in Table 3.2.1 and shown graphically in Figure 3.2-1. Other sectors in the figure are defined by the appropriate townships and portions thereof as shown in Table 3.2-1. The populations of each township are listed in Tables 2.3-1, 2.3-2, and 2.3-3, and Figure 3.2-2.

Cars

The number of vehicles is assumed to be the same as the number of households. The number of people per household is assumed to be three. The number of vehicles of each township is shown graphically in Figure 3.2-3.

TABLE 3.2-1
POPULATION

<u>Sector</u>	<u>City/Township</u>	<u>Population</u>
<u>2-Mile Radius</u>		
NNW + E	Limerick (1,667)*	3,894
	Lower Pottsgrove (2,227)**	
WSW + S	East Coventry (2,038)***	2,038
<u>2- to 5-Mile Radius</u>		
E	Limerick (3,774)*	8,706
	Royersford	
NNW	Lower Pottsgrove (4,454)**	32,782
	Upper Pottsgrove	
	Pottstown	
S	Spring City	8,012
	East Vincent	
WSW	East Coventry (1,736)***	8,878
	North Coventry	
<u>5- to 10-Mile Radius</u>		
E	Upper Providence Lower Providence Collegeville Trappe Skipack Upper Salford Lower Salford Upper Frederick Lower Frederick Schwenksville Perkiomen Greenlane	41,977

* Out of total of 5,441.

** Out of total of 6,681.

*** Out of total of 3,774.

TABLE 3.2-1 (Continued)

POPULATION

<u>Sector</u>	<u>City/Township</u>	<u>Population</u>
	<u>5- to 10-Mile Radius</u> (Continued)	
NNW	New Hanover	30,737
	Douglass (Montgomery)	
	Douglass (Berks)	
	West Pottsgrove	
	Amity	
	Colebrookdale	
	Earl	
	Boyertown	
	Washington	
S	West Vincent	30,873
	East Pikeland	
	West Pikeland	
	Schuylkill	
	Phoenixville	
	Charlestown	
	Upper Uwchlan	
WSW	Union	5,807
	Warwick	
	South Coventry	
	East Nantmeal	

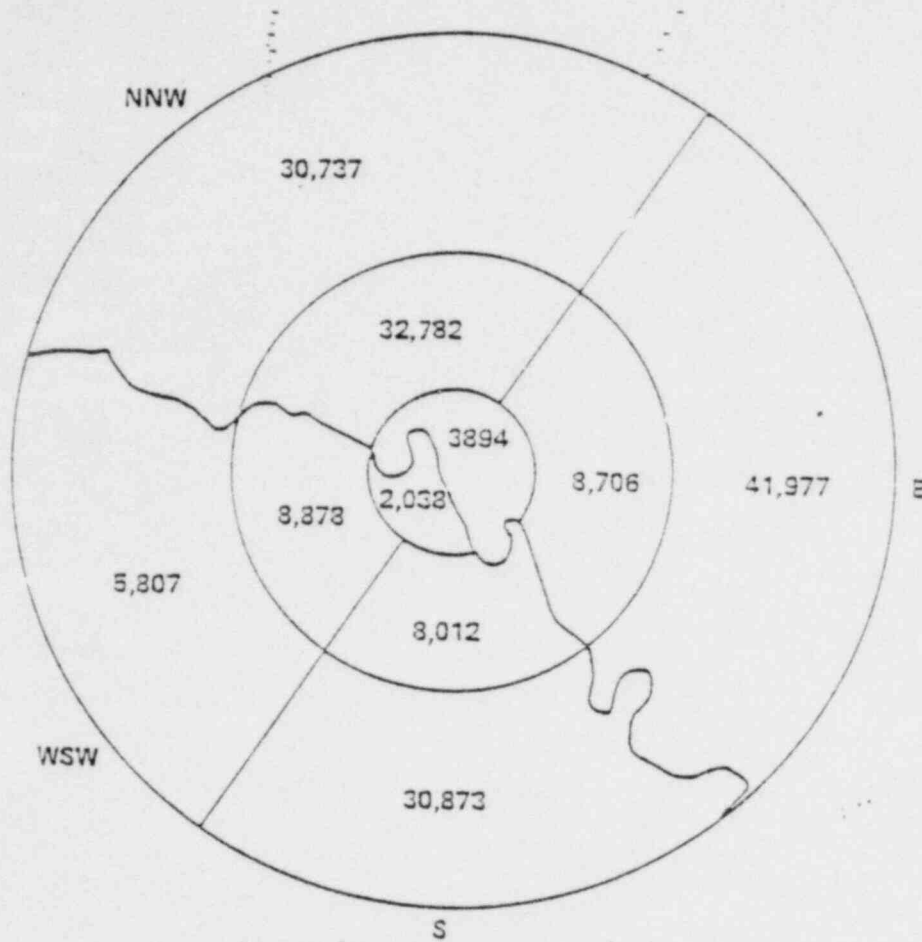


Figure 3.2-1
Population Distribution by Sectors

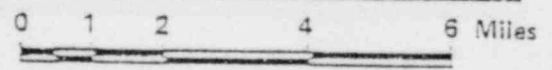
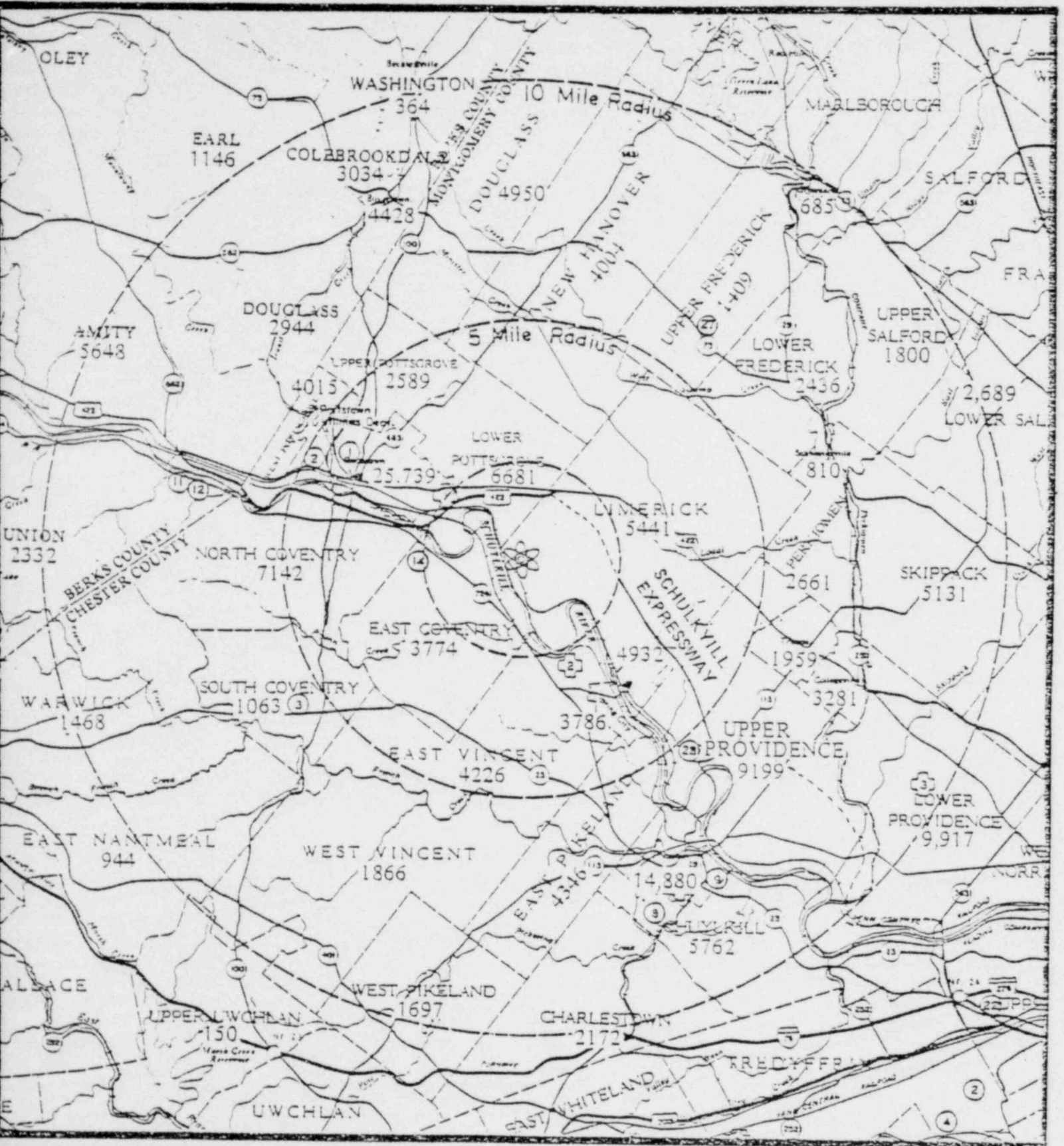


Figure 3.2-2
Population Distribution by Township

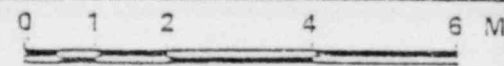
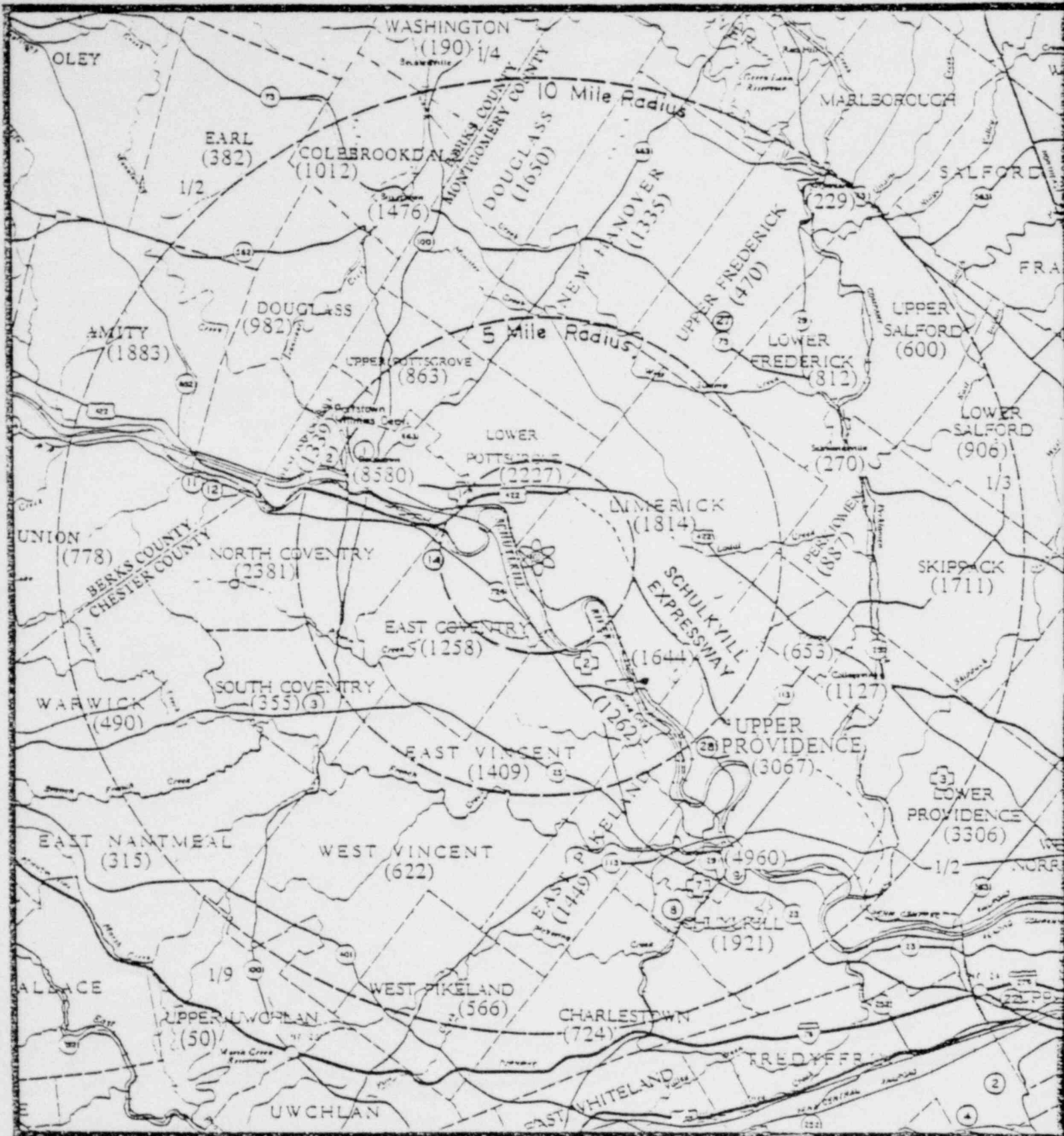


Figure 3.2-3
Vehicle Distribution

The highway capacity data is based on the DVRPC 1972 Route and Intersection Inventory.⁽⁴⁾ Level E capacity, as defined therein, is the assumed level of service for these estimates. This capacity is defined as the "maximum number of vehicles which has a reasonable expectation of passing over a given roadway during a given time period under prevailing roadway and traffic conditions."

The evacuation routes of each sector are shown in Figures 3.3-1, 3.3-2, 3.3-3, and 3.3-4. The routes are designated with a letter followed by a two-digit number. The letters N, E, S, and W represent the sectors NNW, E, S, and WSW, respectively. The two-digit numbers are assigned as route reference numbers for this report.

For each proposed evacuation route, the figures on each map reflect the number of vehicles which will pass a given point on that road in the number of hours designated in parentheses. In the Pottstown area, the vehicles-per-hour values provided by the DVRPC were used directly. For the other areas in the 10 mile zone, a conservative capacity of 700 vehicles per hour was used, except in the Schuylkill and Charlestown Townships where only a 600 vehicles-per-hour factor was employed.



Figure 3.3-1
Evacuation Routes in MNW Sector

Total Number of Vehicles: 21,920



Figure 3.3-2
Evacuation Routes in
E Sector

LEGEND
 ○ Traffic Control Point
 - Local Traffic

Total Number of Vehicles: 17,500



Figure 3.3.3
Evacuation Route in
S Sector

Total Number of Vehicles 13,508 (12,252 + 1,256)



LEGEND
 ○ Traffic Control Point
 — Local Traffic

Limerick Station

TO W02



Figure 3.3.4
Evacuation Route in
WSW Sector

The evacuation highway load distribution is listed in Tables 3.4-1 through 3.4-4, and in Figures 3.3-1 through 3.3-4.

The routes have been given temporary designations as more than one Federal or State routes may be involved. The final emergency plan will, of course, identify these routes in terms of their current designations.

TABLE 3.4-1
FAIR WEATHER EVACUATION TIMES
North Northwest Sector

<u>Township/Borough</u>	<u>Route</u>	<u># of Cars</u>	<u>Total #Cars</u>	<u>Time* (Hours)</u>	<u>Remarks**</u>
<u>0-2 Miles</u>					
Lower Pottsgrove (556)	N01	556	556	<u>0.8</u>	
<u>0-5 Miles</u>					
Lower Pottsgrove (1671)	N09	1671	1671	<u>2.4</u>	2227 Total Lower Pottsgrove
Pottstown (8580)	N06	4400	4400	2.1	2100 cars/hr
	N08	880	880	1.3	
	N01	3300	3856	0.9	4200 cars/hr
Upper Pottsgrove (863)	N07	863	863	1.3	
<u>0-10 Miles</u>					
West Pottsgrove (1339)	N02	1339	1339	1.6	850 cars/hr
Douglass (Berks) (982)	N02	200	1539	2.2	
	N03	782	782	1.1	
Amity (1883)	N01	942	4798	2.9	1700 cars/hr
	N02	942	2481	<u>3.6</u>	
New Hanover (1335)	N08	1335	2215	3.2	
Douglass (Mont. Co.) (1650)	N07	1650	2513	<u>3.6</u>	
Boyertown (1476)	N04	738	738	1.1	
	N05	738	738	1.1	
Colebrookdale (1012)	N04	1012	1750	2.5	
Earl (382)	N03	382	1164	1.7	
Washington (190)	N05	190	928	1.4	

* Time underlined represents longest time in sector.

** Road capacity assumed to be 700 cars/hr except where noted.

TABLE 3.4-2
FAIR WEATHER EVACUATION TIMES
East Sector

<u>Township/Borough</u>	<u>Route</u>	<u># of Cars</u>	<u>Total #Cars</u>	<u>Time* (Hours)*</u>	<u>Remarks**</u>
<u>0-2 Miles</u>					
Limerick (336/1816)	E02	556	556	<u>0.8</u>	
<u>0-5 Miles</u>					
Limerick (1258/1816)	E02	631	1187	1.7	
	E03	627	627	0.9	
Royesford (1644)	E03	1096	1723	<u>2.5</u>	
	E10	548	548	0.8	
<u>0-10 Miles</u>					
Upper Providence (3067)	E10	1534	2082	3.0	
	E06	1534	1534	2.2	
Schwenksville (270)	E02	270	1457	2.1	
Trappe (653)	E06	327	1861	2.7	
	E07	327	327	0.6	
Collegeville (1127)	E07	1127	1454	2.5	
Lower Providence (3306)	E09	1354	1354	2.4	
	E08	1354	1354	2.4	
	E07	600	2054	3.0	
Perkiomen (887)	E03	887	2610	<u>3.8</u>	
Skippack (1711)	E05	1711	1711	2.5	
Lower Salford (906)	E04	906	906	1.3	
Lower Frederick (812)	E01	812	812	1.2	
Upper Frederick (470)	E01	470	1282	1.9	
Green Lane (229)	E01	229	1511	2.2	
Upper Salford (600)	E02	600	2057	3.0	

* Time underlined represents longest time in sector.

** Road capacity assumed to be 700 cars/hr except where noted.

TABLE 3.4-3
FAIR WEATHER EVACUATION TIMES

South Sector

<u>Township/Borough</u>	<u>Route</u>	<u># of Cars</u>	<u>Total #Cars</u>	<u>Time* (Hours)</u>	<u>Remarks**</u>
<u>0-2 Miles</u>					
East Coventry (340/1258)	S09	340	340	<u>0.5</u>	See Table 3.4-4
<u>0-5 Miles</u>					
Spring City (1263)	S09	631	971	1.4	629 in WSW Sector 629 in S Sector <u>1258</u> East Coventry
	S08	632	632	0.9	
East Vincent (1409)	S08	1409	2041	<u>2.9</u>	
East Coventry (789/1258)	S09	289	1260	1.8	S09 joins W02 in WSW Sector
<u>0-10 Miles</u>					
Phoenixville (4960)	S01	992	992	1.4	
	S02	992	992	1.4	
	S03	992	992	1.4	
	S04	992	992	1.4	
	S07	992	992	1.4	
Schuylkill (1921)	S01	641	1633	2.8	600 cars/hr
	S02	641	1633	2.8	600 cars/hr
	S03	641	1633	2.8	600 cars/hr
Charlestown (724)	S03	362	1995	<u>3.4</u>	600 cars/hr
	S04	362	1354	2.3	600 cars/hr
East Pikeland (1449)	S05	725	725	1.1	
	S06	725	725	1.1	
West Pikeland (566)	S05	283	1008	1.5	
	S06	283	1008	1.5	
Upper Uwchlan (50)	S07	50	1042	1.5	50 out of 451
West Vincent (622)	S07	622	1664	2.4	

* Time underlined represents longest time in sector.

** Road capacity assumed to be 700 cars/hr except where noted.

TABLE 3.4-4
FAIR WEATHER EVACUATION TIMES
West Southwest Sector

<u>Township/Borough</u>	<u>Route</u>	<u># of Cars</u>	<u>Total #Cars</u>	<u>Time* (Hours)</u>	<u>Remarks**</u>
<u>0-2 Miles</u>					
East Coventry (340/1258)	W05	340	340	<u>0.5</u>	See Table 3.4-3 629 in WSW Sector 629 in S Sector <u>1258</u> East Coventry
<u>0-5 Miles</u>					
East Coventry (289/1258)	W02	289	1549	2.2	1260 from S09
North Coventry (2381)	W05	1500	1840	<u>2.7</u>	
	W03	881	881	<u>1.3</u>	
<u>0-10 Miles</u>					
Union (778)	W04	778	778	1.1	
South Coventry (355)	W02	355	1904	<u>2.7</u>	
Warwick (490)	W03	490	1371	2.0	
East Nantmeal (315)	W01	315	315	0.5	

* Time underlined represents longest time in sector.

** Road capacity assumed to be 700 cars/hr except where noted.

3.5

Evacuation Times

3.5.1

Limerick Evacuation Times

The evacuation time for a given sector is the sum of the notification time and the sector highway movement time. The sector highway movement time is the maximum local highway movement time of each sector, which is underscored in Table 3.4-1. Each sector highway movement time is rounded off to the next higher whole number before it is added to the notification time.

The local highway movement time is the time required to move the accumulated vehicles out of the township on the specified evacuation route. The "notification times," as applied in this study, include notification, preparation, and initial movement times. Notification times are assumed to be 1, 3, and 5 hours for 2-, 5-, and 10-mile radii, respectively.

The maximum evacuation time is represented by the parenthetical number closest to the point where each designated evacuation route crosses the 10-mile perimeter. Hence, the estimated evacuation time represents the most conservative assumptions possible, i.e., the person who receives notification and initiates movement at the last possible moment, so that he is the last person in the traffic flow to utilize the designated evacuation route. Obviously, therefore, all other persons will have crossed prior thereto.

Realistically, it is clear that the existing road network will permit evacuation of all of the population in the 10-mile zone on a much shorter time frame. Moreover, it is unlikely that notification frames of 3 and 5 hours would be required in an actual situation.

Notification is assumed to be achieved by door-to-door contact, radio and television broadcasts, and public address systems including mobile units with loud speakers.

Confirmation times were thoroughly explored with the pertinent local officials. The directors of the emergency preparedness agencies for Montgomery, Chester and Berks Counties believe that confirmation can be achieved by some method such as traffic monitoring, but not by a door-to-door check. This method of confirmation does not add to the total evacuation times.

A summary of the notification times and the highway movement times is shown in Figure 3.5-1. When the highway movement times rest in fractions, the fractions are rounded off to the next higher whole number. The evacuation times are summarized in Figure 3.5-2.

3.5.2 A Comparison With An EPA Evacuation Study

Evacuation experience in the United States for the period from 1959 to 1973 is summarized in a report published by the U.S. Environmental Protection Agency (EPA).⁽²⁾ The report provides data on 64 evacuation events, most of which were in response to hazards from transportation accidents, floods or hurricanes.

The Reactor Safety Study (RSS)⁽⁶⁾ found that evacuation times from transportation accidents were more appropriate for the evaluation of evacuation times in reactor accidents. (Table 3.5-1 presents the collected data for transportation accidents.)

Based on a distribution of evacuation speeds for evacuations of all types, the RSS concluded that an effective speed of 1.2 mph had the highest probability of occurrence during evacuations. In applying this conclusion, a simple estimate for an evacuation of a 10-mile radius is 8 hours 20 minutes. This is reasonably close to the estimates of 9, 9, 9, and 8 hours shown in Figure 3.5-2.

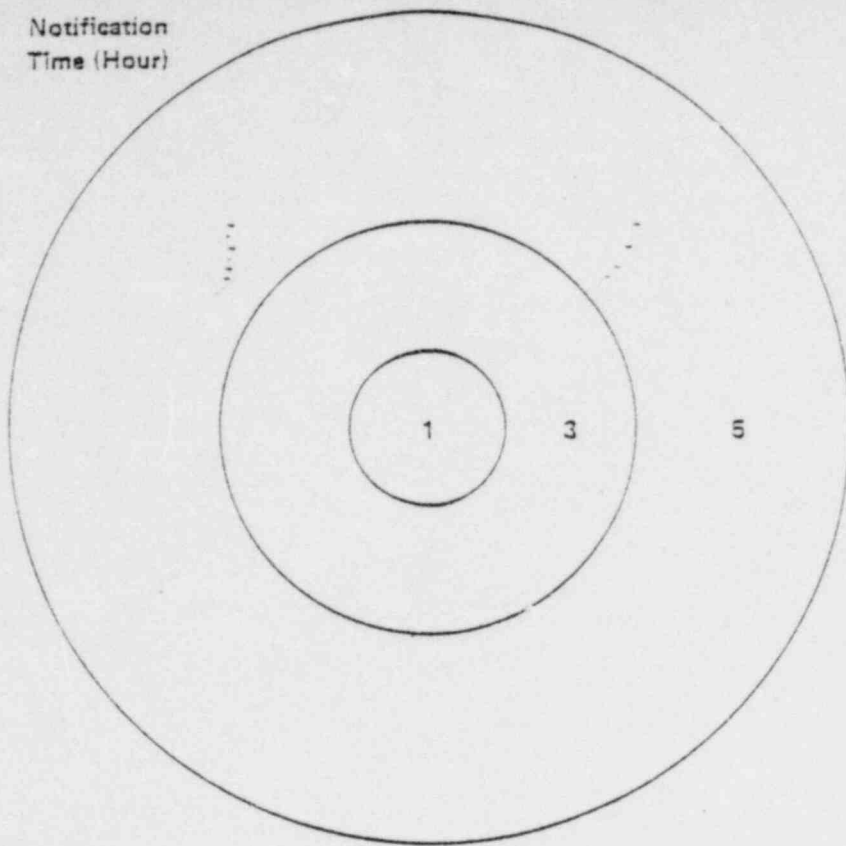
TABLE 3.5-1
BASIC EVACUATION DATA - TRANSPORTATION

Event Number	Location and Date	Type of Area Evacuated	Area Evacuated (sq. miles)	Number of Persons Evacuated	Distance Evacuated (Miles)	Evacuation Period (hrs)	Population Density (number per sq. mile)	Road and Conditions (a)	Weather	Time of Day	Evacuation Plans (b)	Remarks
12	Douglasville, GA: 2/5/73	Suburban	0.15	700 of 200	1.0	2.0	1100	S, U	Cloudy	Night	70	Private vehicles
15	Wave Coats, MO: 3/2/61	Rural residential; suburban; Urban	15	7,500	12	1.0	500	S, U	WX	Night	70	Private vehicles
13	Cladyburne, MI: 1/11/68	Suburban	0.5	150	1.0	5.0	700	S, U	Cloudy	Dark Night	70	Private vehicles
11	Wetaska, OK: 4/4/69	Rural residential	3	2,000	15	8	667	S, U	Cloudy	Day	70	Private vehicles
14	Louisville, KY: 1/19/72	Urban	0.15	4,000	1	1	11,400	U, E	Rain	Day	70	Private vehicles; chlorine large; no chlorine release
15	Urbana, OH: 8/11/61	Suburban	1.1	4,000	0.75	1.5	1,300	S, U	Clear	Day	N.D.	Private vehicles
16	Baton Rouge, LA: 3/65	Urban	8	150,000	10	2.0	19,000	S, U, E	Clear	Day	70	Private vehicles; chlorine large; no chlorine release
18	Morgan City, LA: 1/19/72	Urban	1.3	1,000 of 1,100	2	4	1,300	U, E	Snow	Day	70	Private vehicles; chlorine large; no chlorine release
19	Texasville, TX: 3/27/67	Suburban	9.0	5,000	1	4	550	S, U	Clear	Night	70	Private vehicles
44	Glendora, MS: 9/11/69	Rural Farming; rural residential; suburban; Urban	1,100	15,000	10	4	19	S, U	Cloudy	Night	70	Private vehicles

(a) Key: U - urban road;
S - suburban road;
R - rural road;
E - express way (unlimited access);
E - express way (limited access).

(b) Key: ? - plan available (not used);
70 - plan used
N.D. - no plan
N.D. - no data

Notification
Time (Hour)



Highway Movement Time (Hour)

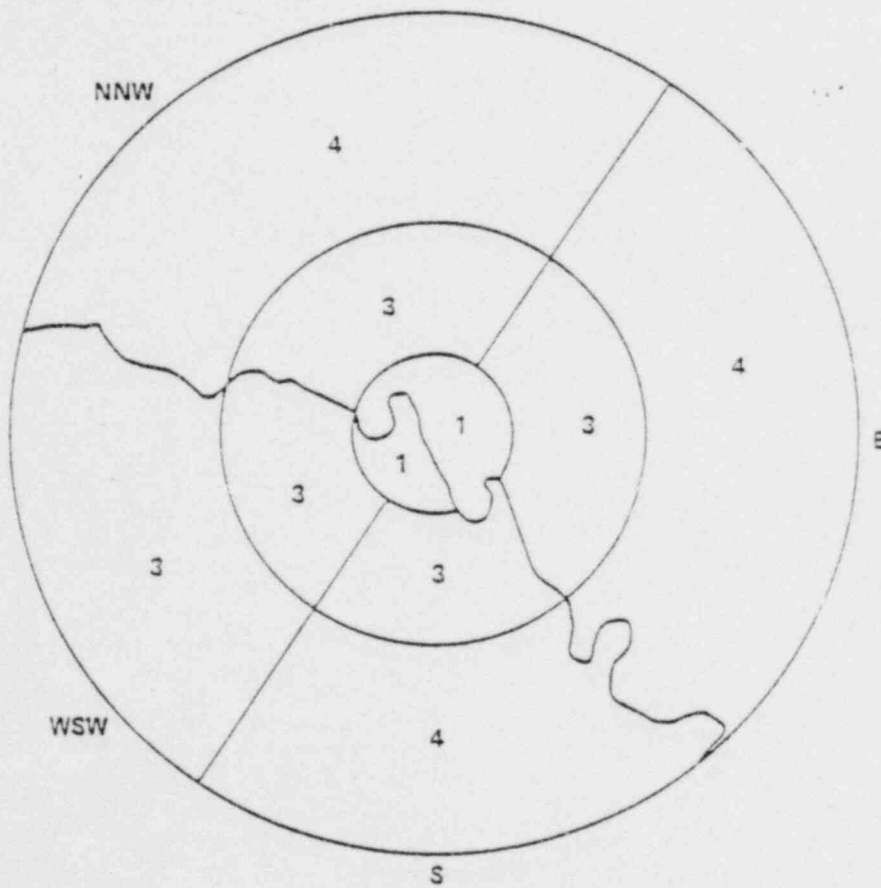


Figure 3.5-1

Notification Time and Sector Highway Movement Time

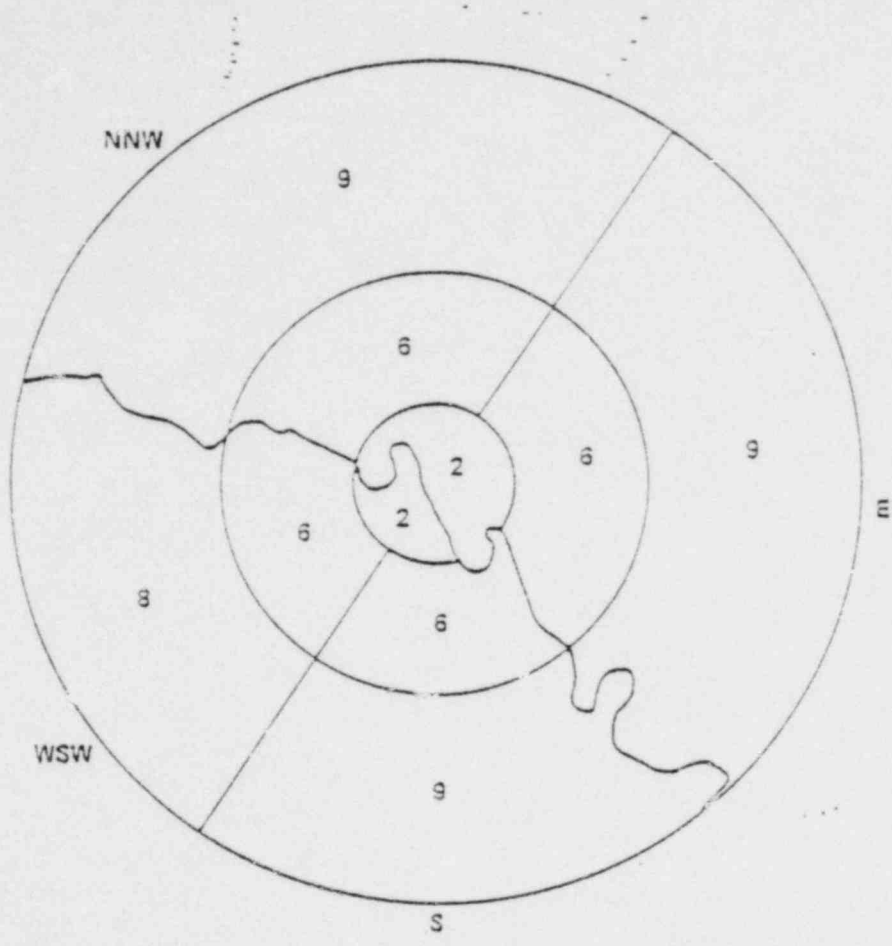
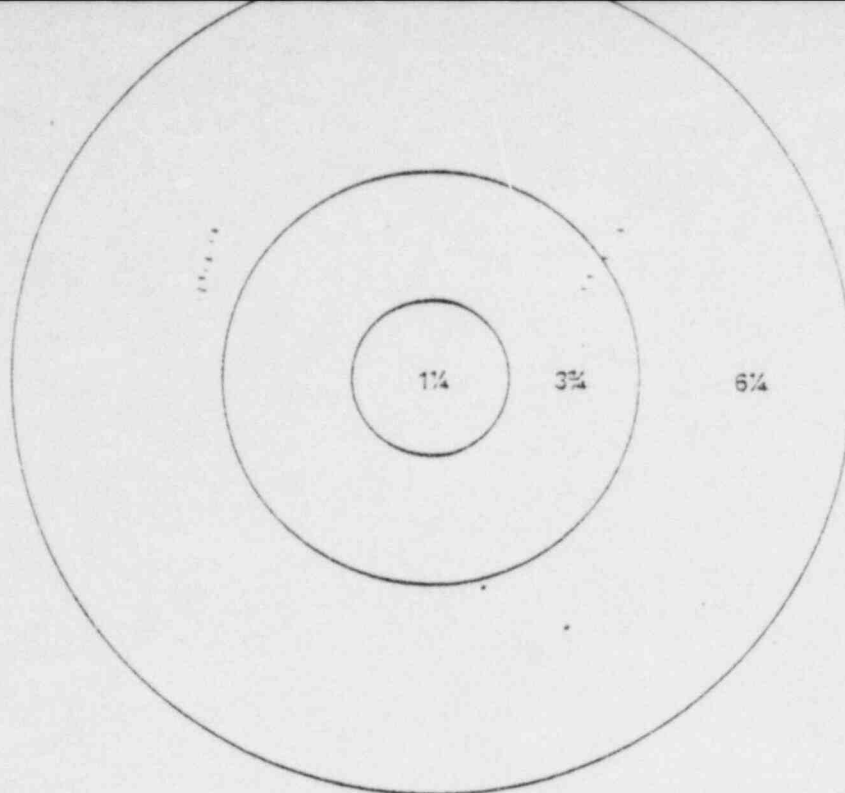


Figure 3.5-2
Evacuation Times By Sector*

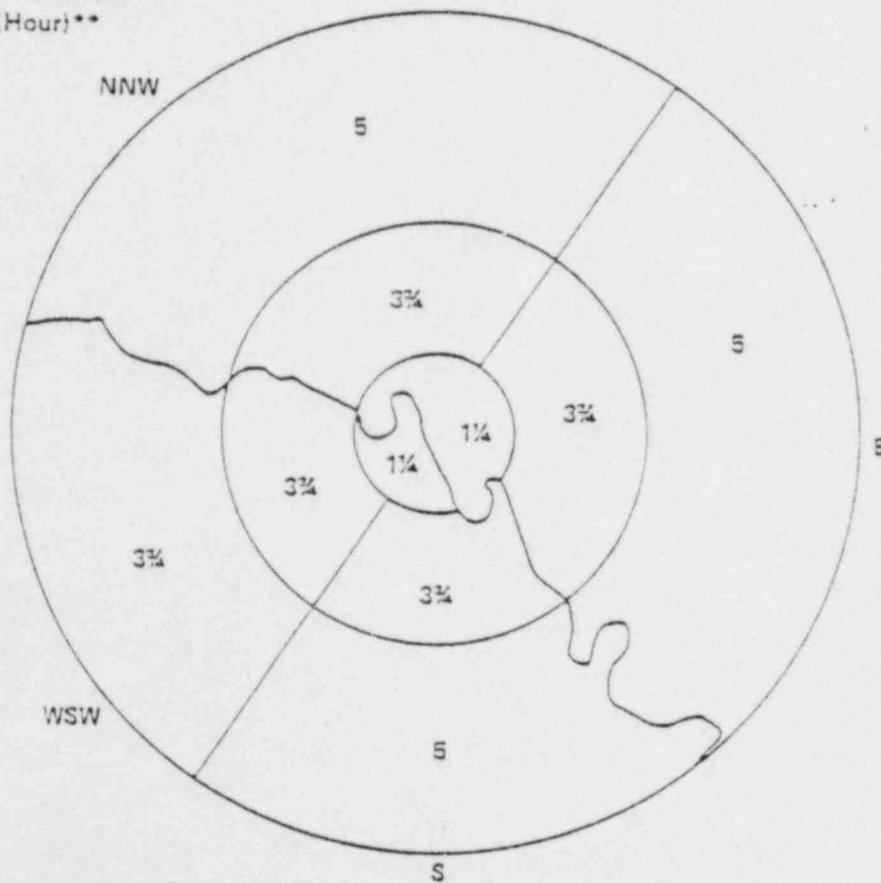
*Evacuation times include notification time.

Obviously, the impact of weather conditions may vary widely as illustrated by the data on snowfalls (see Table 2.4-1). However, in order to respond, we have taken the 20% figure from the Transportation Research Circular, p.261. ⁽⁵⁾ Obviously, as is recognized by the Grimes letter, if one assumes a blizzard to occur simultaneously with an evacuation, it is likely that the responsible authorities would determine that the more effective protection of the public health and safety would be to have the populace remain sheltered.

This 20% reduction in highway capacity resulted in a 25% increase in local highway movement times. Notification times, which include notification, preparation, and initial movement times, are also increased by 25%. These results are shown in Figures 3.6-1 and 3.6-2. For more details on the meteorology and adverse weather in the EPZ, refer to Section 2.4.



Highway Movement
Time (Hour)**



*Notification times are cumulative. The notification time for the entire 10-mile EPZ is 6 3/4 hours.
 **Highway movement times are cumulative. The outer number represents the total sector highway movement time.

Figure 3.6-1

Notification Time and Sector Highway Movement Times in Adverse Weather

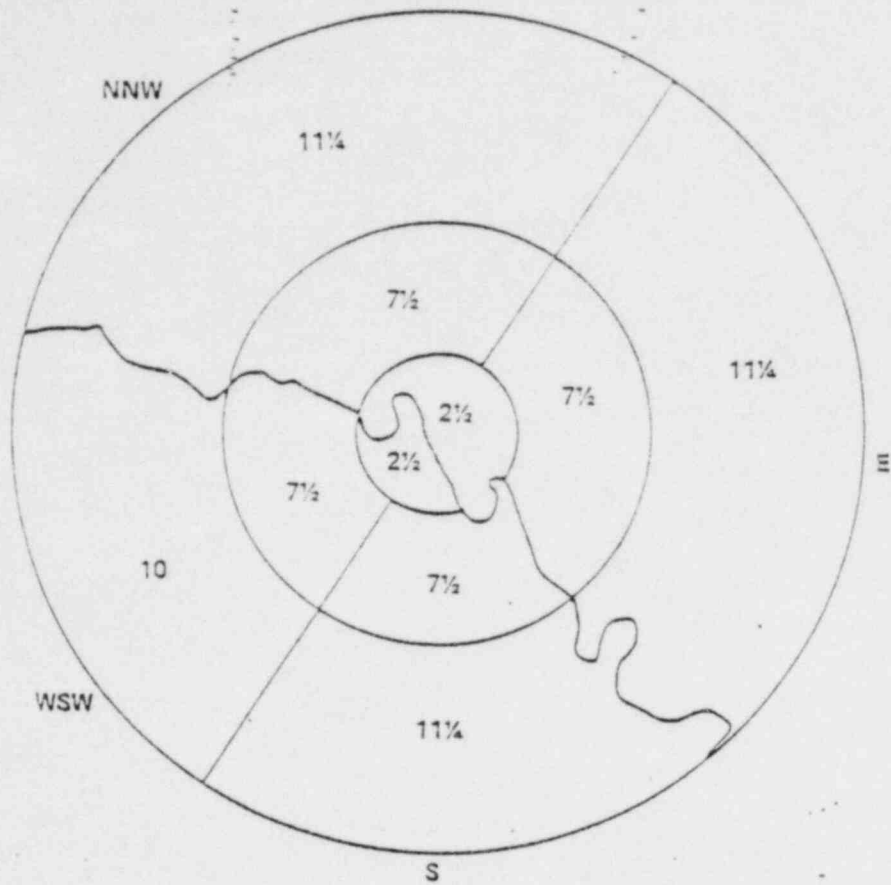


Figure 3.6-2
Evacuation Time in Adverse Weather

*Times for the 5- and 10-mile radial sectors are cumulative. The outer number is the total for the entire 10-mile sector.

1. Aldrich, D. C., "Examination of Offsite Radiological Emergency Protective Measures for Nuclear Reactor Accidents Involving Core Melt," Ph.D. Thesis, MIT, 1978.
2. Hans, J. M. and T. C. Sell, "Evacuation Risks--An Evaluation, U.S. Environmental Protection Agency, EPA-520/6-74-002, 1974."
3. "1972 Route and Intersection Inventory, Delaware Valley Regional Planning Commission, June 1977."
4. Transportation Research Circular, Number 212, Transportation Research Board, National Academy of Sciences, 2102 Constitution Avenue, Washington, D.C., January 1980.
5. WASH-1400, Appendix VI, Reactor Safety Study.

Special facilities are nursing homes, general hospitals, mental institutions, and prisons. Public and private educational institutions are also considered in this category. Within the 10-mile EPZ of Limerick, there are 15 special facilities. Eleven of them are beyond the 5-mile limit and only Pottstown Memorial Medical Center is within the 2-mile radius. It is 1.8 miles from Limerick Station. In order to establish a reasonable perspective on the evacuation times of such institutions, onsite interviews were conducted with the directors and/or other responsible personnel of institutions representing each type of special facility within the 10-mile EPZ: nursing homes, general hospitals, mental hospitals, and correctional institutions. There are 9 nursing homes, 3 general hospitals, 1 mental hospital, and 2 correctional institutions within the EPZ.

Neither of the correctional institutions, Montgomery County Prison Farm or Graterford Prison, are within the 5-mile radius. In fact, Graterford, an 1,800-person maximum security prison, is approximately 8.3 miles from the plant, and the Montgomery County Prison Farm is at the 10-mile limit, just west of Eagleville.

The crucial time factor for a special facility is the time it takes to prepare the special facility population to evacuate, including the time it takes to load the population onto

waiting vehicles. Depending upon the facility, the emergency planning agencies will be required to provide supplemental means of transportation. This fact is fully understood by the local authorities. It is assumed that all special facilities would be notified rapidly in the event of a general evacuation per the PEMA plan, thus making notification almost immediate. It is also reasonable to assume that in a slowly developing incident at the plant, advance notification to special facilities would permit certain preparatory measures to commence well before notification to the general public to evacuate the 10-mile EPZ. This advance notification would reduce the preparation time but credit for this reduction is not included in these estimates.

4.1 Graterford Prison

Graterford Prison is an 1,800-inmate, maximum security, state prison facility that comes under the purview of the Pennsylvania Commissioner of Corrections. The prison is approximately 8.3 miles from the Limerick Station with as much underground space as aboveground space. This underground space was previously used for Civil Defense.

The Commissioner of Corrections has had the experience of planning for and estimating the approximate evacuation time of an 1,100-inmate facility in Camp Hill. He was required to formulate these plans for the Camp Hill facility because of the Three Mile Island incident.

The State Commissioner of Corrections estimated a total evacuation time of 5 hours and 30 minutes for Graterford, if the evacuation order is given in the daytime. (Prisoners would not be moved outside the prison at night for security reasons.) Mobilization time (i.e., time to get buses to the site and get the prisoners ready to load onto the buses) is 4 hours and 15 minutes. Loading and driving time to beyond the 10-mile limit was estimated at 1 hour and 15 minutes. This estimate assumes the availability of 90 buses. If the order to evacuate was given just after sunset, the mobilization would commence 4 hours and 15 minutes before sunrise, and loading and departure would begin at first light. Other planning information and details are proprietary.

The hospital is within the 2-mile radius of the plant. Located approximately 1.8 miles from the plant, Pottstown Memorial Medical Center is the largest hospital in the 10-mile EPZ, based on licensed and approved bed capacity statistics from the Pennsylvania Department of Health,* and on onsite interviews with Pottstown Memorial Medical Center officials. With a current total capacity of 275 beds, it is almost double the capacity of the second largest hospital within the 10-mile EPZ.

Hospital officials estimated that approximately 50% of the patients within the hospital at any given time would be ambulatory and could go home with relatives, thus not requiring any special transportation arrangements other than contacting families to pick them up.

Ambulatory patients, who could not be discharged in time due to problems with contacting relatives, would be moved to a safe staging area from which families would be notified. Hospital officials estimated it would take an estimated 3 to 4 hours to discharge these patients. A more difficult consideration is the evacuation of patients requiring medical equipment such as respirators, or orthopedic patients unable to be transported by ambulance. These patients would have to be transported in bed and it is assumed they would be transported by moving van. This method was used recently when all such patients were moved into the newly constructed hospital building.

* Directory of Licensed/Approved Hospitals in Pennsylvania, Pennsylvania Department of Health, 1976.

Psychiatric patients would require one employee per patient; however, it is anticipated that in an emergency, the level of hospital personnel support necessary to cover this contingency would be present.

So, with these considerations, hospital officials estimated it would take them 3 to 4 hours (maximum) to move all other patients from their rooms and load them into ambulances or other rescue transportation vehicles. It is assumed that the necessary vehicles would arrive at the hospital within the first 3 hours of preparation. It is likely that under any circumstances in which an evacuation is even remotely possible, special facilities would be given special attention by state and local officials so that such facilities would have notice in advance of the general public to prepare well before the general evacuation order is given. It is assumed that under these conditions and with proper police escort evacuation time of the hospital could be significantly reduced.

In the unlikely event the hospital were to not receive advance notification to prepare, its preparation time of 4 hours would be added to the local highway movement time of 4 hours. This assumes the hospital evacuation vehicles would use evacuation route N06. Thus, the worst case fair weather estimate would be 8 hours, and the worst case adverse weather estimate is 9 hours.

Table 4.2-1 lists hospitals within the EPZ, including addresses, licensed/approved bed capacities, and approximate distances from the plant. It is assumed that these hospitals would proceed in a fashion similar to Pottstown in the event of a decision to evacuate.

TABLE 4.2-1
 LIST OF HOSPITALS
 WITHIN THE EPZ

<u>Facility/Address</u>	<u>Beds</u>	<u>Approximate Distance</u>
Pottstown Memorial Center Firestone Boulevard and High Street Pottstown, Montgomery County, PA	275	1.8 miles
Eagleville Hospital and Rehabilitation Center P. O. Box 45, Eagleville Road Eagleville, Montgomery County, PA	126	9.0 miles
Phoenixville Hospital 140 Nutt Road Phoenixville, Chester County, PA	139	7.8 miles

Two nursing homes were selected to represent this category: one in the North Northwest Sector with 143 beds, and one in the Eastern Sector with 600 beds.

4.3.1 Frederick Mennonite Home

The Frederick Mennonite Home is approximately 6.4 miles from the plant and has a total bed capacity of 143 beds. Its physical plant consists of retirement residences and nursing facilities. The requirement for ambulances would be minimal in the worst circumstances since there are no bed-ridden patients in the facility. (Only those recovering from an operation or injury would require ambulance service.) It is assumed that the demand for ambulances could vary considerably at each nursing home. (See Montgomery County Geriatric Center, Section 4.3.2.) The facility conducts fire drills every month.

As part of the drill procedure, each resident goes to a predetermined exit. An evacuation would not require a change in this routine generally except that the residents would then continue from their stations to the vehicles. Also, those residents who normally remain in bed during fire drills would be moved to exit points in wheel chairs. Accounting for this additional time to the fire drill time, the director estimated a total 10 minutes time for all patients to go from bed to the appropriate exits.

The nursing home director estimated that approximately 35% of the resident population would need close personal attention in moving while the remaining 65% would not require an employee

at their side. Those residents requiring close attention would need help in boarding cars and buses. Three minutes per person was assumed just for loading these persons, based on the director's experience in sending groups of residents on field trips and visits.

To move residents from the beds to the exits and then to vehicles in the middle of the night when staff attendance is lowest and during adverse weather conditions, the director estimated 2 hours and 15 minutes. Driving time to beyond the 10-mile limit is considered to be negligible at 6.4 miles from the Limerick Station. With advance notice it is likely that the nursing home could evacuate faster than the general population for the North Northwest Sector.

In the unlikely event that the nursing home was not notified in advance, and preparation started at the same time as for the general population, the nursing home population would be on the road with the general population in 2 hours and 15 minutes. Assuming the facility vehicles used Evacuation Route N09, the total fair weather evacuation time is an estimated 5 hours and 15 minutes, in adverse weather 6 hours and 45 minutes.

4.3.2 Montgomery County Geriatric and Rehabilitation Center*

The Montgomery County Geriatric Center, outside Royersford, is a maximum 600-patient care facility, approximately 6 miles from the Limerick Station. There are 350 skilled patients (i.e., patients requiring close attention) and 241 intermediate care patients (i.e., ambulatory patients).

* This facility was added to the study as a result of comments from local officials.

Interviews with the director of the facility indicated that the facility conducts one house drill each month with several smaller drills during the month. Although no general evacuation of the entire facility has been rehearsed at one time, each unit within the facility has experienced a fire drill.

After consultation with his staff, the director of the center estimated that the entire facility could be mobilized within 3.5 hours at night. This time includes preparation from the moment of notification through completion of the process of loading all patients onto waiting vehicles. This time assumes that the required staff members assemble at the facility to help the residents.

The mobilization time estimate also assumes the availability of fifteen 30-passenger buses more than those available onsite full-time, 20 ambulances capable of carrying two patients each, and 4 wheelchair vans. The director estimated conservatively that approximately 40 patients would require ambulances; the remainder could travel by bus.

With advance notification, the nursing home could evacuate the EPZ faster by starting its preparation before notification that there is a general evacuation.

If no advance notification were provided, and assuming the nursing home population uses the closest evacuation route (also the most conservative in terms of highway movement times), the total fair weather-evacuation estimate is 8.5 hours. The adverse weather estimate is 9.75 hours, assuming Evacuation Route E13 is used in both cases.

Table 4.3-1 is a list of nursing home facilities within the EPZ, including addresses, number of beds and approximate distance from the plant.

TABLE 4.3-1

NURSING HOME FACILITIES
WITHIN THE EPC

Nursing Home Facility/Address	Beds	Approximate Distance from Plant (miles)
Leader Nursing and Rehabilitation Center 724 North Charlotte Street Pottstown, PA 19464	159	4.0
Montgomery County Geriatric and Rehabilitation Center 1600 Black Rock Road Royersford, PA 19468	600	6.0
Frederick Mennonite Home for Aged Route 73 Frederick, PA 19435	143	6.1
Manatawny Manor and Residential Care Route 724, Old Schuylkill Road Pottstown, PA 19466	99	4.8
Douglassville Home R.D. 1 Douglassville, PA	40	7.2
River Road Home R.D. 1 Douglassville, PA	25	6.7
Mary Hill Rest Haven Cold Stream and Mary Hill Roads Phoenixville, PA	17	8.0
Coventry Manor Chestnut Hill Road Coventryville, PA	41	5.5
Phoenixville Manor 833 S. Main Street Phoenixville, PA	135	7.7

The Pennhurst Center is a state mental institution including residents ranging from hyperactive children to those who would require tight security, plus escort in the event of a decision to evacuate the facility. The 1003-resident population is distributed among 24 buildings, and the center itself is approximately 2.5 miles from the plant, just north of Spring City. Each building has a separate evacuation plan geared to the occupants and layout of that building.

The Center's existing evacuation plan requires further work to set up reception centers. It is necessary to send the residents to a similar institution capable of housing and caring for these clients' special needs. The existing plan now provides for a chain of command for decision making, tentatively sets plans for obtaining vehicles, specifies the need for pharmacists to dispense drugs and allocate drug supplies, and sets the priorities for client evacuation by class of client (i.e., first--physically ill or bedfast; second--non-ambulatory; and third--ambulatory). Some percentage of the clients would be discharged to their families, according to the plan.

There are extensive underground facilities at Pennhurst that will accommodate up to 10,000 people. This is sufficient for the residents and staff of Pennhurst as well as the population of Chester County within three miles of the Center. Elmer B. McSurdy, the Director of Administrative Services at Pennhurst is a licensed Shelter Manager.

Transportation of the Pennhurst Center clients would require 33 buses, 76 ambulances, and 2 furniture vans for wheel chair clients. No suitable transport is available at the Center. It will have to be brought to the Center during the advance notification period.

The Center has an employee pool of 1,600, 600 of whom represent the maximum staff at any daytime hour. The availability of a sufficient number of the regular staff would have to be planned and assumed for an evacuation time estimate. Based on these considerations, the director of the facility estimates that the total institution could be mobilized and loaded within 2 hours. This estimate is based on the availability of many loading points for the ambulances and buses (Figure 4.4-1). Because there are 24 separate occupied buildings, Pennhurst clients can be conveniently loaded into their transport at many points simultaneously without interfering with other clients. Embryville and Norristown are two possible reception sites.

Advance notification of about 6 hours is required to allow the facility to begin preparation before the general public gets the notification that it is to evacuate.

In a worst case situation where this special facility is not given advance notification, the preparation time is added to the estimated evacuation time yielding a fair weather estimate of 8 hours and an adverse weather evacuation estimate of 10 hours, which include notification and preparation time, loading time, and highway movement time.

4.5 Schools

There are 12 school districts within the 10-mile EPZ, 10 of which have schools within the EPZ. School bus drivers and school buses are most often contracted from a private company and, for the purposes of this preliminary estimate, these buses and drivers are assumed to be available. Assuming the availability of buses, these schools represent a controlled population for the purpose of evacuation.


The school districts having schools within the 10-mile EPZ are as follows:

- Montgomery County:
Pottstown, Pottsgrove, Spring Ford, Perkiomen Valley, Methacton, and Boyertown
- Chester County:
Owen J. Roberts, Phoenixville, and Great Valley
- Berks County:
Daniel Boone and part of Boyertown

In the affected counties, school districts are required to bus students within their school districts to schools in other districts up to 10 miles from their borders.

LEGEND:

- TRUMAN UNIT (T1, T2, Q1, Q2, M1, M2)
- JOHNSON UNIT (H1, H2, I1, I2, Wards 1 and 2, ward W)
- JOHNSON UNIT (H1, H2, I1, I2, Wards 1 and 2, Ward W)
- EISENHOWER UNIT (D1, D2, D3, D4, D5)
- PENN HALL 1 AND 2
- PENN HALL 1 and 2
- INDEPENDENCE UNIT (Modulars 1-10)
- LINCOLN UNIT (C9, C10, C11A, C11B, C14)
- WASHINGTON UNIT (C5, C6, C7, C8)
- HUMPHREY UNIT (47, 48, 49, 50, 51, 51)

 - BUS LOADING POINT

 - AMBULANCE LOADING POINT

24 OCCUPIED BUILDINGS

33 BUSES

76 AMBULANCES

2 FURNITURE VANS

G BUILDING - DIRECTORY

L BUILDING - CANTEEN

P BUILDING - PERSONNEL

A BUILDING - ADMINISTRATION

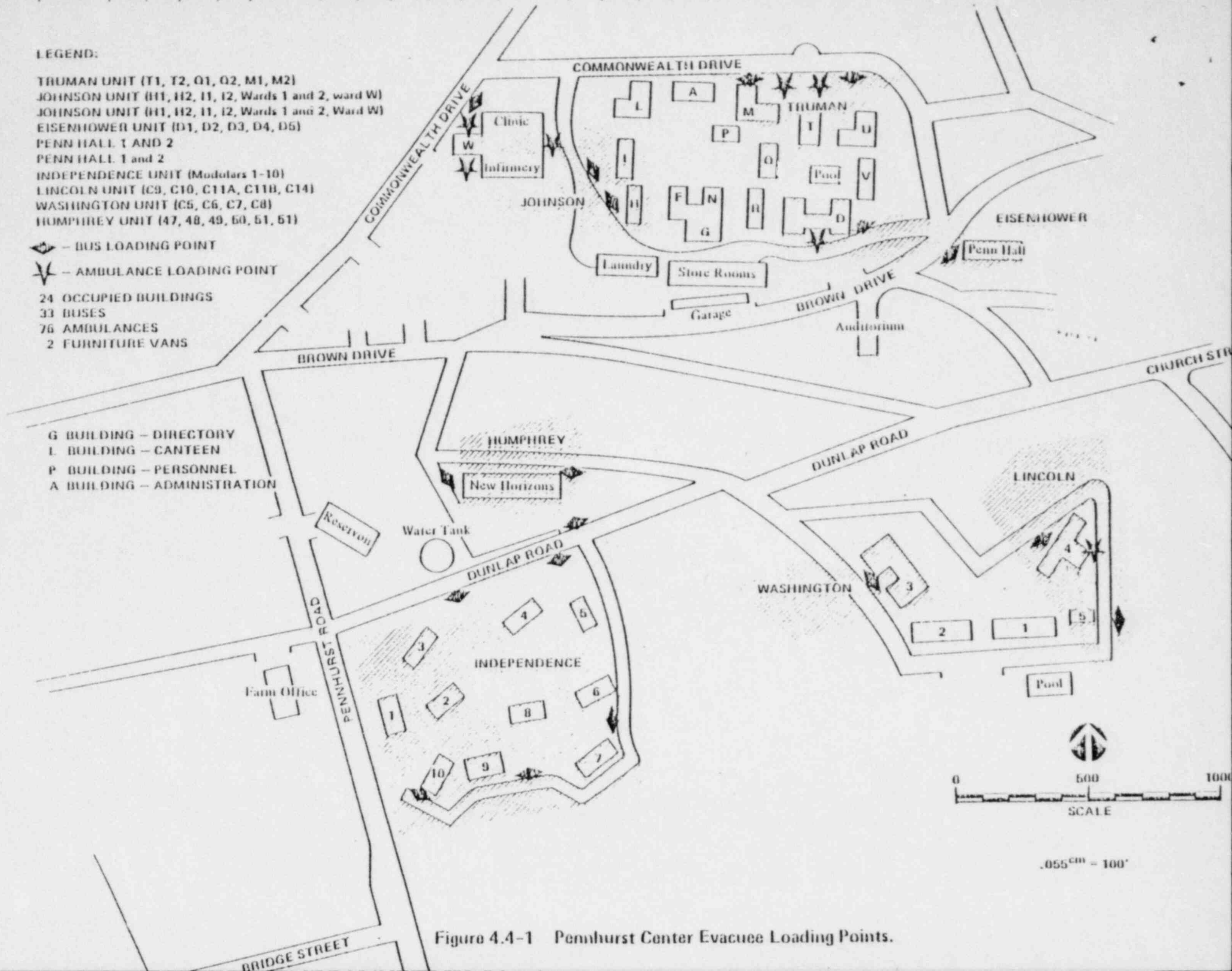


Figure 4.4-1 Pennhurst Center Evacuee Loading Points.