PSEG Site
ESP Application
Part 5, Emergency Plan

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April 15, 2015

REVISION 4

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SUMMARY OF REVISIONS

Revision 0 – Initial Issue

Revision 1 – Incorporation of changes made in response to RAI Nos. 1, 2 and 22.

Revision 2 – Incorporation of changes made in response to RAI No. 66 (Attachment 10) and PSEG's approach to implement Emergency Preparedness Rule changes (Section 15).

Revision 3 – Incorporation of changes to support a eight year drill cycle and requirement to conduct a hostile action based drill once every eight years (Section 15).

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Date

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Manager - EP Date

Reviewed By: N/A ________
Director - Nuclear Oversight Date
(If Applicable)

PORC Review and Station Approvals

N/A
Mtg. No. __N/A__ PSEG Site Chairman

N/A
Date

N/A
PSEG Site Plant Manager
N/A
Date

Effective date of this revision: ________
Date

SECTION 1

INTRODUCTION

1.0 Purpose

This plan has as its fundamental purpose the protection of health and safety of the general public and site personnel from the potential hazards of a radiological emergency.

2.0 Background

This plan is submitted in accordance with the requirements of 10 CFR 50 Appendix E and the objectives of NUREG 0654 (November 1980).

3.0 Scope

This plan identifies the normal and emergency operating organizations, the emergency facilities available, and the overall program for managing and recovering from an emergency situation. The plan shows which federal, state, and local authorities and agencies are available for assistance, and that liaison with such authorities and agencies can be and is established in order to obtain assistance and implement protective actions if necessary. In this manner, the plan reflects the combined efforts and coordination of all responsible organizations, and addresses the general criteria and organization for managing an emergency.

4.0 Planning Basis

In developing this plan, the following reference documents were used as the planning basis:

(1) "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants", NUREG-0654/FEMA, REP.- 1, Rev. I (November 1980); and

(2) "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants" NUREG-0396, EPA 510/1-78-016 (December 1978).

The PSEG Site is 15 miles south of the Delaware Memorial Bridge, 18 miles south of Wilmington, Delaware, 30 miles southwest of Philadelphia, Pennsylvania, and 7-1/2 miles southwest of Salem, New Jersey. Figure 1-1 shows the general location of the PSEG Site and the PSEG Site layout is shown in Figure 1-2. The closest primary public road is New Jersey Route 49, and typical access to the site is from Alloway Creek Neck Road.

The overall objective of this plan is to prevent or reduce radiation exposures to the public resulting from an accident at the PSEG Site. The actual or potential exposures considered in the development of this plan are due to the two principal pathways (plume and ingestion). Although the selected planning basis is independent of specific accident sequences, a number of accident descriptions were considered in the development of this plan, including the core melt accident release categories of the Reactor Safety Study (WASH 1400).

The planning basis used two predominant Emergency Planning Zones (EPZs).

(1) Plume exposure pathway EPZ – The plume exposure pathway EPZ is an area surrounding the plant within a radius of approximately 10 miles. The principal exposure sources from this pathway are: (a) whole body external exposure to gamma radiation from the plume and from deposited material; and (b) inhalation exposure from the passing radioactive plume.

(2) Ingestion exposure pathway EPZ – The ingestion exposure pathway EPZ is an area surrounding the plant within a radius of approximately 50 miles. The principal exposure from this pathway is the ingestion of contaminated milk. The planning effort for this pathway involves the identification of potential sources of contaminated milk and associated control points and mechanisms that prevent it from entering the human food chain. Ingestion pathway exposures in general would represent a problem in the days or weeks following an accident, although some early protective actions to minimize subsequent contamination of milk are provided in the state plans. Additionally, the secondary exposure pathway of ingestion of contaminated foods (either human or animal) was considered in the planning effort.

The EPZ Centerpoint is located at Latitude 39° 27' 50.4" and Longitude 75° 32' 08.7". (Exact boundaries are determined in concurrence with state and county authorities). Figure 1-3 provides an illustration of the plume exposure pathway EPZ which includes areas within approximately 10-miles of the PSEG Site in Salem and Cumberland counties in New Jersey and New Castle and Kent counties in Delaware. Figure 1-4 provides an illustration of the ingestion exposure EPZ which consists of an area approximately 50 miles in radius around the PSEG Site and includes portions of New Jersey, Delaware, Maryland and Pennsylvania.

The EPZs are the areas for which planning is performed to assure that prompt effective actions can be taken to protect the public in the event of an accident. The state's response organizations, rather than local, have taken principal responsibility for the planning associated with the ingestion exposure pathway. The principal townships, towns, cities, and ERPA populations within ten miles of the site are listed in Table 1-1.

The following definitions are used in the plan:

(1) **<u>Accident</u>**

An unforeseen and unintentional event that may result in an emergency.

(2) **<u>Action Steps</u>**

Those steps listed in the Emergency Plan Implementing Procedures which are used to provide direction to appropriate individuals to reduce risk to the health and safety of the public, site personnel and emergency workers in the event an emergency occurs.

(3) **Affected Station**

Distinguishes the station (PSEG Site, Hope Creek or Salem), which experiences a specific emergency event. The designation of the affected station determines the leadership sequences for the emergency response organization for PSEG.

(4) **Assessment Actions**

Those actions taken during or after an accident to obtain and process information necessary to make decisions to implement specific emergency measures.

(5) **Committed Effective Dose Equivalent (CEDE)**

The sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues.

(6) **Contamination**

The presence of radioactive material in undesirable locations.

(7) **Curie (Ci)**

A unit of radioactivity; 1 Curie is that amount of radioactive material in which 3.7×10^{10} disintegrations occur per second. The millicurie and microcurie are respectively one thousandth and one millionth of a Curie.

(8) **Deep Dose Equivalent (DDE)**

Applies to external whole body exposure. It is the dose equivalent at a tissue depth of 1 cm (1000 mg/cm^2).

(9) **Decontamination**

The removal of radioactive contaminants from surfaces or equipment, by cleaning or washing with water or a decontamination solution, if required.

(10) **Drill**

The supervised instruction period aimed at testing, developing and maintaining skills in a particular operation of emergency preparedness. A drill is often a component of an exercise.

(11) **Emergency**

That situation or condition which may lead to undue risk to the health and safety of the public or to site personnel. The emergency action levels that are used to identify these emergencies are described in the Event Classification Guide (as discussed in Section 5 of this plan).

(12) **Emergency Action Levels (EAL)**

Pre-designated parameters of radiological dose rates, specific contamination levels of airborne, waterborne, or surface-deposited concentrations of radioactive materials, or specific instruments/parameters (including their rates of change) that may be used as thresholds for initiating a particular level of emergency, a notification procedure, or a particular protective action.

(13) **Emergency Coordinator (EC)**

That person who has the authority and responsibility to immediately and unilaterally initiate any emergency action including the decision to notify and provide protective action recommendations to authorities responsible for implementing offsite emergency measures.

(14) **Emergency News Center/Joint Information Center (ENC/JIC)**

A facility operated by PSEG for the purpose of disseminating accurate information to the news media.

(15) **Emergency Operations Center (EOC)**

A state or local government's command and communication center which is activated to evaluate the radiological emergency and coordinate the protective actions that may need to be implemented.

(16) **Emergency Operations Facility (EOF)**

A facility operated by PSEG for the coordination of decisions affecting accident mitigation and public safety. The EOF is described in Section 9.0 of this plan.

(17) **Emergency Plan Implementing Procedures**

Specific procedures defining in detail the actions to be taken in the event of an accident by the emergency response organization. The procedures are separate from, but may incorporate and refer to, normal plant operating procedures and instructions.

(18) **Emergency Response Planning Area (ERPA)**

A subdivision of the plume exposure emergency planning zone (10 mile).

(19) **Exercise**

An exercise is an event that tests the integrated capability and a major portion of the basic elements existing within emergency plans of the principal response organizations.

(20) **Fixed Nuclear Facility (FNF)**

A site where nuclear materials are employed in commercial power generating operations.(This term is used extensively in the offsite emergency plans.)

(21) **Mitigating Actions**

Those emergency measures taken to reduce the consequences of or terminate an emergency situation in order to prevent an uncontrolled release of radioactive material or to reduce the magnitude of a release, e.g., shutting down equipment, fire fighting, repair and damage control.

(22) **Offsite**

That area outside of the Protected Area.

(23) **Onsite**

That area inside the Protected Area.

(24) **Operations Support Center (OSC)**

An onsite emergency response facility which functions to coordinate the corrective and protective action activities of site personnel outside of the Control Room. These activities include repairs, fire fighting, damage control, search and rescue, medical response, bomb searches, and local plant system lineup changes.

(25) **Owner Controlled Area (OCA)**

This refers to that area within the PSEG property line.

(26) **Population at Risk**

Those persons for whom protective actions are being or would be taken.

(27) **Protective Actions**

Those emergency measures taken after a release of radioactive material has occurred, or before a release which is expected to occur which would exceed a Protective Action Guide (PAG), for the purpose of preventing or minimizing radiological exposures to persons and the public.

(28) **Protective Action Guides (PAG)**

Projected radiological dose or dose commitment values to individuals in the general population which would warrant protective action following a release of radioactive material. Protective actions would be warranted only when the reduction in individual dose expected to be received is not offset by excessive risks to individual safety should the protective action be taken. The PAG does not include the dose that has

unavoidably occurred prior to the assessment (under no circumstances will a PAG dose be considered an acceptable dose).

(29) **Protected Area (PA)**

That area within the boundaries of the Security fence.

(30) **Rad**

Acronym for radiation absorbed dose, basic unit of absorbed dose of radiation. Technically, a dose of one rad means the absorption of 100 ergs of radiation energy per gram of absorbing material (refer to SI units).

(31) **Radiation (as referred to in this plan)**

Any or all of the following: a form of energy which includes gamma rays, x-rays, neutrons, high-speed electrons, positrons, and other atomic particles which occur from radioactive decay or nuclear fission.

(32) **Radiation Accident**

Any unexpected event, occurrence or circumstance involving an actual or potential radiation exposure or radioactive contamination in excess of federal regulations and/or the facility technical specifications.

(33) **Radiological Control Area (RCA)**

That portion of the plant where exposure to nuclear radiation, radioactive material or radioactive contamination is a concern.

(34) **Recovery Actions**

Those actions taken after the emergency to restore the plant as nearly as possible to its pre-emergency condition.

(35) **Release of Radioactive Material**

Plant effluent greater than tech spec limits.

(36) **Rem**

Acronym for Roentgen Equivalent Man, a measure of the dose equivalence of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose of one roentgen of X - rays or gamma radiation (refer to SI units).

(37) **Roentgen**

A unit of radioactive exposure; the amount of X-radiation or gamma radiation that will provide one electrostatic unit of charge (positive or negative) in one cubic centimeter of

dry air at standard pressure and temperature conditions (2.58 x 10^4 coulombs per Kilogram of air).

(38) **Sector**

22½^0 division of the Emergency Planning Zones (EPZs). The sector (N) is bisected by a line from the PSEG Site directly north.

(39) **Station**

Term used to refer to a licensed nuclear facility that may contain multiple reactors – PSEG Site, Salem and Hope Creek.

(40) **Technical Support Center (TSC)**

This emergency response facility provides a location outside of the Control Room area, where technical support of operations, accident assessment, and initial augmentation of emergency plan implementation may be conducted.

(41) **Total Effective Dose Equivalent (TEDE)**

Term used in conjunction with 10CFR20 and EPA 400 summarizing total dose to the individual which includes exposure from all sources both internal and external to the body.

(42) **Unit**

Term used to refer to a separate reactor in a multi-reactor station – Salem Unit 1, Salem Unit 2.

5.0 State Government Emergency Planning for Contiguous Jurisdictions

5.1 Principal Government Jurisdiction in the EPZs

The States of Delaware and New Jersey are the principal offsite authorities for emergency planning and response for both EPZs. This plan outlines the activities of the states and their response capabilities and includes the agreement between PSEG and the states but does not include the states' plans. A list of all supporting emergency plans is provided as Table 1-2.

5.2 Secondary Government Jurisdictions in the EPZs

The secondary jurisdictions in the EPZs include the affected counties within New Jersey and Delaware and the contiguous States of Pennsylvania and Maryland. These governmental entities have agreements with the States of New Jersey *or* Delaware. The arrangements are outlined in this plan but are not included as part of this plan since they are a part of the appropriate state's plan.

6.0 Integrated Guidance and Criteria

NRC and FEMA have consolidated the guidance intended for use by the licensees, state and local governments in NUREG-0654 FEMA-REP-1, Rev. 1. Should an accident occur, the public can be best protected when the response by all parties is fully integrated. Each party involved must have a clear understanding of what the overall level of preparedness must be and what role it will play in the event of an accident. This understanding can be best achieved if there is an integrated development and evaluation of plans. There must also be an acceptance by the parties and a clear recognition of the responsibility they share for safeguarding public health and safety. This plan has been developed to meet these goals.

Although NUREG-0654 indicates that the criteria are applicable to one or more specific organizations, the intention throughout NUREG-0654 is to provide for an adequate state of emergency preparedness around the facility. To meet this intent this plan has been developed to complement the emergency plans of the States of New Jersey and Delaware.

7.0 Technical Assistance

The planning for response to the offsite consequences of an accident at the PSEG Site and implementation of protective actions resulting from that accident are the responsibility of the States. This plan provides for cooperation with and assistance to the States of New Jersey and Delaware.

8.0 Emergency Response Organization (ERO)

PSEG has established an organization to respond to emergencies at the PSEG Site. This organization consists of PSEG response personnel. These response organizations and their method of notification, resources, initiation and limitations are detailed in the appropriate sections of this plan.

9.0 Form and Content of Plans

This plan has been written following the outline of NUREG-0654 (November 1980) to minimize the need for cross referencing and to aid the review process.

10.0 Emergency Plan Implementing Procedures

Emergency plan implementing procedures provide directions for implementation of the Emergency Plan. Each Table of Contents to the procedure volumes is considered the controlled listing of procedures and revisions. Emergency Plan Procedures, including PSEG Site Event Classification and Notification Procedures, are also listed in the Emergency Plan attachment volume.

TABLE 1-1

LIST OF EMERGENCY RESPONSE PLANNING AREAS, TOWNS WITHIN 10 MILES OF THE PSEG SITE, AND ERPA POPULATIONS [1]

DELAWARE TOWNS	DISTANCE FROM SITE (miles)	NEW JERSEY TOWNS	DISTANCE FROM SITE (miles)
Bay View Beach	3.4 (WNW)	LAC Township	0.0 (E)
Delaware City	7.5 (WNW)	Quinton Township	8.5 (NE)
Middletown	9.5 (W)	Salem	8.0 (NNE)
Odessa	6.2 (W)		
Port Penn	4.2 (NNW)		
St. Georges	9.5 (WSW)		
Townsend	9.5 (WSW)		
Woodland Beach	9.7 (SSE)		

DELAWARE

ERPA	POPULATION
A	5343
B	11,202
C	16,496
D (River)	0
DE TOTAL	33,041

NEW JERSEY

ERPA	POPULATION
1	862
2	3067
3	6595
4	242
5	437
6	491
7	299
8 (River)	0
NJ TOTAL	11,993

DELAWARE & NEW JERSEY TOTAL	**45,034**

1 – 2009 Population data based on ETE Report (Attachment 11)

TABLE 1-2
OFFSITE EMERGENCY PLANS SUPPORTING PSEG EMERGENCY PLAN

Plan	Responsible Agency
Plume Exposure Pathway	
New Jersey Radiological Emergency Response Plan	Office of Emergency Management, New Jersey State Police
Salem County Radiological Emergency Response Plan	Salem County Office of Emergency Management
Elsinboro Township Radiological Emergency Response Plan	Elsinboro Township Office of Emergency Management
Lower Alloways Creek Township Radiological Emergency Response Plan	Lower Alloways Creek Office of Emergency Management
Mannington Township Radiological Emergency Response Plan	Mannington Township Office of Emergency Management
Pennsville Township Radiological Emergency Response Plan	Pennsville Township Office of Emergency Management
Quinton Township Radiological Response Plan	Quinton Township Office of Emergency Management
Salem City Radiological Emergency Response Plan	Salem City Office of Emergency Management
Cumberland County Radiological Emergency Response Plan	Cumberland County Office of Emergency Management
Greenwich Township Radiological Emergency Response Plan	Greenwich Township Office of Emergency Management

TABLE 1-2 (cont)
OFFSITE EMERGENCY PLANS SUPPORTING PSEG EMERGENCY PLAN

Plan	Responsible Agency
Plume Exposure Pathway	
Stow Creek Township Radiological - Emergency Response Plan	Stow Creek Township Office of Emergency Management
Delaware Radiological Plan	Delaware Emergency Management Agency
New Castle County Radiological Emergency Plan	New Castle County Department of Public Safety
Kent County Radiological Emergency Plan	Kent County Emergency Planning and Operations
Ingestion Pathway	
Maryland Disaster Assistance Plan, Annex O, Radiological Emergency Response Plan	Maryland Civil Defense & Disaster Preparedness Agency
Pennsylvania Disaster Operations Plan, Annex E, Fixed Nuclear Facility Incidents	Pennsylvania Emergency Management Agency

FIGURE 1-1
GENERAL LOCATION OF THE PSEG SITE AND SURROUNDING AREA

FIGURE 1-2
PSEG SITE LAYOUT

FIGURE 1-3
10-MILE EMERGENCY PLANNING ZONE

FIGURE 1-4
50-MILE EMERGENCY PLANNING ZONE

SECTION 2

ASSIGNMENT OF RESPONSIBILITY

1.0 PSEG

1.1 Internal Responsibility

PSEG, licensee of the PSEG Site, has the primary responsibility for planning and implementing emergency measures within the site boundary. In addition to accident mitigation, this responsibility includes accident assessment and the evaluation of any real or potential risk to the public health and safety. Based upon this evaluation, appropriate offsite agencies are promptly notified of the Protective Action Recommendations (PAR) for the affected population areas.

The Manager - Emergency Preparedness (Manager EP) is the individual who is responsible for maintaining emergency preparedness for PSEG. The Manager EP reports to the Director - Regulatory Affairs, who reports to the President and Chief Nuclear Officer. Organization charts showing reporting relationships for emergency preparedness within both the corporate structure and PSEG are presented in Figures 2-1 and 2-2.

Throughout the duration of an emergency, accident mitigation is the responsibility of the Shift Manager (SM). The Technical Support Center (TSC) staff under the direction of the Emergency Duty Officer (EDO) supplies support. Protective Action Recommendations are made from the TSC following its activation. Additional support is available from the Emergency Operations Facility (EOF), which is staffed and may be activated for Alerts and always activates at a Site Area Emergency. Protective Action Recommendations are made from the EOF following its activation.

The Emergency Response Organization at each level of response is described in Section 3. Each emergency manager/supervisor is responsible for maintaining and ensuring the continuity of personnel and resources.

The PSEG Site maintains 24-hour emergency response capability. The normal on-shift complement provides the initial response to an emergency. This group is trained to handle emergency situations (e.g., initiate implementation of the emergency plan, make initial accident assessment, emergency classification, notifications, communications, and protective action recommendations) until the augmented ERO arrives. The ERO is composed of a broad spectrum of personnel with specialties in operations, maintenance, engineering, radiochemistry, radiation protection, material control, fire protection, security, communications, and emergency preparedness who are available and trained to augment on-shift personnel in an emergency. Procedures for training and maintenance of the emergency organization are in place to provide the capability of continuous (24-hour) operations.

1.2 External Agreements

PSEG has entered into agreements with the appropriate emergency response organizations which would provide onsite and offsite support in the event of an emergency at the PSEG Site. These agreements are provided in Emergency Plan Attachments 2 and 3. Figures 2-3

and 2-4 show how these organizations interface with PSEG. Figure 2-5 shows how these organizations interface for protective action decision making.

2.0 Principal Government Jurisdictions in the EPZs

2.1 The State of Delaware

The Delaware Emergency Management Agency (DEMA), Department of Public Safety, has developed the Delaware Radiological Emergency Preparedness (REP) Plan and serves as the lead agency for coordinating state emergency actions as authorized in the Delaware Code Annotated Title 20, Chapter 31.

The Delaware Department of Natural Resources and Environmental Control (DNREC), as authorized by the Delaware Code Annotated Title 7, Chapter 60 is responsible for protecting the environment to include participation in accident assessment, mitigation and recovery efforts in the event of a radiological incident.

The Delaware Department of Health and Social Services (DHSS), as authorized by the Delaware Code Annotated, Title 16, Chapter 1, has the overall responsibility for protecting health and safety of the general public to include accident assessment, social services mitigation and recovery efforts in the event of radiological incident.

The Delaware Department of Agriculture (DDA), as authorized by the Delaware Code Annotated Title 29, Chapter 81, is responsible for protection of agriculture in the interest of health and safety of the public.

The Technical Assessment Center (TAC) develops Delaware's accident assessment and protective action response. The TAC comprises members of the DNREC, DHSS with the Deputy Director of the Division of Public Health (DPH) and Division of Water Resources (DWR) Senior Science Advisor serving as the Co-Chairperson of the TAC. Protective Action Recommendations are developed and provided to the DEMA Director by the TAC Chairperson.

The resources and response organization of the State of Delaware are described in the Delaware Radiological Emergency Plan. The response organization for the State of Delaware is provided as Figure 2-6. The development of protective actions is performed as outlined in Figure 2-5 and discussed in detail in Sections 10 and 11 of this plan.

2.2 The State of New Jersey

The Office of Emergency Management (OEM) of New Jersey State Police (NJSP) is granted the authority to assist in supervising and coordinating the emergency response activities of the state government and of all of the political subdivisions as outlined in the New Jersey Civil Defense Act of 1942, Chapter 251, as amended.

The New Jersey Department of Environmental Protection (DEP) is empowered by NJ Radiation Accident Response Act (N.J.S.A. 26:2D-37 et.seq.), to take/recommend radiological protective actions as necessary to protect the public health or welfare.
The Superintendent of NJSP is the agency head that acts as New Jersey's emergency coordinator responsible for directing and/or coordinating all emergency response by New

Jersey state agencies. The response organization for the State of New Jersey is provided as Figure 2-7.

The New Jersey Department of Environmental Protection is the lead agency for New Jersey's assessment of radiological emergencies. The Commissioner of the DEP is the agency head responsible for the response of that organization. The actions taken by DEP are coordinated through and parallel with the actions of the NJSP.

The resources and response organizations of the State of New Jersey are described in the New Jersey Radiological Emergency Response Plan. The development of protective actions is performed as outlined in Figure 2-5 and is discussed in detail in Sections 10 and 11.

2.2.1 Local Governments

The County Emergency Management Coordinators for Salem and Cumberland Counties in New Jersey and the County Emergency Preparedness Coordinators for New Castle and Kent Counties in Delaware are the local government representatives who act as the county emergency coordinators. The response organizations for the counties are provided in Figures 2-8 through 2-11.

3.0 Contiguous (Ingestion Pathway) States

The States of Pennsylvania and Maryland are contiguous (Ingestion pathway) states. The ingestion exposure pathway planning area is shown in Emergency Plan Section 1, Figure 1-4. The State of New Jersey has taken the primary responsibility for notification and communications with the contiguous (ingestion pathway) States of Pennsylvania and Maryland.

The Memoranda of Understanding between the State of New Jersey and the States of Pennsylvania and Maryland are available for review and located in the Emergency Plan attachment volume. Should the accident cause conditions offsite that justify monitoring of the ingestion pathway, PSEG's emergency coordinator function verifies with the States of New Jersey and Delaware that the ingestion pathway is being monitored. Additionally, the individual acting in the emergency coordinator function verifies with the State of New Jersey that the States of Pennsylvania and Maryland have been notified. The State of Delaware also has agreements in force with the States of Maryland and Pennsylvania regarding emergency notifications. The criteria for recommending ingestion pathway monitoring is that radionuclide concentrations in excess of 10CFR20 Appendix B limits could potentially exist *or* are verified to exist offsite.

FIGURE 2-1
PSEG CORPORATE ORGANIZATION

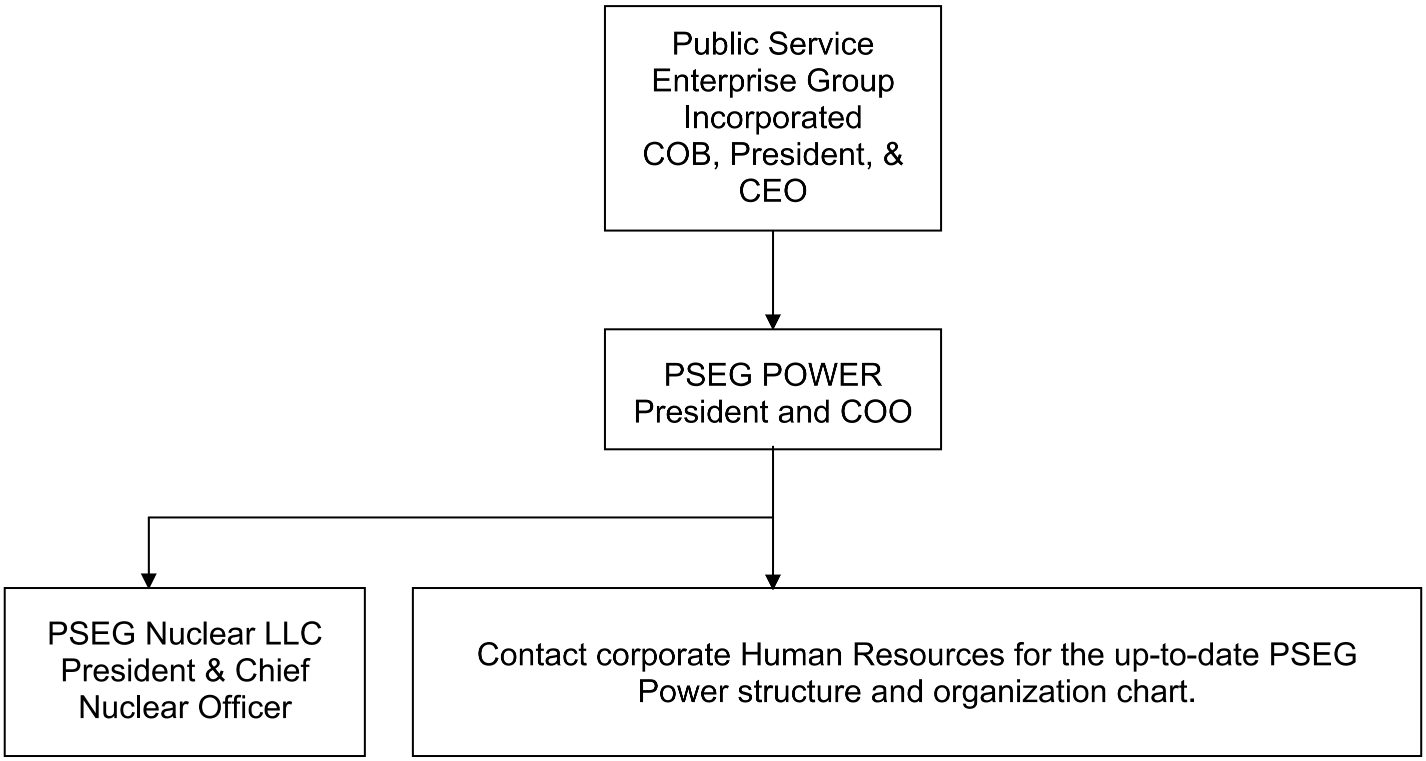


FIGURE 2-2
PSEG NUCLEAR ORGANIZATION

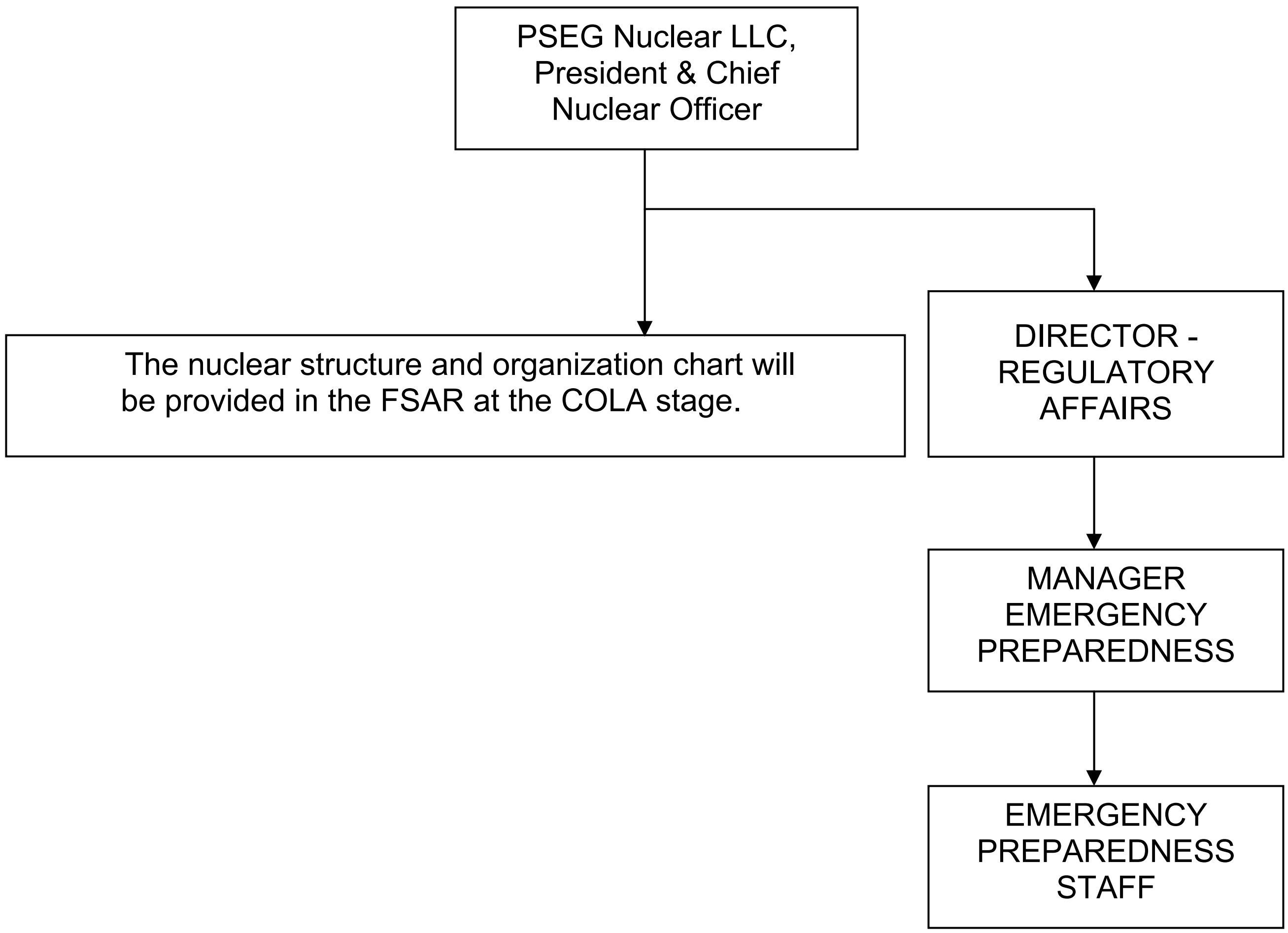
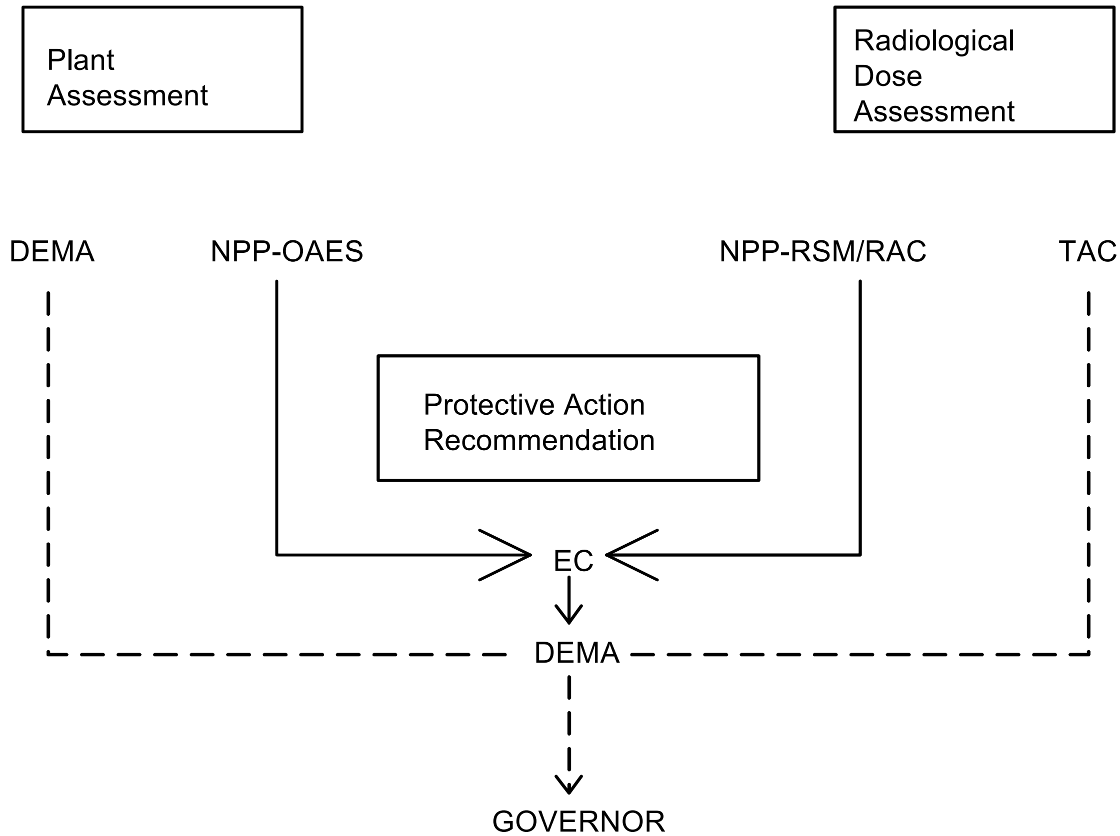


FIGURE 2-3
DELAWARE STATE INTERFACE

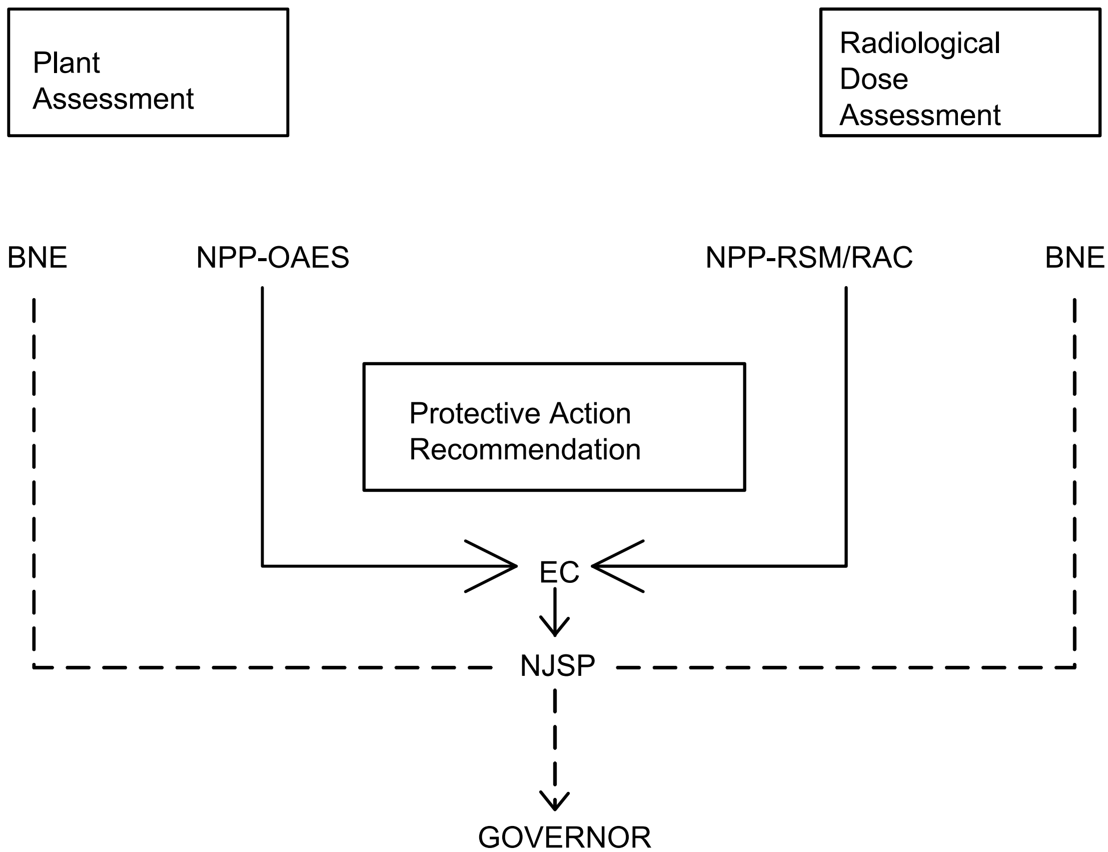


Key to Abbreviations/Symbols

- - - - - state communication
——— utility communication

EC	Emergency Coordinator (Shift Manager, Emergency Duty Officer, Emergency Response Manager)
NPP	Nuclear Power Plant (Fixed Nuclear Facility)
RAC	Radiological Assessment Coordinator
RSM	Radiological Support Manager
OAES	Operations Assessment and Engineering Staff
TAC	Technical Assessment Center, State of Delaware
DEMA	Delaware Emergency Management Agency, State of Delaware

FIGURE 2-4
NEW JERSEY STATE INTERFACE



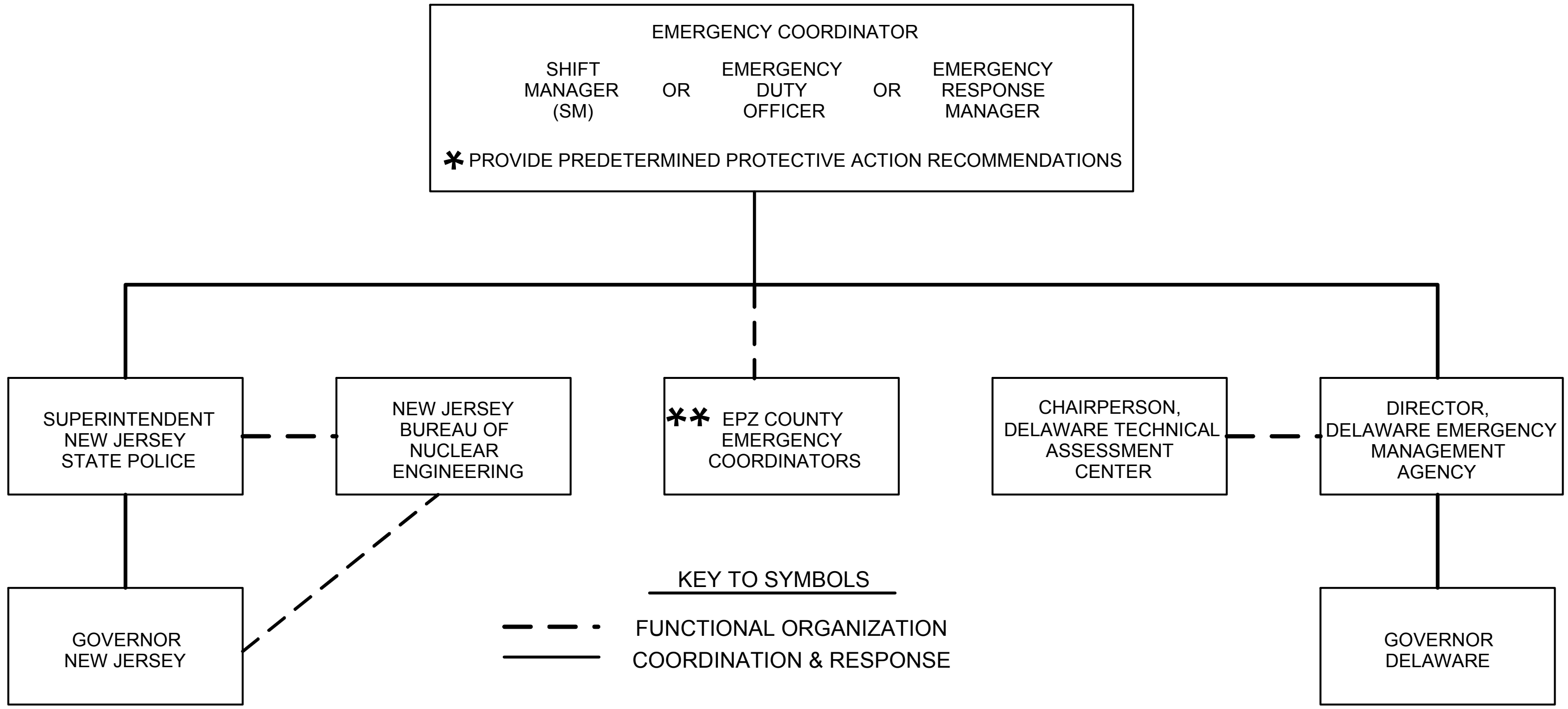
Key to Abbreviations/Symbols

- - - - - state communication
———— utility communication

EC	Emergency Coordinator (Shift Manager, Emergency Duty Officer, Emergency Response Manager)
NPP	Nuclear Power Plant (Fixed Nuclear Facility)
RAC	Radiological Assessment Coordinator
RSM	Radiological Support Manager
OAES	Operations Assessment and Engineering Staff
BNE	New Jersey Bureau of Nuclear Engineering, Department of Environmental Protection
NJSP	New Jersey State Police

FIGURE 2-5

**DECISION CHAIN
PROTECTIVE ACTIONS
FOR
EVENTS CLASSIFIED AS GENERAL EMERGENCY**



* PREDETERMINED PROTECTIVE ACTION RECOMMENDATIONS ARE DEVELOPED IN ACCORDANCE WITH IE INFORMATION NOTICE 83-28 AND NUREG - 0654, REV. 1. RELEASE ASSESSMENT WILL THEN BE PERFORMED TO ENSURE APPROPRIATE PROTECTIVE ACTIONS HAVE BEEN DEVELOPED.

** COUNTY EMERGENCY COORDINATORS ARE SHOWN HERE BECAUSE THEY ARE NOTIFIED DIRECTLY IF THE STATE(S) CANNOT BE CONTACTED AT A GENERAL EMERGENCY.

FIGURE 2-6

STATE OF DELAWARE
RADIOLOGICAL EMERGENCY RESPONSE
STATE ORGANIZATION

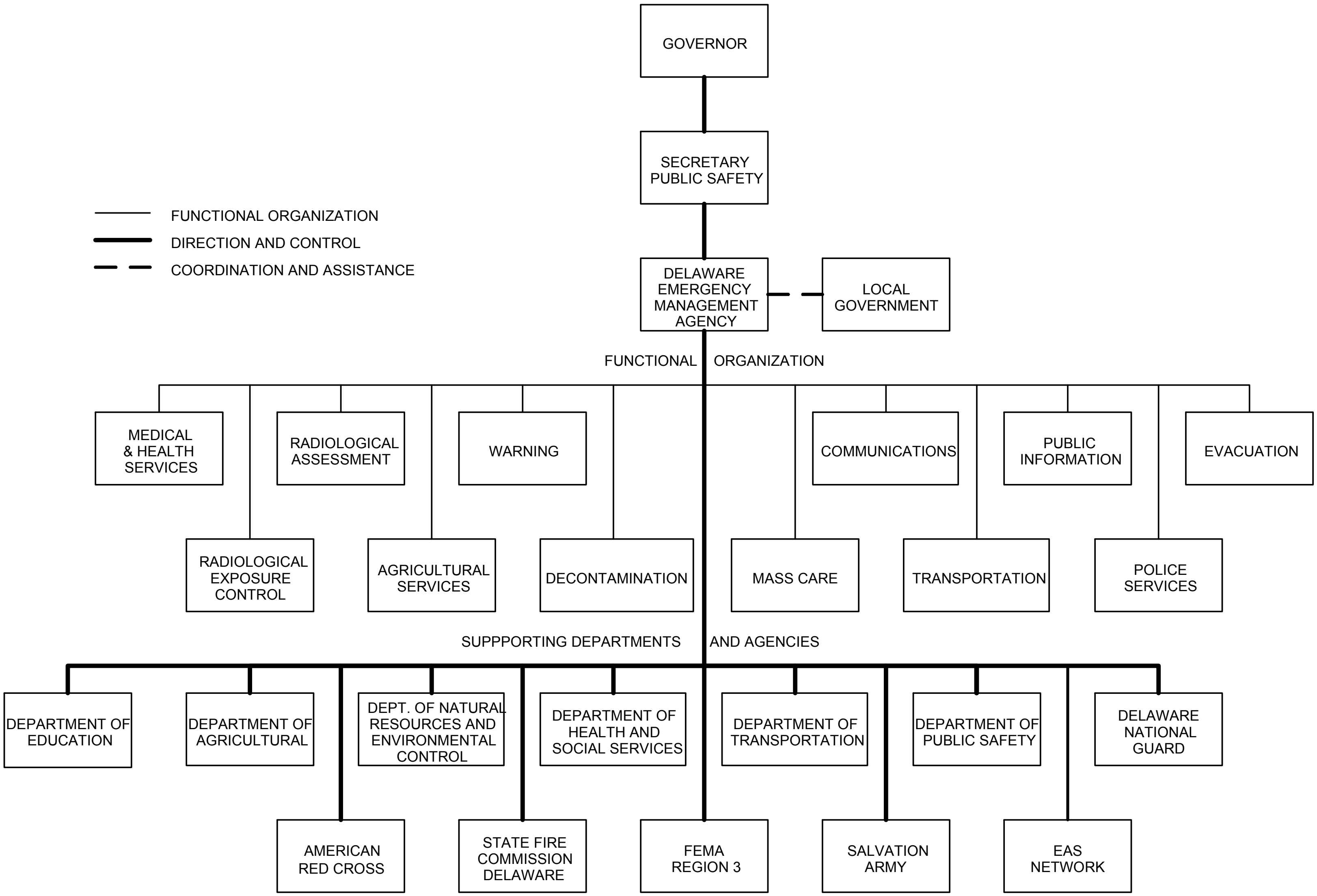


FIGURE 2-7
STATE OF NEW JERSEY
RADIOLOGICAL EMERGENCY RESPONSE
STATE ORGANIZATION

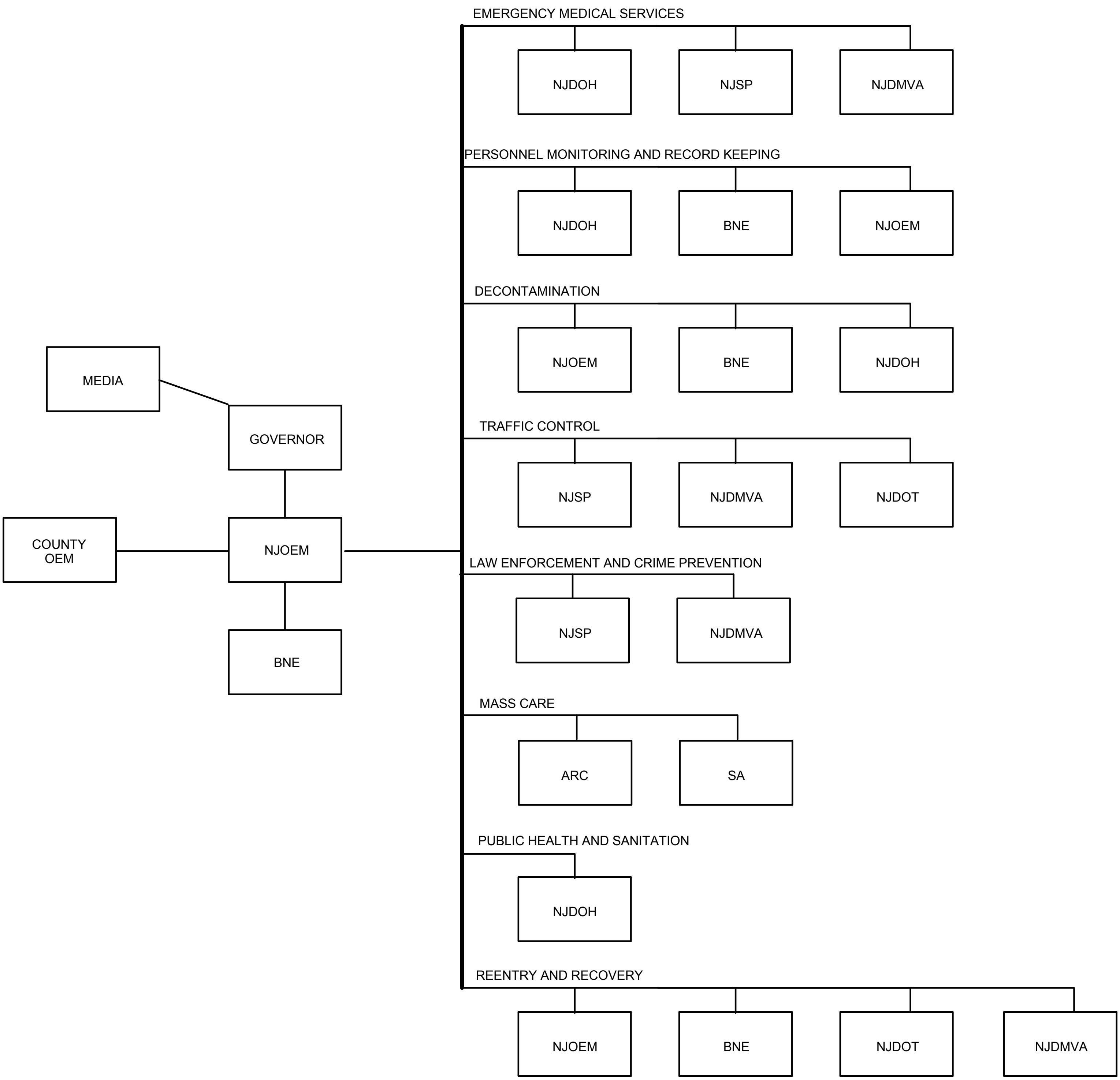


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FIGURE 2-8

SALEM COUNTY
COUNTY EMERGENCY ORGANIZATION

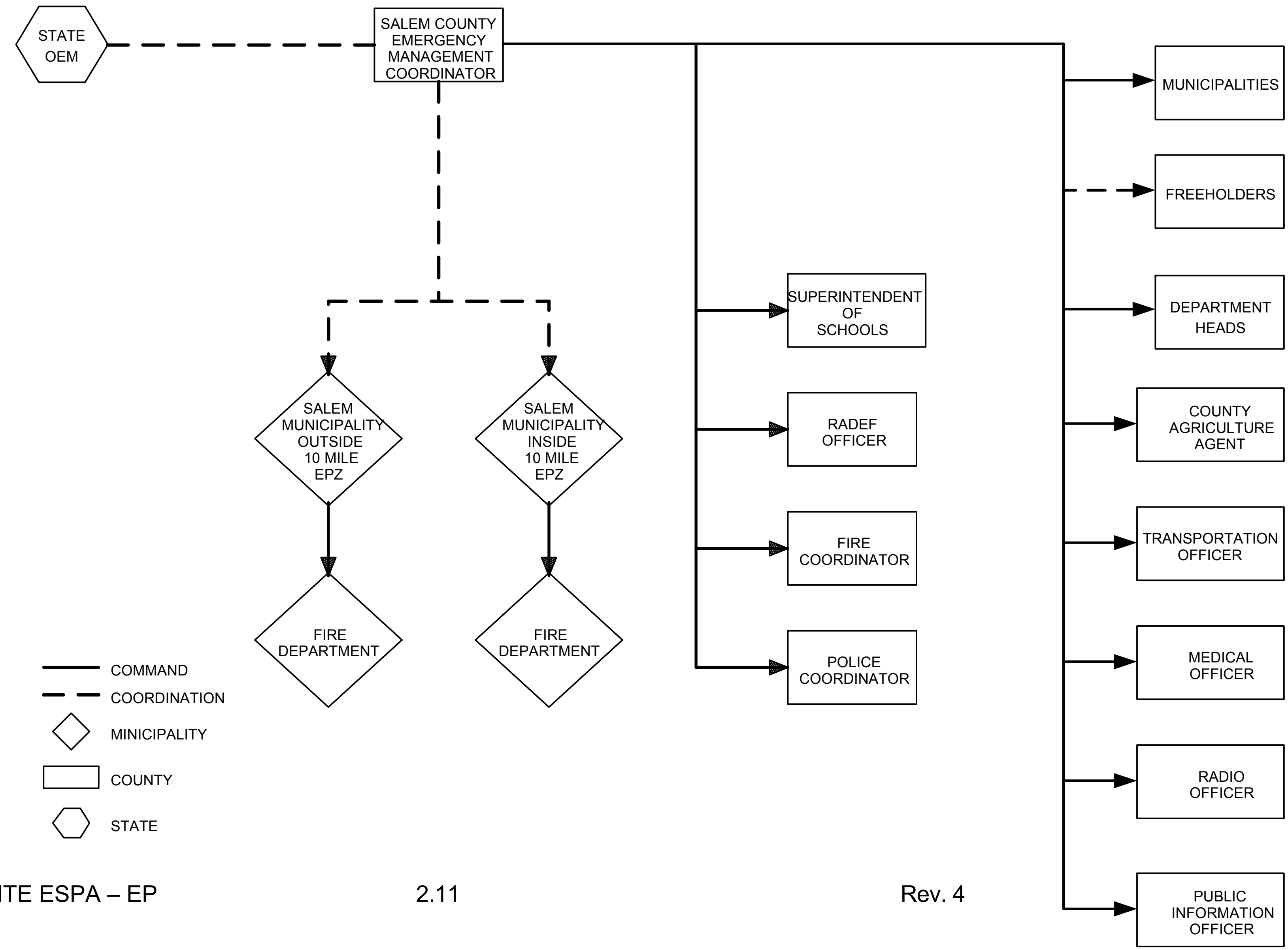


FIGURE 2-9

CUMBERLAND COUNTY
COUNTY EMERGENCY ORGANIZATION

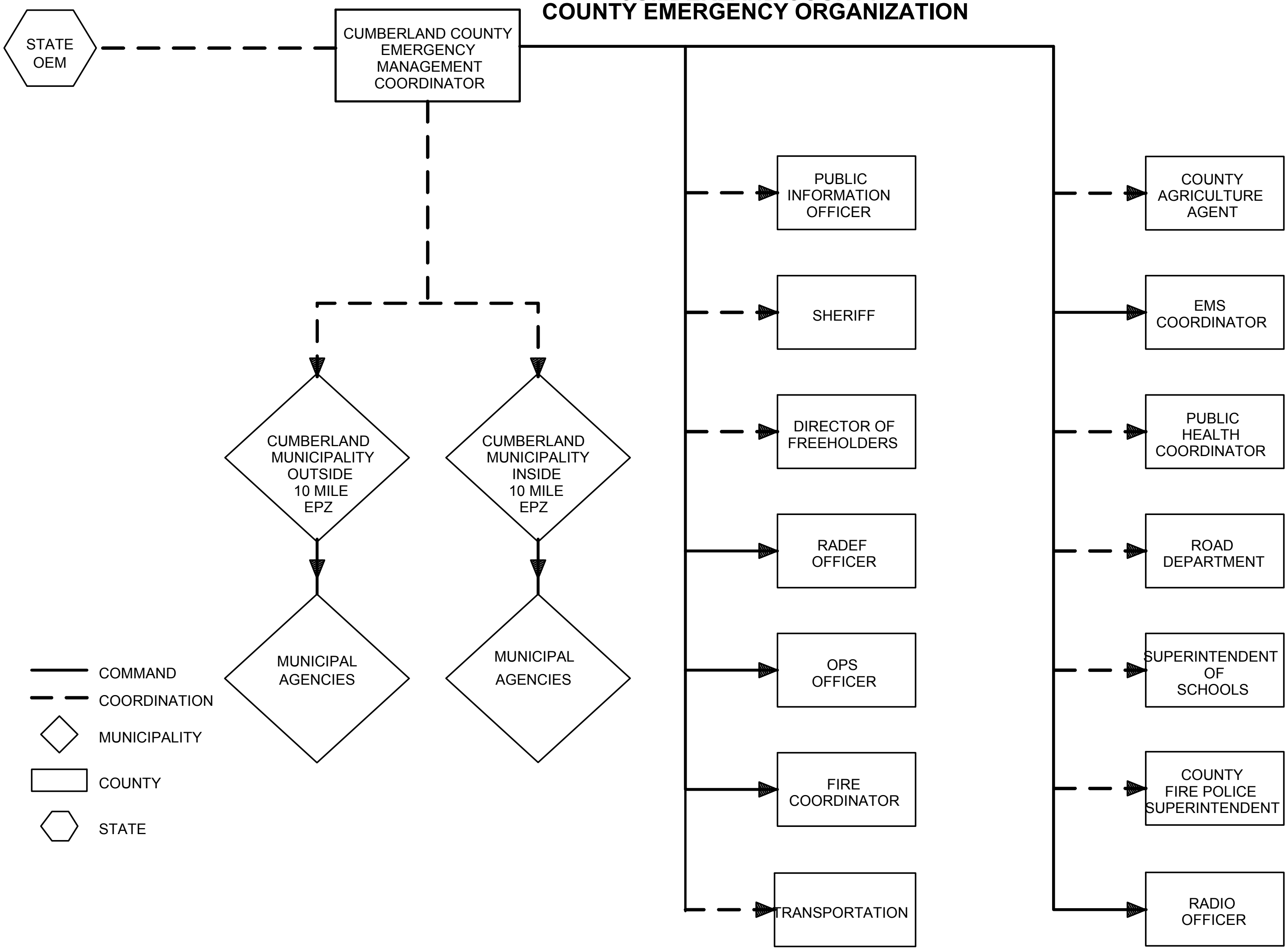
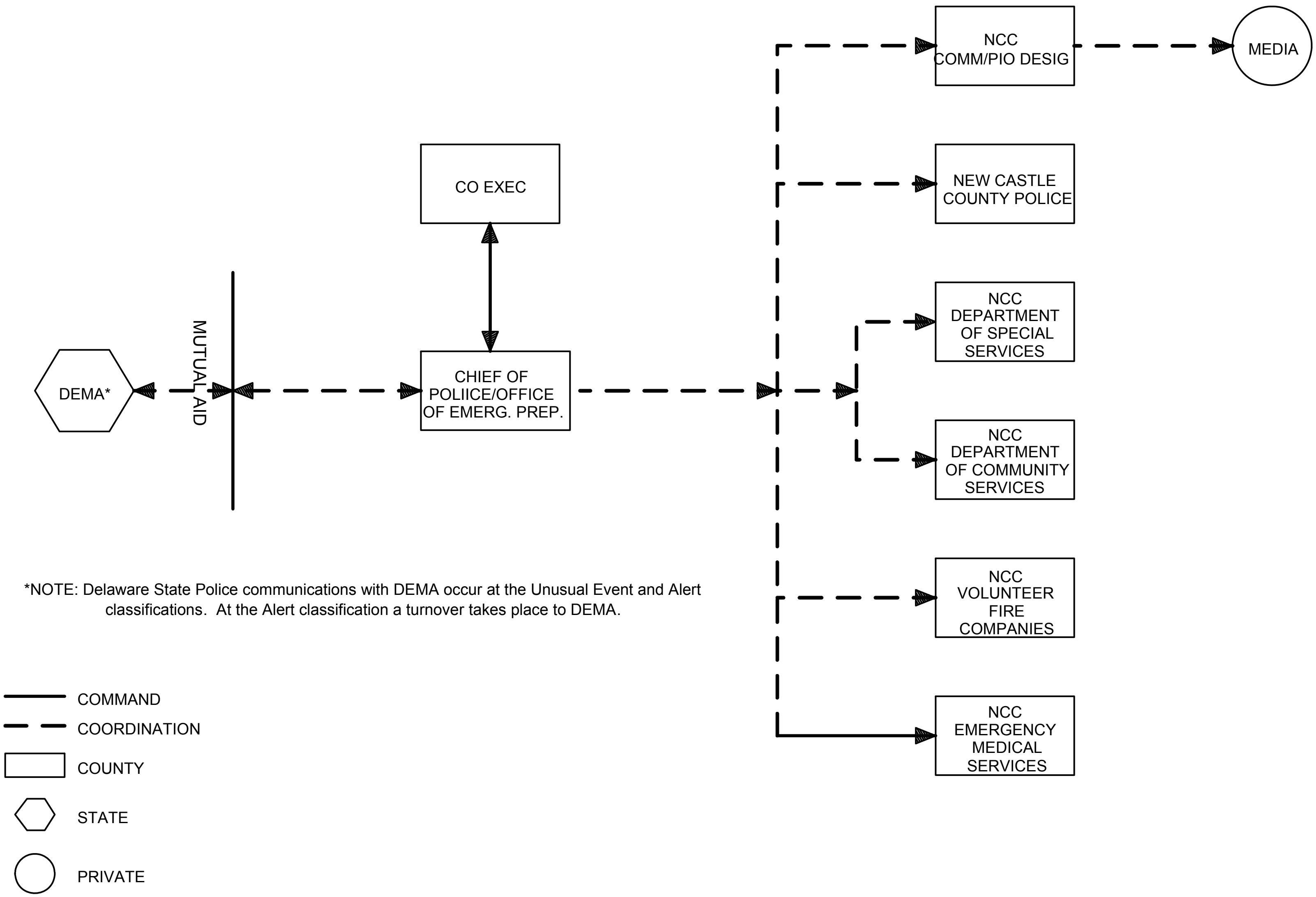


FIGURE 2-10

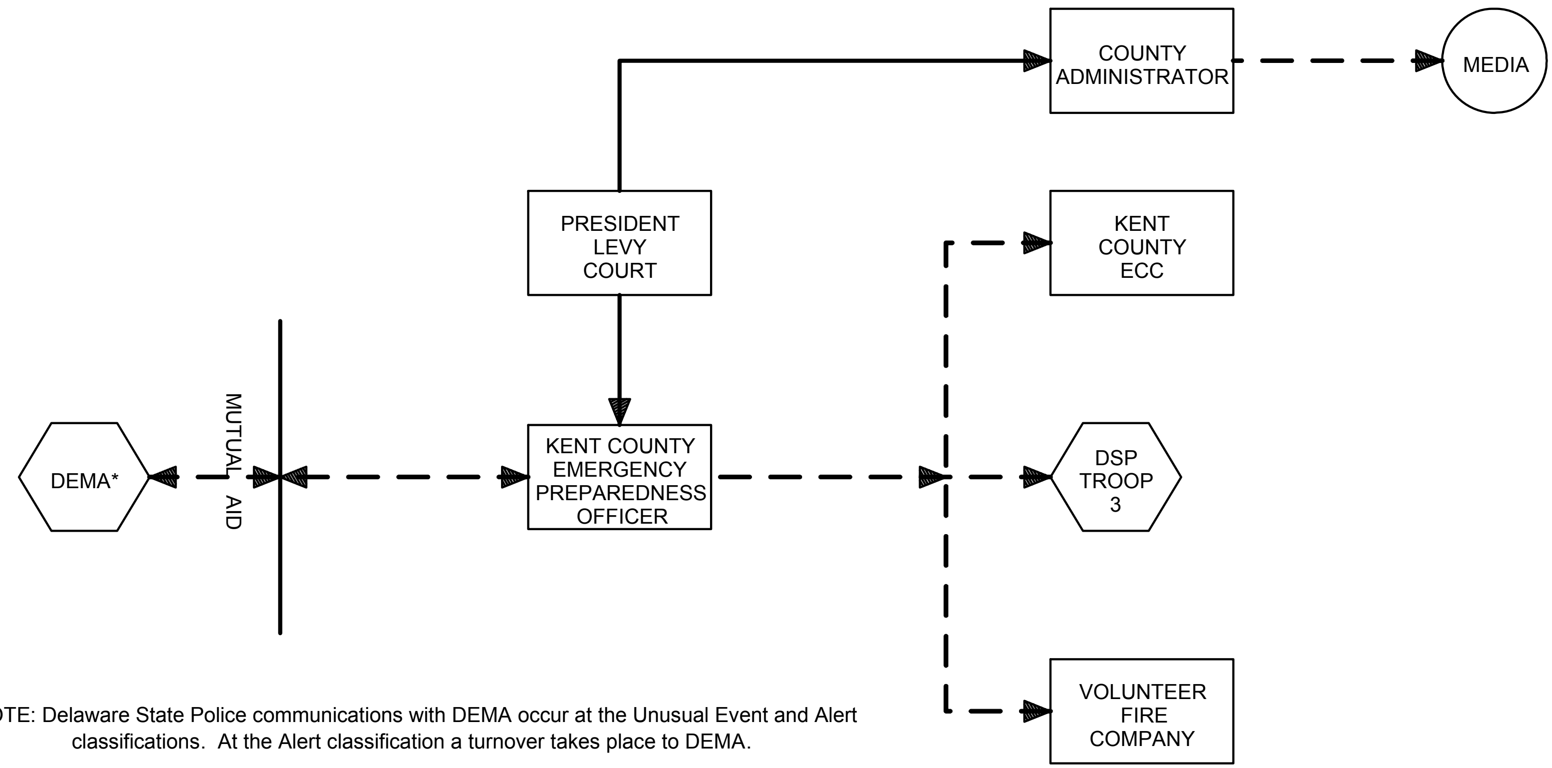
NEW CASTLE COUNTY (NCC) COUNTY EMERGENCY ORGANIZATION



*NOTE: Delaware State Police communications with DEMA occur at the Unusual Event and Alert classifications. At the Alert classification a turnover takes place to DEMA.

FIGURE 2-11

KENT COUNTY
COUNTY EMERGENCY ORGANIZATION



*NOTE: Delaware State Police communications with DEMA occur at the Unusual Event and Alert classifications. At the Alert classification a turnover takes place to DEMA.

COMMAND
COORDINATION
COUNTY
STATE
PRIVATE

SECTION 3

EMERGENCY ORGANIZATION

1.0 Normal Management Organization

PSEG is wholly owned by Public Service Enterprise Group, a corporation formed under the laws of the State of New Jersey. Its primary purpose is to provide safe, adequate and reliable electric and gas service to its customers at reasonable rates. Management structure and reporting responsibilities for PSEG are delineated in organizational charts (Figures 2-1 & 2-2). The Manager - Emergency Preparedness has been delegated the authority for developing, implementing, and maintaining a comprehensive program for emergency preparedness. The emergency preparedness program is designed to protect the health and safety of the public and onsite personnel during a nuclear plant accident while interfacing with federal, state and local agencies, and to coordinate the development of offsite and onsite plans.

2.0 Normal Shift Organization

2.1 Operations

The Shift Manager (SM) is normally the senior shift member of the station organization. The SM has the primary management responsibility for safe operation of the station during the shift. The SM maintains an overview of the unit's condition, makes decisions, and directs operations by giving specific directions and responsibilities to the shift personnel. The SM holds a Senior Reactor Operator's License and meets or exceeds the qualifications required by the Facility Technical Specifications.

The Control Room Supervisor (CRS) is an extension of the authority and responsibility of the SM. The CRS maintains an overview of the unit's status and condition. In the areas of operation to which he/she is assigned, the CRS is given the authority and responsibility to make decisions and direct operations by giving specific direction and responsibility to the shift personnel. All operations personnel are subject to the orders, directions and instructions of the CRS as though he/she were the SM.

The CRS coordinates the activities of the shift personnel with the SM to avoid conflicts and to ensure that all operations are performed according to the orders, directions, and instructions of the SM. The CRS holds a Senior Reactor Operator's License and meets or exceeds the qualifications required by Facility Technical Specifications. In the event that the SM is unable to complete a shift, the CRS fills these positions until that position can be recalled from offsite.

Reactor/Plant Operators are assigned to the Control Room in accordance with the requirements of the Facility Technical Specifications. They are responsible for manipulating controls for startup, changing electrical output and reactor power, and plant shutdown, as required. Reactor and Plant Operators take directions from the SM and CRS.

The Equipment Operators perform duties outside the main control room necessary for safe continuous operation of the plant. Their duties include maintaining equipment logs, initiating actions to maintain assigned equipment in a safe condition, and operating auxiliary equipment as necessary to support plant operations. The Equipment Operators take directions from the Licensed Reactor/Plant Operators or CRS.

2.2 Fire Department and First Aid Team

The on-shift fire department is maintained in accordance with Technical Specifications and is staffed by full-time fire protection operators and fire fighters who have received fire-fighting and first-aid training. The fire department's staff reports to the Duty Nuclear Fire Protection Supervisor for normal assignments and directions but receives on-shift direction from the Shift Manager concerning priority response. The First Aid Team is a collateral duty of the Fire Department. The First Aid Team is staffed by personnel who are qualified Emergency Medical Technicians (EMT's) in the state of New Jersey.

2.3 Maintenance

The Shift Controls Technician Electrical are the members of the Maintenance Department who are available to perform surveillance and preventive and corrective maintenance on electrical distribution equipment. This position reports to the Maintenance Department for normal assignments and supervision and receives on-shift direction from the shift maintenance supervisor in coordination with the SM concerning priority repairs to support plant operations.

Maintenance on valves, pumps and other mechanical components is the responsibility of the Maintenance Department Nuclear Technician - Mechanical. These individuals are not included as part of a shift's normal staffing complement but are available, as needed, to support the required repairs. The Scheduled Controls Technician I&C are the members of the Maintenance Department who are responsible for preventive and corrective maintenance on any instrumentation and controls. This position reports to the Maintenance Department for normal assignments and supervision but receives on-shift direction from the shift maintenance supervisor in coordination with the SM concerning priority repairs to support plant operations.

2.4 Technical

The Technical Engineers with specialties in controls, electrical, mechanical, and core thermal engineering, who are assigned to the Technical Support Team, are members of the Engineering Department. The PSEG plant technical support provides primary system engineering support during normal operations.

2.5 Security Organization

The on-duty Nuclear Security Supervisor and the Security Force are responsible for station security. These persons are assigned in accordance with the Station Security Plan and report to the Emergency Services Manager for normal assignments and directions, but receive on-shift direction from the SM, concerning special access control requirements or accountability.

2.6 Radiation Protection/Chemistry Organization

The PSEG Site’s back-shift Radiation Protection/Chemistry Organization consists of one Shift Radiation Protection Technician (SRPT) and one Onshift Radiation Protection Technician (ORPT), who is directed by the SRPT, and one Chemistry Technician.

When Radiation Protection Supervision is not present, the SRPT, ORPT, and any Radiation Protection Technicians (RPTs), who may be on shift, report to the SM. Radiation Protection personnel on the back-shift are normally responsible for conducting routine and special

surveys, operating counting room instrumentation, maintaining access control at the Control Point, writing Radiation Work Permits, and providing job coverage as required.

The Chemistry Technicians are the members of the Station Chemistry Department who are responsible for performing reactor coolant chemistry sampling and analysis. This position reports to the Chemistry Department for normal assignments and supervision, but receives on-shift direction from the SM concerning sampling required to support station operations.

During an Emergency, Chemistry Supervisors and technicians report to the SM, until the TSC is activated. The Chemistry Supervisor(s) and technicians report to the Radiological Assessment Coordinator (RAC), upon activation of the TSC.

3.0 Emergency Organization Functional Description

The emergency organization is explained by functional areas in this section and in Figures 3-1 thru 3-4. Figures 3-1 and 3-2 indicate onsite staffing for the PSEG Site. Detailed job descriptions for each box shown in the figures are provided in Part 9.0 of this section.

4.0 Emergency Direction and Control

The individual functioning in the position of Emergency Coordinator (EC) has overall responsibility to direct and control the emergency response. The function of EC passes from the SM to the Emergency Duty Officer (EDO) and to the Emergency Response Manager (ERM) as the emergency response organization is augmented. Responsibilities and duties of these three emergency response positions, (SM, EDO, ERM) are outlined in paragraph 9.0 of this section. The individual fulfilling the function of EC has the responsibilities listed below which are non-delegable:

- Provide direction, control and coordination of PSEG's emergency response.
- Authorize the expenditure of company funds and commit corporate resources as necessary to implement emergency procedures and/or to mitigate the accident.
- Classify emergencies in accordance with the PSEG Site Event Classification Guides.
- Make decisions to notify and recommend protective actions to offsite agencies.

4.1 On-Shift and Initial Augment

The SM has the emergency coordinator function initially and provides emergency direction and control (unless relieved by an EDO-qualified member of Station Management). The SM has the authority and responsibility to immediately and unilaterally initiate any emergency actions. The CRS takes operational control of the unit while the SM is fulfilling the emergency coordinator function.

The Nuclear Shift Technical Advisor (NSTA) provides an independent engineering assessment of plant conditions and advises the SM of potential problems recognized as a result of the assessment. The NSTA and the CRS or SM may be the same individual.

4.2 Short-Term Augment

Following assumption of the emergency coordinator function (from the SM) by an EDO, the EDO has the authority and responsibility to immediately and unilaterally initiate any emergency actions. The SM then takes control of the unit and is responsible for issuing all orders concerning operations that require direction by a senior reactor operator licensed individual. The CRS assists the SM. The NSTA provides an engineering assessment of plant conditions.

4.3 Long-Term Augment

Following the assumption of the emergency coordinator function (from the EDO) by the Emergency Response Manager (ERM), the ERM has the authority and responsibility to immediately and unilaterally initiate emergency actions. The Site Support Manager (SSM) is responsible for assessing and advising plant-related protective action recommendations to the ERM. The SSM receives plant condition information from the Technical Support Supervisor (TSS) located in the TSC.

The EDO retains the authority and responsibility for immediately and unilaterally initiating measures to protect the plant and onsite personnel.

4.4 Plant Operations

During an emergency, the normal Control Room staff is maintained. A more senior member of the station management, who holds a Senior Reactor Operator's license, may assume direct control of the shift after completing proper relief procedures while the SM shall maintain the EC function until relieved by the EDO. Entry into the Severe Accident Management Guidelines will be in accordance with the station emergency operations procedures.

5.0 Corrective Actions and Support of Operations

5.1 On-Shift and Initial Augment

Upon determination by the SM of an emergency classified as an Alert or higher, the OSC is activated. The PSEG Fire Protection Operators, a Radwaste Operator, Equipment Operators, a Shift Controls Technician Electrical, and a Scheduled Shift Controls Technician I&C report to either the OSC or other onsite location as directed.

This initial group of individuals is under the control of the initial OSC Coordinator. Additional support personnel are called in by the SM.

The Shift Operations Manager or Operations Director are normally expected to report to the Control Room of the affected unit under accident conditions to oversee plant operations and provide guidance and direction, as appropriate, to the SM.

5.2 Short-Term Augment

The initial OSC Coordinator takes control of the corrective action and support function from the SM and acts as an interface between the SM and the OSC support teams. The initial OSC Coordinator assumes the responsibility for directing support of repair, corrective actions, fire

fighting, search and rescue teams, and is responsible for supplementing the OSC staff as needed. The initial OSC Coordinator ensures through coordination with the EDO, that adequate OSC staffing is available prior to accomplishing a site evacuation. In addition to the on-shift staffing, an additional Controls Technician Electrical and Controls Technician I&C are called in.

The augment shall also consist of a supervisory group and respective support personnel functioning under the direction of the OSC Coordinator. The supervisory group consists of representatives from Maintenance, Operations, and Radiation Protection. These supervisors shall operate from the OSC. Support personnel shall report to the Ready Room until required for corrective actions. The Radiation Protection Supervisor for Exposure Control (OSC) shall additionally serve as a liaison between Radiation Protection at the Control Point and the OSC staff.

5.3 Long-Term Augment

The long-term augment consists of additional radwaste operators, electricians and machinists as necessary to support emergency response operations, and is under the control of the OSC Coordinator. This augment may include additional contractual assistance as established through the Administrative Support Manager (ASM) in the EOF.

6.0 Offsite Radiological Accident Assessment

6.1 On-Shift and Initial Augment

The SRPT is the individual responsible for radiological accident assessment on shift and reports to the SM. The SRPT takes direction from the SM, until the TSC is activated. Upon activation of the TSC, the SRPT takes direction from the Radiological Assessment Coordinator (RAC) or his designee.

The SRPT obtains radiological and meteorological data from the Radiation Monitoring System (RMS) and Plant Display Systems. Trained personnel are available on shift to do in-plant and out-of-plant radiation surveys. The SRPT will make offsite dose projections using prescribed methods. These dose projections are used as a basis for offsite radiological protective action recommendations, which the SRPT relays to the SM in the Control Room. The SM considers both the recommendation from the SRPT and his own evaluation of the plant status (predetermined protective action recommendation) to derive an appropriate protective action recommendation to be communicated to offsite authorities. The SRPT also assigns onsite radiation protection and chemistry personnel to obtain radiation monitor data and coolant samples for analysis.

The ORPT takes direction from the SRPT or SM, until the TSC is activated. The ORPT takes direction from the SRPT and the RAC upon activation of the TSC.

6.2 Short-Term Augment

The Radiological Assessment Coordinator (RAC) and additional support personnel report to the TSC to assume responsibility for offsite dose projection and monitoring. The Radiation Protection Supervisor Offsite directs onsite and offsite monitoring personnel and performs/directs dose calculations. The RAC provides information to the communicators to

give the States of Delaware and New Jersey (updates of the Station Status Checklist), to enable the states to calculate an independent offsite dose projection.

6.3 Long-Term Augment

When the Emergency Operations Facility (EOF) is activated, the Radiological Support Manager (RSM) has responsibility for offsite dose projections and offsite field monitoring. The Radiological Support Manager (RSM) directs offsite dose projection and field monitoring from the EOF. Communicators in the EOF assume the duties of providing offsite authorities with updates of the Station Status Checklist.

The Offsite Teams radio survey results to the Field Team Communicator. Radiological assessment staff members make offsite dose projections using either computer or manual calculation methods and Offsite Team survey results.

The dose projections are used as a basis for radiological offsite protective action recommendations, which the RSM provides to the ERM.

The ERM considers both the recommendation from the RSM and the evaluation of the plant status to derive and communicate an appropriate protective action recommendation to offsite authorities via a communicator. The RSM uses additional information from plant sample analysis, State offsite monitoring teams, and other support organizations to provide the best possible radiological dose assessment and protective action recommendation.

7.0 Radiation Protection Onsite

7.1 On-Shift and Initial Augment

The SM is the individual responsible for radiation protection onsite. The SM is supported by SRPT/Chemistry personnel (PSEG Site, Hope Creek and Salem), available to do in plant, onsite radiation monitoring, and systems sampling and analysis. Radiation Protection/Chemistry personnel also support onsite corrective actions, access control, personnel monitoring, dosimetry, search and rescue and first aid.

7.2 Short-Term Augment

As the emergency organization is augmented, additional Radiation Protection personnel report to the Control Point and the TSC. The SRPT continues with dose assessment and reports/gives results to the SM/EDO until relieved by the RAC. When relieved (turnover completed), the SRPT/ORPT assists with Radiation Protection activities at the CR, CP, TSC, and OSC, as needed and directed by the RAC or his designee.

The RAC assumes responsibility for Onsite Radiation Protection/ Chemistry personnel. Radiation Protection personnel at the Control Point report to the SRPT/ORPT, who in turn reports to the RAC. Chemistry personnel at the Control Point report to the Chemistry Supervisor, who is located at the TSC. Additional support personnel are shown in Emergency Organization Figure 3-2.

7.3 Long Term Augment

The RAC continues to be responsible for onsite radiation protection at the TSC and CP. The Radiation Protection staff is augmented as required by the emergency conditions. Additional Radiation Protection personnel report to the SRPT/ORPT at the Control Point who, in turn, report to the RAC at the TSC.. This augment may include additional contractual assistance as established through the ASM in the EOF.

8.0 Plant Systems Assessment and Engineering

8.1 On-shift and Initial Augment

The NSTA, an individual experienced in core analysis and thermal hydraulics, provides plant systems assessment and evaluates plant conditions relative to emergency action levels. Recommendations for protective actions are made to the SM on plant conditions.

8.2 Short-Term Augment

The NSTA, or Incident Assessor, normally remains in the control room and directly advises the SM on plant assessment. The short-term augment personnel for the areas of Core/Thermal Hydraulics, Nuclear Fuels, Mechanical Engineering and Electrical Engineering report to the Technical Support Supervisor in the TSC.

At the TSC, the Technical Support Supervisor (TSS) takes command and direction of the technical support team led by the Technical Support Team Leader (TSTL). The TSS is responsible for making technical plant assessments and providing recommendations on protective actions to the EDO.

The technical support team in the TSC/EOF is a group of engineers providing engineering support for the TSC and Control Room. The technical support team, under the direction of the Technical Support Team Leader (TSTL), is comprised of engineers familiar with plant operational specifics and provides an assessment of plant systems and trends. As needed, additional engineers may be directed to report to the EOF to augment the engineering resources as part of the emergency response or to assist with recovery.

8.3 Long-Term Augment

Assistance for the Technical Support Team in the TSC will be coordinated via the Technical Support Manager (TSM) in the EOF. The TSM shall call out technical support personnel and supply the TSC with support and information as required.

The TSM in the EOF directs and coordinates engineering support (requested from TSC) and any construction efforts required by the emergency response.

9.0 Emergency Organization Job Descriptions

The following job descriptions are the responsibilities and duties of the emergency response organization personnel as delineated in Figures 3-1, 3-2, 3-3, and 3-4. Position titles in figures 3-1, 3-2, 3-3, and 3-4 designated by an asterisk indicates that the position is optimal “support responder”, but not required. Position titles in figures 3-1, 3-2, 3-3, and 3-4 not designated by

an asterisk indicates that the position is a required ERO on-shift position or ERO "duty responder" position. See "Maintenance of the ERO" procedure for more information on expectations concerning "support responder" and "duty responder" positions.

9.1 A. EMERGENCY DIRECTION AND CONTROL

A.1 Emergency Response Manager (ERM)

The ERM has overall responsibility for management of onsite and offsite emergency response activities. The ERM assumes EC functions from the EDO. When performing the function of EC the ERM is responsible for non-delegable duties as described in Part 4 of this section.

Duties:

1) An ERM is available 24 hours a day.

2) Upon classification of an **ALERT**, the ERM, with coordination from the EDO, makes the decision to activate the Emergency Operations Facility (EOF) organization.

3) Upon classification of a **SITE AREA** or **GENERAL EMERGENCY,** the ERM is required to activate the EOF organization.

4) The ERM keeps corporate management advised of plant status and significant emergency response operations.

5) Upon arrival at the EOF, the ERM keeps a log of actions taken.

6) The ERM has ultimate authority and responsibility for the dissemination of technical information concerning plant conditions and emergency response operations.

7) The ERM acts as the principal corporate interface between the company and all other organizations.

8) In carrying out the duties of the position, the ERM designates alternates or others to act in his/her behalf as he/she deems necessary except for those functions considered as non-delegable.

9) The SSM may assume the ERO position of ERM to include EC functions, if the ERM is unable to fill the position.

A.2 Site Support Manager (SSM)

The SSM reports to the ERM and is responsible for providing information to the ERM on plant conditions which may result in Protective Action Recommendations (PARs) to offsite authorities, or classification escalation.

Duties:

1) Reports to the ERM.

2) Coordinates with and is an interface between the TSC and the ERM.

3) Communicates with the TSS and is knowledgeable of current plant conditions such that he can determine if Emergency Action Levels (EALs) have been exceeded or if issuance of Protective Action Recommendations (PARs) is required.

4) Provides input information for plant condition PARs to the ERM. Also directs callouts for PARs transmitted to the states.

5) Responsible for providing technical information and briefings to the Public Information Liaison (PIL).

6) Upon notification of an emergency, the SSM notifies any additional individuals needed to support the site support function.

7) Upon arrival at the EOF, the SSM keeps a log of actions taken.

8) Notifies the ERM when prepared to assume site support functions in accordance with Emergency Plan Implementing Procedures.

9) Responsible for coordination and assignment of offsite support to individuals within the emergency response organization.

10) Assumes the ERO position of ERM to include EC functions, if the ERM is unable to fill the position.

A.3 Emergency Duty Officer (EDO)

The EDO relieves the SM of the EC function and all accident management except plant operations. When performing the functions of the EC the EDO is responsible for the non-delegable duties as described in Part 4 of this section.

Duties:

1) If possible, reports to the Control Room initially to receive a turnover of the EC function and responsibility for emergency direction and control from the SM.
2) Evaluates plant and radiological conditions.

3) When acting in the EC function, responsible for ensuring accomplishment of the necessary assessment of offsite radiation concentrations resulting from a release.

4) Determines alternate locations to be used to assemble emergency personnel; ensures onsite/offsite communications are established.

5) Responsible for activating the TSC.

6) May call in additional station management as necessary.

7) Reviews near-term and long-term actions taken by the SM and briefs the SM on all significant information and actions taken.

8) Responsible for providing the point of contact with the NRC onsite.

9) Has the authority to order any required Protective Actions for onsite personnel.

10) Ensures all injured personnel receive proper assistance.

11) Ensures the dispatch of emergency/survey teams as required by the emergency conditions.

12) The TSS may assume the ERO position of EDO to include EC functions, if the EDO is unable to fill the position.

A.4 Shift Manager (SM)

The SM initially assumes the EC function and is responsible for initiating the necessary immediate actions to limit the consequences of an accident and bring the affected unit under control. When performing the function of EC, the SM is responsible for the non-delegable duties as described in Part 4, Emergency Direction and Control, of this Section in the Emergency Plan.

Duties:

1) Notifies and briefs the EDO of an emergency and determines the need for summoning additional personnel.

2) Evaluates plant and radiological conditions when in the EC function.

3) Maintains all required records in accordance with emergency preparedness implementing procedures.

4) Initiates the required telephone notifications of offsite agencies, until the EDO assumes this responsibility.

5) Keeps the EDO informed of plant status.
6) Directs the operation of the plant in compliance with all normal plant procedures, directives, technical specifications, emergency procedures and severe accident guidelines.

7) Establishes priorities for OSC response activities.

A.5 Emergency Preparedness Coordinator (EPC)

The EPC assists the ERM in evaluating the overall emergency response from the EOF. Additionally, the EPC assists in the assignment of response actions and provides resource and action guidance with respect to the emergency plan and emergency response commitments.

Duties:

1) Reviews data transmitted to offsite organizations.

2) Assists ERM in review of applicable procedures.

3) Provides guidance on offsite interface.

4) Assists ERM in developing/reviewing protective action recommendations.

5) Verify notifications for changes in classifications or PARs.

9.2 B. PLANT OPERATIONS

B.1 Nuclear Shift Technical Advisor (NSTA)

The NSTA is the accident assessment advisor to the SM during emergencies. The NSTA may be the same individual as the CRS if all requirements are met. The NSTA's primary duty is to provide technical operational advice to the SM during the emergency.

If the NSTA is the CRS or SM, then another SRO shall assist the NSTA as the "Incident Assessor" during unexpected or transient conditions. Responsibilities of the "Incident Assessor" include:

- Remain within 10 minutes of the Control Room
- Advisor to the SM on matters of safety and act as an assistant to the NSTA.
- During transient and accident conditions:
  - Maintain an overview role of plant operations
  - Monitor critical safety functions
  - Verify critical steps of EOPs and transitions
  - Perform independent assessments and diagnosis or plant conditions
  - Perform independent verification of Emergency Classifications
  - Provide recommendations to the SM and/or CRS

B.2 Control Room Supervisor (CRS)

The CRS assists the SM during the emergency.

Duties:

1) Brief the SM and EDO as necessary.

B.3 Reactor Operator/Plant Operator (RO/PO)

The RO/PO supports the CRS in emergency assessment and plant emergency response.

Duties:

1) Provide additional assistance as directed by the CRS to mitigate effects of an emergency situation.

2) Manipulate controls for routine and, if necessary, emergency operations for the affected unit in accordance with the operating and emergency instructions.

B.4 Control Room Communicators (CM1/CM2)

The CM1/CM2 relay official messages during an emergency for the SM, and gather plant data to be transmitted to emergency response facilities.

Duties:

1) At the request of the SM, deliver emergency notification messages to federal, state, and local authorities.

2) Call up additional personnel as requested.

B.4.A Communicator - OPS Advisor

Gathers plant data and transmits it to other Emergency Response Facilities.

B.5 Equipment Operators (EO)

The EOs assist the CRS and RO/PO in accident assessment and emergency response operations.

Duties:

1) Operate plant equipment, including radwaste equipment, in support of emergency response and recovery operations.

2) Maintain equipment and associated logs.

3) Conduct search and rescue operations, if needed.

9.3 C. CORRECTIVE ACTION AND SUPPORT OF OPERATIONS

C.1 Operations Support Center Coordinator (OSCC)

The OSCC directs plant personnel in support of repair, corrective actions, fire fighting, search and rescue teams. The OSCC also acts as an interface between the SM and the OSC Support teams.

1) Activates OSC, and assembles team.

2) Confirms team is briefed and radiologically equipped.

3) Directs fire fighting personnel during a fire emergency.

4) Provides the SM with status reports of repair and corrective actions.

C.2 Scheduled Controls Technician Instrument and Controls (I&C)

The Scheduled Controls Technician I&C assists in repair tasks as requested by the SM, OSCC, or OSC Support Supervisor.

Duties:

1) Activating equipment and monitoring equipment operation.

2) Receives direction from the Maintenance Supervisor or OSC Coordinator.

3) If assigned to the unaffected stations, support affected station as needed.

C.3 Shift Controls Technician Electrical

The Shift Electrician assists in repair related tasks as requested by the SM, OSCC, or OSC Support Supervisor.

Duties:

1) Supports the repair and corrective actions during emergency response and recovery operations.

2) Receives direction from the OSCC.

3) If assigned to the unaffected stations, support affected station as needed.

C.4.A OSC Operations Supervisor
C.4.B OSC Support Maintenance Supervisor
C.4.C OSC Shift Maintenance Supervisor

These OSC Support Supervisors report to the OSCC. They are responsible for providing supervision of on-shift operations and maintenance support personnel in the OSC. The OSC Shift Maintenance Supervisor will act as the OSC Coordinator until relieved.

Duties:

1) Assemble OSC teams as requested.

2) Coordinate corrective action.

3) Verify appropriate briefings, protective equipment, and dosimetry have been obtained by each team dispatched.

C.5.A OSC Radwaste Operator
C.5.B Nuclear Tech - Mechanical
C.5.C This designator is not used
C.5.D Controls Tech Electrical
C.5.E Controls Tech - I&C

These OSC Support Team Members report to their respective OSC Supervisors at the OSC. Assignments and responsibilities vary, but all disciplines provide general technical and specialist support as requested. Members are frequently assigned to corrective actions and repair teams.

Duties:

1) Activate or monitor equipment.

2) Assess damage, determine condition, or report status of plant/plant equipment.

3) Receive direction from the Maintenance Supervisor.

C.6 <u>Fire Brigade</u>

The Fire brigade reports to the OSCC and provides fire protection support to the Station.

Duties:

1) Provide fire fighting and first aid support.

2) Conduct search and rescue operations.

3) Conduct survey, repair and corrective actions.

C.7 <u>This designator is not used</u>

C.8 <u>Planner</u>

The planner reports to the OSCC to provide support to the OSC in material control, repair and corrective action activities.

Duties:

1) Supply/obtain support materials as needed for OSC activities.

2) Assist in tagouts, parts identification, and procurement.

C.9.A <u>This designator is not used</u>
C.9.B <u>This designator is not used</u>

C.10 <u>OSC Clerk</u>

The OSC Clerk reports directly to the OSCC and provides administrative support to the OSC.

Duties:

1) Update OSC Status Boards and maintain the OSCC logbook.

2) Provide general clerical and administrative support to the OSC.

9.4 D. RADIOLOGICAL ACCIDENT ASSESSMENT

D.1 Radiological Support Manager (RSM)

The RSM reports to the ERM and is responsible for offsite assessment of potential or actual radiological consequences to the public. The RSM provides assistance to the RAC, as necessary.

Duties:

1) The RSM reports to the ERM.

2) The RSM is responsible for offsite dose assessment after the EOF has been activated. Prior to activation of the EOF organization, the RAC has this responsibility.

3) The RSM provides field monitoring teams for offsite radiological evaluation.

4) The RSM ensures radiological dose calculations are made.

5) The RSM provides input information on potential or actual radiological releases or consequences and PARs to the ERM. The RSM communicates with the States of Delaware and New Jersey, and relays radiological information and other pertinent information to them.

6) The RSM initiates and coordinates long-term environmental monitoring. Long-term assistance may also be drawn from other nuclear power utilities and contractors.

7) The RSM establishes communication with medical assistance facilities and personnel to put the Emergency Medical Assistance Plan into operation, if necessary. Contact is established as defined in the Emergency Medical Assistance Plan.

8) After the emergency is under control and evacuation of the public is no longer likely, the RSM assists station personnel to determine efforts which may be used to further reduce exposures to the station operating personnel and to the public. The doses are evaluated for the duration of the exposure.

D.2 Radiological Assessment Staff - EOF

The D2A position's primary responsibility is performing and assessing dose assessment calculations with respect to making appropriate PAR recommendations to the RSM in accordance with Emergency Plan Implementing Procedures. This includes the completion of the Station Status Checklist, page 2. Additional duties the D2A position may be called upon to perform are the same as the D2B and D2C positions, listed below.

D.2.A Radiological Assessment Staff – EOF Duty
D.2.B Radiological Assessment Staff – EOF Supp

D.2.C Radiological Assessment Staff – EOF Supp

1) Assists station personnel to determine efforts, which may be used to further reduce exposures to the station operating personnel and to the public.

2) Complete the radiological portion of the NRC Data Sheet.

3) Coordinates and directs offsite monitoring from the EOF.

4) Monitors the habitability of the EOF.

5) Updates the radiological status boards.

6) Issues dosimetry to EOF personnel, as directed by the RSM.

7) Provide radiological assessment data to the SSM, Communicators, and State representatives.

D.3 Offsite Team Coordinator/Field Team Communicator

Responsible for maintaining offsite communications with Field Teams in the EOF.

Duties:

1) Establishes continuous communications with the Offsite Teams.

2) Ensures that Offsite Teams are kept up-to-date on the status of the emergency.

3) Evaluates data provided by the Field Teams to track the plume and confirm the dose estimates.

D.4 Offsite Team Members

Responsible for radiological support offsite as directed by the EOF.

D.4.A Offsite Team Monitor

Duties:

1) Performs offsite radiation and air sampling surveys as directed by the Radiological Support Manager or Radiological Assessment Coordinator.

2) Informs EOF or TSC of survey results.

D.4.B Offsite Team Driver

1) Drives to offsite locations.

2) Assist Offsite Team Monitor as appropriate.

9.5 E. RADIATION PROTECTION ONSITE

E.1 Radiological Assessment Coordinator (RAC)

The RAC, usually located in the TSC, assists the SM/EDO in matters relating to radiological problems during the emergency and provides radiological assessment and recommendations for protective action recommendations to the EDO. Upon an Alert or higher classification, the unaffected unit's duty RAC will report to the affected Station's Radiation Supervision to fulfill Radiation Protection Technician (RPT) duties, until relieved by RPTs who have been called in.

Duties:

1) Supervise the onsite Radiation Protection Organization.

2) Supervise the onsite Chemistry Organization.

3) Ensure that the TSC is ready for radiological response activation.

4) Ensure adequate emergency response staff for radiological and chemistry assessment.

5) Advise EDO on all station/site radiological issues.

6) Advise EDO on all offsite radiological issues.

7) Make final EAL recommendations to EDO on radiological issues.

8) Make recommendation of protective action to the EDO for onsite personnel (including onsite evacuation).

9) Make final radiological PARs to EDO for offsite personnel.

10) Advise/recommend applicable emergency dose authorization extensions to the EDO.

11) Provide the Station Status Checklist Radiological Data Section to EDO, or designate, until the EOF takes responsibility of performing this function.

12) Interface directly with the RSM at EOF.

13) Interface directly with the NRC in the TSC, or by phone, on specific radiological issues.

14) Direct/review dose assessment at the TSC.

15) Ensure appropriate contamination controls are established for all on-site emergency response facilities.

16) Direct vehicle surveys and decontamination, as required, if the EOF is not activated. Assist the RSM in vehicle surveys and decontamination, as required, if the EOF is activated.

17) Direct effluent sampling and analysis.

18) Recommend expenditures for additional equipment or staff to support accident response.

19) Direct all onsite radiological and bioassay sampling.

20) Decide when and who shall receive potassium iodide (KI) for all onsite personnel.

E.2.A Radiation Protection Supervisor – Offsite (TSC)

The Radiation Protection Supervisor – Offsite (RPS - Offsite) is a common position among PSEG Site, Hope Creek and Salem Nuclear Generating Stations. During multi-station events, the RPS – Offsite will initially report to the Station that paged him to come in first. Upon arrival, the RPS – Offsite will report to the Station that has the most significant radiological concern, according to the RAC or the EDO.

Duties:

1) Advise RAC of all radiological conditions.

2) Perform dose calculations and provide RAC with recommendations on onsite protective actions for the owner controlled area as appropriate.

3) Coordinate effluent, steam lines, liquid, and plant vent sampling and analysis.

4) Direct onsite readings for projection purposes and provide findings to the EDO and RSM staff.

5) Interface with Control Point on plant vent samples.

6) Supervise the radiation protection radio operator and the onsite field monitoring team.

7) Ensure onsite radiological monitoring for evacuees or personnel gathered at assembly stations is being performed.

8) Ensure onsite groups being moved or evacuated are receiving appropriate radiation protection escort(s).

9) Assume control of offsite field monitoring teams until EOF takes control for the teams.

10) Assume limited RAC duties in accordance with appropriate emergency plan implementing procedures.

E.2.B Radiation Protection Supervisor - Exposure Control (OSC)

Upon an Alert or higher classification, the unaffected station E.2.B on-duty position will report to Radiation Protection Supervision to fulfill RPT duties, until relieved by RPTs. During multi-station events, the E.2.B position will report to their station duty facilities (OSC).

The RPS - Exposure Control (OSC) coordinates with the OSC staff in order to facilitate timely in-plant OSC repair corrective action missions, which includes search and rescue and medical support missions.

Duties:

1) Interface directly with OSCC and SM on repair corrective action missions.

2) Support radiation work permits and approve authorization reviews for repair corrective action missions.

3) Coordinate RP support personnel for repair corrective action missions with SRPT/ORPT/RAC.

4) Provide radiological planning for repair corrective action missions.

5) Provide mission and status information to RAC or RPS – Offsite, as time allows.

6) Implementation of protective actions concerning contamination and habitability for OSC/CR.

7) Coordinate dose extensions to appropriate values for the emergency response organization, including emergency dose authorization, in accordance with appropriate emergency plan implementing procedures.

8) Supervise RP Technicians assigned to the OSC.

E.3 Radiation Protection Technicians (RPT)

The RPT is responsible for radiological support for repair, corrective action, search and rescue, and medical support missions.

Duties:

1) Perform onsite radiation and air sampling surveys.

2) Conduct operational checks on all equipment.

3) Perform dose calculations.

4) Perform access control, and issue dosimetry.

5) Decontaminate personnel and equipment.

6) Provide sampling results to appropriate RPS.

7) Assist in Radiological Work Permits (RWP) preparation.

8) Support Repair corrective action missions as required.

9) Maintain communication with the Control Point.

10) Provide communications to onsite and offsite Field Teams (RPT – Radio).

11) Perform onsite/offsite radiological monitoring.

12) Issue radiological monitoring equipment.

13) Initiate, perform, and assist in sampling and analysis of samples.

14) If assigned to the unaffected stations, support affected station as needed.

E.3/E.4 <u>Shift Radiation Protection Technician E.4 (SRPT)/Onsite Radiation Protection Technician E.3 (ORPT)</u>

The SRPT/ORPT will assist and advise SM with respect to radiological conditions prior to TSC activation.

Duties:

1) Perform initial dose assessment.

2) Advises SM on radiological matters prior to being relieved by an RPS.

3) Evaluate Radiation Monitoring System (RMS) and provide long term RMS information to all Emergency Response Facilities.

4) Provide CR contamination control/habitability monitoring.

5) Support repair and corrective action missions with personnel and equipment (medical, search and rescue, fire fighting, escort, etc.)

6) Assist with count room activities and direct instrument issue activities.

7) Assist in radwaste activities.

8) Coordinate inplant surveys, obtain inplant samples (noble gas/iodine), and effluent grab samples.

9) Direct access control and dosimetry issue.

10) Request dosimetry and whole body count support for inplant personnel.

11) Coordinates decon of personnel and equipment.

12) Assess RMS readings for inplant habitability and protective equipment use.

13) Coordinate, initiate, perform, and assist in sampling and analysis of samples.

14) If assigned to the unaffected stations, support affected station as needed.

E.5 Chemistry Supervisor

The Chemistry Supervisor, located at the TSC, coordinates Chemistry's response for sampling and analysis functions. The Chemistry Supervisor reports to the RAC. This is a common position among PSEG Site, Hope Creek and Salem Generating Stations and during multi-station events, the Chemistry Supervisor will initially report to the station that first paged him/her. He/She will upon arrival report to the station that has the most significant chemistry concern, according to the RAC and/or the EDO's guidance.

Duties:

1) Coordinates Chemistry personnel activities.

2) Directs and coordinates high activity samples, main steam sampling, and analysis of samples.

3) Coordinates activation of high activity sampling systems and necessary ventilation systems in those areas.

4) Relays sample analysis data to the RAC and then the RSM once the EOF is activated.

5) Coordinates sample results with the Core Thermal-Hydraulics Engineer and the Technical Support Team Leader.

6) Initiates sample log.

7) Augments Chemistry Staff when necessary.

8) Coordinates with Core Thermal-Hydraulics Engineer in the TSC.

E.6 Chemistry Technician (CT)

The CT will assist and advise the Chemistry Supervisor with respect to sampling activities from the Control Point.

Duties:

1) Directs and coordinates high activity samples, main steam sampling, and analysis of samples.

2) Disassembles, assembles, and operates the multi-channel analyzer.

3) Establishes backup laboratory facility.

4) Coordinates activation of high activity sampling systems and necessary ventilation systems in those areas if the TSC is not activated.

5) CT at the unaffected station should support the affected stations CT and if needed, support RP with onsite/offsite monitoring (driver).

9.6 F. PLANT SYSTEMS ASSESSMENT AND ENGINEERING

F.1 Technical Support Supervisor (TSS)

The TSS has overall responsibility for tracking and trending plant conditions, identifying plant condition EALs, and providing advice on PARs to the EDO, and when the EOF is activated, the SSM. The TSS is the lead evaluator and decision maker for the Severe Accident team.

Duties:

1) The TSS reports to the EDO.

2) The TSS evaluates the potential for an offsite radiological release based upon plant conditions in accordance with EALs. Prior to activation of the EOF, these evaluations are provided to the EDO for action. After activation of the EOF, these evaluations are provided to the SSM for action and the EDO for information.

3) The TSS provides advice to the EDO on priorities for plant repair and corrective actions.

4) The TSS is responsible for analysis and development of plans and procedures in direct support of operations personnel with the objective of placing the plant in a safe shutdown condition in a manner, which minimizes any adverse health and safety effects on the public.

5) The TSS obtains an evaluation of instrument and controls problems from the Technical Support Team, determines alternatives, and coordinates the installation of short-term instrument and controls modifications.

6) The TSS directs the actions of the Technical Support Team Leader and the Technical Support Team in the TSC.

7) The TSS may assume the ERO position of EDO to include EC functions, if the EDO is unable to fill the position.

8) The TSS directs plant operations by providing specific instructions directly to shift personnel, after Severe Accident Management Guidelines (SAMG) transition has been made.

F.2 Technical Support Team Leader (TSTL)

The TSTL is responsible for coordination and guidance of the engineering support in the TSC. The TSTL will be the primary interface at the TSC for the TSM in the EOF and will coordinate all engineering support required from the EOF.

Duties:

1) The TSTL reports to the TSS.

2) Coordinates all engineering tasks requested by the SM and the EDO.

3) Coordinates/Requests engineering support from the Technical Support Manager (TSM) at the EOF.

4) Serves as primary point-of-contact in TSC for TSM.

F.3 Engineer - Electrical

The Engineer - Electrical develops recommendations concerning plant operations relating to electrical systems and equipment for the TSTL.

Duties:

1) Analyzes plant electrical systems and equipment to determine current operating condition.

2) Reviews proposed plant operations with respect to electrical systems.

3) Receives instructions from and reports findings to the TSTL.

F.4 Engineer - Mechanical

The Engineer - Mechanical develops recommendations concerning plant operations relating to mechanical system for the TSTL. The Mechanical Engineer is an evaluator on the Severe Accident Management team.

Duties:

1) Forecast future values of EOP and SAG control parameters (parameter trending).

2) Identify plant conditions as they relate to EOP and SAG control parameters and specify the state of the plant with respect to those parameters.

3) Evaluate plant conditions, control room indications, and control parameters to determine core status.

4) Determine operability of a system and its availability.

5) Develop a methodology to restore a system.

6) Recommend appropriate EOP/SAG actions to follow based on trends, indications, or calculations.

7) Receives instructions from and reports to the TSTL.

F.5 Engineer - Controls

The Engineer - Controls develops engineering recommendations for the TSTL concerning control systems impacted by an emergency.

Duties:

1) Provides control systems accident assessment.

2) Analyzes plant control systems requiring trouble-shooting during an emergency.

3) Receives instructions from and reports to the TSTL.

F.6.A Core Thermal-Hydraulics Engineer

NOTE:
If needed to ensure timely availability, the CTHE may report to and perform assigned duty from the EOF.

The Core Thermal-Hydraulics Engineer (CTHE) develops recommendations for plant operations that would affect safe core conditions for the TSTL. The Core Thermal-Hydraulics Engineer provides fuel damage assessment information to the TSS, RAC, TSM and RSM.

Duties:

1) Analyzes core parameters to determine current conditions of the core.

2) Reviews proposed plant operations with respect to the effect on the core conditions.

3) Evaluates fuel damages based core thermal conditions, radiological conditions and specific chemistry samples.

4) Coordinates high activity reactor coolant sampling with the Chemistry Supervisor and the RAC.

5) Receives instructions from and reports to the TSTL.

F.6.B This designator is not used

F.7 Emergency Preparedness Advisor (EPA) - TSC

The EPA reports to the EDO. The EPA is responsible for directing and supervising the activities of the TSC Communicators in obtaining and routing operational and radiological data.

Duties:

1) Verify that required offsite/onsite notifications are made and that notifications/responsibilities are turned over properly when control is passed from one facility to another.

2) Ensure that operational and radiological data are obtained, posted, and distributed in the TSC.

3) Assist in testing and maintaining communication systems in the TSC and other onsite facilities.

4) Provide resource and action guidance with respect to the emergency plan and emergency response commitments.

F.8 TSC Communicator (TSC1/TSC2)

The TSC Communicators (TSC1/TSC2) report to the EPA/EDO at the TSC and are responsible, at direction of the EPA/EDO, to make official notifications, and to obtain and transmit data.

Duties:

1) Make required notifications.

2) Obtain operational and radiological data.

3) Transmit data when required.

F.8.A This Classification is not used.
F.8.B OPS Advisor - TSC

The OPS Advisor - TSC reports to the TSS at the TSC and is responsible, at direction of the TSS, to obtain plant status information from the control room, keep TSC supervisors informed of plant status, assist in status board maintenance and serve as a backup to either one of the TSC Communicator positions (CM1/CM2). The Ops Advisor is an evaluator on the Severe Accident Management Team.

Duties:

1) Forecast future values of EOP and SAG control parameters (parameter trending).

2) Recommend appropriate EOP/SAG actions to follow based on trends, indications, or calculations.

F.9 Technical Support Manager (TSM)

The TSM is responsible for coordinating the need for engineering design changes and plant modifications as well as any engineering support requested by the TSC.

Duties:

1) Receives directions from and reports results to the ERM.

2) Conducts emergency response callout for the engineering support personnel as needed.

3) Make recommendations concerning event mitigation.

4) Coordinates support activities with the TSTL in the TSC.

F.10 This designator is not used

F.11 This designator is not used

9.7 G. PUBLIC INFORMATION

G.1 Company Spokesperson (CS)

The CS is a senior management representative responsible for representing PSEG in news media briefings.

Duties:

1) Act as official Company Spokesperson.

2) Counsel PSEG top corporate management on status of accident and Emergency News Center/Joint Information Center (ENC/JIC) briefings.

3) Give direction to Lead Technical Advisor, ENC Manager, and Staff Writers.

4) Upon ENC/JIC activation, review and approve News Bulletins and other releases to the media.

5) Supervise rewriting of News Bulletins and other media information into format for rumor control operations and Muskrat Information Line for employee call-in.

G.2 Emergency News Center Manager (ENCM)

The ENCM is responsible for the overall operation of the ENC/JIC including the dissemination of information and media monitoring.

Duties:

1) Coordinate the dissemination of media information from the ENC/JIC.

2) Approve News Bulletins when directed by CS or if CS is unavailable.

3) Ensure information is coordinated with and disseminated to County, State, and Federal representatives at the ENC/JIC before it is released to the media.

4) Coordinate media briefings with PSEG Nuclear, industry, County, State and Federal representatives.

5) Ensure approved ENC/JIC News Bulletins and other media releases are distributed to PSEG corporate offices, co-owners, and the industry.

6) Provide information to Media Information Line operators for dissemination to news outlets.
7) Direct activities of the Industry/Government Affairs Coordinator, Rumor Control Coordinator, and Operations Supervisor.

G.3 <u>This designator is not used</u>
G.4 <u>This designator is not used</u>
G.5 <u>Industry/Government Affairs Coordinator</u>

The Industry/Government Affairs Coordinator (IGAC) is responsible for maintaining contact with industry group representatives, PSEG Government/Federal Affairs Departments, Lower Alloways Creek Township, County and State officials to provide them information about the emergency. The IGAC reports to the ENC Manager.

Duties:

1) Establish contact with the co-owners and Board of Regulatory Commissioners to inform them of the emergency event and keep them updated on changes in status.

2) Advise Institute of Nuclear Power Operations (INPO) and Nuclear Energy Institute (NEI) [formerly United States Council on Energy Awareness (USCEA)] on the status of the emergency.

3) Update General Manager - Federal Affairs or designee on emergency status.

4) Update General Manager - State Governmental Affairs on emergency status.

5) Update LAC Township's Liaison about emergency event.

G.6 <u>Rumor Control Coordinator (RCC)</u>

The RCC is responsible for coordinating the media monitoring effort and dissemination of information about the emergency using the Company’s Rumor Control Network.

Duties:

1) Activate PSEG’s rumor control lines.

2) Provide Media Monitors, Media Line Operators and Rumor Control Centers with updated News Bulletins and other approved information about the emergency.

3) Update wire services as News Bulletins are issued.

G.7.A <u>This designator is not used</u>
G.7.B <u>Media Monitors</u>

Media Monitors are responsible for reviewing media reports for accuracy and reporting discrepancies and misinformation to the Rumor Control Coordinator.

Duties:

1) Review and record radio and television news programs and bulletins related to the emergency.

2) Inform Rumor Control Coordinator of incorrect or misleading television and radio accounts of the emergency.

3) Clarify incorrect or misleading information with television and radio stations when directed.

G.8.A <u>Staff Writer - Duty</u>
G.8.B <u>Staff Writer - Support</u>

The staff writer is responsible for composing News Bulletins and other information for the media about plant conditions and emergency response activities.

Duties:

1) Write News Bulletins and prepare other information for the media.

2) Provide News Bulletins to the Company Spokesperson for review and approval.

G.9.A <u>This designator is not used</u>
G.9.B <u>Media Information Line Operator</u>

The Media Information Line Operator is responsible for operating Media Information Telephone Bank and ensuring the media is provided with timely and accurate information about the emergency.

Duties:

1) Provide the media with News Bulletins and other approved information.

2) Refer State-related inquiries to appropriate State information sources.

G.10.A Lead Technical Advisor (LTA)

The LTA is responsible for maintaining contact with TSC and EOF to track status of emergency event and provide information to the Company Spokesperson and ENC/JIC staff.

Duties:

1) Direct activities of other Technical Advisors at the ENC/JIC.

2) Report directly to the Company Spokesperson.

3) Provide technical briefings to the ENC/JIC staff and others as directed by the Company Spokesperson.

4) Receive information from the EOF facility or leads briefing.

G.10.B Media Technical Advisor (MTA)

The MTA is responsible for providing the media with general technical information about the PSEG Site and the nuclear industry.

Duties:

1) Obtain News Bulletins and technical details of the emergency.

2) Provide media at ENC/JIC with Press Kits and other approved information about the emergency event.

3) Interface with media at ENC/JIC on plant-related questions and provide general technical information.

G.10.C Communications Technical Advisor (CTA)

The CTA is responsible for keeping the Staff Writer and other ENC/JIC staff informed about the emergency event and providing understandable technical information.

Duties:

1) Obtain current and accurate information about the emergency event.

2) Update the ENC/JIC staff on plant status and the emergency event.

3) Report to the TSC if directed to do so by the LTA and provide timely and accurate information about the emergency event to the ENC/JIC.

4) When the EOF is activated and the PIL is functioning, report to the ENC/JIC and receive further direction from the LTA.

G.11 ENC Operation Supervisor (ENCOS)

The ENCOS is responsible for directing Administrative Operations in the ENC/JIC and reports to the ENC Manager.

Duties:

1) Supervise setup of the ENC/JIC and ensure proper operation of equipment.

2) Direct Administrative Support Staff members, Audio-Visual Services Coordinator, and facility support functions. Direct facility access control if Sheriff's deputies are not available.

3) Provide facility support functions such as access control, food, first aid, augmented staffing and equipment needs, and relief staffing.

G.12 This designator is not used

G.13 Public Information Liaison (PIL)

Obtain timely and accurate information at the EOF and transmit it to the ENC/JIC.

Duties:

1) Provide timely and accurate information about the emergency event to the ENC/JIC.

2) Respond to requests for information from the ENC/JIC via the Communications Technical Advisor.

G.14 Public Information Manager (PIM)

The PIM is the on-call staff member of Nuclear Communications who is responsible for representing PSEG as the Company Spokesperson until activation of the ENC/JIC. The PIM has the authority to release information provided by the Emergency Coordinator concerning any event at the PSEG Site that may be of interest to the media and the public.

Duties:

1) On-call to receive notifications of emergency and non-emergency events that are of potential interest to the media and the public in accordance with the Event Classification Guides (ECG) from the SM/EDO and other approved sources.

2) Write and issue News Bulletins based on information provided by the Emergency Coordinator and other approved sources.

3) Turnover duties to Company Spokesperson at ENC/JIC when the ENC/JIC is activated.

9.8 H. <u>This designator is not used</u>

9.9 I. <u>SITE ACCESS CONTROL AND ACCOUNTABILITY</u>

I.1 <u>Security Liaison (TSC)/Security Operations Supervisor Main Guard House (MGH)</u>

The Security Liaison reports to the EDO. The Security Liaison is responsible for coordinating aspects of site evacuation and personnel accountability. The Security Operations Supervisor works for the Security Liaison and coordinate site evacuation and personnel accountability activities at the MGH.

Duties:

1) Verify accountability is established.

2) Assist in the coordination and control of site evacuation.

3) Maintain personnel entry log at the TSC.

4) Provide emergency vehicle support.

I.2 <u>Site Security Coordinator (SSC)</u>

The SSC reports to the EDO. The SSC is responsible for overseeing all security operations during an emergency including site evacuation and personnel accountability.

Duties:

1) Provide overall control and direction for all site security operations.

2) Verify personnel accountability is implemented as directed.

3) Oversee coordination and control of site evacuation.

I.3 <u>This designator is not used</u>
I.4 <u>Security Force Member</u>

The Security Force Member reports to the Site Support Manager. The Security Force Member is responsible for the proper establishment and maintenance of access control.

Duties:

1) Maintain access control at the EOF.

2) Assist in personnel accountability.

3) Open the EOF.

I.5 EOF Communicator (EOF1/EOF2)

The EOF Communicator (EOF1/EOF2) report to the SSM/ERM at the EOF and, at the direction of the SSM/ERM, are responsible for making official notifications, and obtaining and transmitting data.

Duties:

1) Make required notifications.

2) Obtain operational and radiological data.

3) Transmit data when required.

I.5.A EOF OPS Advisor

Obtain operational data and advise the SSM on the operational condition of the affected unit.

9.10 J. ADMINISTRATIVE SUPPORT

J.1 Administrative Support Manager (ASM)

The ASM reports to the ERM, and provides administrative support for the emergency response effort.

Duties:

1) Provides general office support functions including typing, reproduction, office supplies, and office furniture.

2) Functions as the EOF purchasing agent.

3) Administers the petty cash fund and expense accounts.

4) Coordinates personnel and equipment requests from the ERM and the other support managers.

5) Performs administrative support organization callout.

J.02.A Admin Support Staff - Personnel Supv.
J.02.B Admin Support Staff - Purchasing
J.02.C This designator is not used
J.02.D Admin Support Staff – Administrative
J.02.E Admin Support Staff – Information Technology Support Supervisor.

Coordinate Administrative Support activities as identified by the designated discipline and advise ASM of your activities.

Duties:

1) Provide support related to personnel matters including personnel callouts.

2) Provide purchasing support required during an emergency.

3) Provide material control support during an emergency.

4) Provide administrative/clerical support.

5) Provide Information Technology support.

6) Assist in EOF setup and activation.

J.03 Administrative Support Supervisor (ADMSS)

The ADMSS is responsible for providing administrative support to the EDO and has the authority to arrange for procurement of the necessary materials or personnel.

Duties:

1) Supervise administrative functions in the TSC.

2) Coordinates activities with the ASM.

3) Maintains records of purchases.

J.04 TSC Administrative Staff

The TSC Administrative staff reports to the ADMSS and provides administrative support to the TSC/OSC.

J.04.A This designator is not used

J.05 ENC Administrative Support

The ENC Administrative Support staff reports to the ENC Operations Supervisor and provides administrative support to the ENC/JIC staff.

J.06 Audio/Visual Services Coordinator

Provide audio/visual support to the ENC/JIC staff.

Duties:

1) Videotape media briefings.

2) Create/provide visual aids as requested by the ENC/JIC staff.

Z.03 Delaware Offsite Representative (not on organization chart)

Duties:

1) Keep Delaware officials up-to-date on emergency status

2) Provide technical and emergency classification assistance.

10.0 Staffing Commitments

The commitment for minimum staffing will be in accordance with NUREG-0654, Revision 1, Table B-1.

Table 3-2 provides a correlation between major functional areas, major tasks, position title or expertise, as described in NUREG-0654, Revision 1, Table B-1, and the similar tasks and titles in the emergency response organization. The alphanumeric codes that appear with staffing capability goals represent the emergency response organization positions used in this section of the plan. Facility activation goals/response times are described in Section 9, Emergency Facilities and Equipment.

TABLE 3-1
LINE OF SUCCESSION
EMERGENCY COORDINATOR DUTIES

		Classification Requiring Activation of Emergency Coordinator Personnel Assigned Function			
Duty Position	**Duty Position**	**UE**	**A**	**SAE**	**GE**
SM	SM is a normal shift duty assignment per station technical specification	X	X	X	X
EDO	Operations Manager or designee	X(1)	X	X	X
ERM	Filled by PSEG Nuclear Department Senior Management Personnel		X(2)	X	X

NOTES:

1) The EDO is contacted for all events classified as an Unusual Event or higher. The EDO may or may not respond to the Emergency Coordinator function of this level event. This response would be based on the conditions of the incident.

2) The ERM is contacted for all events classified as an Alert or higher. The ERM may or may not respond to the Emergency Coordinator function of this level event. This response would be based on the conditions of the incident.

TABLE 3-2
CORRELATION TO NUREG-0654, TABLE B-1 (Note 2)

(NUREG-0654, TABLE B-1) Major Functional Area	Major Tasks	Position Title or Expertise	On* Shift (Note 1)	Capabilities for Additions 90 min
Plant Operations and Assessment of Operational Aspects		Shift Manager (SM) (SRO) Control Room Supervisor (CRS) (SRO) Reactor/Plant Operator (RO/PO) Nuclear Equipment Operator (NEO)	1 A4 1 B2 2 B3 2 B5	
Emergency Direction and Control (Emergency Coordinator		Shift Manager (SM)(SRO)	1**A4	
Notification/ Communication	Notify Licensee, State, Local and Federal personnel and maintain communication	Control Room Communicator TSC & EOF Communicators	2 B4	2 F8 & 2 I5 (TSC & EOF Communicators)
Radiological Accident Assessment and Support of Operational Accident Assessment	Near-site EOF-Manager Offsite Dose Assessment Offsite Surveys Onsite (out-of-plant) In-plant Surveys Chem/Radio-chemistry	Emergency Response Manager (ERM)*** Shift RP Tech (SRPT)/RP Supervisor-Offsite Technician (RPT) Technician (RPT) Technician (RPT) Technician (CT)	 1 E4 (Note 3) (Note 9) 1 E3 (Note 5) 1 E6 (Note 5) 2 E3 (Note 5) 1 E6	1A1 (Emergency Response Mgr) 2E1 (RACs) 4D4 (Offsite Monitors/Drivers) 1E2A (RPS Offsite) 1E3 (Callout RPT) 1E5 (Chemistry Supv)

TABLE 3-2 (cont.)
CORRELATION TO NUREG-0654, TABLE B-1 (Note 2)

(NUREG-0654, TABLE B-1) Major Functional Area	Major Tasks	Position Title or Expertise	On* Shift (Note 1)	Capabilities for Additions 90 min
Plant System Engineering, Repair and Corrective Actions	Technical Support	Shift Technical Advisor (STA)	1 B1(Note 4 & 6)	
		Core/Thermal Hydraulics		1 F6A (CTH Engineer)
	Repair and Corrective Actions	Electrical		1 F3 (Electrical Engineer)
		Mechanical		1 F4 (Mech Engineer)
		Mechanical Maintenance/ Rad Waste Operation	1 C4C 1**C5A (Note 8) 1 C5A	
		Electrical Maintenance/ Instrument and Control	1C3** 1 C2 1 C3 1 C2 (Note 5) 1 C3 (Note 5)	
Protective Actions (In-plant)	Radiation Protection a. Access Control b. HP coverage for repair, corrective actions, search and rescue, first aid, and fire fighting. c. Personnel monitoring d. Dosimetry	Technician (RPT)	2**E3 (Note 5) 2 (Note 7)	1E3 (Callout RPT) 2 E2B (All Stations) (RPS – Exposure Control)
Fire Fighting			5 C6 (Fire Brigade per Tech. Spec.)	Local Support
Rescue Operations and First Aid			2** C6	Local Support

TABLE 3-2 (cont.)
CORRELATION TO NUREG-0654, TABLE B-1 (Note 2)

(NUREG-0654, TABLE B-1) Major Functional Area	Major Tasks	Position Title or Expertise	On* Shift (Note 1)	Capabilities for Additions 90 min
Site Access Control and Personnel Accountability	Security, Fire Fighting, Communications, Personnel Accountability	Security Personnel	All per Security Plan	Local and State Support
		Total Staffing:	**28**	**20**

Notes:

* For each unaffected nuclear unit in operation, maintain at least one Control Room Supervisor, one Reactor/Plant Operator and one Equipment Operator.

** May be provided by Shift personnel assigned other functions. Staffing designated with double asterisk is not counted in "Total Staffing" values at end of table.

*** Overall directions of facility response to be assumed by near-site EOF Emergency Response Manager when all facilities are fully manned & activated.

Note 1: Thirty (30) - minute responder positions in NUREG-0654, Table B-1 are addressed in the "On-Shift" staffing column. There is not a 30 - minute callout process.

Note 2: This chart provides a table that correlates the emergency response organization to the position guidance of NUREG-0654, Table B-1. Staffing response times are as discussed in Section 9 of the Emergency Plan.

Note 3: Will be performed by the Shift Radiation Protection Technician (E4) until relieved by the Radiation Protection Supervisor - Offsite.

Note 4: Advisory function will be performed by Shift Technical Advisor (STA) until relieved by Core/Thermal – Hydraulics Engineer.

Note 5: Additional personnel available from the unaffected station to support In-plant activities.

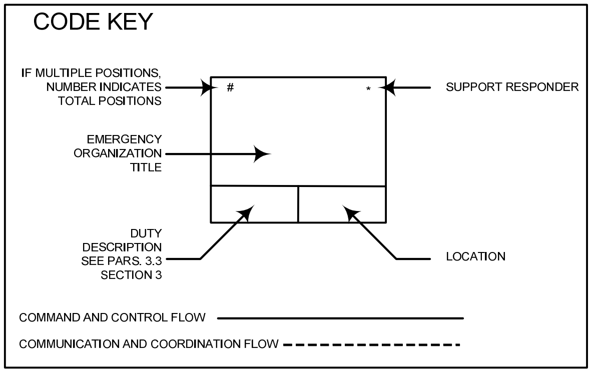
Note 6: At Hope Creek, the STA can also be assigned the duties of the Control Room Supervisor or Shift Manager in accordance with technical specification provisions.

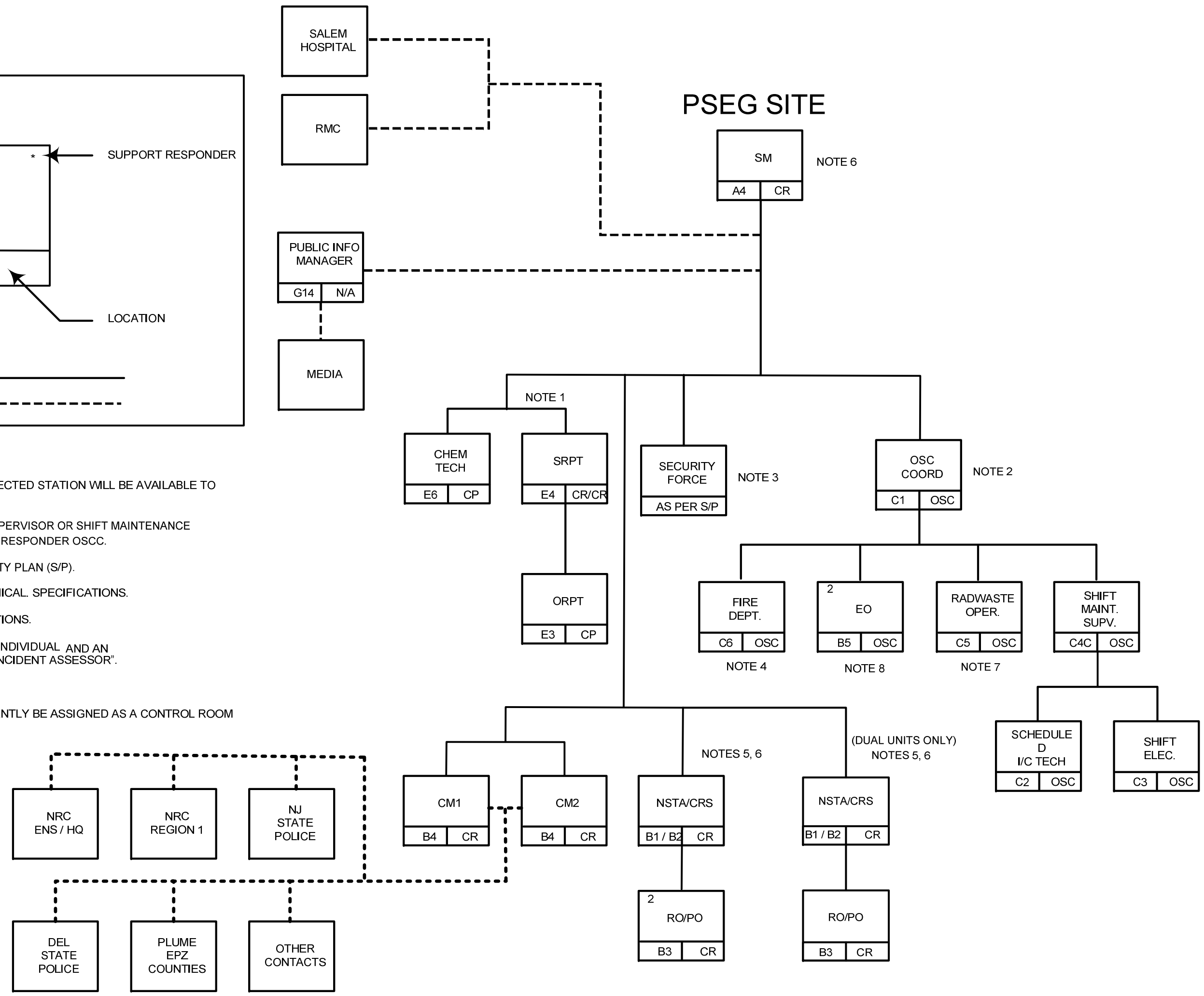
Note 7: Individuals who are radiation worker qualified may fill this position.

Note 8: An onshift Nuclear Equipment Operator (Salem) or Rad Waste Operator (Hope Creek) may concurrently fill a Non-Licensed Operator position until relieved.

Note 9: Offsite surveys may be performed by onsite field monitoring personnel until the offsite field monitoring team members report to the EOF.

FIGURE 3-1
ON SHIFT STAFFING
EMERGENCY RESPONSE ORGANIZATION





NOTE 1 RP TECHS AND CHEM TECHS FROM UNAFFECTED STATION WILL BE AVAILABLE TO RESPOND TO AFFECTED UNIT.

NOTE 2 INITIAL OSC COORDINATOR WILL BE OPS SUPERVISOR OR SHIFT MAINTENANCE SUPERVISOR UNTIL RELIEVED BY THE DUTY RESPONDER OSCC.

NOTE 3 SECURITY FORCE AS SPECIFIED IN SECURITY PLAN (S/P).

NOTE 4 FIRE DEPARTMENT AS SPECIFIED IN TECHNICAL SPECIFICATIONS.

NOTE 5 STA STAFFING PER TECHNICAL SPECIFICATIONS.

NOTE 6 NSTA/SM OR NSTA/CRS CAN BE THE SAME INDIVIDUAL AND AN ADDITIONAL SRO WILL FILL THE ROLE OF "INCIDENT ASSESSOR".

NOTE 7 THE RWO POSITION IS FILLED BY AN NLO.

NOTE 8 EO ASSIGNED TO OSC CANNOT CONCURRENTLY BE ASSIGNED AS A CONTROL ROOM COMMUNICATOR.

FIGURE 3-2
STATION RESPONSE WITH EXTERNAL INTERFACE

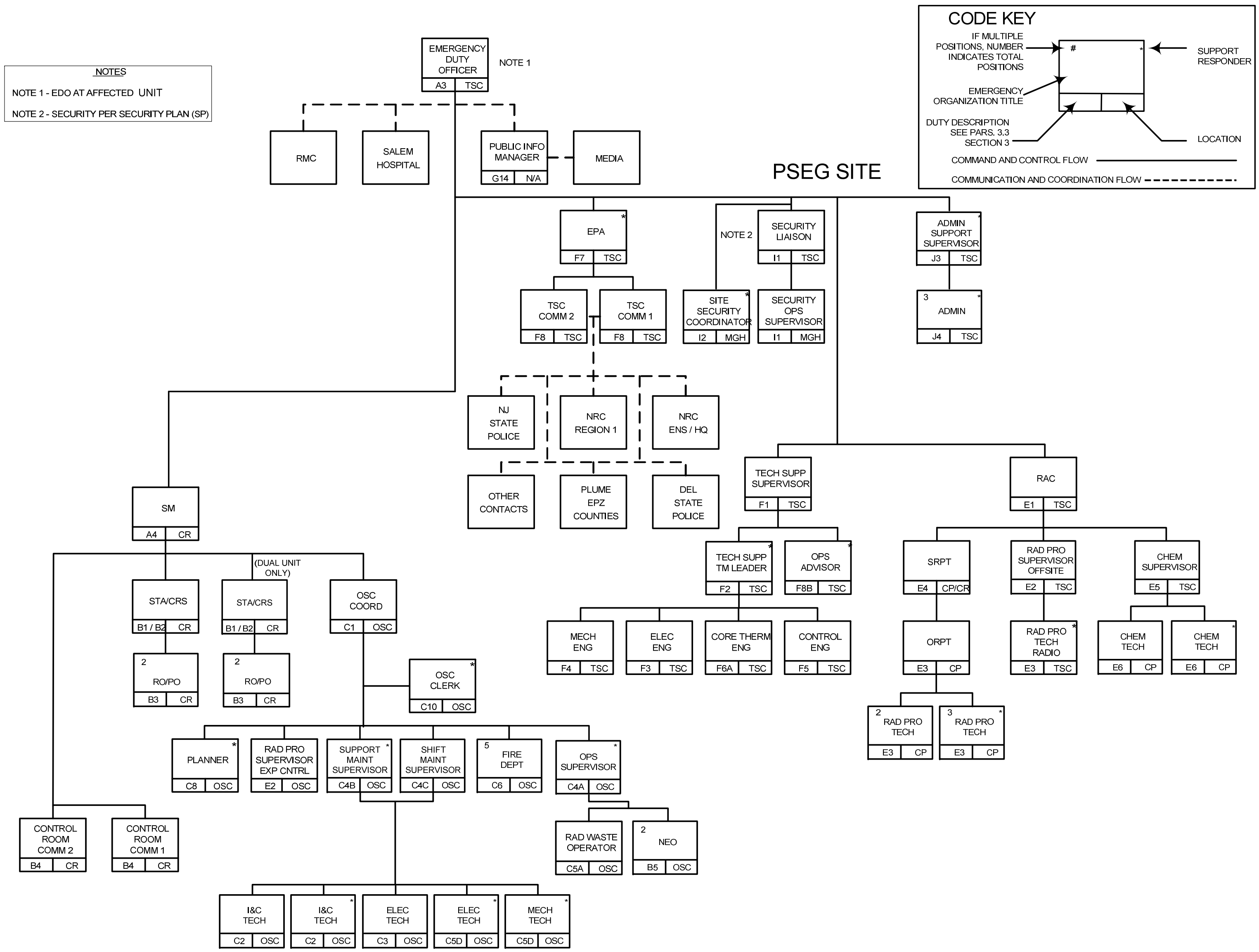


FIGURE 3-3
EMERGENCY OPERATIONS FACILITY EMERGENCY RESPONSE ORGANIZATION WITH EXTERNAL INTERFACE

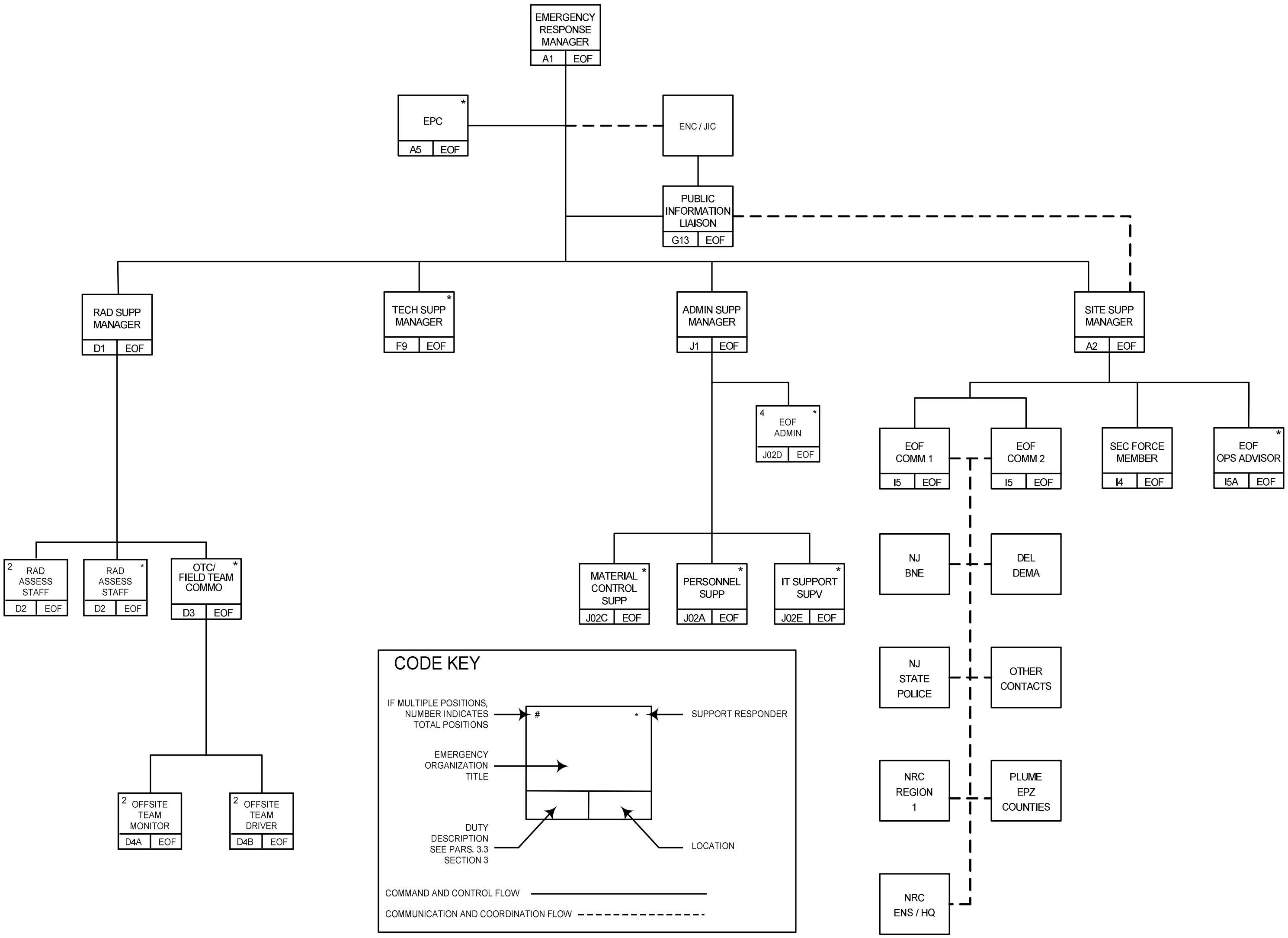
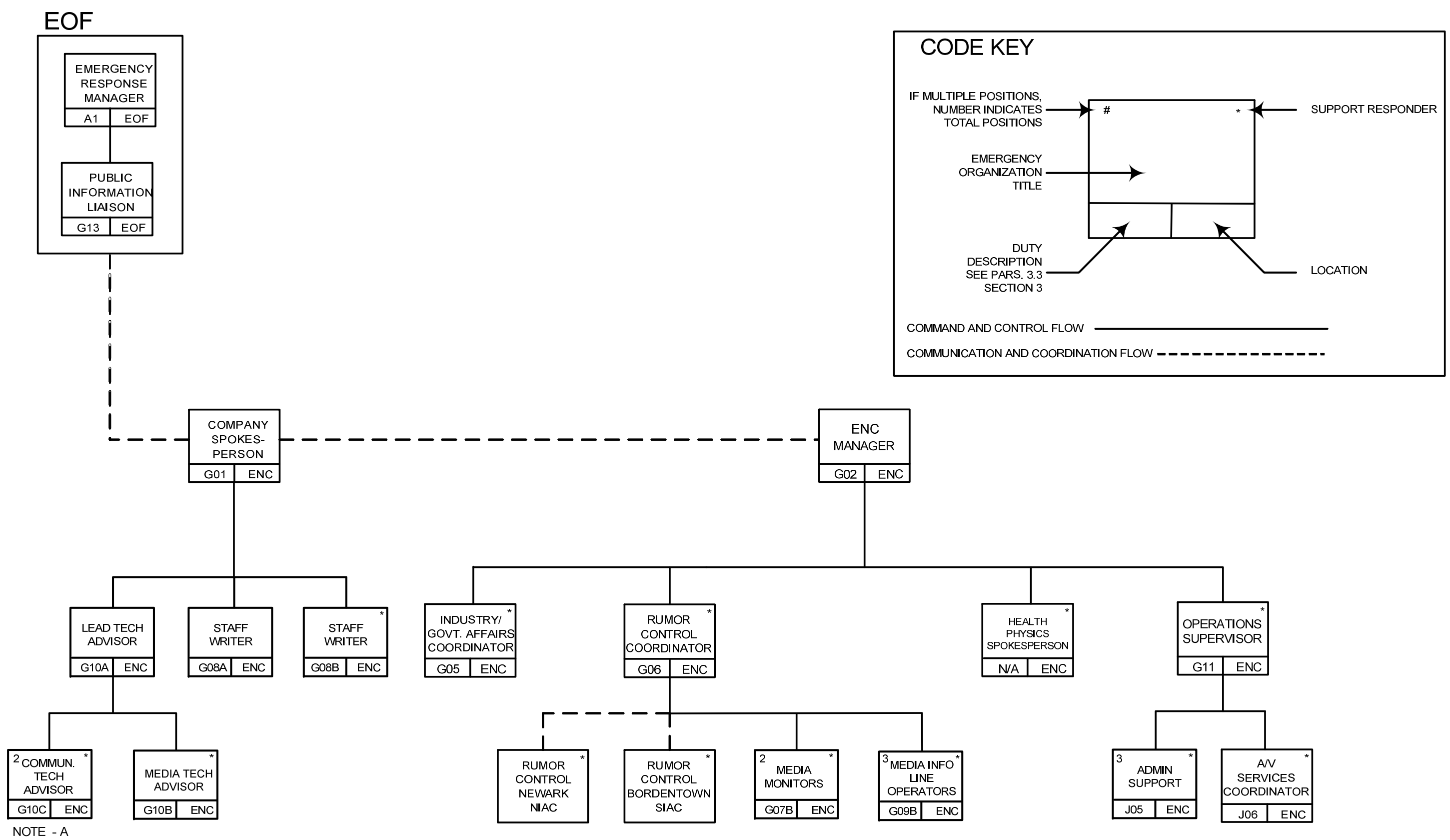


FIGURE 3-4
EMERGENCY NEWS CENTER / JOINT INFORMATION CENTER ORGANIZATION WITH EXTERNAL INTERFACE



NOTE - A A SECOND COMMUNICATION TECH ADVISOR MAY BE SENT TO THE TSC TO GATHER INFORMATION AT THE DISCRETION OF THE LEAD TECHNICAL ADVISOR.

SECTION 4

EMERGENCY RESPONSE SUPPORT AND RESOURCES

1.0 Local Services Support

The local services support to be relied on in the event of an emergency is classified into two general categories: Medical and Fire Protection.

1.1 Medical Support

Medical support is provided by the Memorial Hospital of Salem County. The specific resources and capabilities of medical support are provided in Section 13.0 of this Plan.

1.2 Fire Protection

Fire protection support is provided for the PSEG Site in accordance with station technical specifications. The resources are provided at the request of the Shift Manager (SM) or Emergency Duty Officer (EDO). Additionally, local fire companies respond (in accordance with appropriate agreements) to fires at the PSEG Site. While these personnel are onsite they will be under the direction and control of the SM or Control Room Supervisor (CRS) prior to OSC activation and under the direction and control of the initial OSC coordinator/OSC coordinator after the OSC is activated.

2.0 State and County (Local) Government Response

For events classified as an Unusual Event, Alert or Site Area Emergency, the contact with the local governments and states is provided through the states. Following this initial contact, the states will be responsible for assessing the information provided, activating their response organization (as required) notifying the local governments, the U.S. Coast Guard and the public. If the states cannot be contacted within fifteen minutes, the PSEG Site notifies the local governments (counties) and the U.S. Coast Guard directly.

For events classified as a General Emergency, the PSEG Site makes direct contact with the States of New Jersey and Delaware. If the states cannot be contacted within fifteen minutes, the PSEG Site notifies the local governments (counties) and the Coast Guard. Following this initial contact the states, or if the states could not be contacted the counties, will be responsible for assessing the information provided, activating their response organization (as required), notifying appropriate local governments and the public.

Following contact by the state, or PSEG, each county and the U.S. Coast Guard are responsible for assessing the information provided and activating their response organizations.

The Plan provides the appropriate space and facilities to the principal State and Federal response organizations at the Emergency Operations Facility (EOF). PSEG assigns a person to assist the States of New Jersey and Delaware in accordance with the

Memorandum of Understanding with each State. This allows state response personnel to have immediate access to all station radiological and operational data. Additionally, PSEG is prepared to provide representatives to the state EOCs to assist the state (at their request) in answering questions and contacting the appropriate PSEG personnel.

3.0 Federal Response

The federal response is expected to consist primarily of representatives from the U.S. Department of Energy (U.S. DOE), U.S. Nuclear Regulatory Commission (NRC), and U.S. Coast Guard (USCG). PSEG provides space in the EOF as required. Since the federal response (other than NRC) is primarily related to offsite protective actions and radiological assessment, it is implemented at the request of the States of New Jersey and/or Delaware. The Federal Emergency Management Agency (FEMA) acts as coordinator of the federal response. Emergency Management from New Jersey and Delaware provides information and assistance to FEMA as required to assist it in coordinating the federal response.

3.1 U.S. Nuclear Regulatory Commission

The NRC is notified via a dedicated telephone line (ENS) from the Control Room, Technical Support Center (TSC) or Emergency Operations Facility (EOF), to the Rockville, Maryland Operations Center within one hour after identifying the existence of an emergency condition. The NRC is responsible for the coordination of the federal government's technical response activities. Response support is initially supplied by the Office of Inspection and Enforcement, Region I, King of Prussia, Pennsylvania.

3.2 U.S. Coast Guard (USCG)

The U.S. Coast Guard is notified of all emergency events at the PSEG Site. At the request of the States of New Jersey or Delaware, they will provide rescue and/or notification operations on the Delaware River and associated waterways.

3.3 U.S. Department of Energy (DOE)

Radiological assistance teams are provided by Brookhaven National Laboratories, Brookhaven Area Office in Upton, New York. This assistance generally is requested by the States of New Jersey and Delaware. DOE is responsible for coordinating the offsite radiological monitoring and evaluation activities of the federal government.

3.4 Federal Emergency Management Agency (FEMA)

FEMA has the responsibility for coordinating all offsite nontechnical response activities of the federal government. They serve as the primary point of contact for requests for federal assistance from state and local officials, and other federal agencies.

3.5 National Weather Service

When requested, the National Weather Service provides backup meteorological data for the PSEG Site.

4.0 Federal Resources

The resources of the Federal government through the implementation of the National Response Framework (NRF) Nuclear/Radiological Incident Annex may be used to supplement the onsite surveys or relieve PSEG offsite survey teams. This Plan does not use NRF resources for making protective action assessments or recommendations.

The individual assigned the emergency coordinator function is the PSEG individual who is authorized to request NRF resources. The NRF teams are instructed to go to the EOF and report to the Radiological Support Manager. Survey team efforts offsite are managed and survey data are assembled and analyzed at the EOF.

The EOF is also the location where the Federal response coordination will be conducted. Desks and phones are available at the EOF to support the Federal response by the lead federal agency - NRC. Figure 4-I provides information on airports near the PSEG Site.

5.0 Other Organizations

Other organizations that are available for emergency support duties are called upon and report to the Technical Support Center (TSC) or Emergency Operations Facility (EOF).

5.1 PSEG Maplewood Testing Services

The PSEG Maplewood Testing Services is a wholly owned research subsidiary of PSEG. Maplewood provides environmental sampling and meteorology consultation. The testing service located in Maplewood, New Jersey, has extensive facilities and equipment for analysis of materials, environmental radioactivity analysis, and radiation surveys. Equipment available for radiation analysis includes: low level alpha-beta counters, gamma spectroscopy system, beta-gamma counter, and several types of portable radiation survey instruments. The equipment is maintained and periodically calibrated to appropriate radiation standards.

In addition, the PSEG Maplewood Testing Services has manpower available to assist in sample collection in the aftermath of an incident involving the release of radioactive materials. The emergency services and manpower from the laboratory would be requested by the Emergency Coordinator.

5.2 Reactor Vendor

The emergency response capabilities of Nuclear Steam Supply System (NSSS) vendors in support of the PSEG Site are provided in Emergency Plan Attachment 3.

5.3 Institute of Nuclear Power Operations (INPO)

INPO requested that all utilities with nuclear generating stations provide INPO with information concerning material and personnel resources. This information is available in their "Emergency Resources Manual," to which PSEG Nuclear is a signatory. This source of information, available on-line at the INPO website, is used by the emergency coordinator function in requesting assistance from other Companies.

Emergency Plan Attachment 3 contains the letter of agreement from INPO that outlines INPO's role in assisting a member during an emergency.

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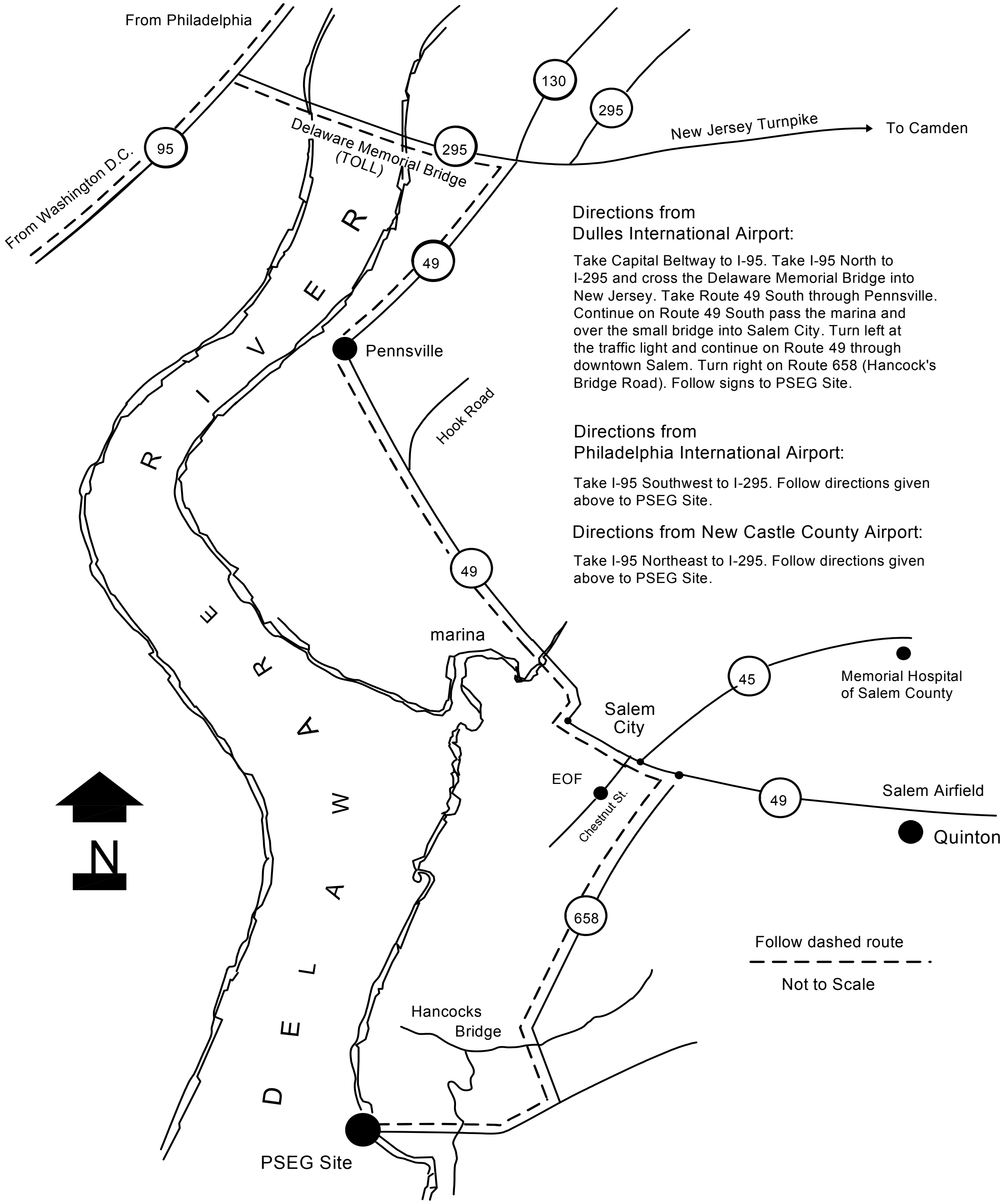
FIGURE 4-1
PSEG SITE
ACCESS FROM AREA AIRPORTS



SECTION 5

EMERGENCY CLASSIFICATION SYSTEM

The emergency classification system is designed to provide a consistent method for categorizing possible events or accidents into one of four emergency classifications: Unusual Event, Alert, Site Area Emergency, and General Emergency. Refer to the "Introduction" section of the Event Classification Guide (ECG) for a detailed description of the emergency classifications.

1.0 Unusual Event (UE)

Unusual Events, as used for emergency planning purposes, characterize off-normal plant conditions, which may not in themselves be particularly significant from an emergency response standpoint. An Unusual Event could reasonably have the potential to increase in significance if proper action is not taken or if circumstances beyond the control of the operating staff render the situation more serious from a safety standpoint. For Unusual Events, the States of New Jersey and Delaware are notified promptly (within 15 minutes) following the declaration of the emergency. No offsite response is necessary.

1.1 Alert

The Alert classification is the lowest level resulting in offsite emergency response. At this level, physical occurrences within the plant require station emergency response organization (ERO) response. This level, however, is associated with a judgment that the emergency situation can be corrected and controlled by the plant staff and it is unlikely that an offsite hazard will evolve.

For Alerts, the States of New Jersey and Delaware are notified promptly (within 15 minutes) following the declaration of the emergency. Furthermore, the onsite Technical Support Center (TSC) and Operations Support Center (OSC) are activated. Staffing of the Emergency Operating Facility (EOF) and Emergency News Center/Joint Information Center (ENC/JIC) is a planned option. Activation of the EOF will occur if, based on plant conditions, the emergency coordinator requires EOF support. State Emergency Operations Center (EOC) will activate, county and municipal EOC's may activate.

1.2 Site Area Emergency (SAE)

The Site Area Emergency classification reflects conditions where there is a clear potential for significant releases, such releases are likely, or they are occurring, but does not involve indications of a core melt situation based on current information. For Site Area Emergency, the States of New Jersey and Delaware are notified promptly (within 15 minutes) following the declaration of the emergency. "No protective actions are recommended at this time" is communicated to the states in the initial notification message following the declaration of a Site Area Emergency. Furthermore, the OSC, TSC, EOF, and ENC/JIC are activated. State, county, and municipal EOCs activate.

2.0 General Emergency (GE)

A General Emergency classification level reflects conditions involving an actual or imminent substantial core degradation or melting with the potential or loss of containment integrity. For General Emergency, the States of New Jersey and Delaware are notified promptly (within 15 minutes) following the declaration of the emergency. A protective action recommendation of either sheltering and/or evacuation out to a fixed distance is communicated to the states in the initial notification message following the declaration of a General Emergency. Furthermore, if not previously done, all PSEG Emergency Response Facilities are activated. State, county, and municipal EOCs activate.

3.0 Event Classification Guide (ECG)

The Event Classification Guides (ECG) for the PSEG Site list the action levels for all emergency and non-emergency reportable events consistent with NEI guidance documents endorsed by Regulatory Guide 1.101, Emergency Planning and Preparedness for Nuclear Power Reactors, station technical specifications, the Code of Federal Regulations, and special Licensee commitments.

The ECG's subject categories of initiating conditions are summarized for the PSEG Site in Attachment 5. Like the Emergency Plan, the ECG is subject to specific reviews and approvals prescribed by Section 17 of this Emergency Plan. The current revision of the ECGs provides the current controlled, approved document.

The ECG volume guides the emergency coordinator to an immediate and appropriate emergency response specific to the event. The ECG volumes contain the initiating conditions and associated emergency action levels. Since these volumes have been provided to the NRC in accordance with 10CFR50, as approved or revised per 10 CFR50.54q and 10CFR50, Appendix E, they have been included in this plan as attachments. The ECG volumes are considered proper annexes of the PSEG Emergency Plan.

The EALs have been discussed and agreed upon by PSEG and the state governments. Further, the EALs will be reviewed annually as discussed in Section 17 of this Emergency Plan.

SECTION 6

NOTIFICATION METHODS - RESPONSE ORGANIZATIONS

1.0 INITIAL NOTIFICATION

1.1 PSEG EMERGENCY RESPONSE ORGANIZATION

The initial notification of an emergency or a change in emergency classification is in accordance with Figure 6-1. Table 6-1 provides an initial notification and action summary as discussed in NUREG-0654. The station plant paging systems are utilized to notify onsite personnel of emergency conditions and that activation of emergency response facilities may be required.

An automated Emergency Outdial System computer is utilized to callout the balance of emergency response personnel for full organizational augmentation and activation of emergency response facilities. The system activates the appropriate digital group pagers while simultaneously calling other personnel on the telephone. The system is interactive and recognizes emergency response personnel by their employee identification numbers.

Additional PSEG telephone notifications are made in accordance with applicable Event Classification Guide Attachments and Emergency Plan Implementing Procedures.

1.2 INITIAL NOTIFICATION - STATES

The initial notification to the states of an emergency or a change in emergency classification is made to the State Police Headquarters of New Jersey and Delaware. Upon completion of the initial message, each State Police Headquarters verifies the call by performing a callback check and then makes the notifications indicated in Figures 6-2 and 6-3.

The procedures for initial notifications to the State of New Jersey and Delaware are identical for all emergency classes. Once activated however, the Delaware Emergency Management Agency (DEMA) will take initial notifications instead of the Delaware State Police. This notification is made promptly following the declaration of the emergency (within 15 minutes). An example of the message format for this initial notification used in the emergency procedures is provided as Figure 6-4. These notifications meet the requirements of NUREG-0654, Element E-3. Appropriate forms are utilized for each emergency classification.

1.3 INITIAL NOTIFICATION - LOCAL

For events classified as an Unusual Event, Alert or Site Area Emergency classification, each state, following notification by PSEG, initially notifies the local authorities. If, however, PSEG has not been able to contact a state, PSEG directly notifies the local (county) authorities.

All initial notifications must be accomplished within 15 minutes. Accident assessment, protective action recommendations, and other information normally provided to the state are communicated to the local authorities (or other agencies as provided in the Memorandum of Understanding with the state) until the state assessment agency assumes its communications and assessment responsibilities.

For events classified as a General Emergency, PSEG makes direct contact with the States of New Jersey and Delaware. If the states cannot be contacted within fifteen minutes, PSEG notifies the local governments (counties) and the Coast Guard. Following this initial contact the states, or if

the states could not be contacted the counties, will be responsible for assessing the information provided, activating their response organization (as required), notifying appropriate local governments, and the public.

Following contact by the state, or PSEG, each county and the U.S. Coast Guard are responsible for assessing the information provided and activating their response organizations.

1.4 FOLLOWUP COMMUNICATION - STATES

The followup communication with the states is initiated by a return call from the authorized state agency. For the State of Delaware, the Delaware Emergency Management Agency is responsible for followup communications. For the State of New Jersey, the Department of Environmental Protection, Bureau of Nuclear Engineering and/or the New Jersey State Police Office of Emergency Management is responsible for followup communications.

The procedures for followup communications with the States of New Jersey and Delaware are identical for all emergency classes. An example message format for followup communications used in the emergency plan procedures is provided as Figure 6-5. These notifications meet the requirements of NUREG-0654, Element E-4. Appropriate forms are utilized for each emergency classification.

1.5 FOLLOWUP COMMUNICATIONS - LOCAL

Followup communications with the local authorities are provided by the appropriate state agency for all emergency classifications.

1.6 NOTIFICATION OF THE NRC

This plan provides for appropriate notification of the NRC for the events described in the Event Classification Guide.

2.0 PROMPT ALERTING AND NOTIFICATION OF THE PUBLIC

> NOTE
>
> The existing Salem and Hope Creek Generating Station Prompt Alerting and Notification System will be used by the PSEG Site. This system meets FEMA REP 10 requirements.

Following initial notification, the states make a determination on protective actions and activation of the Prompt Alerting and Notification System. This system can be activated directly by Salem County in New Jersey and by the Delaware State Police in Delaware for a rapidly developing emergency.

Land use within the PSEG Site plume exposure Emergency Planning Zone (EPZ) is principally rural. The area within five miles of the PSEG site is largely water and marsh land. This area attracts only a limited number of hunters and trappers, most of whom are local residents. The towns and city within ten miles of the PSEG Site are listed in Table 1-1.

2.1 SIREN SYSTEM AS THE FIRST PROMPT ALERTING SYSTEM

The Prompt Alerting and Notification System (operated by the states) (Figure 6-6) consists of subsystems which meet the criteria of FEMA REP-10. The system provides notification of the population within zero to five miles of the PSEG Site in 15 minutes and notification of the population within five to ten miles in 45 minutes. The first Prompt Alerting and Notification subsystem consists of a siren system controlled from a continuously (24 hour) staffed location in New Jersey and Delaware. Within zero to ten miles of the PSEG Site this system is designed to provide siren coverage for essentially 100% of the permanent resident population. In addition, it provides siren coverage of population centers throughout the plume exposure EPZ and selected coverage for the areas known to have recreational or transient populations. An area map showing this system is provided as Figure 6-7. Figure 6-7 includes a listing of siren locations. This system is as represented in the Alert and Notification System Report submitted by New Jersey, Delaware, and PSEG to FEMA Region 2 on January 31, 1986 and tested on December 10, 1986; as amended by the Final Design Review Report approved and issued by FEMA in April 2007 for the updated Alert and Notification System.

2.2 PUBLIC ADDRESS SYSTEMS AS THE SECOND PROMPT ALERTING SYSTEM

The second prompt alerting and notification subsystem combines alerting, notification, and information into a single system. This system, which is used for waterborne transient boaters within the plume exposure EPZ, consists of a radio alert and notification system coordinated by the United States Coast Guard (USCG) on Marine Channel 16 and supplemented by broadcasts via Emergency Alert System (EAS) and National Oceanographic and Atmospheric Administration (NOAA) Weather Radio. The USCG and states also dispatch boats and helicopters to make direct contact with boaters.

2.3 TRANSIENT ALERTING AND NOTIFICATION SYSTEM

Prompt alerting and notification of the transient population within the plume exposure EPZ utilizes the prompt alerting and notification system for the permanent resident population. The States of Delaware, New Jersey and the USCG have established methods for augmenting the prompt alerting and notification system that provides additional assurance that transients are notified in the event of an emergency requiring implementation of protective actions for the public. In general, the agencies in charge of parks and recreation, the Delaware National Guard, the marine police and the state police assist in the notification of transients within their jurisdictions. The alerting and notification of transients may utilize motor vehicles, aircraft, boats or road blocks. The methods used to inform/educate the transient population of the prompt alerting system and their required response is provided in Section 8.0 of this plan. These subsystems are augmented by the use of route alerting by police and fire personnel.

2.4 ROUTE ALERTING AS A BACK-UP ALERTING SYSTEM

The prompt alerting subsystems described previously are all augmented by the use of public address systems used by police and fire personnel.

2.5 ALERT NOTIFICATION SYSTEM REPORT

The Alert Notification System Report for Salem and Hope Creek Generating Stations, submitted to FEMA to meet REP 10 requirements, provides appropriate reports on the design, hardware, and other applicable components of the systems, including specific letters of agreement, plans and procedures.

TABLE 6-1
NOTIFICATION AND ACTION SUMMARY

A. Unusual Event

Class/Condition	Licensee Actions	Offsite
1. Potential degradation of the level of safety of the plant OR Security threat to facility protection.	1. Promptly inform DE DSP/DEMA and NJ OEM authorities.	1. Verify event classification/ status.
2. No radiological release requiring offsite response or monitoring is expected.	2. Assess event conditions and initiate corrective actions.	2. Notify key personnel.
	3. Augment on-shift resources as needed.	3. Provide assistance if requested.
	4. Escalate emergency level or terminate the event.	4. Standby until termination.

TABLE 6-1 (cont)
NOTIFICATION AND ACTION SUMMARY

B. Alert

Class/Condition	Licensee Actions	Offsite
1. Potential/actual safety system degradation OR Security event that involves probable life threatening risk to site personnel or damage to site equipment because of hostile action.	1. Promptly inform DE DSP/DEMA and NJ OEM authorities.	1. Alert state response personnel & key county personnel.
2. Potential/actual radiological release is fraction of EPA PAG.	2. Activate the OSC.	2. Activate state EOC. Alert to standby/ activate Kent County, Cumberland County, New Castle County, and Salem County Emergency Coordinators.
	3. Mobilize additional personnel to activate TSC. Emergency Duty Officer assumes control as Emergency Coordinator. Provide periodic plant status updates to the states.	3. Initiate field monitoring, if appropriate.
	4. Assess event conditions & initiate corrective actions.	4. Escalate emergency level or terminate event.
	5. Dispatch field monitoring teams as applicable.	
	6. Provide states with escalated emergency level or terminate event.	

TABLE 6-1 (cont)
NOTIFICATION AND ACTION SUMMARY

C. Site Area Emergency

Class/Condition	Licensee Actions	Offsite
1. Actual/likely major failure of plant function needed to protect public OR Hostile action that results in intentional damage or malicious acts toward site personnel or equipment that could lead to likely failure of, or that prevents effective access to, equipment needed for protection of the public.	1. Promptly inform DE DSP/DEMA and NJ OEM authorities.	1. Initiate prompt notification and activate EAS and keep public informed.
2. Radiological release may exceed EPA PAG at site boundary.	2. Augment all resources to activate EOF. Emergency Response Manager assumes control as emergency coordinator.	2. Alert all emergency response personnel and activate specific functions. Activate state, county and local EOCs.
3. Possible degraded core.	3. Assess event conditions and initiate corrective actions.	3. Monitor appropriate locations.
4. Imminent loss of physical control of plant.	4. Conduct accountability and release nonessential personnel.	4. Alert contiguous and ingestion pathway states.
	5. Dispatch radiological monitoring teams.	5. Provide assistance to the site, if required.
	6. Provide states with: On/offsite radiological data, plant conditions, and meteorological data.	6. Escalate or deescalate emergency class.
	7. Provide state with dose projections and recommend protective actions.	
	8. Escalate or deescalate emergency class.	

TABLE 6-1 (cont)
NOTIFICATION AND ACTION SUMMARY

D. General Emergency

Class/Condition	Licensee Actions	Offsite
1. Actual/imminent core degradation or melting with potential containment failure OR Hostile actions that result in an actual loss of physical control of the facility.	1. Promptly inform DE DSP/DEMA and NJ OEM authorities. Provide pre-determined (based on plant condition) protective action recommendations.	1. Activate emergency and protective action functions.
2. Actual/potential radiological release exceeding EPA PAG offsite.	2. Assess event conditions and initiate corrective actions.	2. Make and implement protective actions, including pathway measures.
3. Loss of two fission Product barriers and Potential loss of the third.	3. Augment all Resources.	3. Regularly inform the public of Emergency status.
	4. Keep federal and state authorities informed of event status and developments.	4. Coordinate field monitoring with federal, offsite and onsite teams.
	5. Regularly provide radiological and meteorological data to the States.	5. Continuously assess event effects upon the public.
	6. Initiate actions, mitigate the incident and terminate any radiological releases.	6. Reduce emergency and initiate recovery action.
	7. Initiate recovery action and reduce emergency class.	

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FIGURE 6-1
NOTIFICATION METHOD - PSEG

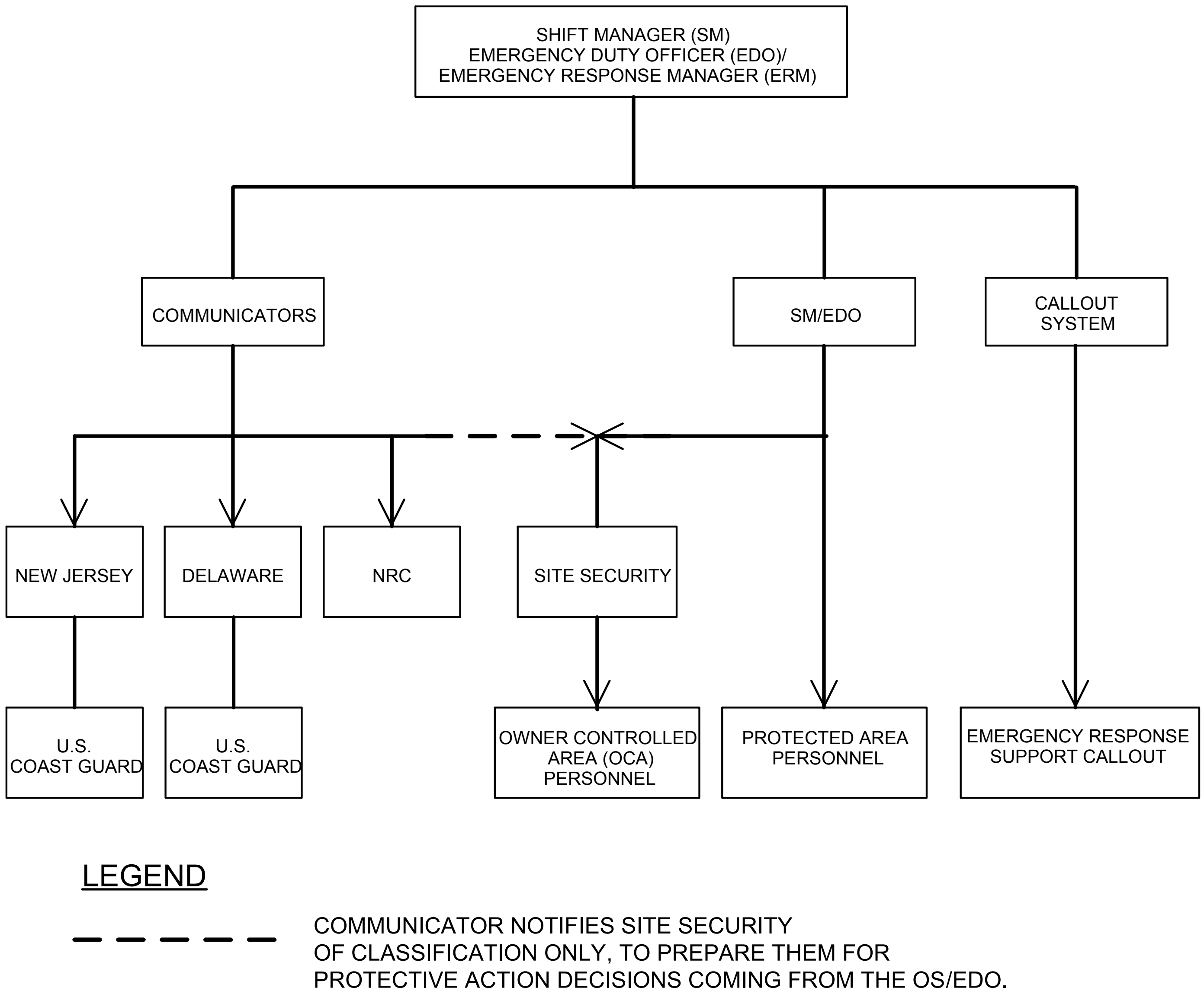

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FIGURE 6-2
NOTIFICATION METHOD – NEW JERSEY

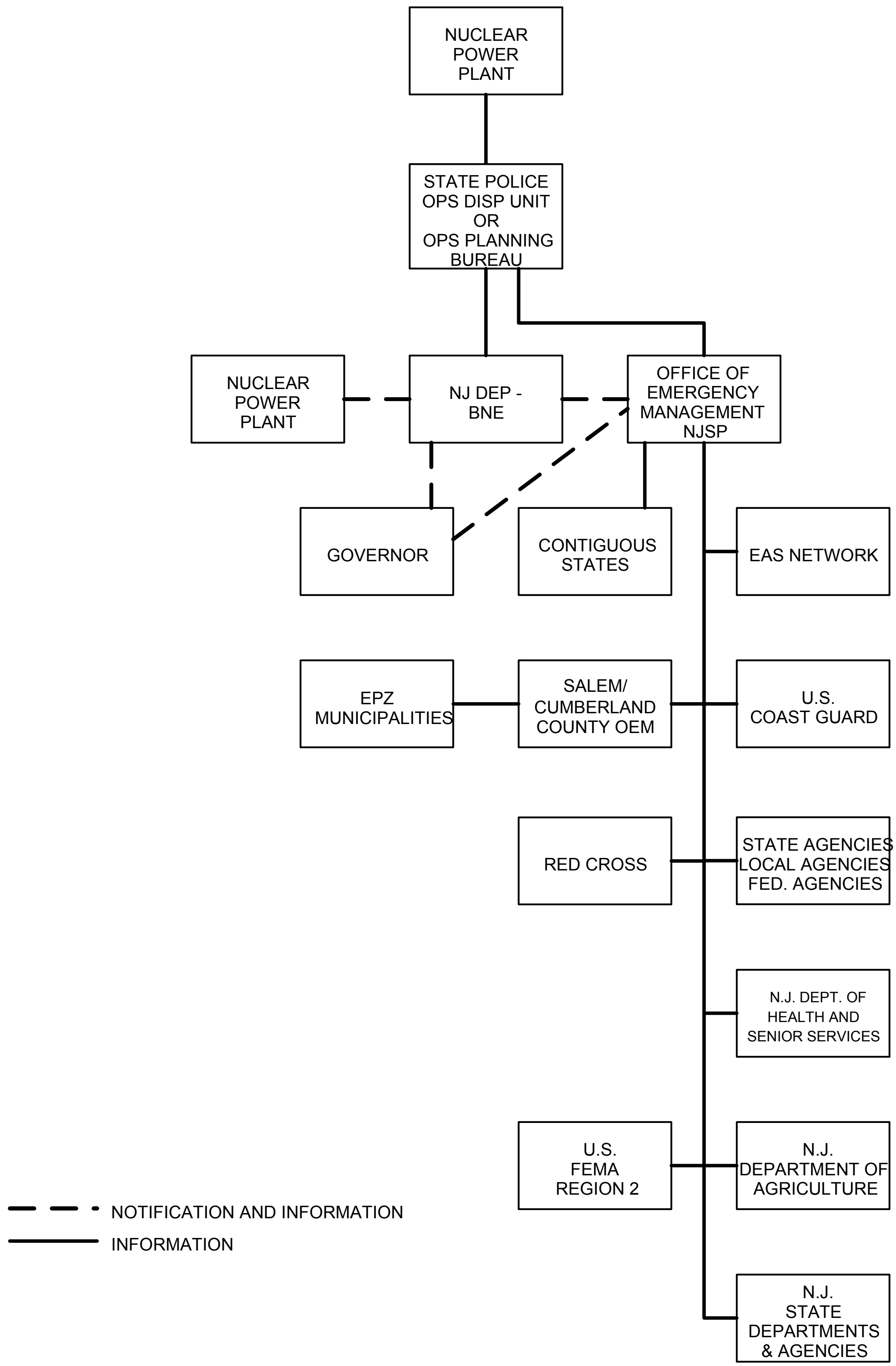

FIGURE 6-3
NOTIFICATION METHOD – DELAWARE

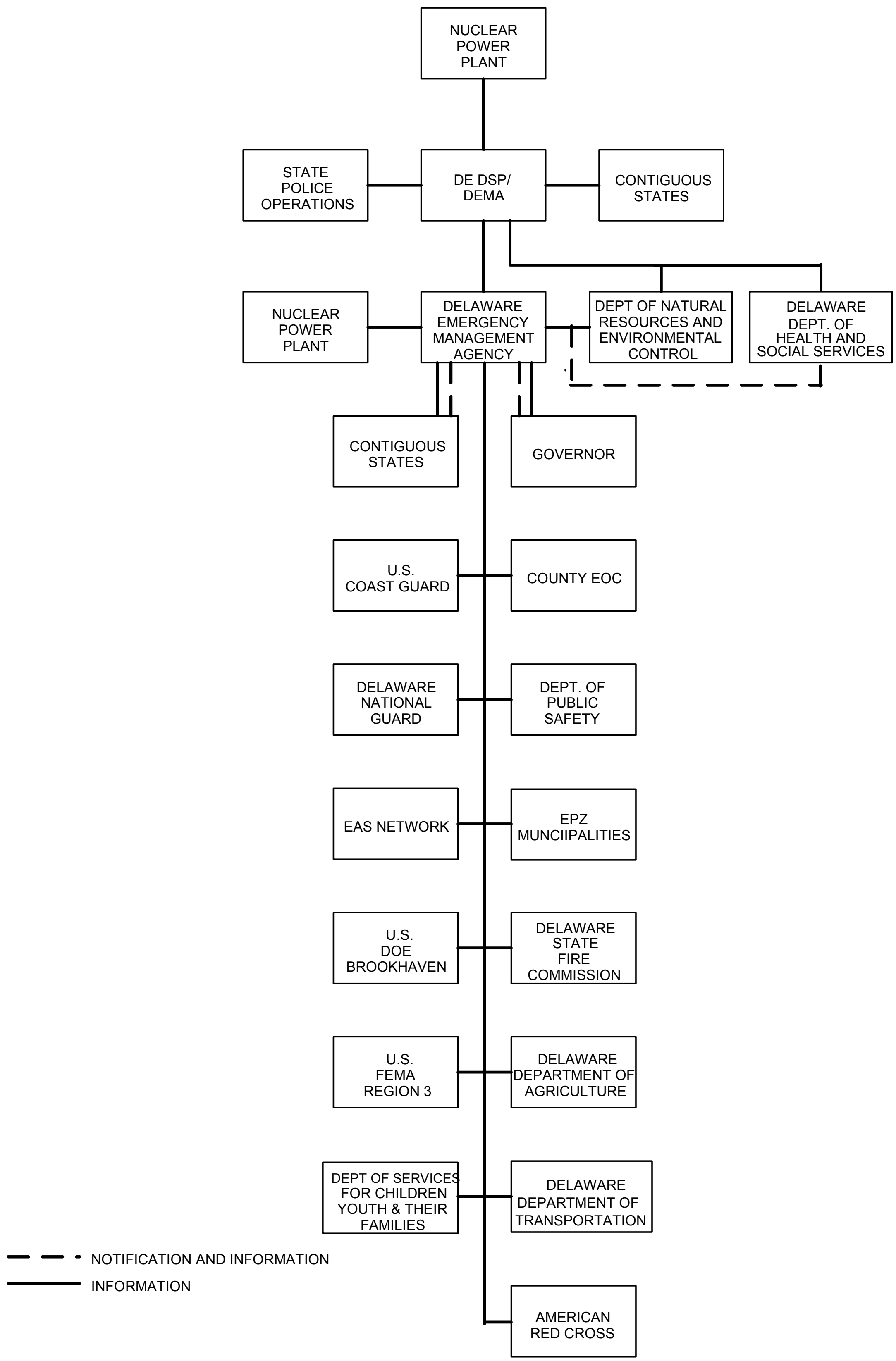

FIGURE 6-4
TYPICAL INITIAL CONTACT MESSAGE FORM

INITIAL CONTACT MESSAGE FORM

I. THIS IS ________________________ , COMMUNICATOR IN THE ☐ CONTROL ROOM
(NAME) ☐ TSC
☐ EOF

AT THE **PSEG Site**, UNIT NO. _________.

II. ☐ THIS IS NOTIFICATION OF A **SITE AREA EMERGENCY** WHICH WAS

DECLARED AT __________________ ON __________________.
(TIME - 24 HOUR CLOCK) (DATE)

EAL #(s) ______________________, ______________________, ___________________

DESCRIPTION OF EVENT: ____

____
____

III. ☐ NO RADIOLOGICAL RELEASE IS IN PROGRESS.

☐ THERE IS A RADIOLOGICAL RELEASE IN PROGRESS.

$\left.\right\}$ see NOTE for release definition

IV. 33 FT. LEVEL WIND DIRECTION (From):________________ WIND SPEED: ___________
(From MET Computer) (DEGREES) (MPH)

V. ☐ **NO PROTECTIVE ACTIONS ARE RECOMMENDED AT THIS TIME**

____
EC Initials
(Approval to Transmit ICMF)

NOTE: Radiological Release is defined as: [To be determined after new plant data is available.]

FIGURE 6-5
TYPICAL STATION STATUS CHECKLIST

SSCL

STATION STATUS CHECKLIST

(Pg. 1 of 2)

Operational Information

PSEG Site Unit No.____ Message Date ________ Time _______

Transmitted By: Name ____________________________________ Position ________________
(CR/TSC/EOF)

1. Date and Time Event Declared: Date ______________ Time _______________ (24 hr clock)

2. Event Classification: ☐ Unusual Event ☐ Site Area Emergency ☐ Alert ☐ General Emergency

3. Cause of Event: Primary Initiating Condition used for declaration

EAL #(s) ____

Description of the event ____

____

____

____

4. Status of Reactor: ☐ Tripped/Time _______________ ☐ At Power ☐ Startup ☐ Hot Standby ☐ Hot Shutdown ☐ Cold Shutdown ☐ Refuel

5. PZR/RCS Pressure ___________ psig Core Exit TC ____________ ^{o}F

6. Is offsite power available? ☐ YES ☐ NO

7. Are two or more diesel generators available? ☐ YES ☐ NO

8. Did any Emergency Core Cooling Systems actuate? ☐ YES ☐ NO

9. Is the Containment barrier failed? (Loss per EAL Barrier Table) ☐ YES ☐ NO

10. Other pertinent information ____

____

____

____

Approved: ________________________
EC or TSS or SSM

FIGURE 6-5 (cont)
TYPICAL STATION STATUS CHECKLIST

STATION STATUS CHECKLIST
(PAGE 2 OF 2)
RADIOLOGICAL INFORMATION

PSEG SITE UNIT NUMBER: ___ CALCULATION TIME: ______ DATE: _______

1. GASEOUS RELEASE>TECH SPEC (T/S) LIMITS:
(T/S LIMITS: * IODINE)
YES: [ ] RELEASE START TIME: ____________ DATE: __________
NO: [ ]

A. RELEASE TERMINATED: YES [ ] NO [ ] N/A [ ]
B. ANTICIPATED OR UNKNOWN DURATION OF RELEASE: _____________ HOURS
C. TYPE OF RELEASE: GROUND [ ] ELEVATED: [ ] N/A [ ]
D. ADJUSTED WIND SPEED: ________(mph) ________(m/sec) WIND DIR (deg from) _______
E. STABILITY CLASS: _____________ (A-G) DELTA T: _______(deg C)
F. VENT PATH OF RELEASE: *_________*_________*_________*_________
G. NG RELEASE RATE: *_____________ *_______________ *________________
*_______________(μCi/sec)
H. I-131 RELEASE RATE: *_____________ *______________ *________________
*______________ DEFAULT (μCi/sec) (circle if default)
I. TOTAL RELEASE RATE NOBLE GAS: ___________________(μCi/sec)
J. TOTAL RELEASE RATE IODINE-131: ___________________(μCi/sec)

2. PROJECTED OFFSITE DOSE RATE CALCULATIONS:

DISTANCE FROM VENT (IN MILES)	XU/Q (1/M2)	TEDE RATE (MREM/HR)	TEDE DOSE (4 DAY) (MREM)	THYROID-CDE RATE (MREM/HR)	THYROID-CDE DOSE (MREM)
MEA *	________	__________	__________	____________	_______________
2.00	________	__________	__________	____________	_______________
LPZ 5.00	________	__________	__________	____________	_______________
EPZ 10.00	________	__________	__________	____________	_______________

[*: To be determined after new plant data is available.]

3. OTHER PERTINENT INFORMATION: ____

____

4. UPDATE TO STATES (IF VERBALLY TRASMITTED):

	NAME	TIME	INITALS
STATE OF NEW JERSEY:	______________________	______________	________
STATE OF DELAWARE :	______________________	______________	________
AGENCY:	______________________	______________	________

APPROVED: _____________________
EC or RAC or RSM

FIGURE 6-6
PROMPT NOTIFICATION SYSTEM

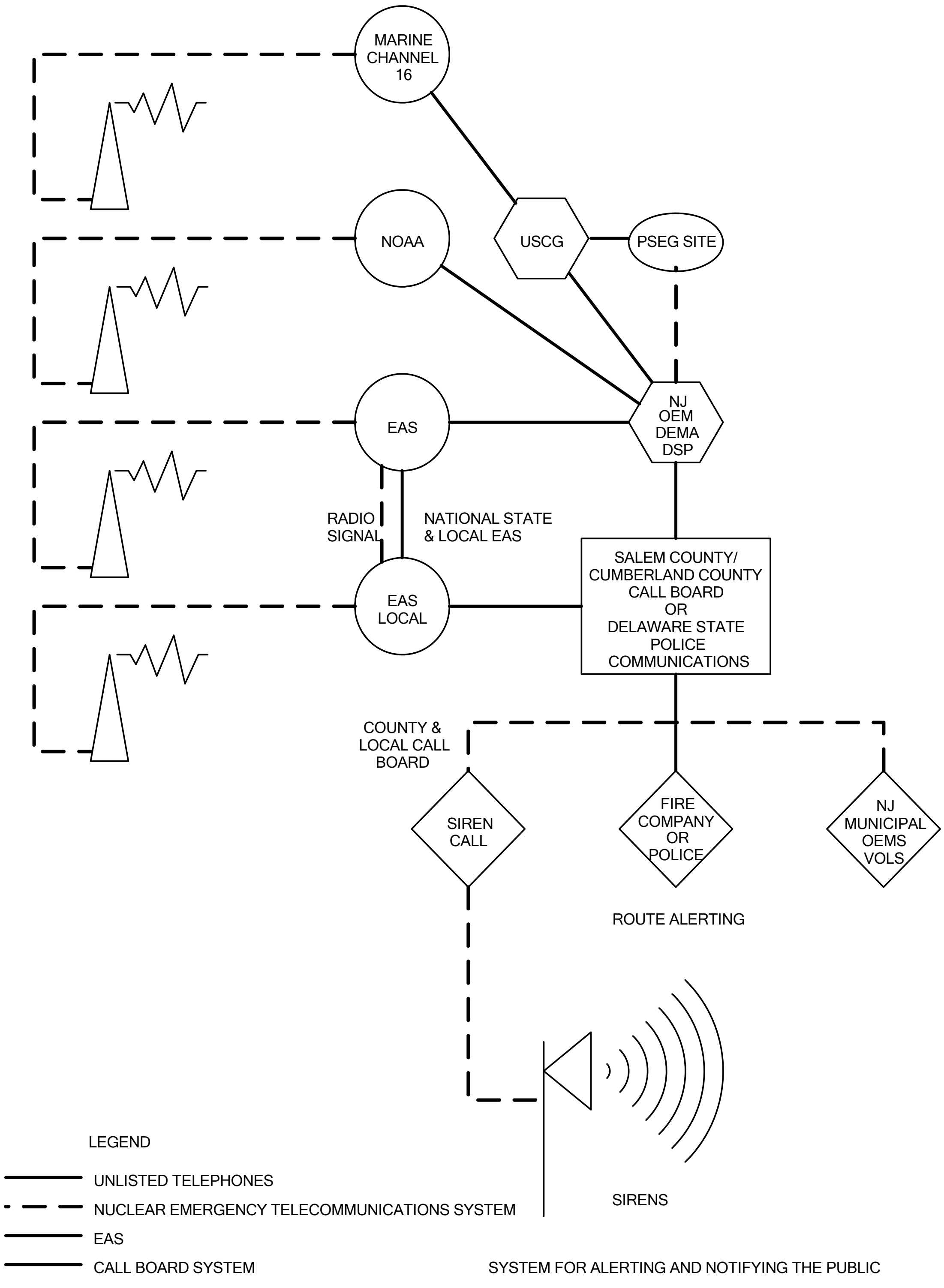

FIGURE 6-7
APPROXIMATE AREA OF PROMPT NOTIFICATION SYSTEM COVERAGE

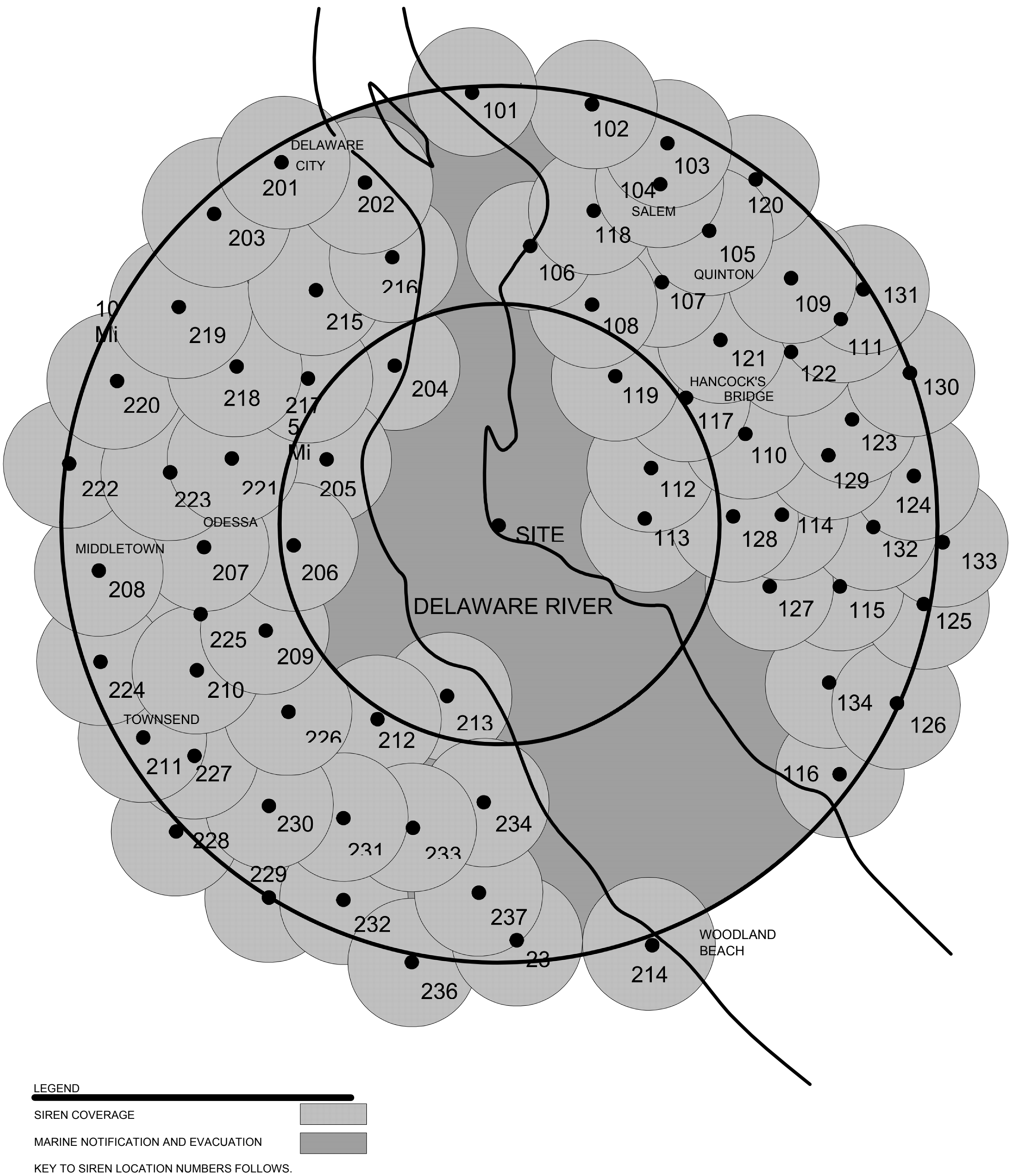

FIGURE 6-7 (CONTINUED)
APPROXIMATE AREA OF PROMPT NOTIFICATION SYSTEM COVERAGE
SIREN LOCATIONS

Siren No.	State/City & County	Location
		New Jersey
101	NJ/Pennsville Salem Co.	Fort Mott Road, 0.1 mile south of Fort Mott Park
102	NJ/Pennsville Salem Co.	Route 49, 1000 ft. south of intersection with Harrisonville Lighthouse Road
103	NJ/Salem Salem Co.	Route 45, 0.2 mile east of intersection with Tide Mill Road
104	NJ/Salem Salem Co.	New Market Street at intersection with Belden Street
105	NJ/Salem Salem Co.	Quinton Road, 0.2 mile west of intersection with Harris Road
106	NJ/Elsinboro Salem Co.	Delaware Avenue, 0.1 mile east of intersection with Locust Avenue
107	NJ/Haggerville Salem Co.	Salem-Hancocks Bridge Road, 1 mile from intersection with Amwellbury Road
108	NJ/Elsinboro Salem Co.	Fort Elfsborg-Hancocks Bridge Road, 1200 feet southeast of intersection with Money Island Road
109	NJ/Quinton Salem Co.	Quinton Fire Department, at intersection of Route 49 with Robinson Road
110	NJ/Lower Alloways Creek Salem Co.	Harmersville-Pecks Corner-Cohansy Road, 2000 feet east of intersection with Mays Lane
111	NJ/Quinton Salem Co.	Burden Hill Road, 3000 feet southwest of intersection with Route 49

**FIGURE 6-7 (CONTINUED)
APPROXIMATE AREA OF PROMPT NOTIFICATION SYSTEM COVERAGE
SIREN LOCATIONS**

Siren No.	State/City & County	Location
112	NJ/Lower Alloways Creek Salem Co.	Alloway Creek Neck Road, 2000 feet south of intersection with Grosscup Road on Access Road to Artificial Island
113	NJ/Lower Alloways Creek Salem Co.	Alloway Creek Neck Road, 1.8 mile south of intersection with Grosscup Road on Access Road to Artificial Island
114	NJ/Lower Alloways Creek Salem Co.	Frog Ocean Road, 1800 feet east of intersection with Stow Neck Road
115	NJ/Stow Creek Cumberland Co.	Stow Creek Road, 0.1 mile west of intersection with Canton Road
116	NJ/Greenwich Cumberland Co.	Bay Side Road, 1.1 mile west of intersection with Tindall Island Road
117	NJ/Lower Alloways Creek Salem Co.	Buttonwood Road at the intersection with Cuff Road
118	NJ/Elsinboro Salem Co.	Tilbury Road, 1500 feet south of the intersection with Sinnickson Landing Road
119	NJ/Elsinboro Salem Co.	Abbott's Farm Road, 4300 feet south of intersection with Fort Elfsborg-Hancocks Bridge Road
120	NJ/Salem Salem Co.	Quaker Neck Road at intersection with Sandy Ridge Road
121	NJ/Lower Alloways Creek Salem Co.	Beasley Neck Road, 2000 feet north of intersection with Hogate Boulevard

FIGURE 6-7 (CONTINUED)
APPROXIMATE AREA OF PROMPT NOTIFICATION SYSTEM COVERAGE
SIREN LOCATIONS

Siren No.	State/City & County	Location
122	NJ/Quinton Salem Co.	Cross Road, 500 feet south of intersection with Hogate Boulevard
123	NJ/Quinton Salem Co.	Quinton-Jericho Road at intersection with Mill Pond Road
124	NJ/Quinton Salem Co.	Quinton-Jericho Road, 500 feet northwest of inter section with Gravelly Hill Road
125	NJ/Stow Creek Cumberland Co.	Willis Road, 2500 feet east of Frank Davis Road South
126	NJ/Greenwich Cumberland Co.	Gum Tree Corner Road, 3250 feet south of intersection with Stathems Neck Road
127	NJ/Lower Alloways Creek Salem Co.	Frog Ocean Road at intersection with Frog Road
128	NJ/Lower Alloways Creek Salem Co.	Stow Neck Road, 0.5 mile south of intersection with Long Bridge Road
129	NJ/Lower Alloways Creek Salem Co.	Maskell's Mill Road at intersection with Batter Cake Lane
130	NJ/Quinton Salem Co.	Harmersville-Pecks Corner Cohansey Road, 3500 feet west of intersection with Route 49
131	NJ/Quinton Salem Co.	Burden Hill Road, 2000 feet north of intersection with Route 49
132	NJ/Lower Alloways Creek Salem Co.	Buckhorn Road, 8000 feet west of intersection with Macanippuck Road

FIGURE 6-7 (CONTINUED)
APPROXIMATE AREA OF PROMPT NOTIFICATION SYSTEM COVERAGE
SIREN LOCATIONS

Siren No.	State/City & County	Location
133	NJ/Stow Creek Salem Co.	Macanippuck Road, 2000 feet south of intersection with Buckhorn Road
134	NJ/Greenwich Cumberland Co.	Stathems Neck Road, 5500 feet west of intersection with Gum Tree Road at the bend in the road
		Delaware
201	DE/Delaware City New Castle Co.	Route 72 at intersection with Clarks Corner Road
202	DE/Delaware City New Castle Co.	Clinton St. at intersection with Second Street
203	DE/St. Georges New Castle Co.	Route 13 at intersection with Coxs Neck Lane
204	DE/Port Penn New Castle Co.	Biddles Corner-Port Penn Road, 0.1 mile west of intersection with River Road
205	DE/Bayview New Castle Co.	McDonough Bayview Road, 0.2 mile west of intersection with Thomas Corner Road
206	DE/Thomas Landing New Castle Co.	Thomas Corner Road, 0.8 mile west of intersection with Old Corbit Road
207	DE/Odessa New Castle Co.	Marl Pitt Road at intersection with Fifth Street
208	DE/Middletown New Castle Co.	Main Street at intersection with New Road
209	DE/Mathews Corners New Castle Co.	Stump Corner Road, 0.6 mile south of intersection with Thomas Corner Road

FIGURE 6-7 (CONTINUED)
APPROXIMATE AREA OF PROMPT NOTIFICATION SYSTEM COVERAGE
SIREN LOCATIONS

Siren No.	State/City & County	Location
210	DE/Fieldboro New Castle Co.	Noxontown Road, 0.1 mile west of intersection with Route 13
211	DE/Townsend New Castle Co.	Townsend Pine Tree Corner Road, 0.1 mile west of intersection with Blackbird Middletown Road
212	DE/Taylors Bridge New Castle Co.	Flemings Landing Road, 1.8 mile east of intersection with Taylors Bridge Road
213	De/Taylors Bridge New Castle Co.	Cedar Swamp Road, 2 miles east of Route 9
214	DE/Woodland Beach Kent Co.	Route 6, 2.8 miles east of intersection with Route 9
215	DE/Port Penn New Castle Co.	Route 9, 200 feet south of intersection with Dutch Neck Road
216	DE/Port Penn New Castle Co.	Dutch Neck Road, 9000 feet northeast of intersection with Biddles Corner- Port Penn Road
217	DE/Port Penn New Castle Co.	Boyd’s Corner Road, 2000 feet west of intersection with Biddles Corner-Port Penn Road
218	DE/St. Georges New Castle Co.	Route 13, 2500 feet south of intersection with Biddles Corner-Port Penn Road
219	DE/Biddles Corner New Castle Co.	Biddles Corner Grove Road, 2600 feet north of intersection with County Road 412A
220	DE/Mt. Pleasant New Castle Co.	Ratlidge Road, 1500 feet north of intersection with Mount Pleasant-Boyd’s Corner Road

FIGURE 6-7 (CONTINUED)
APPROXIMATE AREA OF PROMPT NOTIFICATION SYSTEM COVERAGE
SIREN LOCATIONS

Siren No.	State/City & County	Location
221	DE/McDonough New Castle Co.	Route 13, 1000 feet south of intersection with McDonough-Bayview Road
222	DE/Armstrong New Castle Co.	Route 301, 1500 feet north of intersection with Armstrong Corner Road
223	DE/Armstrong New Castle Co.	Shallcross Road, 5500 feet north of intersection with Armstrong Corner Road at bend in the road
224	DE/Middletown New Castle Co.	Blackbird-Middleton Road, 3000 feet south of intersection with Noxontown Road
225	DE/Fieldboro New Castle Co.	Route 13, 2000 feet north of intersection with Chestnut Lane
226	DE/Blackbird New Castle Co.	Taylors Bridge Road at intersection with Union Church Road
227	DE/Ginns Corner New Castle Co.	Route 13, 5000 feet north of intersection with Blackbird-Middletown Road
228	DE/Blackbird New Castle Co.	Blackbird Station Road, 800 feet west of Blackbird Creek
229	DE/Blackbird New Castle Co.	Route 13, 2950 feet south of intersection with Blackdiamond Road
230	DE/Blackbird New Castle Co.	Gum Bush Road, 2000 feet northeast of intersection with Blackbird Landing Road
231	DE/Walker New Castle Co.	Walker School Road at intersection with Gardner Road

FIGURE 6-7 (CONTINUED)
APPROXIMATE AREA OF PROMPT NOTIFICATION SYSTEM COVERAGE
SIREN LOCATIONS

Siren No.	State/City & County	Location
232	DE/Walker New Castle Co.	Paddock Road, 1750 feet north of intersection with Black Diamond and Walker School Roads
233	DE/Taylors Bridge New Castle Co.	Paddock Road, 3500 feet west of intersection with Route 9
234	DE/Taylors Bridge New Castle Co.	Thoroughfare Neck Road, 6000 feet east of intersection with Route 9
235	DE/Brick Store Kent Co.	County Road 82, 1000 feet south of intersection with Route 9
236	DE/Smyrna New Castle Co.	End of Brick Store Landing Road, 1500 feet east of intersection with County Road 503
237	DE/Brickstore Kent Co.	Route 9, 2000 feet northwest of intersection with County Road 317

NOTE:

All sirens are omni-directional and each has a weighted average sound pressure level of 119.5 dB© at 100 feet to meet criteria of FEMA REP-10.

PSEG Site
ESP Application
Part 5, Emergency Plan

SECTION 7

EMERGENCY COMMUNICATIONS

1.0 The Plan provides for establishing communications on a continuous (24 - hours per day) basis with the following organizations:

1) The State of New Jersey
2) The State of Delaware
3) Salem County New Jersey
4) Cumberland County New Jersey
5) New Castle County Delaware
6) Kent County Delaware
7) Lower Alloways Creek Township
8) PSEG (Internal Communication)
9) U.S. NRC

The actual notification methods are outlined in Section 6.0 of this Plan.

2.0 General Equipment and System Descriptions

To assure that external notifications and communications are available during an emergency, PSEG maintains both dedicated and commercial communications systems as part of its emergency response capabilities. Table 7-I summarizes the dedicated and commercial communications services maintained in emergency response facilities on and offsite. The following descriptions of the available communications systems emphasize the features which distinguish them. All are highly reliable telephone systems.

2.1 NETS

The Nuclear Emergency Telecommunications System (NETS) is a privately controlled, self-contained telephone exchange that operates as a closed system, not accessible from other phone exchanges. This feature allows the system to be dedicated to emergency response use. The system may use either PSEG microwave, commercial telephone system microwave, fiber optics, or buried cable transmission as needed. The exchange switching equipment is maintained at the Environmental & Energy Resource Center (EERC). As an independent system with an uninterruptible power supply, it may operate with or without local phone service or external power.

2.2 Centrex/ESSX 1

The Centrex/Electronic Switch System Exchange I (Centrex/ESSX 1) is also a privately controlled exchange, which PSEG operates with its own microwave signal system. This system is also independent of local phone service, since each circuit is independently wired. The microwave signal is generated from corporate facilities in Newark, NJ, separated from any local effects of weather or telephone use. The exchange is accessible from other exchanges, but circuits are located only in PSEG facilities. It is considered the primary backup for the NETS system.

2.3 DID

Direct Inward Dial (DID) system is named for the dominant feature of the commercial telephone service provided by the local telephone company for the site. DID allows station telephones to be extensions or tied lines of the same systems. These exchanges can take advantage of backup power supplies provided to the stations, and may use either PSEG microwave, commercial telephone system microwave, or buried cable transmission systems to maintain external communications. This commercial telephone service is available as an additional backup for the NETS and Centrex/ESSX 1 system.

3.0 Emergency Communications with the States of New Jersey and Delaware and Counties of Cumberland, Salem, Kent, and New Castle

NOTE

The existing Salem and Hope Creek Generating Station Emergency Communication Systems will be used by the PSEG Site.

3.1 Primary Emergency Communications

The primary communications system between the PSEG Site, the states, and counties is the NETS system described above. NETS telephones are located in onsite emergency response facilities, and offsite emergency facilities of PSEG, as well as the Emergency Operations Center Facilities of the states and counties.

The system is used to notify the states for all emergency action levels and provide emergency communications with the counties. See Table 7-I for a summary of NETS equipment and locations.

3.2 Secondary Communication

The secondary communications to the New Jersey and Delaware states and counties are provided by both the Centrex/ESSX 1 and DID systems, described above, which are strategically placed throughout emergency facilities. Both systems can be used to contact the states and counties via commercial telephone lines.

4.0 Additional Methods for State and County Contacts

EMRAD (Emergency Radio) radio frequency communications equipment is located in the Control Room areas in each station and the EOF, and provide still another means of contacting the state of New Jersey, and the New Jersey counties of Salem and Cumberland.

National Attack Warning and Alert System (NAWAS) communications, which are available in the Control Room areas, TSC, and the EOF, provide still another means of contacting the state of Delaware.

5.0 Emergency Communications with the NRC

A dedicated communications system with the NRC, the Federal Telecommunications System (FTS) consists of direct lines to the NRC. FTS lines are used to provide general accident information. These telephones are installed in the Control Room, TSC, and the EOF.

6.0 PSEG Internal Communications

6.1 Telephone Systems

Table 7-1 summarizes the equipment and locations for NETS access. Those locations include all PSEG emergency response facilities on and offsite.

As described above, NETS telephones are also used for PSEG internal communications for emergency response.

The NETS is used to initiate and expedite implementation of Emergency Plan Procedures. Any NETS locations may contact any other NETS location or access commercial back up services.

Centrex/ESSX 1 system also acts as a backup system for NETS in the PSEG internal communications network. DID, as described earlier, is the principal telephone system used for normal business at the site and is also a backup system for emergency response.

All PSEG emergency facilities on and offsite can be contacted from these systems.

6.2 PSEG Site's Alarm Systems

6.3 Fire Detection System

The fire detection system is designed to quickly detect visible or invisible smoke (or other products of combustion) and/or heat in designated areas of the plant. The fire alarm communication systems and subsystems are located at strategic points throughout the plant to warn personnel of a nuclear incident or other emergency conditions. Existing plant alarm systems are sufficiently audible to alert personnel in the event of a fire or need for assembly. These alarm communication systems consist of warning sirens and lights (in high noise areas) and the Plant Public Address (PA) system.

6.4 Radiation Alert Alarm

The PSEG Site radiation alert alarms are continuous, pulse-tone sounds, generated electronically in the tone generators of the PA systems. They are broadcast throughout each station via the PA page channels. The alarms are initiated manually by pushbutton from the control room.

6.5 Local Area Evacuation Alarms

Local evacuation alarms will be provided when available.

7.0 PSEG Site Public Address (PA) Systems

The PA is a voice communication system which is designed for use in extreme environmental conditions such as dust, moisture, heat and noise. The system is located throughout the plant including the Control Room, OSC and TSC and consists of handsets, speakers and their associated amplifiers.

The power for this system is 120 volts AC from an inverted DC source to provide reliable communications during an emergency.

8.0 PSEG Site Radio Systems

One of the station's radio systems is the VHF security radio system. This radio system is used for security duties and is routinely tested in accordance with the Station Security Plan.

A second radio system is the Operations and Fire Protection Departments' UHF radio system. This multi-frequency system is used routinely by both station Operations Departments and the Fire Protection Department. When an emergency event is declared, these radio frequencies serve the station Operations Support Center (OSC).

A third, 900-MHz radio system is used for both onsite and offsite field monitoring team communications. Two specific frequencies (talk groups) are assigned for field monitoring team communications. One talk group is assigned for onsite communications between the Control Room, TSC, and onsite radiation monitoring team with a second talk group assigned for communications between the EOF and offsite radiation monitoring teams. In addition to the installed and portable 900-MHz radio hardware, backup communications devices are supplied to onsite and offsite field teams. The 900-MHz radio system is routinely tested in emergency preparedness drills and monitored by the IT department. This test frequency and monitoring has been determined to be more conservative than required by NUREG-0654 or 10CFR50, Appendix E.

9.0 Notification of Owner Controlled Area

Notification of the Owner Controlled Areas, also discussed in Section 11, Protective Response, is provided for the protection of all personnel located external to the stations' protected area. The primary notification method for the owner controlled area is an onsite siren system which directs evacuation. The backup means for notifying the owner controlled area is through the use of security force members making specific contacts or utilizing public address equipment.

TABLE 7-1
NUCLEAR BUSINESS UNIT
EMERGENCY RESPONSE FACILITIES COMMUNICATIONS SUPPORT [1]

*LOCATION	NETS LINE	DID LINE	Centrex/ESSX 1 LINE	FAX MACHINES	**SPECIAL EQUIPMENT
EOF	TBD	TBD	TBD	TBD	TBD
ENC/JIC	TBD	TBD	TBD	TBD	TBD
CR	TBD	TBD	TBD	TBD	TBD
SMO	TBD	TBD	TBD	TBD	TBD
OSC	TBD	TBD	TBD	TBD	TBD
CP	TBD	TBD	TBD	TBD	TBD
TSC	TBD	TBD	TBD	TBD	TBD

Note [1] - Quantities of equipment to be determined after new plant data is available

*
CP = Control Point
ENC/JIC = Emergency News Center/JIC
OSC = Operations Support Center
TSC = Technical Support Center
CR = Control Room
EOF = Emergency Operations Facility
SMO = SM Office Complex
TBD = To Be Determined

**
A = UHF Ops/FP/OSC RADIO
B = VHF Security RADIO
C = OSC RADIO MONITOR
D = EMRAD RADIO
E = WALKIE-TALKIES
F = NAWAS
G = EMERGENCY EXT. 3333
H = SYSTEM OPERATOR (LOAD DISPATCHER)
I = PLANT PAGE
J = NRC/ENS (FTS 2000)
K = STATE CALLBACK
L = 900-MHz RADIO SYSTEM

TABLE 7-1 (Cont.)
NUCLEAR BUSINESS UNIT
EMERGENCY RESPONSE FACILITIES COMMUNICATIONS SUPPORT

LOCATION	NETS	SECONDARY NUMBERS
NJ STATE POLICE (NJSP)	8	2
NJ – BNE	3	2
SALEM COUNTY	2	1 – NORMAL 1 – 24 HRS.
CUMBERLAND COUNTY	2	1 – NORMAL 1 – 24 HRS.
LOWER ALLOWAYS CREEK	1	1
DELAWARE (DEMA)	4	2
DEL STATE POLICE (DSP)	1	1
KENT COUNTY	1	1
NEW CASTLE COUNTY	1	1
WILMINGTON, DE (WDEL)	1	
MEMORIAL HOSPITAL OF SALEM COUNTY	1	

Telecopiers (fax machines) provided (1 each) to the NJSP, NJ-BNE, DSP and DEMA.

LOCATION	NETS
PSEG Security Department	2
PSEG Fire Department	1

SECTION 8

PUBLIC INFORMATION

1.0 Public Awareness

The public information program consists of general information on the topics of nuclear energy, radiation, and emergency planning. Additionally, specific information on protective response is provided as an information insert in appropriate local publications at least annually.

1.1 General Information - Program Content

The information on each general topic consists of material on the following:

1.2 Nuclear Energy

a. Definition of emergency in general terms.
b. How nuclear energy produces electricity.
c. Safeguards designed into nuclear power plants.
d. Comparisons with other energy sources.
e. Definitions of basic nuclear terminology.

1.3 Radiation

a. Radiation sources in the environment.
b. Safeguards designed into nuclear power plants to prevent or minimize the release of radiation to the environment.
c. Definitions of basic radiation terminology.

1.4 Emergency Planning

a. Description of the public response options of sheltering or evacuation.
b. Evacuation methods, routes and relocation centers.
c. Methods of notification.
d. Special consideration for the handicapped.
e. Special considerations for farms and agricultural concerns.
f. Contacts for additional information.

This information is provided in various forms (pamphlets, advertisements, or other means) either individually or as a set such that the general topic areas are covered annually.

1.5 Protective Response - Program Content

The program for protective response information is more specific in nature and contains material on the following:

1) Protective response options (sheltering and evacuation).

2) Evacuation methods, routes and relocation centers.
3) Methods of alerting and notification.

This information is provided in appropriate formats to the transient and permanent residents of the Plume Exposure Emergency Planning Zone (EPZ). Pamphlets, advertisements in locally distributed newspapers, or telephone books, placards, or postings at recreational facilities may be used, as appropriate, to maintain transient information. Annually, selected information is either updated and redistributed or verified to be in place at appropriate locations.

2.0 Public Information During an Emergency

Until activation of the EOF normal public information planning (incorporating both non-emergency events and emergency events as a plan basis) will be used. This system will be activated by the Communications Representative by calling the appropriate contact in the Public Affairs Department and appropriate media representatives.

Upon activation of the ENC/JIC, all information (news bulletin) formally provided to the media is approved by the Company Spokesperson or ENC Manager, and NJ during a declared state of emergency, in accordance with the agreements on news bulletins between PSEG and the States.

The Public Information Liaison, located in the EOF, will ensure the necessary information is provided to the ENC/JIC by the emergency response organization. A timely exchange of information is ensured among the designated spokespersons for PSEG and representatives of the States of New Jersey and Delaware by systematically recording the receipt of news bulletins.

3.0 Media Awareness

An information program for the media and the general public is provided to present the information outlined in paragraph 1.1. This program consists of distribution of training information along with an invitation to annually observe a training drill. All appropriate local news media representatives are provided the materials and are invited to attend the drill.

4.0 Rumor Control (Public Inquiry)

Rumor control is provided to minimize the possibility that a source of public information (e.g., NRC, FEMA, State or PSEG) could be using out-of-date information. This is accomplished by providing information to other public information sources simultaneously and providing Public Information Officers with access to the PSEG public information source. Additionally, telephone access numbers are listed in the annual public information brochure to allow access to quickly confirm or deny the accuracy of a given report or rumor.

SECTION 9

EMERGENCY FACILITIES AND EQUIPMENT

1.0 PSEG - Emergency Facilities and Equipment

Emergency facilities and equipment are maintained both onsite and offsite. Equipment specifically for monitoring and assessment of operational, radiological, geophysical events, and similar instrumentation is described in Section 10, Accident Assessment. The Emergency Operations Facility and Emergency News Center/Joint Information Center are offsite facilities that serve PSEG.

Although onsite facilities are described separately in Sections 2.0, 3.0 and 4.0, to reflect station specifics, they have common functions, and fulfill the same organizational and operational commitments.

1.1 Control Rooms

The Control Room continues its control functions during emergency response. The classification and notification responsibilities are met from the Control Room until other emergency facilities are activated. The radiological protection emergency equipment and communications support that are available to the Control Room are shown in Tables 9-1 and 7-1. The specific features of major communications systems are described in Section 7, Emergency Communications.

1.2 Operations Support Center

The Operations Support Center (OSC) functions as an information relay station, dispatching office, assembly and assignment point, and also as an accountability station for teams assigned from the OSC. Radiological protection emergency equipment and communication systems that are available to the OSC are presented in Table 9-1 and Table 7-1, respectively. Specific features of the communications systems are described in Section 7, Emergency Communications.

Refer to Attachments 6 through 9 for additional information regarding the OSC for each proposed technology.

1.3 Technical Support Center

The Technical Support Center (TSC) provides a well equipped location onsite to support plant management during an emergency. The TSC functions as an augmented communication/analysis center of technical data to supplement the Control Room staff's technical analysis and to support plant operations personnel. Figure 3-2 illustrates the staffing and organization of the TSC.

The TSC is used by members of the emergency response organization to relieve control room operators of (and remove from the control room) any plant specific duties not directly related to the direct handling of plant controls. Such duties include directing analysis and assessment of the emergency conditions and performing functions associated with the Emergency Operations Facility, when that is not activated. The TSC is activated for Alert, Site

Area Emergency, or General Emergency action levels and may be activated at an Unusual Event, if deemed necessary by the EC. The TSC is used as the assembly point for PSEG personnel, onsite vendor support, NRC, or for the personnel who are directly involved in assessment of an accident and mitigation. After TSC activation, if it becomes uninhabitable for any reason, the TSC personnel will transfer to an unaffected station TSC.

The TSC emergency response facility can be staffed and activated within 90 minutes of an Alert or higher emergency classification. This staffing and activation time could vary if severe weather conditions or acts of nature/terrorism were experienced at the same time as the ERO callout. The Emergency Duty Officer (EDO) determines when the TSC is staffed based on manning requirements as identified in the PSEG Emergency Organization Chart. The EDO's discretion may be used to declare the TSC activated with less than the staffing required in the organization chart based on extenuating circumstances and plant conditions. Efforts to staff all required positions shall continue until the positions are filled or the emergency is terminated.

Radiological protection emergency equipment and communications support that are available to the TSC are presented in Table 9-1 and Table 7-1, respectively. When activated, the TSC becomes the primary on-site communications center during an emergency. The TSC provides reliable voice communications to the Control Room, OSC, EOF, NRC, and other offsite agencies. In addition, it provides facsimile transmission capability and electronic transfer capabilities. The specific features of the communications systems are described in Section 7, Emergency Communications.

1.4 Emergency Vehicles

An ambulance is available to transport injured or contaminated-injured personnel to Memorial Hospital of Salem County or another facility.

2.0 Onsite Emergency Facilities and Equipment – Salem – Not Used

3.0 Onsite Emergency Facilities and Equipment – Hope Creek – Not Used

4.0 Onsite Emergency Facilities and Equipment – PSEG Site

Emergency facilities and equipment were developed to meet the intent of NUREG-0737, Supplement 1, except as indicated. Additional information related to the specific locations design, and function of the PSEG Site Control Room, TSC and OSC is in Attachments 6 - 9 of this Plan.

4.1 Control Room Area

The PSEG Site Control Room is designed to meet the habitability requirements of the General Design Criteria 19 and Standard Review Plan Section 6.4. The radiological protection emergency equipment provided in the Control Rooms and Operations Support Center is shown in Table 9-1.

4.2 Operations Support Center (OSC)

In the event of an emergency, operations personnel not on duty and other support personnel report to the OSC to form repair and corrective action teams. Additionally, an OSC Coordinator is designated to coordinate the teams' efforts. The TSC will serve as a backup OSC if required.

4.3 Technical Support Center (TSC)

The TSC meets all habitability requirements outlined in NUREG-0737, Supplement 1. This center supplies technical support to the operations personnel in the Control Room area. The analytical and assessment capabilities assigned to the PSEG Site TSC include:

Safety Parameter Display System (SPDS)
Computerized Dose Assessment
Plant Engineering Support

Documentation available within the TSC supports emergency classification, procedures, and assessments. Document groups include:

Emergency Plans and Procedures
Operating Procedures (Emergency and Normal)
Departmental Support Documents
Technical Specifications
Engineering Support Material
Updated Final Safety Analysis Report
Technical Drawings

4.4 Control Point (CP)

During normal operations, this area serves PSEG Site as the access control point for personnel entering or leaving the Radiological Controlled Area. The radiological protection emergency equipment provided at this location is shown in Table 9-1. Communications equipment is described in Section 7, Emergency Communications.

5.0 Offsite Emergency Facilities and Equipment

5.1 Emergency Operations Facility - General Description

The Emergency Operations Facility (EOF) is controlled and operated by PSEG. It serves as the near site support center to form management of the aggregate response to a radiological emergency as defined by NUREG-0654, Revision 1, and Appendix 1. PSEG commits to operating the EOF so as to fulfill the functional requirements of paragraph 8.4.1 of NUREG-0737, Supplement 1. It should be noted that based on the backup EOF exemption granted for the Salem Generation Station Plan, and the fact that the PSEG Site, Salem and Hope Creek Generating Stations are co-located, the exemption is applicable to all EOF requirements for the PSEG Site.

The EOF provides facilities and equipment to support staff performance of four major functions:

1. Management of overall emergency response activities.
2. Coordination of radiological and environmental assessment.
3. Development of recommendations for protective actions for the public.
4. Coordination of emergency response operations with Federal, state, and local agencies in accordance with the Emergency Plan.

The communications systems available at the EOF are presented in Table 7-1. Specific features of those systems are described in Section 7, Emergency Communications.

The EOF emergency response facility can be staffed and activated or ready to activate, within 90 minutes of an Alert or higher emergency classification. This staffing and activation time could vary if severe weather conditions or acts of nature/terrorism were experienced at the same time as the ERO callout.

Activation of the Emergency Operations Facility is at the option of PSEG at the Alert emergency classification. The option is exercised depending upon management's evaluation of the potential consequences of the situation based upon the nature of initiating conditions, trends subsequently perceived, and results of actions taken to mitigate potential consequences. EOF activation is mandatory in the event of declaration of a Site Area Emergency or General Emergency.

An individual who is designated as the Emergency Response Manager (ERM) manages the activated EOF. The ERM directs PSEG's offsite response activities and coordinates actions with and provides appropriate support to the Technical Support Center (Emergency Duty Officer). The EOF is staffed by PSEG and other (Federal, state, and support personnel, as required) emergency personnel designated by the PSEG Emergency Plan.

The ERM determines when the EOF is fully staffed based on manning requirements as identified in the PSEG Emergency Organization Chart. The ERM's discretion may be used to declare the EOF activated with less than the staffing required in the organization chart based on extenuating circumstances and plant conditions. Efforts to staff all required positions shall continue until the positions are filled or the emergency is terminated.

Equipment is provided in the EOF for acquisition, recording, display and evaluation of containment and operational conditions, radiological releases, and meteorological data. The data is analyzed and evaluated to determine the nature and scope of any protective measures, which may be recommended to state and local officials for protection of the public health and safety, if the magnitude and potential effects of a radioactive release dictate. The equipment includes a display of information collected by the Radiological Monitoring System (RMS). All equipment, displays, and instrumentation to be used to perform essential EOF functions are located in the EOF.

Facilities are provided in the EOF for NRC, FEMA, New Jersey, Delaware and local emergency response agency personnel responsible for implementing emergency response actions for protection of the general public. This arrangement enhances coordination of activities and exchange of information among participating agencies and the PSEG

emergency response organization. The agencies also operate from other offsite control centers located at their respective agency facilities.

To ensure EOF activation readiness, PSEG provides normal industrial security for the EOF complex including lock and key control, a personnel identification system, exterior lighting, and a perimeter security system providing offsite alarm notification and response by local police department. If the EOF is activated, access to the building and facility is restricted to authorized personnel by the industrial security system.

5.2 Location, Structure, and Habitability

The Emergency Operations Facility is located in PSEG Environmental & Energy Resource Center (EERC) on Chestnut Street in Salem, New Jersey. This site is located 7.5 miles from the Technical Support Center. The site location is judged to provide operational and logistical benefits with regard to its relationship to the area’s transportation system. Salem is at the intersection of the two state highways (Routes 45 and 49). Three county highways, Routes 557, 540, and 581, connect to Routes 45 and 49. A freight only railroad and an airfield serve the city of Salem capable of accommodating small commercial aircraft. In addition, the offsite EERC has a helicopter-landing pad. There is also a landing pad located just outside of the Protected Area. This makes possible rapid movement of personnel between the station and the EOF.

This transportation network makes the EOF readily accessible by road and air to designated personnel of all agencies and activities assigned an emergency response role by the emergency plan.

The physical structure of the facility has been well engineered for the design life of the plant. The building is a 65,000 square foot structure on reinforced concrete footings and floor slab, with supporting steel columns, beams, and joists. The built up roofing material is supported on a steel deck.

The EOF conforms to all applicable building codes and has been designed to withstand winds and floods with 100 year recurrence frequency. The State of New Jersey Department of Environmental Protection identifies the 10 year and 100 year high water levels at the EOF site as 7.1 feet and 8.9 feet above mean sea level, respectively. The floor elevation of the EOF is 9.0 feet. The elevation of the road to the EOF is slightly over 4 feet. Thus, record high water levels would flood the access road and preclude access to the EOF by vehicle and could hamper activities of mobile monitoring teams in some areas. The EOF would continue to be accessible by helicopter. Internal EOF operations would continue without adverse impact. The SGS Final Safety Analysis Report, Environmental Report, Operating License Stage, Appendix B Report, Site environmental studies, identifies high winds with a 100 year recurrence frequency as having a maximum velocity of 100 miles per hour. It is not anticipated that such winds will significantly affect self contained internal EOF operations. This is due to the strength of building construction and the availability of backup power.

However, activities of mobile monitoring teams would have to be suspended. Under such conditions, radiation exposures would be correspondingly low. Remote monitoring would continue to be available to the extent transmission lines survive. Similarly, data transmission could be adversely impacted by damage to microwave and radio antennae and transmission lines, particularly if winds were accompanied by electrical storms, which are often associated

with squall lines, tornadoes and hurricanes. Under such circumstances, atmospheric conditions could be expected to intermittently affect data transmission and communications.

Protective clothing is maintained at the EOF, in accordance with the emergency plan. In addition, mutual support agreements with other utilities in the region include providing emergency equipment, including radiation survey devices and protective clothing. Potassium iodide for the staff is also stored in the EOF emergency equipment locker.

Additional supplies are available from Radiation Management Corporation, Philadelphia, Pennsylvania or other approved vendors. A description of the methodology to determine airborne I-131 concentrations is presented in Section 10 of the Emergency Plan. Detection limits for I-131 are less than 1E-7 uci/cc if not masked by noble gases. Masking is not expected to be a factor due to use of silver zeolite filter cartridges and adequate purge times in sample collections.

Full face respirators with charcoal filters are maintained in the EOF. However, airborne contamination is not expected to present a major problem at the EOF due to its location and the upgraded ventilation system.

5.3 Size

The EOF meets or exceeds the space requirements of paragraph 8.4.1c of NUREG-0737, Supplement 1. Approximately 5240 square feet of floor space in the EERC is designated for use as the Emergency Operations Facility. This provides approximately 75 square feet of workspace per person for a staff of up to 70 persons and 650 square feet for conference rooms.

Additional space is available in the building to accommodate another 100 persons in the unlikely event of a situation in which a greatly augmented staff would be required. Normal EOF occupancy by all concerned parties and agencies is not expected to exceed 80 persons.

The functional layout of the EOF depicts designated workspaces:

1. Space for EOF data system equipment for data transmission and reception (Data Center, Communications Center).
2. Space to repair, maintain and service equipment displays and instrumentation (in EERC workshops and labs).
3. Space to accommodate communications equipment and its use by EOF personnel to perform their assigned functions.
4. Space for ready access to functional displays of EOF data (Data Center, provisions for installation of remote terminal in the Dose Assessment Area).
5. Space for storage of plant records and historical data or space for the means to readily acquire and display the records.
6. Space for emergency response activities.
7. Office space for state, local and FEMA personnel.
8. Separate office space to accommodate a minimum of ten NRC personnel during emergency activation of the EOF (NRC offices).

Personnel are assigned to work areas in functional groups. Groups, which perform related tasks and therefore would have the most need for face to face interaction, are, in most cases,

located adjacent to one another. Each workstation is assigned sufficient display space, equipped and staffed as appropriate to its function.

5.4 Radiological Monitoring

The EOF complies with the radiation protection provisions of paragraph 8.4.1B of NUREG-0737, Supplement 1 by providing radiological monitoring equipment in the facility. This equipment provides the capability to monitor airborne radioactivity (gross beta, gamma, iodine, and particulates) to ensure that EOF personnel are not subjected to adverse radiological conditions. Available equipment and a table in a Emergency Plan Implementing Procedure permits the detection of radioiodines at a concentration as low as 1.00E-07 uCi/cc using a field counting methodology (A portable continuous air sampler collects iodine in a silver zeolite cartridge. The cartridge is then counted using a count rate meter. The corrected counts per minute value are then compared to a graph to find the iodine concentration).

The continuous air monitor sampler may be moved to various points in the facility, is equipped with a strip chart recorder, an alarm light, and an alarm bell. The alarm setting is variable and will be set slightly above background to give an early warning of adverse conditions, which may affect EOF habitability. In addition, the alarm light provides visual warning of radiation levels. The air sampler is maintained and calibrated on a regular schedule by station personnel.

More detailed counting analysis is available at the station (emergency situation permitting) or any other licensed facility (i.e., Peach Bottom, Limerick, etc.).

Survey meters are available, which have sensitivity ranges up to 50 R/hr. Additional EOF radiation monitoring equipment includes high and low range self reading dosimeters (or equivalent electronic dosimeters), TLDs, and air samplers. Radiation monitoring equipment is stored in the radiological protection emergency equipment closet (Table 9-1). The radiological assessment staff performs habitability of the EOF, in accordance with procedure.

The Radiological Support Managers have a variety of radiological, health physics, and nuclear power plant experience.

5.5 Instrumentation, Data System Equipment, and Power Supplies

The EOF complies with the provisions of paragraph 8.4 1G NUREG-0737, Supplement 1 by providing an EOF data system consisting of a Radiological Monitoring System, an operational parameter data information system, which provides plant variables to a computer system that displays data and is capable of being printed out.

The EOF data system performs its functions independently of personnel actions in the Control Room and the TSC and will not degrade or interfere with Control Room and plant functions.

Backup power is provided to ensure data system availability. Backup power is supplied by a diesel generator in conjunction with an automatic transfer switch, which activates the generator upon loss of power. The generator provides electrical output sufficient to supply all facility lighting, the telephone system and all EOF data and communications systems described in this document. Electrical equipment load in the EOF does not affect any safety

related power source. The data system has been designed to preclude loss of any stored data vital to EOF functions due to power supply failure or circuit transient.

5.6 Technical Data and Data System

The comprehensive EOF technical data system is capable of reliable collection, storage, analysis, display, and communication of information on containment conditions, radiological releases, and meteorology sufficient to determine site and regional status, determine changes in status, forecast status and take appropriate actions. Variables from the following categories that are essential to EOF functions are available in the EOF.

Appropriate variables from Table 1 of Regulatory Guide 1.97 (Rev. 3) and; the meteorological variables in Regulatory Guide 1.97 (Rev. 3) for site vicinity and regional data available via communication from the National Weather Service.

6.0 Emergency News Center/Joint Information Center (ENC/JIC)

Emergency News Center/Joint Information Center (ENC/JIC) facilities are at the Salem County 911 Center. The ENC/JIC provides space for media briefings; media work area, and telephone access. Separate work areas are maintained for PSEG, NRC, State and County personnel. The facility is convenient to major highways. Designed for public use, the building has sufficient facilities to support use by 100 or more media personnel.

If support for more then 100 media personnel is needed, PSEG will coordinate the use of alternate media briefing locations with State and County officials. The communications equipment is described in Section 7 and summarized in Table 7-1. For media use, commercial telephone lines have been assigned from a physically distant exchange, which would reduce the load on local telephone services during an emergency.

Under appropriate circumstances, space for a limited number of press representatives may be made available at the EOF.

7.0 Additional Offsite Capabilities

7.1 Offsite Environmental Radiological Monitoring

Section 10, Accident Assessment presents a discussion of other assessment capabilities and instrumentation. The Stations are located on a man-made island, which, within four miles, is surrounded by tidal marshlands or river. The thermo luminescent dosimeter (TLD) points of the routine offsite environmental radiological monitoring program include TLDs in neighboring towns and cities and at schools and public assembly points, and at distances sufficiently close to the station to provide meaningful data in the event of an accident. No TLDs were deployed on marshlands where no serviceable roads existed. The Operational Radiological Monitoring program for the Station conforms to the NRC Radiological Assessment Branch Technical Position as described in Section 10 of the Emergency Plan.

7.2 Meteorological Monitoring

A meteorological program in accordance with the recommendation of NRC Regulatory Guide 1.23 "Onsite Meteorological Program" and Section 2.3.3 of NUREG 75/087 (Rev. 3) has been established. Monitoring and assessment capabilities are discussed in Section 10.

The dose calculation methodology of Section 10 of the Emergency Plan, concerning the transport and diffusion of gaseous effluents, is consistent with the characteristics of the Class A model outlines in NUREG-0654 (November 1980).

7.3 Alternate Reporting Location

An alternate near-site location at the EERC has been identified and equipped in the event that a security or other event prevents the ERO from reporting to the primary onsite Emergency Response Facilities. The ERO would be notified to report to this alternate reporting location instead of to their normal onsite Emergency Response Facilities.

8.0 Field Assessment and Monitoring

The EOF, once activated, is the location for collection and assessment of all offsite radiological monitoring information from the survey teams. Periodically the information on doses calculated in accordance with Section 10 of the Plan is multiplied by the projected sector population data from Emergency Plan Attachment 11 to provide an estimated integrated dose to the affected population.

9.0 Administration and Maintenance of Emergency Facilities and Equipment

The emergency equipment listed in Table 9-1 is inventoried and operationally checked quarterly, and after each use to allow for replacement in the event of normal servicing and calibration. The instrument calibration frequency has been established in accordance with the appropriate technical guidance.

Table 9-1 is a generic listing of typical equipment maintained both on and offsite. Detailed listings are part of emergency preparedness inventory procedures.

TABLE 9-1
EMERGENCY EQUIPMENT SUMMARY
(TYPICAL)
Page 1 of 2

EQUIPMENT	CR/OSC	PSEG Site CP/TSC Field Team Kit	EOF/Field Team Kit
RO2A Survey Instrument *	L	L	E
RM14/EL14ON *	L	L	E
Teletector *	L	L	E
E520 Survey Instrument *	L	L	E
RO2 Survey Instrument *	L	L	E
High Range Dosimeters or Electronic Dosimeters *	L	L	E
Low Range Dosimeters or Electronic Dosimeters *	L	L	E
Dosimeter Charger (not needed for Electronic Dosimeters)	L	L	N/A
Air Sampler (A/S)	L	L	E
DC Powered A/S	L	L	N/A
Marinelli Beaker with A/S Head	L	L	N/A
Charcoal Cartridges for A/S	L	L	E
Silver Zeolite Cartridges for A/S (Sealed)	L	L	E
Particulate Filter Papers for A/S	L	L	E
Envelops for Particulate A/S	L	L	E
Flashlights with Batteries	L	L	E
Spare Batteries (replacement set for each instrument)	L	L	E
Sample Containers or Small Bags	L	L	E
Smears	L	L	E
Rad Info Signs	L	L	A
Barricade Rope or Ribbon and Stanchions	L	L	N/A
Tape	L	L	E

NOTES/LOCATION DESCRIPTIONS
A = Accessible in general area of the Emergency Response Facility
E = Located in the EOF or EOF Field Team Kits
N/A = Not applicable in that specific Emergency Response Facility
L = Location at PSEG Site Emergency Response Facilities (To Be Determined)
* = or equivalent

TABLE 9-1
EMERGENCY EQUIPMENT SUMMARY
(TYPICAL)
Page 2 of 2

EQUIPMENT	CR/OSC	PSEG Site CP/TSC Field Team Kit	EOF/Field Team Kit
Large Plastic Bags	L	L	E
Step-off Pads SOP)	L	L	A
Paper or Cloth Coveralls	L	L	E
Shoe Covers	L	L	E
Rubber Gloves	L	L	E
Hoods and Caps	L	L	E
Respirators and Charcoal/Participate Cartridges	L	L	A
Emergency Plan Procedures (as applicable)	L	L	E
SCBAs	L	L	N/A
Check Sources (button) *	L	L	E
KI Tablets	L	L	E
Absorbent Material	N/A	L	E
Calculator/Computer	N/A	L	E
Dosimeters of Legal Record	L	L	E
Logs, Paper Supplies, Pens, Clip Boards, etc.	L	L	E
Plastic Sheeting	N/A	L	A
First Aid Kit	L	L	E

NOTES/LOCATION DESCRIPTIONS

A = Accessible in general area of the Emergency Response Facility
E = Located in the EOF or EOF Field Team Kits
N/A = Not applicable in that specific Emergency Response Facility
L = Locations at the PSEG Site Emergency Response Facilities (To Be Determined)
* = or equivalent

1. The Control Room/Operations Support Center (CR/OSC) area comprises adjacent hallways, lockers, and storage areas.
2. Control Point (CP) comprises adjacent and accessible area including lockers, equipment issue areas, and dress out areas.
3. Technical Support Centers (TSC) are dedicated facilities.
4 Emergency Operations Facility (EOF) includes the adjacent meeting rooms and Room 50.
5. The EOF Field Team Kits describes materials reserved for Field Monitoring.

SECTION 10

ACCIDENT ASSESSMENT

1.0 General

1.1 Emergency Action Level Determination

The plant parameter and instrument values used to identify an emergency class are provided in Plan Attachment 5.

2.0 Accident Assessment and Instrumentation – Salem – Not Used

3.0 Accident Assessment and Instrumentation – Hope Creek – Not Used

4.0 Accident Assessment and Instrumentation – PSEG Site

There are several monitoring systems used to support emergency planning activities at the PSEG Site. The primary systems utilized are listed below.

- Radiation Monitoring System (RMS).
- Safety Parameters Display System (SPDS)
- Reactor Coolant Sampling System

4.1 Radiological Monitoring Instrumentation – PSEG Site

The radiological monitors consist of process radiation monitors, effluent radiation monitors and area radiation monitors. The system continuously displays and/or records the radiation levels in key areas. The PSEG Site Radiation Monitoring System (RMS) will comply with the recommendations of NUREG 0578.

Permanent monitor channels are not always available at a location of interest and the use of portable area monitors may be required during an accident.

4.2 Process and Area Monitors

In order to provide the operators with essential information on plant conditions during an emergency, various plant processes are continuously monitored. Many of these processes involve Limiting Conditions for Operations (LCO) and are controlled by the Technical Specifications. If an LCO parameter "goes out of specification" it requires the operators to implement the action required by the associated action statement. The intent of this action is to take corrective measures under abnormal conditions before a situation becomes more serious. These parameters would be monitored closely during an accident for assessment purposes.

4.3 Gaseous Release Path Monitoring

In addition to the main plant vent, a monitored vent, the other potential major release points from the plant during an accident will be identified upon the selection of the reactor

technology for the PSEG Site. Procedures are utilized to monitor these potential release pathways and perform the necessary dose assessment.

4.4 Reactor Coolant and Containment Air Sampling – PSEG Site

Reactor coolant and containment gaseous activity sampling (normal and high activity/emergency samples) are performed using station procedures and the normal day-to-day sampling systems. The plant vent, which is the final release point, is continuously monitored by the RMS for noble gases. The iodine cartridge is physically removed and taken into a laboratory for analysis by a multi-channel analyzer available at the PSEG Site.. There are also provisions provided in the plant vent for extracting a grab sample.

Analysis of reactor coolant and containment air samples provides detailed information on the status of the reactor core. These samples are used to provide confirmation of a loss of the fission product barriers.

5.0 Dose Assessment From Plant Effluent Monitors

Plume dose calculation procedures use plant effluent monitor data to project offsite doses due to noble gases and iodines. The primary purposes of the offsite dose calculation are to determine the axial location of highest expected dose at selected distances from the release point, to project dose rates and time integrated doses for downwind portions of the Emergency Planning Zone, and to determine if a Protective Action Recommendation (PAR) is needed. These procedures and calculation capabilities are available at the PSEG Site Control Room, Control Point, TSC, and EOF. The procedures use the meteorological dispersion factor (X/Q), dose rate or commitment conversion factors, and plant effluent monitor readings to project an offsite dose. The X/Qs are selected according to the existing temperature differentials, wind speed, and distance from the plant vent. The dose calculation is based on expected isotopic mixtures or specific mixtures if an isotopic mix has been determined. The plant effluent monitor readings are used in the calculations. The actual isotopic mix of the releases is used if the releases have been sampled and analyzed. Calculated offsite doses are then compared to Protective Action Guides developed using EPA-400-R-92-001.

The PSEG Site Radiation Monitoring System computer and/or Safety Parameter Display System provide early indication of abnormal radiological conditions from both process and area monitors. The computer systems provide monitoring capability for the radiological parameters identified in Regulatory Guide 1.97, including high range monitoring capability for effluent release paths. This data is input to the dose assessment computers at the PSEG Site.

The Radiation Monitoring System provides radiological release rate information and computer systems provide meteorological data acquisition for the PSEG Site. A computerized dose assessment program provides redundant emergency dose assessment modeling capability in manual mode and all modes at the EOF.

Dose assessment or projection represents the calculation of an accumulated dose at some time in the future, if current or projected conditions continue. During an accident, the plant parameter display system and personal computers provide the ERO with the timely information required to make decisions. Radiological and meteorological instrumentation

readings are used to project dose rates at predetermined distances from the plant, and to determine the integrated dose received. A computerized dose assessment program with the following methods is used:

a. Monitored Release Points: This method uses the plant's effluent radiation monitors and system flow rates. Effluent release points are used to directly calculate a release rate. The point of the release determines the way the source term is affected and is adjusted by the dose assessment process.
b. Containment Leakage/Failure: This method uses a variety of containment failures or leak rates in conjunction with available source term estimations to develop a release rate to the environment. A direct vent of containment can be modeled as a failure to isolate.
c. Release Point Samples: This method uses a sample at the release point and an estimated flow rate to develop a release rate at the point of release.
d. Field Monitoring Team Data: This method uses a field survey or sample and the atmospheric model to back calculate a release rate and ratio concentrations of radioactive material at various points up and downwind of plume centerline.

The computer applications are used to provide dose calculations to evaluate dose against the EPA -400 plume exposure protective action guides (PAGs) applicable for the early phase of an accident. These evaluations place an emphasis on determining the necessity for an offsite PAR.

The model is time dependent and provides integrated doses as well as dose rates using EPA 400 dose factors.

Ingestion pathway calculations including (1) airborne concentrations, (2) ground level contamination, (3) foodstuff contamination, (4) ground shine committed dose, and (5) population doses are performed in accordance with the intermediate phase objectives provided in EPA 400.

Several choices are available to the user for determining the source term. If a Design Basis Accident is assumed, but the release rate is unknown, preset release scenarios can be used for accident scenarios. Otherwise, real time data from effluent monitors is used.

Upon declaration of a General Emergency (which is done by evaluating specific system parameters), a predetermined PAR is provided to the State governments in New Jersey and Delaware.

The predetermined PARs are developed as outlined in NUREG-0654, Rev. 1, Appendix 1, and Inspection and Enforcement Information Notice 83-28. These PARs are incorporated into both the Event Classification Guide and Emergency Plan Implementing Procedures for Protective Action Recommendations. The use of predetermined PARs allows the transmission and consideration of protective actions in a manner, which affords timely notification of the Emergency Planning Zone (EPZ) municipalities/counties.

The dose calculations use the best information available from the plant effluent monitoring and sample system and the field monitoring team surveys. The doses are integrated over the appropriate sectors and distances around the station.

Transient population is not expected to affect person-rem dose calculations significantly within 10 miles of the plant.

6.0 Dose Assessment From Containment Radiation Monitoring

Dose assessment, utilizing containment high range dose rate monitors, is obtained with the use of dose assessment computer programs.

7.0 Dose Estimates When Instruments Are Off-Scale or Out of Service

7.1 Defaults for the PSEG Site

Emergency Plan Procedures describe in detail how projected dose calculations are made if radiation monitors normally used for monitoring plant release points or containment radiation are inoperable or off-scale. The procedures call for determining the type of accident, which is occurring and classifying it according to a set of default classes that are dependent on the reactor technology.

Once a determination of the type of accident has been made, Total Effective Dose Equivalent (TEDE) and thyroid committed doses are projected in accordance with Emergency Plan Implementing Procedures.

8.0 Dose Assessment From Field Monitoring – PSEG Site

The PSEG Site Offsite Dose Calculation Manual (ODCM) summarizes Environmental Radiological Monitoring. Field monitoring within the plume exposure EPZ takes place whenever the radiological emergency response organization is fully activated. Field teams take direction from the radiological support personnel in the TSC and/or EOF. Data is obtained and updated quarter hourly and hourly on the meteorological variables of wind direction, speed and vertical temperature change (Delta T). This data is used to direct the onsite and offsite survey teams. Each field monitoring team is capable of performing the necessary functions required to obtain reliable data. Communications are accomplished by the use of emergency radios and cellular phones by each team. Deployment times range from 30 to 60 minutes for the onsite and offsite emergency radiation survey team(s). Field monitoring is performed in accordance with Emergency Plan Implementing Procedures. Procedures have been prepared which allow personnel to determine release rates from field data and then calculate doses at other locations.

PSEG Site survey instruments are able to detect radioiodine concentrations as low as I.0E-07 uCi/cc provided that noble gases and background radiation (which can adversely affect the Minimum Detectable Activity (MDA) are minimized. In order to achieve this, silver zeolite cartridges, which can be placed in portable field samplers, are used. The silver zeolite cartridges have better iodine to noble gas adsorption ratio than standard charcoal cartridges. Since high background can also adversely affect readings, survey team personnel are pre-directed to count the cartridges in low background areas.

Emergency Plan Implementing Procedures list equipment required for a field survey team. This equipment provides the means for directly measuring or relating measured field contamination levels to dose rates. The dose rate due to contamination and the plume are obtained directly from the dose rate meter.

9.0 Dose Assessment from Liquid Sample Activity Concentration

Since the Delaware River is not a source of potable water in the vicinity of the PSEG Site, the major critical pathways by which a population would receive a radiation exposure from liquid effluent releases are swimming and boating activities.

The radiation dose received by such activities is dependent upon three factors:

a. The isotopic mixture of the release;

b. The concentration of the nuclides at the point of interest; and

c. The time period of exposure.

All three factors are highly variable, but certain assumptions can be made to calculate a conservative dose conversion factor. The isotopic mixture varies according to the operating history of the plant and on the status of the radwaste system at the time of the incident. The concentration of the nuclides is also dependent upon plant conditions but of equal importance is that this factor varies according to the hydrological mixing and dilution during transport of the liquid release to the site of interest. Based on predicted surface temperature profile data, a dilution factor of 10 can be assumed for swimming and boating activities near The PSEG Site.

In the event of a radioactive release to the Delaware River, water samples are taken and counted. The total counts per minute determined would then be converted to a gross gamma concentration.

9.1 Water Immersion (Swimming)

The radiation dose from water immersion (swimming) depends upon the concentration of the nuclides present at the location of the immersion and the period of exposure. Dose rate conversion factors have been calculated on the assumption that the swimmer is completely submerged and surrounded on all sides by a large volume of water. This physical arrangement approximates 4 π geometry for gamma radiation and 2 π for beta radiation.

9.2 Normalized Conversion Factors for Water Immersion and Boating

Based on a typical isotopic mixture, general dose equations can be formulated which incorporate a weighted average dose rate conversion factor, a gross isotopic concentration value, and the time period of exposure.

Based on sample analysis, exposure time, and the normalized conversion factors, dose can be calculated for any swimming or boating activities in the vicinity of the PSEG Site. A comparison would then be made of these calculated doses with State Action Levels as indicated in the State Radiological Emergency Response Plans for Nuclear Power Plants.

10.0 Other Onsite Emergency Equipment- Assessment

Onsite instrumentation, which can be used to initiate emergency measures, is described in the implementing procedures of this plan.

10.1 Meteorological Monitoring

A meteorological program in accordance with the recommendation of NRC Regulatory Guide 1.23 "Onsite Meteorological Programs" and Section 2.3.3 of NUREG 75/087 (Rev. 1) has been established.

The primary meteorological monitoring system measures wind speed and direction at three elevations (300 ft., 150 ft., and 33 ft.). Temperature difference is measured between 300 ft. and 33 ft. and between 150 ft. and 33 ft., in order to provide vertical lapse rates for air stability estimates. Calculated sigma theta values of the wind direction at the three elevations are also provided.

Backup meteorological data is provided by a backup tower located onsite approximately 500 ft. south of the primary meteorological tower. Backup meteorological data is provided through wind speed and wind direction sensors mounted on a ten-meter pole. In addition to the 15-minute averaged wind speed and wind direction, a computed sigma theta value is provided. The primary as well as the backup meteorological information is available in the PSEG Site Control Room, TSC, and the EOF.

The meteorological monitoring system is provided with a dedicated battery backup power supply. The system is calibrated quarterly using equipment traceable to an NBS Standard. The Meteorological Monitoring Program is reviewed biennually in accordance with the Hope Creek and Salem UFSAR. (A detailed description of the onsite meteorological measurements program is provided in the PSEG Site SSAR).

A system to provide alternate remote interrogation of the meteorological system is available by way of direct telephone dial-up capability.

The Emergency Plan Implementing Procedures provide for meteorological support from the closest NOAA Weather Station (National Weather Service-NWS). Information, including synoptic weather conditions, forecast, regional precipitation and severe weather alerts from this NWS station is available on a 24-hour-per-day basis. Monthly communication checks with this NWS station are made in accordance with Section 15.0 of this Plan. It has been determined that the data from this nearby NOAA weather station is representative of the combination of local and regional meteorology. Backup communication with this weather station uses the Delaware NAWAS.

10.2 Seismic Monitoring

A Control Room alarm is provided in the event of seismic activity associated with the Operating Basis Earthquake (OBE). The seismic monitoring system measures and records the acceleration (earthquake ground motion) of the structure. Attachments 6 through 9 of this Plan describe technology specific seismic instrumentation.

10.3 River Level Monitoring

River water level monitoring requirements will be determined when the reactor technology is selected.

The geophysical instrumentation monitors the parameters required for evaluating action levels contained in the Event Classification Guide (ECG) and Emergency Plan Implementing Procedures.

10.4 Fire Detection

The PSEG Site Fire Protection System is designed in general accordance with the National Fire Protection Association's standards. Any fire initiates fire alarms and the protection systems as appropriate. An alarm is initiated by automatic sprinkler actuation, smoke detector actuation, heat sensor actuation or by manual action.

SECTION 11

PROTECTIVE RESPONSE

1.0 Onsite Protective Response

The onsite protective response consists of warning, notification, assembly, accountability, and protective actions.

1.1 Onsite Warning

In the event of an emergency at the PSEG Site, methods are established for notifying personnel within the Protected Area (PA) and Owner-Controlled Area (OCA) for all emergency classifications.

The primary means of notification within the PA is the plant public address system and evacuation alarms, as described in Section 7.0 of this Plan. Announcements include the emergency classification and response actions to be taken by personnel onsite (such as ERO, non-ERO, contractor personnel, and visitors). Provisions are made to alert personnel in high noise areas and outbuildings within the PA, as applicable. PSEG maintains the ability to notify all individuals within the PA.

NOTE:
The Salem and Hope Creek Generating Stations currently employ an onsite siren system to notify workers outside of the PA of the need to evacuate. The PSEG Site will use the existing onsite siren system.

PSEG informs individuals located outside the PA, but inside the OCA, via an onsite warning system, which provides siren coverage of the habitable portions of the OCA. A siren signal is provided to all personnel in accordance with security procedures. Signs are in place to inform personnel in the OCA to evacuate if the OCA sirens sound. Other notification methods include public address system announcements and activities of the security force (e.g., vehicle-mounted public address systems). PSEG maintains the ability to notify all individuals within the OCA.

1.2 Assembly and Accountability

The sheltering of personnel is performed only for the specific area affected, or as determined necessary by the Emergency Coordinator (EC), for emergencies classified as Unusual Events. However, the EC has the option of initiating accountability if it is beneficial.

For emergencies classified as an Alert, Site Area Emergency or General Emergency, assembly/evacuation of onsite personnel and personnel accountability (optional at Alert) are performed and the initial personnel accountability is completed thirty minutes after the accountability message has been announced over the station page. Any personnel not accounted for within thirty minutes are paged and then called at home prior to initiating search and rescue. This accountability includes all personnel (site personnel, visitors or contractor personnel) who remain within the Protected Area. Essential PSEG personnel are

detained at accountability stations until the Shift Manager (SM)/Emergency Duty Officer (EDO) is assured that they can be released, sheltered, or evacuated. Non-essential personnel (PSEG and contractor) in the Protected Area are directed to exit the site and evacuate the OCA. Evacuation of non-essential personnel (PSEG personnel, contractor personnel or the general public) outside the Protected Area, but within the Owner Controlled Area (OCA), is accomplished through notification by either a site siren system or by the security force.

The accountability system is based in the security computer that maintains normal logs of personnel entering and exiting onsite (the Protected Area) and utilizes the photobadge issued to each person able to access the site. Upon initiation of Assembly, onsite personnel report to their assigned accountability stations. It should be noted that when Assembly is initiated, nonessential station personnel and contractors exit the Protected Area (conditions permitting) to reduce the number of personnel subject to the accountability process.

After accountability is initiated, personnel pass their photobadge through dedicated accountability card readers installed at the various accountability stations. The security computer then generates a report for the security supervisors that indicates the names of unaccounted-for personnel. The security supervisor informs the SM/EDO of the accountability results.

After it is determined which personnel have not been accounted for, actions are taken to locate the missing persons, including the use of search & rescue teams if appropriate.

Site protective actions during security related events are taken in accordance with station abnormal operating procedures that deal with “airborne threats” and “security events” and take priority ahead of the normal assembly/accountability process as outlined in NRC Bulletin 2005-02.

1.3 Protective Actions

Once personnel accountability has been performed, specific instructions on appropriate protective actions to be taken by station personnel are issued using a public address system. Warning of personnel in the OCA is accomplished through the combined use of the owner controlled area siren system and Security Force Members in vehicles.

The protective action options of sheltering and evacuation are combined with a consideration of the necessity for keeping specific technical or management personnel at the station for implementation of this Plan. The evacuation routes and transportation for nonessential onsite personnel are part of the evacuation study for the entire area around the PSEG Site, which is provided as Emergency Plan Attachment 11.

Evacuations are performed utilizing the site evacuation procedures, which provides guidance to the Emergency Coordinator function on actions required for site evacuation and guidance to the security force for their assistance in site evacuations.

The access road to the PSEG Site is currently the only route for evacuating the site. A proposed causeway may be available for use as an alternate route. Affected individuals evacuate the site via personal vehicles. Persons without transportation are identified and

provided transportation as necessary. Appropriate sheltering is available if circumstances preclude evacuation of personnel via the access road.

2.0 Personnel Monitoring and Decontamination

For emergencies classified as an Unusual Event or Alert, monitoring of personnel is restricted to those who have potentially been exposed to or in contact with radioactive materials. The initial monitoring and decontamination is performed onsite in the decontamination area at each control point or other suitable location within the controlled access areas of the station. Methods for personnel decontamination (skin) are described in Emergency Plan Implementing Procedures and in Table 12-2. If the skin cannot be decontaminated below the acceptable values, medical support personnel are consulted in accordance with Section 13 of this plan and applicable Radiation Protection Department instructions.

For emergencies classified as a Site Area Emergency or General Emergency the same general criteria for monitoring and decontamination are used as for the Unusual Event or Alert. Should an actual release of radioactive material occur, the source, wind direction, and survey results are used to determine if general monitoring of station personnel is required. If general monitoring of personnel is determined to be required, the monitoring and decontamination are performed in accordance with Emergency Plan Implementing Procedures. Once evacuated from the Owner Controlled Area, non-emergency workers that are PSEG employees, also known as non-essential personnel, are normally treated as the general public concerning decontamination processes. Monitoring of personnel or vehicles is performed by offsite officials at an appropriate reception center.

If thought appropriate by the emergency coordinator, personnel may be evacuated to or asked to report to the EOF, which serves as an offsite assembly area. The EOF has facilities for personnel monitoring and decontamination.

Individual respiratory protection, protective clothing and potassium iodine are available for onsite emergency response personnel.

3.0 Offsite Protective Response

The States of New Jersey and Delaware are using similar basis for recommending protective actions within the Plume Exposure Pathway. PSEG make recommendations to the States in case of a General Emergency. PSEG uses bases similar to those established by the States to make recommendations. Recommended action levels consistent with those indicated in both State Plans (and adopted from EPA-400-R-92-001) are being used as guidance in making a determination as to what protective actions, if any, should be recommended.

For projected TEDE + 4 Day Dose of 1 rem and Thyroid Commitment Dose Equivalent (CDE) of 5 rem (child or adult) the option exists to recommend seeking shelter or initiating evacuation (or a combination of two depending on distance and direction of plume). The decision is based primarily on a comparison of the projected plume travel time, evacuation time estimates, ambient meteorology, anticipated duration of release, and degree of protection afforded by local residential units. A list of representative shielding factors provided by typical structures against direct exposure to the plume is provided in Table 11-1. If an evacuation can be completed prior to the plume passing over the affected population, then an evacuation recommendation may be made, while considering other environmental

factors, in the case of a projected 1 rem TEDE + 4 Day Dose or 5 rem Thyroid CDE. A sheltering recommendation may be made, if a "puff" radiological release occurred and it was not expected that evacuation could be completed within the plume travel time.

3.1 Evacuation Time Estimate

The evacuation time estimate for the Plume Exposure Pathway EPZ is provided in Emergency Plan Attachment 11.

3.2 Population Distribution

The population distribution within ten miles of the PSEG Site is provided in Section 1.0 and Attachment 11 of this Plan..

TABLE 11-1
REPRESENTATIVE SHIELDING FACTORS FROM GAMMA CLOUD SOURCE

Structure Description	Shielding Factor (1)	Representative Range
Outside	1.0	-
Vehicles	1.0	-
Wood-frame house (2) (No Basement)	0.9	-
Wood-frame House (Basement)	0.6	0.1 to 0.7 (3)
Masonry House (No Basement)	0.6	0.4 to 0.7 (3)
Large Office or Industrial Building	0.2	0.1 to 0.3 (3, 4)

NOTES:

(1) The ratio of the dose received inside the structure to the dose that would be received outside the structure.

(2) A wood frame house with brick or stone veneer is approximately equivalent to a masonry house for shielding purposes.

(3) This range is mainly due to different wall materials and different geometry.

(4) The shielding factor depends on where the personnel are located within the building, such as in the basement or an inside room.

Source: SAND 77-1725 (Unlimited Release)

SECTION 12

RADIOLOGICAL EXPOSURE CONTROL

1.0 Onsite Exposure Guidelines

Site evacuation criteria, protective action recommendation guidance, emergency worker exposure limits, and decontamination guidance to be used by the emergency coordinator function, Radiation Protection Supervision, and radiation protection personnel during an emergency are provided in emergency plan implementing procedures.

The specific goal within the radiation protection program is the positive control of personnel exposure to radiation and radioactive material.

1.1 Onsite Emergency Radiation Protection Program

The radiation protection program provides the following emergency capabilities:

1) 24 hour-per-day dose determination recording and record retention capability;

2) Contamination control;

3) Onsite and offsite decontamination of site personnel;

4) Respiratory protection; and

5) Life saving dose risk assessment.

24-hour-per-day dose determination capability for doses received by emergency personnel, including the provisions for distribution of dosimeters and the maintenance of dose records will be implemented. If the nature of the incident is such that additional personnel will be arriving onsite, the Radiation Protection department will prepare additional dosimetry and ensure it is available and ready for use. If it becomes necessary to evacuate during an emergency condition, necessary dosimetry equipment, both internal and external, may be relocated to lower dose rate areas in order to provide the means for exposure evaluation.

1.2 Contamination Control

Decontamination of vehicles is performed in accordance with the Emergency Plan Implementing Procedure for vehicle survey. Decontamination of personnel is performed as outlined in the Emergency Plan Implementing Procedure and/or Station Radiation Protection Procedures. (Table 12-2 provides general guidance.) The limit of acceptable surface contamination levels (Table 12-1) are used as a guide for the release of equipment. Release of station personnel is performed utilizing normal station operational limits as incorporated into Emergency Plan Implementing Procedures. These values may be increased at the discretion of the Radiological Assessment Coordinator or the Emergency Duty Officer.

Once evacuated from the Owner Controlled Area, non-emergency workers that are PSEG employees, also known as non-essential personnel, will normally be treated as the general public concerning decontamination processes. Monitoring of personnel or vehicles will be performed by offsite officials at an appropriate reception center.

If thought appropriate by the emergency coordinator, personnel may be evacuated to or asked to report to the EOF, which serves as an offsite assembly area. The EOF has facilities for personnel monitoring and decontamination.

Bottled drinking water and food supplies are shipped to the site from outside vendors. Onsite drinking facilities having the local ground water as their source would be considered contaminated until sampled. Access control to the controlled areas of the station is maintained. Personnel assigned to this area monitor personnel coming in and out of the controlled access areas.

Criteria for permitting return of areas and items to normal use are established. Restoration levels and personnel exposures do not exceed 10CFR20 limits. Disposal of decontamination waste is in accordance with routine Radiation Protection Procedures.

1.3 Decontamination of Site Personnel

Procedures for decontaminating relocated onsite personnel, including provisions for extra clothing and decontaminants suitable for the type of contamination expected are established. In all cases, first aid efforts take precedence over decontamination efforts unless the contamination itself is life threatening. Relocated onsite personnel can be decontaminated at the control point or at the Emergency Operations Facility. Extra clothing and decontaminants are housed onsite.

1.4 Internal Exposure Control

The Radiation Protection Department is responsible for ensuring that internal and external radiation exposure at the worksite is kept as low as reasonable achievable (ALARA). Title 10CFR20.1201 sets limits on the sum of internal and external dose, which a nuclear worker may receive. Respiratory protection shall be used in a manner that keeps total dose (the sum of internal and external dose) ALARA.

To limit expected and potential respiratory contamination from radioactive dust, aerosols, or gases, engineering controls such as work procedures, setting local containments (like tents or glove bags), and ventilation or filtration measures may be recommended by the Radiation Protection Department.

In an emergency, there are situations in which prompt actions need to be taken before engineering controls can be set up and before airborne contamination levels can be measured or evaluated. In all of the above cases, personnel are required to wear respiratory protective devices to assure that inhalation of radioactive contaminates is held to a minimum.

1.5 Performance of Life Saving/Corrective Actions and Dose Risk Assessment

Procedures have been established, which address radiological exposure control. Any planned exposure greater than regulatory limits is considered an emergency exposure requiring authorization. Twenty-five rem is established as the upper limit for performance of actions to save station equipment required to mitigate the emergency. The upper limit for life saving actions is 75 rem.

Life saving activities applies to the following:

1) Removal of injured persons;

2) Undertaking corrective actions;

3) Performing assessment actions;

4) Providing first aid;

5) Performing personnel decontamination;

6) Providing ambulance service; and

7) Providing medical treatment services.

Emergency exposure requires the approval of the Emergency Duty Officer (EDO). If the EDO is not available, the Shift Manager (SM) with the advice of the Shift Radiation Protection Technician makes the authorization decision. The Emergency Plan Implementing Procedure on emergency exposure authorization is used. It describes both oral and written exposure authorization methods to ensure timely reentry as required for emergency actions.

The following guidance for lifesaving and emergency mitigating actions is used.

1) Life Saving Actions

   a. Rescue personnel should be volunteers or professional rescue personnel (e.g., firemen who volunteer by choice of employment).

   b. Rescue personnel should be broadly familiar with the consequences of exposure.

   c. Declared pregnant women shall not take part in these actions.

   d. Other things being equal, volunteers above the age of 45 should be selected.

   e. Planned External Dose Equivalent (EDE) shall not exceed 75 rem.

   f. Hands and forearms may receive additional doses of up to 200 rem.

g. Internal exposure shall be minimized by the use of the best available respiratory protection, and contamination controlled by the use of available protective clothing.

h. Exposure under these conditions shall be limited to once in a lifetime.

i. Persons receiving exposures, as indicated above, should avoid procreation for a few months.

2) Emergency Mitigating Actions

a. Persons performing the planned actions should be volunteers broadly familiar with exposure consequences.

b. Declared pregnant women shall not take part in these actions.

c. Planned EDE dose shall not exceed 25 rem.

TABLE 12-1
ACCEPTABLE SURFACE CONTAMINATION LEVELS (Notes 1 & 2)

"LOOSE CONTAMINATION"

$\leq$ 1000 dpm/100cm^2 Gross Beta/Gamma	$\leq$ 20 dpm/100cm^2 Gross Alpha

"COMBINED (LOOSE & FIXED) CONTAMINATION"

$\leq$ 5000 dpm/100cm^2 Gross Beta/Gamma	$\leq$ 100 dpm/100cm^2 Gross Alpha

NOTES:

(1) Reference - INPO 85-0047, Guidelines for Radiation Protection at Nuclear Power Stations.

(2) Reference RP-AA-500, Radioactive Material (RAM) Control, (Section 2.3).

TABLE 12-2
PERSONNEL DECONTAMINATION METHODS

NOTE:

This table is adapted from U.S. HEW, "Radiological Health Handbook", Washington, D.C., 1970.

Begin with the first listed method and then proceed, step-by-step, to the more severe method as necessary.

Method	Surface	Technique
Mild soap & water	Skin & hair	Wash 2-3 min. Do not scrub with a brush.
Lava soap, soft brush & water	Skin	Use light pressure with heavy lather. Use care not to scratch or erode the skin.
Tide or other detergent	Hair	Wash hair, rinse thoroughly and repeat.
Flushing	Eyes, ears, nose, & mouth	Roll back the eyelid, flush with large amounts of water. Use Isotonic irrigants if available.
Flushing	Wounds	Wash wound with large amounts of water & spread edges to stimulate bleeding, if not profuse (1).

NOTE:

(1) If bleeding is profuse:

- Stop bleeding first
- Clean edges of wound
- Bandage

If any contamination remains, it may be removed by normal cleaning methods as noted above.

SECTION 13

MEDICAL SUPPORT

1.0 PSEG's Medical Support

1.1 Normal Operations – Onsite Medical Support

The PSEG ambulance provides the equipment and capability to safely transport injured and/or contaminated personnel to an offsite medical facility. This ambulance is operated by members of the Fire Department who provide first aid during transport. A member of the station's radiation protection staff accompanies the patient to provide health physics coverage if required.

1.2 Emergency Medical Support

The Memorial Hospital of Salem County (MHSC) will provide emergency medical support. The Memorial Hospital of Salem County has agreed to accept contaminated patients for emergency medical and surgical treatment on a 24-hour basis per day, and for subsequent observation and/or treatment if the capabilities of the hospital allow such subsequent care. A letter of agreement with the MHSC operator South Jersey Health Corporation is provided in the Emergency Plan Attachment document. In order to handle contaminated patients safely, without disrupting other hospital operations, MHSC has a designated Radiation Emergency Area (REA). Procedures for implementing the hospital's radiological medical emergency preparedness plan (EPP) have been prepared and are known to the hospital personnel responsible for handling the treatment of radiological accident victims.

Upon notification of MHSC that a contaminated patient may or will be transported by the plant operations department, the hospital’s EPP is activated.

All communications with the hospital concerning the possible or actual referral of a patient from the plant to the hospital are directed to the Emergency Department Triage Nurse (EDTN) or alternate.

The EDTN notifies the other key personnel involved in the implementation of the hospital's radiation emergency procedures. Equipment and supplies are maintained at MHSC.

PSEG performs maintenance of the hospital’s EPP and the equipment required to support the plan. Radiological survey equipment and other required equipment is inventoried annually. PSEG performs calibration of the radiological survey equipment as required by the appropriate technical guidance for the specific equipment.

MHSC is located near Salem, New Jersey as indicated in Section 4 of this Emergency Plan. All station and local ambulance drivers and support personnel are familiar with directions to the hospital.

If for any reason the MHSC cannot provide emergency medical treatment of contaminated personnel, other area hospitals are equipped to provide treatment of contaminated personnel.

1.3 Backup Medical Support

An Emergency Medical Assistance Program is in effect with REAC/TS. The program provides for backup medical treatment of radioactively contaminated patients. The primary backup for MHSC is Southern Ocean County Hospital. If additional support is needed, both Christiana and Wilmington Hospitals in Delaware are capable of and approved to provide backup medical treatment of radioactively contaminated patients.

2.0 Offsite Medical Support

Local ambulance squads provide secondary first aid and transportation support to the site. As indicated in the New Jersey Radiological Emergency Response Plans for Salem County and its municipalities, the Salem County Office of Emergency Services is responsible for the overall coordination of emergency medical units. A letter of agreement between PSEG and the Salem County Office of Emergency Services, provided in the Emergency Plan Attachment document, ensures that this coordination is maintained for the emergency medical support required by PSEG.

3.0 Coordinated Communication

The primary communications link between the onsite and offsite organizations responsible for medical support is provided by commercial telephone. The telephone numbers are listed in the Emergency Telephone List. Individual organizations maintain communications with mobile medical facilities (ambulances, etc.) operating under their direction. Communications directing or requesting mobile medical facilities are made to the organization responsible for the mobile medical facility requested.

SECTION 14

RECOVERY AND REENTRY PLANNING

1.0 Termination or Reduction of an Emergency

Termination of an emergency is an available option and is based on no emergency action levels in the Event Classification Guide (ECG) being applicable. Termination of the emergency by entering recovery is another option discussed in Part 2.0 below.

Reduction of an emergency classification level is an available option and is based upon improving conditions and the selection of the appropriate Emergency Action Level in the Event Classification Guide (ECG). Upon reduction of the emergency classification the Emergency Coordinator (EC) may modify the emergency response organization.

2.0 Initiation of Recovery Operations

The Emergency Coordinator (EC) determines if the emergency is under control prior to securing the emergency response and entering into recovery operations. Termination of the emergency and entry into recovery may be considered when the following guidelines are met:

1. Full time operations of Emergency Response Facilities may be curtailed.
2. Radiation levels in all areas are either stable or decreasing with time.
3. Releases of radioactive materials to the environment from the plant are within allowable federal limits.
4. Fire, flooding, or similar emergencies no longer present an emergency situation to plant operation.
5. The plant is in a safe status and further degradation of a safety system is not expected.

3.0 Recovery Operations

Notification is made to offsite agencies when it has been determined that an emergency has been terminated and recovery entered as defined above and in accordance with implementing procedures. Recovery Operations will be under the direction of a qualified Emergency Coordinator. Termination and entry into recovery operations of an alert or higher classification requires the concurrence of the Station VP, or in his absence the President and Chief Nuclear Officer PSEG Nuclear LLC or designee. Recovery Operations consist of the following efforts:

1. An orderly evaluation of the causes and effects of the emergency.
2. Measures necessary to place the plant back into operation.
3. An analysis of exposure records maintained by onsite emergency workers during the emergency response.

4. The assembling of an appropriate Recovery Management Organization (RMO) to implement Recovery Operations. This RMO will be determined by the Emergency Coordinator and the Recovery Manager based on the cause and extent of the emergency.

5. Coordination of additional assistance to offsite organizations.

6. Reentry (defined in Part 4.0 below).

The extent of these efforts will depend upon the nature of the incident and its effect upon plant systems.

The EC will notify all key emergency response managers/supervisors and offsite state and local support agencies of the initiation of recovery actions through established communications methods. This will be performed in accordance with Emergency Plan Implementing Procedure on Recovery Operations.

All recovery operations that may have offsite consequences, i.e., controlled release of radioactive material or transport of significant amounts of radioactive wastes, will be coordinated with appropriate offsite agencies.

4.0 <u>Reentry</u>

Reentry (onsite) consist of planned and deliberate access to areas of the plant that were evacuated or controlled as limited access areas as the result of an emergency. The Radiological Assessment Coordinator (RAC) or Radiological Support Manager (RSM) determines what is needed to reenter affected areas. Reentry activities may occur prior to termination of the emergency, or they may be conducted as a part of recovery operations. Reentry does not include the initial corrective or protective actions taken to establish effective control of the emergency situation. The primary function of reentry is to perform comprehensive radiological surveys of the plant or to perform assessments of damaged plant equipment so that detailed recovery plans can be established. The following areas are considered when planning reentry:

- Contamination and ALARA controls
- Dose Limits
- Back out Dose Limits and Rates
- Decontamination requirements
- Posting of radiological areas
- Site access

Offsite reentry is the responsibility of state and local authorities in accordance with their plans and procedures.

SECTION 15

EXERCISES AND DRILLS

1.0 Exercises

An exercise is an event that tests the integrated capability and a major portion of the basic elements existing within emergency plans of the principal response organizations.

1.1 Exercise Schedule

Exercises required by NUREG-0654 are shown in Table 15-1.

The scenario is varied from year to year such that all major elements of the plans and preparedness organizations are tested within an eight-year period. An exercise should start between 6:00 p.m. and 4:00 a.m., once every eight years. Exercises are conducted under various weather conditions.

1.2 Exercise Scenario

Exercises are conducted in accordance with an exercise manual approved by the EP Manager, or designee that includes, at a minimum, the following elements:

1) Exercise objectives
2) Date(s), time period, and place(s) for exercise and drill events and the briefings and critiques.
3) Participating agencies and locations
4) Guidelines for the conduct of the exercise
5) Assignments for Referees/Observers and arrangement for official observers for the federally observed biennial exercise.
6) Evaluation criteria
7) Narrative scenario summary and timeline
8) Initiating events
9) Test messages
10) Operational and radiological data
11) Field radiation monitoring data
12) Simulated events/actions

Official referees/observers are issued controlled copies of appropriate portions of an exercise manual in advance of an exercise. PSEG limits the scope and timing of this distribution to protect the confidentiality of the exercise scenario.

1.3 Exercise Evaluation

Federal observers/evaluators or drill referees/observers will evaluate based on the adequacy of the emergency response demonstrated for the exercise objectives. Following an exercise, a critique is scheduled to evaluate the ability of the participants to respond to an emergency in accordance with the plan and procedures and to identify any deficiencies in training, facilities, equipment, or procedures.

The biennial exercise critique consists of a review and analysis of comments from observers and participants with federal observers in attendance, to evaluate the performance and identify areas needing improvement.

The EP Manager reviews all deficiencies identified and ensures corrective actions are assigned appropriately. The NRC evaluated exercise critiques are rolled out to senior management through NRC exit meetings, station morning meetings, and emailing out the final critique report. Corrective actions are tracked for timely resolution or escalated to higher levels of management for action.

An exercise shall test, as a minimum, the following response capabilities:

1) Ability of personnel to assess simulated plant conditions and take the appropriate actions.
2) Notification, communication, and coordination with the response organizations of the States of New Jersey and Delaware.
3) Transfer of emergency coordinator authority and responsibility.
4) Staffing of emergency facilities.
5) Ability to provide radiological assessment.
6) Ability to provide technical evaluation of plant conditions.
7) Ability to conduct and coordinate radiological surveys.
8) Ability to provide appropriate protective action recommendations.
9) Ability to provide appropriate emergency response and initiate recovery management (if scenario allows) from the Emergency Operations Facility (EOF).

2.0 Drills

A drill is a supervised instruction period aimed at developing and maintaining skills in a particular operation. Drills are a training tool to develop and maintain the emergency response organization.

2.1 Drill Schedule

Drills required by NUREG-0654 and 10 CFR 50 Appendix E are shown in Table 15-1 and training may be conducted as a component of an exercise or an evaluation drill in the Emergency Preparedness Training Program shown in Table 16-2.

2.2 Communications Drills

2.2.1 Monthly Communications Drill

The monthly communications drill consists of a test of the primary and/or secondary communications links between the Control Rooms, TSCs and EOF and the appropriate initial state and local government contact points.

A communications drill to NRC Headquarters and the NRC Regional Office Operations Center from the Control Rooms, TSCs and EOF is completed monthly.

2.2.2 Quarterly Communications Drill

The quarterly communications drill consists of a test of the primary and/or secondary communications links between the Control Rooms, TSCs, and EOF and the appropriate federal emergency response organizations and states within the ingestion pathway contact points.

2.2.3 Annual Communications Drill

The annual communications drill consists of a test of the communications equipment used for notifications with Federal emergency response organizations.

2.2.4 Annual Field Assessment Drill

The annual field assessment team communications drill consists of a test of the primary and secondary communications equipment used for communication among the nuclear facility, the state and local emergency operation centers, and the field assessment teams.

3.0 Notifications

3.1 Pager test

The quarterly Pager test consists of a test of the primary and/or secondary communications links between the callout computer and PSEG emergency response organization members that carry pagers.

4.0 Fire Drills

4.1 Fire Drill

Fire drills are performed at predetermined intervals, not to exceed three months, in accordance with the Fire Protection Program.

5.0 Medical Emergency Drills

5.1 Annual Medical Emergency Drill

The annual medical emergency drill consists of appropriate treatment of the simulated contaminated person(s), use of appropriate contamination control measures, and the transportation to the local medical facility by the station ambulance. (The offsite portions of the medical drill may be performed as part of the required annual exercise.)

6.0 Radiological Monitoring Drills

6.1 Annual Radiological Monitoring Drill

The annual radiological monitoring drill consists of onsite and offsite surveys (to include environmental samples) and assessment of simulated survey results by the appropriate members of the emergency response organization.

7.0 Radiation Protection Drills

7.1 Semi-Annual Radiation Drill:

The semi-annual radiation drill demonstrates Radiation Protection personnel response to simulated elevated radiation levels in airborne and liquid samples and simulates direct reading of radiation measurements in the environment.

8.0 Other Drills

8.1 Accountability Drill

The annual accountability drill demonstrates the ability of personnel to report to their accountability stations and the accounting of protected area personnel during a simulated emergency. Additionally, security force personnel ensure that the accessible areas of the exclusion zone are simulated to be cleared of contractor personnel, and/or members of the general public.

There are two (2) types of accountability drills that may be performed; full accountability drills or limited accountability drills. A full accountability drill involves participation of all protected area personnel and shall be conducted at least once every eight (8) years. The decision to use a full accountability or a limited accountability drill in any given year will depend on station conditions. During the years that a limited accountability drill is conducted (in lieu of a full accountability drill), station personnel will be provided information that describes the actions required during assembly/accountability. A limited accountability drill involves pre-designated drill participants.

8.2 Team-training Drill

Supervised instruction in which personnel in various emergency response positions work together to accomplish a similar task and demonstrate the ability to perform their assigned functions as a unit.

8.3 Facility Drill

Supervised instruction in which all personnel who are required to perform their emergency response tasks at a facility (e.g., Operations Support Center, Technical Support Center, Emergency Operations Facility, Emergency News Center) demonstrate the ability to perform and integrate their assigned functions within the facility. A facility drill may be a part of a facility tabletop training session.

8.4 Site Drill

Supervised instruction in which the emergency response organization and emergency facilities are activated to demonstrate the ability to integrate the emergency response for the common goal of protecting the health and safety of the public in the event of an emergency at the PSEG Site.

8.5 Tabletop Training Session

A 90 to 120 minute training activity conducted in specified emergency facilities. This training session provides the ERO facility members an opportunity to review response expectations, discuss lessons learned from other drills or industry events, obtain training on targeted areas, complete qualification cards and to develop a team approach to emergency response.

8.6 Drill Scenario

Drills are performed in accordance with a drill manual, which includes the basic elements required for the type of drill conducted.

8.7 Drill Evaluation

Drills are evaluated to determine the adequacy of the emergency response demonstrated to meet drill objectives and to identify areas needing improvement. The evaluation consists of a critique of the major elements of the drill, by drill coaches and the participants.

Drills are considered part of emergency response training. Corrective actions for deficiencies identified during drills or exercises are taken in accordance with the PSEG Corrective Action Program or as defined in Section 16 of the Emergency Plan.

8.8 Augmentation Drills

Augmentation drills serve to demonstrate the capability of the process to augment the on-shift staff with a TSC, OSC, EOF, and ENC/JIC after declaration of an emergency. An unannounced augmentation drill shall be performed at least once every cycle (8 years).

TABLE 15-1
SCHEDULE OF EXERCISES AND DRILLS

Exercise	Frequency
State of New Jersey/PSEG	Biennially [1, 2]
State of Delaware/PSEG	Biennially [1, 2]

Drill	Frequency
Communication - State of New Jersey	Monthly
Communication - Salem and Cumberland Counties, New Jersey	Monthly
Communication - State of Delaware	Monthly
Communication - New Castle and Kent Counties, Delaware	Monthly
Communication - Federal (NRC)	Monthly
Communication - Federal (DOE & USCG)	Quarterly
Communication - NOAA Weather	Quarterly
Communication - Ingestion Pathway States (Pennsylvania, Maryland)	Quarterly
Communication - Federal Emergency Response Organizations	Annually
Communication - PSEG Facilities And Field Assessment Teams	Annually
Notification - Pager test	Quarterly
Fire Drill	Not To Exceed Three Months
Medical Emergency (Simulated Contaminated Personnel)	Annually
Radiological Monitoring	Annually
Radiation Protection (Health Physics Drill)	Semi-Annually
Accountability (Full and/or Limited) (A full accountability drill shall be conducted at least once every eight (8) years)	Annually
Augmentation	Once Every Eight Years
EOF Consolidated Functions Drill (multiple units in emergency)	Once Every Eight Years
Hostile Action Based Drill	Once Every Eight Years

[1] May be conducted as separate or coordinated exercise.

[2] Will consist of events classified as General Emergency.

SECTION 16

RADIOLOGICAL EMERGENCY RESPONSE TRAINING

Emergency response training is a shared responsibility between Site Access Training and the Emergency Preparedness Group. Emergency response training is divided into two major categories: (1) training for personnel who are not part of the emergency response organization (ERO) and (2) training for personnel assigned to the ERO.

1.0 General Employee Training Program

Personnel badged for unescorted access to the Protected Area receive a basic Emergency Plan overview as part of the General Employee Training (GET) program. Re-qualification is required annually to maintain unescorted access to the Protected Area. Individuals, who meet training/experience criteria established in the Access Training procedure, can take an examination based on the initial program objectives to maintain their access, if passed.

The Manager - Emergency Preparedness, or designee, periodically reviews the content of the GET program to ensure it contains adequate guidance for personnel not assigned an emergency response position. In addition, the Manager - Emergency Preparedness, or designee, is one of several disciplines that maintain approval authority over this lesson material to ensure it is maintained current and accurate.

1.1 Training of Assigned Emergency Response Personnel

All personnel assigned to emergency response positions are to receive annual emergency preparedness training. Annual emergency preparedness training is described in ERO position specific qualification guides. Training methods may include classroom instruction, computer based instruction, drill training, evaluation, individual knowledge discussions or evaluations, and are outlined in the position specific Qualification Guides.

The Emergency Preparedness Group has the primary responsibility for coordination of emergency preparedness training. The Emergency Preparedness Group is also responsible for conducting drills and exercises. Course content and qualification guides are created using position specific job task analysis (JTA), which describe the elements necessary to perform the job function.

The emergency planning administrative training procedure and Training & Reference Material (T&RMs and Forms) describe the process for the development and presentation of this training material.

1.1.1 Emergency Preparedness Training Instruction

Training and qualification requirements are based on the emergency response assignment duties. The codes for and the description of these assignments are contained in Section 3, Emergency Organization, Subsection 9 of the Emergency Plan.

The Manager - Emergency Preparedness, or designee, will approve lesson plans and qualification guides used for emergency preparedness training.

1.1.2 Emergency Plan Drills

Emergency Plan Drills are used as tools to practice, train, and demonstrate the skills learned in training and to exercise the interface between PSEG and offsite agencies. All drills and exercises will be conducted in accordance with Section 15 of the Emergency Plan.

1.1.3 Deficiency Correction

If deficiencies are identified during drills, the following corrective measures will be taken:

1) Individual Deficiencies - on-the-spot correction by a qualified drill COACH or CONTROLLER (or during post-drill critique sessions).
2) Deficiencies identified in drills or exercises are tracked per the Corrective Action Program.
3) The NRC evaluated (graded) exercise results are rolled out to senior management at the NRC evaluated exercise exit meeting, through the evaluated exercise final critique, and through the station morning meetings.
4) The Manager - EP or designee, reviews and approves all drill and exercise critique reports.

2.0 Program Administration

The Emergency Preparedness Group is responsible for administering the Emergency Plan training program. Records will be maintained in accordance with the PSEG training department procedures or guidance.

3.0 Offsite Support Training

Training is provided for the Lower Alloways Creek (LAC) Fire and Rescue Company, Inc and the LAC EMS and Rescue, Inc. in the event they are needed onsite to supplement station manpower. PSEG training is conducted on station response procedures. Radiation protection techniques training is conducted in accordance with state plans and procedures. Dial 911 notification procedures are used, as in any emergency, therefore, no additional training is needed. Offsite ambulance squad personnel are trained and qualified in courses equivalent or superior to the Red Cross Multi-Media course. All other training and retraining given to offsite (including hospital staff), state, and municipal emergency response personnel will be provided in accordance with the appropriate state, county, and municipal emergency response plans.

4.0 Training of Emergency Preparedness Staff

Periodic training is provided to the emergency preparedness staff. Staff members are assigned to attend at least one training program, drill, conference, or seminar annually. Attendance is assigned on the basis of the individual responsibilities of staff members.

5.0 Emergency Plan Instruction for Untrained Personnel

All individuals entering the Protected Area, who are not badged for unescorted access, will be continuously escorted. This escort is responsible to ensure the untrained individual adheres to all station procedures and policies while within the protected area. During emergencies unbadged personnel will be escorted to the security center (by the escort or security personnel) and given directions to depart the facility.

TABLE 16 – 1
EMERGENCY PLAN TRAINING MATRIX
Page 1 of 4

COURSE/QG[1] / POSITION	QUAL GUIDE (QG) NUMBER	EP MGMT	OPS	RSM	EOF RAD ASSESS	EOF DOSE ASSESS	OFFSITE MON	OFFSITE TEAM COORD	RAC	TECH DUTY	OSC	COMM	ENC/JIC	SECURITY	ADMIN
Emergency Response Manager (ERM) / A01	1	X													
Site Support Manager (SSM) / A02	1	X													
Emergency Duty Officer (EDO) / A03	1	X													
Shift Manager (SM) / A04	2		X												
Emergency Preparedness Coordinator (EPC) / A05	1	X													
Nuclear Shift Technical Advisor (NSTA) / B01	2		X												
Control Room Supervisor (CRS) / B02	2		X												
Reactor Operator/Plant Operator (RO/PO) / B03	10 & 16		X												
Control Room Communicators (CM1/CM2) / B04	16											X			
Communicator – OPS Advisor / B04A	16											X			
Equipment Operators (EO) / B05	10										X				
Operations Support Center Coordinator (OSCC) / C01	9										X				
Shift Controls Technician (I&C) / C02	10										X				
Shift Controls Technician Electrical / C03	10										X				
OSC Operations Supervisor / C04A	9										X				
OSC Support Maintenance Supervisor / C04B	9										X				
OSC Shift Maintenance Supervisor / C04C	9										X				
OSC Radwaste Operator / C05A	10														
Nuclear Tech – Mechanical / C05B	10										X				
Controls Tech Electrical / C05D	10										X				
Controls Tech - I&C / C05E	10										X				
Fire Brigade / C06	10										X				
Planner / C08	10										X				

TABLE 16 – 1
EMERGENCY PLAN TRAINING MATRIX
Page 2 of 4

COURSE/QG[1] / POSITION	QUAL GUIDE (QG) NUMBER	EP MGMT	OPS	RSM	EOF RAD ASSESS	EOF DOSE ASSESS	OFFSITE MON	OFFSITE TEAM COORD	RAC	TECH DUTY	OSC	COMM	ENC/JIC	SECURITY	ADMIN
OSC Clerk / C10	10										X				
Radiological Support Manager (RSM) / D01	20	X		X											
Radiological Assessment Staff - EOF Duty / D02A	22					X									
Radiological Assessment Staff – EOF Supp / D02B	23				X										
Radiological Assessment Staff – EOF Supp / D02C	23				X										
Field Team Communicator / D03	24							X							
Offsite Team Monitor / D04A	25						X								
Offsite Team Driver / D04B	25						X								
Radiological Assessment Coordinator (RAC) / E01	21	X							X						
Radiation Protection Supervisor (Offsite) / E02A[2]	19														
Radiation Protection Supervisor (Exp Cntrl) / E02B[2]	19														
Shift Radiation Protection Technician (SRPT)/Onsite Radiation Protection Technician (ORPT) E03/E04[2]	19														
Chemistry Supervisor - CP/TSC / E05[3]	18														
Chemistry Technician (CT) / E06[3]	18														
Technical Support Supervisor (TSS) / F01[4]	1	X													
Technical Support Team Leader (TSTL) / F02	4 or 5									X					
Engineer - Electrical / F03	4 or 5									X					
Engineer - Mechanical / F04[4]	4 or 5									X					
Engineer – Controls	4 or 5									X					
Core-Thermal Hydraulics Engineer / F06A	4 or 5									X					
Emergency Preparedness Advisor (EPA) – TSC / F07	16											X			
TSC Communicator / F08	16											X			

TABLE 16 – 1
EMERGENCY PLAN TRAINING MATRIX

COURSE/QG[1] / POSITION	QUAL GUIDE (QG) NUMBER	EP MGMT	OPS	RSM	EOF RAD ASSESS	EOF DOSE ASSESS	OFFSITE MON	OFFSITE TEAM COORD	RAC	TECH DUTY	OSC	COMM	ENC/JIC	SECURITY	ADMIN
Ops Advisor – TSC / F08B[4]	16											X			
Technical Support Manager (TSM) / F09	3									X					
Company Spokesperson (CS) / G01[5]	12												X		
Emergency News Center Manager (ENCM) / G02[5]	12												X		
Industry/Government Affairs Coordinator (IGAC) / G05	11												X		
Rumor Control Coordinator (RCC) / G06	11												X		
Media Monitors / G07B	11												X		
Staff Writer Duty / G08A	11												X		
Staff Writer Support / G08B	11												X		
Media Information Line Operator / G09B	11												X		
Lead Technical Advisor (LTA) / G10A	11												X		
Media Technical Advisor (MTA) / G10B	11												X		
Communications Technical Advisor (CTA) / G10C	11												X		
ENC Operation Supervisor (ENCOS) / G11	11												X		
Public Information Liaison (PIL) / G13	11												X		
Security Liaison (TSC)/Security Operations Supervisor-Main Guard House (MGH) / I01 Site Security Coordinator / I-02	17													X	
Security Force Member / I04	13													X	
EOF Communicators EOF1/EOF2 / I05	16											X			
Site Support Staff - OPS Advisor / I05A	16											X			
Administrative Support Manager (ASM) / J01	14														X
Admin Support Staff - Personnel Supv. / J02A	15														X

TABLE 16 – 1
EMERGENCY PLAN TRAINING MATRIX
Page 4 of 4

COURSE/QG[1] / POSITION	QUAL GUIDE (QG) NUMBER	EP MGMT	OPS	RSM	EOF RAD ASSESS	EOF DOSE ASSESS	OFFSITE MON	OFFSITE TEAM COORD	RAC	TECH DUTY	OSC	COMM	ENC/JIC	SECURITY	ADMIN
Admin Support Staff - Purchasing / J02B	15														X
Admin Support Staff – Administrative / J02D	15														X
Admin Support Staff – Information Technology Support Supervisor / J02E	15														X
Administrative Support Supervisor (ADMSS) / J03	14														X
TSC Administrative Staff / J04	15														X
ENC Administrative Support / J05	11												X		
Audio/Visual Services Coordinator / J06	11												X		
Delaware Offsite Representative / Z03	26	X													

Notes:
1 -Key to EP Training qualification guide and training course subject areas
2 -OJT/OJE in accordance with Radiation Protection Program.
3 -Routine system sampling training and high activity sampling is provided as job qualification training for Chemistry.
4 -These positions also require Severe Accident Management Evaluator Training coordinated by Engineering Support Personnel Training Program
5 -These positions also require "ENC Company Spokesperson Training" coordinated by Nuclear Communications

See next page for training course titles and qualification guide titles.

TABLE 16 - 2
EMERGENCY PLAN COURSE CONTENT DESCRIPTION

EP Management Duties
- Emergency Plan Overview
- Event Classification Guide
- Emergency Plan Implementing Procedures
- Core Damage Overview

EP SRO Comm/OSC/SM Duties
- Emergency Plan Overview
- Event Classification Guide
- Emergency Plan Implementing Procedures

EOF Radiological Support Manager Duties
- Emergency Plan Overview
- Event Classification Guide
- Emergency Plan Implementing Procedures
- Core Damage Overview

EOF Radiological Assessment Duties
- Emergency Plan Overview
- Emergency Plan Implementing Procedures

EOF Dose Assessment Duties
- Emergency Plan Overview
- Emergency Plan Implementing Procedures
  Use Of Dose Assessment Computer Program

Offsite Field Monitoring Team
- Emergency Plan Overview
- Emergency Plan Implementing Procedures

Offsite Team Coordinator / Field Team Communicator Duties
- Emergency Plan Overview
  Emergency Plan Implementing Procedures

TABLE 16 - 2
EMERGENCY PLAN COURSE CONTENT DESCRIPTION
Page 2 of 2

Radiological Assessment Coordinator (RAC) Duties

- Emergency Plan Overview
- Event Classification Guide
- Emergency Plan Implementing Procedures
- Core Damage Overview

Communicator Duties

- Emergency Plan Overview
- Emergency Plan Implementing Procedures

Operations Support Center Duties

- Emergency Plan Overview
- Emergency Plan Implementing Procedures

Emergency News Center / Joint Information Center (ENC / JIC) Duties

- Emergency Plan Overview
- Emergency Plan Implementing Procedures

Security Duties

- Emergency Plan Overview
- Emergency Plan Implementing Procedures

Administrative Support Duties

- Emergency Plan Overview
- Emergency Plan Implementing Procedures

Technical Duties (EOF or TSC)

- Emergency Plan Overview
- Emergency Plan Implementing Procedures
- Abnormal and Emergency Operating Procedures Overview (TSC only)
- Core Damage (Only required forF06A position F06A position)
  Severe Accident Management Eval Training (Only required for F01, F04, and F08B F01, F04, and F08B positions)

SECTION 17

EMERGENCY PLAN ADMINISTRATION

1.0 Responsibility

1.1 General

The President & Chief Nuclear Officer - PSEG Nuclear LLC has the overall responsibility for the development and updating of emergency planning and coordination of the plans with other response organizations.

The Manager Emergency Preparedness (MEP) has been delegated the authority to approve the Emergency Plan and Implementing Procedures for adequacy and consistency. He/She is assigned the responsibility for ensuring that the Emergency Plan and Implementing Procedures are appropriately interfaced with the plans, procedures, and training of offsite support agencies as required maintaining suitable timely notifications and development of protective action recommendations. The organization for coordination and direction of emergency planning matters is shown in Figure 17-1.

1.2 Review and Approval of Emergency Preparedness Documents

The MEP approves all revisions to Emergency Preparedness documents. The PSEG Site Plant Manager approves non-editorial changes to the Emergency Plan, Event Classification Guides, and Emergency Plan Implementing Procedures. Non-editorial revisions to the Emergency Plan, Event Classification Guides, and Emergency Plan Implementing Procedures require a 10 CFR 50.54(q) review. Plant Operations Review Committee (PORC) reviews EP related documents if a 10 CFR 50.54(q) review indicates a potential decrease in effectiveness of the emergency plan. The review and approval of the Emergency Plan documents will be done in accordance with Table 17-1 and Emergency Preparedness Administrative Procedures.

1.3 Training Procedures/Lesson Plans

It is the responsibility of the MEP, or designee, to review and revise the Training Procedures/Lesson Plans in accordance with the Nuclear Emergency Preparedness Training Program. The Training Procedures/Lesson Plans are based on the approved Emergency Plan and Procedures.

2.0 Revisions

Revisions to the Emergency Plan, and Emergency Plan Implementing Procedures are made whenever such changes are necessary to ensure that the Emergency Plan can be implemented. The details are contained in the Emergency Preparedness Administrative Procedures.

Any holder of the Emergency Plan, and/or Emergency Plan Implementing Procedures may prepare revision(s) to any section or procedure. Under normal circumstances, implementing procedure changes are reviewed by the department head responsible (Table 17-1) for the given procedure.

The person requesting the revision, in accordance with appropriate PSEG procedures, should initiate a revision request via the corrective action program.

A list of each section or procedure is maintained in front of the Emergency Plan and Emergency Plan Implementing Procedures indicating the latest revision number and effective date.

3.0 Distribution

All revisions are distributed in accordance with current PSEG procedures.

4.0 Annual Review

The Emergency Plan and associated documents are reviewed at least once each year. As part of the review, the Event Classification Guide is reviewed with the state and local governments. The Emergency Plan and associated documents are updated and procedures are improved, based upon training exercises/drills, and changes onsite or in the environs.

Agreement letters from offsite agencies and local support groups are verified or updated biennially or when changes/revisions to the Plan are implemented which could affect their responsibilities. Updating of telephone numbers is done quarterly and the Manager EP, or designee, coordinates this review.

5.0 Independent Review

The Emergency Plan and associated documents receive an independent review, at least once per 12 months in accordance with current requirements.

Management directives provide instructions for evaluation and correction of audit findings, training, readiness testing, and emergency equipment. The results of the review and actions taken are forwarded to PSEG senior management. The records of these reviews are retained for five (5) years in accordance with Emergency Preparedness Administrative Procedures and PSEG procedural requirements.

6.0 Maintenance of Documents

The persons holding controlled copies of the Emergency Plan and associated documents are responsible for their maintenance, which consists of promptly incorporating all revisions, additions and deletions, replacing any lost or damaged portions. Replacements for any pages are supplied upon request.

Each such distribution shall be accompanied by instructions for insertion into the document indicating which pages are to be replaced, deleted or added. The distribution shall be mailed to copyholders in accordance with current PSEG procedural requirements. A file of master copies of each revision of the plan is retained either by EP, or on PSEG approved media.

TABLE 17-1
REVIEW AND APPROVAL OF EMERGENCY PLAN DOCUMENTS

NOTES

Editorial changes to Emergency Plan documents only require MEP approval.

As Required means, review is required if a 10 CFR 50.54(q) indicates a potential decrease in effectiveness of the Emergency Plan in accordance with Emergency Preparedness Administrative Procedures.

If more than one Responsible Manager is listed for a series of procedures, the manager of the personnel performing the procedure becomes the Responsible Manager.

Document / Procedure	50.54q	Responsible Manager	Manager EP	NOS Manager	PORC	Plant Manager
Emergency Plan All Sections	Yes	MEP	Yes	Yes	Yes	Yes
ECG	Yes	SM	Yes	As Required	As Required	Yes
On-Site						
100	Yes	SM	Yes	As Required	As Required	Yes
200	Yes	SM; ED; REM;MEP	Yes	As Required	As Required	Yes
300	Yes	RPM; CM	Yes	As Required	As Required	Yes
EOF						
400	Yes	MEP	Yes	As Required	As Required	Yes
500	Yes	ED	Yes	As Required	As Required	Yes
600	Yes	RPM	Yes	As Required	As Required	Yes
700	Yes	MEP	Yes	As Required	As Required	Yes
ENC/JIC						
800	Yes	MNC	Yes	As Required	As Required	Yes
Security						
900	Yes	SECM	Yes	As Required	As Required	Yes
EP Admin & Maintenance 1000 series & EP-AA-12X	Yes	MEP	Yes	As Required	As Required	N/A

CM	Chemistry Radwaste and Environmental Manager
ED	Site Engineering Director
MEP	Manager Emergency Preparedness
SM	Shift Manager
SECM	Manager - Security Operations
MNC	Manager Nuclear Communications
REM	Reactor Engineering Manager
RPM	Radiation Protection Manager

FIGURE 17-1
ORGANIZATION FOR COORDINATION
OF EMERGENCY PLANNING

Manager Emergency Preparedness

Onsite Planning, Facilities and Equipment		**Offsite Planning**
Onsite Emergency Planning	**Emergency Facilities**	**Offsite Emergency Planning and Liaison**
Develop and implement PSEG Emergency Plan administrative procedures	Maintain the emergency response facilities program	Maintain Emergency Preparedness agreements for offsite programs
Coordinate, develop and maintain the Emergency Plan procedures	Evaluate and coordinate facilities and equipment changes	Coordinate state, county, local and offsite agency interface
Maintain Emergency Preparedness Administrative Programs	Conduct surveillance and maintenance of ERF documents	Conduct drill/exercise program and interface for offsite programs
Develop drill/exercise scenarios	Conduct communications system surveillance program	Assist offsite agencies with annual 44 CFR 350 certification
Conduct drill/exercise program and ensure readiness	Implement correction of identified facilities and equipment deficiencies	Maintain ANS program documentation
Implement the overall deficiency identification and corrective action program	Maintain emergency response activation system	
Conduct EP self-assessment program		
Maintain EP training program		

ATTACHMENT 1
TYPICAL CONTENTS TO EMERGENCY DOCUMENTS

TABLE OF CONTENTS

ATTACHMENT 1-1.1
NOT USED

ATTACHMENT 1-1.2
NOT USED

ATTACHMENT 1-1.3
PSEG SITE STATION EVENT CLASSIFICATION GUIDE
TYPICAL CONTENTS

ATTACHMENT 1-1.3 (CONT)

Licensing is responsible for the Reportable Action Level (RAL) (Section 11) and associated Attachments (marked by “L”).

ATTACHMENT 1-1.3 (CONT)

18	L	4 Hr Report - Radiological Transportation Accident
19	L	24 Hr Report - Fitness for Duty (FFD) Program Events
20	L	24 Hr Report - NRC Regional Office
21	L	Reportable Event - LAC/Memorandum of Understanding (MOU)
22	L	T/S Required Engineering Evaluation

ATTACHMENT		Title
23		Reserved
24		UNUSUAL EVENT (Common Site)
25	L	8 Hr Report (Common Site) - Major Loss of Emergency Assessment, Offsite Response, OR Communications Capability
26	L	8 Hr. Report – NRC Operations
27	L	8 Hr. Report – Medical Emergency - Transport of Contaminated Person
28	L	Boiler and Pressure Vessel Reporting
29	L	24 Hr Report - NERC Disturbance Reporting

ATTACHMENT 1-1.4
EMERGENCY PLAN ONSITE IMPLEMENTING PROCEDURES
TYPICAL CONTENTS

<u>STATION PROCEDURES</u>

PC.EP-EP.ZZ-0101(Q)	ACTIONS REQUIRED AT UNAFFECTED STATION
PC.EP-EP.ZZ-0102(Q)	EMERGENCY COORDINATOR RESPONSE
PC.EP-EP.ZZ-0201(Q)	TSC – INTEGRATED ENGINEERING RESPONSE
PC.EP-EP.ZZ-0202(Q)	OPERATIONS SUPPORT CENTER (OSC) ACTIVATION AND OPERATIONS
PC.EP-EP.ZZ-0203(Q)	ADMINISTRATIVE SUPPORT/COMMUNICATION TEAM RESPONSE - TSC
EPIP 204P	EMERGENCY RESPONSE CALLOUT/PERSONNEL RECALL
PC.EP-EP.ZZ-0205(Q)	TSC - POST ACCIDENT CORE DAMAGE ASSESSMENT
PC.EP-EP.ZZ-0301(Q)	SHIFT RADIATION PROTECTION TECHNICIAN RESPONSE
PC.EP-EP.ZZ-0302(Q)	RADIOLOGICAL ASSESSMENT COORDINATOR RESPONSE
PC.EP-EP.ZZ-0303(Q)	CONTROL POINT - RADIATION PROTECTION RESPONSE
PC.EP-EP.ZZ-0304(Q)	OPERATIONS SUPPORT CENTER (OSC) RADIATION PROTECTION RESPONSE
PC.EP-EP.ZZ-0305(Q)	POTASSIUM IODIDE (KI) ADMINISTRATION

ATTACHMENT 1-1.4 (Continued)

PC.EP-EP.ZZ-0306(Q)	EMERGENCY AIR SAMPLING
PC.EP-EP.ZZ-0307(Q)	PLANT VENT SAMPLING
PC.EP-EP.ZZ-0308(Q)	PERSONNEL/VEHICLE SURVEY AND DECONTAMINATION
PC.EP-EP.ZZ-0309(Q)	DOSE ASSESSMENT (MIDAS) INSTRUCTIONS
PC.EP-EP.ZZ-0310(Q)	RADIATION PROTECTION SUPERVISOR - OFFSITE AND FIELD MONITORING TEAM RESPONSE
PC.EP-EP.ZZ-0311(Q)	CONTROL POINT - CHEMISTRY RESPONSE
PC.EP-EP.ZZ-0312(Q)	CHEMISTRY SUPERVISOR – CP/TSC RESPONSE
PC.EP-EP.ZZ-0313(Q)	ADVANCED DOSE ASSESSMENT (MIDAS) INSTRUCTIONS

ATTACHMENT 1-1.5
EMERGENCY OPERATIONS FACILITY
TYPICAL CONTENTS

EMERGENCY OPERATIONS FACILITY (EOF) PROCEDURES

EMERGENCY COORDINATOR RESPONSE:

NC.EP-EP.ZZ-0401(Q)	Emergency Preparedness Coordinator Response
NC.EP-EP.ZZ-0402(Q)	Site Support Manager Team Response – EOF
NC.EP-EP.ZZ-0403(Q)	Public Information Liaison (PIL) – EOF
NC.EP-EP.ZZ-0404(Q)	Protective Action Recommendations (PARS) Upgrades
NC.EP-EP.ZZ-0405(Q)	Emergency Termination/ Reduction/Recovery

ENGINEERING RESPONSE (EOF):

NC.EP-EP.ZZ-0501(Q)	EOF – Integrated Engineering Response

RADIATION PROTECTION RESPONSE (EOF):

NC.EP-EP.ZZ-0601(Q)	Radiological Support Manager And Radiological Assessment Staff Response
NC.EP-EP.ZZ-0602(Q)	EOF Radiological Dose Assessment
NC.EP-EP.ZZ-0603(Q)	Field Monitoring
NC.EP-EP.ZZ-0604(Q)	Helicopter Plume Tracking

ADMINISTRATIVE SUPPORT RESPONSE (EOF):

NC.EP-EP.ZZ-0701(Q)	Administrative Support – EOF

ATTACHMENT 1-1.6
EMERGENCY NEWS CENTER
TYPICAL CONTENTS

PUBLIC INFORMATION PROCEDURES

EMERGENCY NEWS CENTER

EP-AA-112-600	Emergency News Center Organization, Activation and Operation
EP-AA-112-600-F1	ENC Manager (ENCM) Checklist
EP-AA-112-600-F2	Lead Technical Advisor Checklist
EP-AA-112-600-F3	Health Physics (HP) Spokesperson Checklist
EP-AA-112-600-F4	Company Spokesperson Checklist
EP-AA-112-600-F5	Media Monitor Checklist
EP-AA-112-600-F6	Rumor Control Coordinator Checklist
EP-AA-112-600-F7	Staff Writer Checklist
EP-AA-112-600-F8	JIC Access Security Guidance Checklist
EP-AA-112-600-F9	Communications Technical Advisor Checklist
EP-AA-112-600-F10	Industry/Government Affairs Coordinator Checklist
EP-AA-112-600-F11	Media Technical Advisor Checklist
EP-AA-112-600-F12	Media Information Line Operator Checklist
EP-AA-112-600-F13	ENC Administrative Support Checklist
EP-AA-112-600-F14	Audio/Visual Services Coordinator Checklist
EP-AA-112-600-F15	ENC Manager Media Briefing Guideline
EP-AA-112-600-F16	Opening & Closing Statement Guidelines
EP-AA-112-600-F17	ENC/JIC Activation Checklist
EP-AA-112-600-F18	Briefing Guidelines

ATTACHME4NT 1-1.6
EMERGENCY NEWS CENTER
TYPICAL CONTENTS

EP-AA-112-600-F19	NICC Contact Form
EP-AA-112-600-F20	Rumor Control Report
EP-AA-112-600-F21	Threatening Phone Call Report
EP-AA-112-600-F22	PSEG News Bulletin Traveler
EP-AA-112-600-F23	JIC Media Log
EP-AA-112-600-F24	Sample Layout of JIC Room
EP-AA-112-600-F25	Industry/Government Affairs Contact Report
EP-AA-112-600-F26	Dais Panel Members
EP-AA-112-600-F27	ENC/JIC Shift Relief Schedule/Staffing Chart
EP-AA-112-600-F28	Turnover Checklist
EP-AA-112-600-F29	A/V Equipment Instructions
EP-AA-112-600-F30	Distribution Guidelines
EP-AA-112-600-F31	ENC Operations Supervisor (ENCOS) Checklist
EP-AA-112-600-F32	News Bulletin Guidelines
EP-AA-112-600-F33	Teleprompter Instructions
EP-AA-112-600-F34	Media Information Line Inquiries

ATTACHMENT 1-1.7
SECURITY RESPONSE
TYPICAL CONTENTS

SECURITY PROCEDURES

INTEGRATED SECURITY RESPONSE:

NC.EP-EP.ZZ-0901(Q)	Onsite Security Response
NC.EP-EP.ZZ-0902(Q)	Accountability/Evacuation
NC.EP-EP.ZZ-0903(Q)	Opening of the EOF

ATTACHMENT 1-1.8
ADMINISTRATIVE PROCEDURES
TYPICAL CONTENTS

EMERGENCY PREPAREDNESS ADMINISTRATIVE PROCEDURES

PLAN, EPIP, ECG ADMINISTRATION:

NC.EP-AP.ZZ-1001(Z) Emergency Plan Document Processing
(Superseded by EP-AA-120, EP-AA-120-1005, & EP-AA-120-1006)

NC.EP-AP.ZZ-1003(Q) 10CFR50.54q Effectiveness Review Guide
(Superseded by EP-AA-120-1001)

EPIP 1005 Emergency Preparedness Deficiency/Revision Tracking.

FACILITIES AND EQUIPMENT:

NC.EP-AP.ZZ-1006(Q) Emergency Preparedness Equipment Inventory (Radiation Protection)

EPIP 1008 Emergency Communications Drills.

EPIP 1010 ERF Status Boards.

TRAINING:

NC.EP-AP.ZZ-1011(Q) Maintenance of Emergency Response Organization
(Superseded by EP-AA-120-1007)

EPIP 1012 Preparation, Conduct, and Evaluation of Emergency Preparedness Annual Exercises.

NC.EP-AP.ZZ-1014(Q) Emergency Preparedness Classroom Training Administration.

NC.EP-AP.ZZ-1015(Z) PC Dose Assessment Software Control

EMERGENCY SUPPORT EQUIPMENT:

EPIP 1016 Test Procedures for EOF Backup Generator, Vent System and HVAC Filter Replacement.

NC.EP-FT.ZZ-0004(Q) Emergency Communications Drill (Superseded by EP-AA-124)

PC.EP-FT.ZZ-0006(Q) Emergency Response Data System (ERDS) Test with NRC

ATTACHMENT 2
CERTIFICATION LETTERS

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Note: This attachment contains certification letters from offsite support agencies to support the new plant. As PSEG moves forward with new plant development, information to support the new plant will be incorporated into Memoranda of Understanding (Attachment 3) and the Certification Letters will be deleted.

Nuclear Development Received

JAN 25 2010

State of New Jersey

OFFICE OF THE ATTORNEY GENERAL
DEPARTMENT OF LAW AND PUBLIC SAFETY
DIVISION OF STATE POLICE
POST OFFICE BOX 7068
WEST TRENTON NJ 08628-0068
(609) 882-2000

JON S. CORZINE
Governor

ANNE MILGRAM
Attorney General

COLONEL JOSEPH R. FUENTES
Superintendent

January 13, 2010

Mr. James Mallon
Public Service Enterprise Group Power, LLC
Post Office Box 236
M/C ND7
Hancocks Bridge, New Jersey 08038

Re: PSEG Site Early Site Permit Application
Emergency Plan and Evacuation Time Estimate

Dear Mr. Mallon:

The New Jersey Office of Emergency Management (NJOEM) has received a copy of the Early Site Permit Emergency Plan for the PSEG Site ("ESP Emergency Plan"). In addition, the NJOEM has received a copy of the final updated Evacuation Time Estimate study. These documents have been developed to support the Early Site Permit (ESP) License Application for up to two (2) proposed new generating units adjacent to the Salem and Hope Creek nuclear generating stations (hereafter collectively referred to as the "PSEG Site"). The NJOEM believes the proposed emergency plan is practicable. The NJOEM has also reviewed the updated Evacuation Time estimate and concurs with the information in the final report.

It is our understanding that the Early Site Permit License Application is being developed in accordance with 10 CFR Part 52 and will be submitted to the Nuclear Regulatory Commission during the second quarter of 2010. Emergency planning provisions of 10 CFR § 52 and the application process require PSEG to obtain certifications (assurances) from local and state governmental agencies with emergency planning and support emergency response to any new plant,

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if constructed. Therefore, pursuant to the New Jersey statutes, the NJOEM provides the following assurances:

- The proposed emergency plan is practicable.
- The NJOEM will fully participate in any further development of the plan and required field demonstrations for this emergency plan.
- The NJOEM is committed to executing our responsibilities under the plans in the event of an emergency.
- Per the existing Memorandum of Understanding, the NJOEM will continue to coordinate with the Maryland Emergency Management Agency (MEMA) and the Pennsylvania Emergency Management Agency (PEMA) on all mutual aid activities to support the emergency planning and response efforts of the PSEG nuclear units.

Over the years, the NJOEM has maintained a successful working partnership with PSEG in support of the existing Salem and Hope Creek nuclear generating stations. It is our commitment to support emergency preparedness for this, as well as all hazards that may potentially impact the citizens of New Jersey. Therefore, we will continue to work with PSEG in their planning efforts for the ESP for the PSEG Site.

It is our understanding that the specific nature of arrangements in support of emergency preparedness for operation of any new plant will be clearly established in a properly executed and binding Memorandum of Understanding with NJOEM that will be included in the emergency plan if and when PSEG proceeds with construction and operation of a new plant.

Any questions regarding this matter should be directed to SFC Thomas Scardino, Radiological Emergency Response Planning and Technical Unit, at (609) 963-6900, extension 6721.

Sincerely,

FOR COLONEL JOSEPH R. FUENTES
SUPERINTENDENT

Dennis P. McNulty, Major
Commanding Officer
Emergency Management Section

DPM/TAS:law

Nuclear Development
Received

JAN 08 2010

SALEM COUNTY DEPARTMENT OF EMERGENCY SERVICES

EMERGENCY MANAGEMENT FIRE MARSHAL 911 DISPATCH CENTER
HOMELAND SECURITY FIRE ACADEMY FIRE POLICE

January 5, 2010

James Mallon
Public Service Enterprise Group Power, LLC
PO Box 236
M/C ND7
Hancocks Bridge, NJ 08038

PSEG SITE EARLY SITE PERMIT APPLICATION
EMERGENCY PLAN AND EVACUATION TIME ESTIMATE

Dear Mr. Mallon:

The Salem County Department of Emergency Services has received a copy of the Early Site Permit Emergency Plan and the final updated Evacuation Time Estimate study to support the Early Site Permit License Application for up to two (2) proposed new generating units adjacent to Salem and Hope Creek nuclear generating stations (hereafter collectively referred to as the "PSEG Site"). The Department of Emergency Services believes the proposed emergency plan is practicable. The Department of Emergency Services has also reviewed the updated Evacuation Time Estimate and has provided comments.

It is our understanding that the Early Site Permit License Application is being developed in accordance with 10 CFR Part 52 and will be submitted to the Nuclear Regulatory Commission during the second quarter of 2010. Emergency planning provisions of 10 CFR § 52 and the application process require PSEG to obtain certifications (assurances) from local and state governmental agencies with emergency planning responsibilities that the agency will participate in emergency planning and support emergency response to any new plant, if constructed. The Salem County Department of Emergency Services provides the following assurances:

- The proposed emergency plan is practicable;
- The Salem County Department of Emergency Services will fully participate in any further development of the plan, and required field demonstrations for this Emergency Plan;
- The Salem County Department of Emergency Services is committed to executing our responsibilities under the plans in the event of an emergency.

Over the years, the Salem County Department of Emergency Services has maintained a successful working partnership with PSEG in support of the existing Salem and Hope Creek nuclear generating stations. It is our commitment to support emergency preparedness for this, as well as all hazards that may potentially impact the citizens of Salem County. Therefore, we will continue to work with PSEG and the State of New Jersey Office of Emergency Management in their planning efforts for the ESP for the PSEG Site.

(856) 769-2900 (856) 769-3500 Fax (856) 769-3571
135 CEMETERY ROAD • WOODSTOWN, NEW JERSEY 08098-9455

Salem County Certification Letter

It is our understanding that the specific nature of arrangements in support of emergency preparedness for operation of any new plant will be clearly established in a properly executed and binding Memorandum of Understanding that will be included in the emergency plan, if and when, PSEG proceeds with construction and operation of a new plant.

Respectfully,

Jeffery Pompper
Emergency Management Coordinator
Salem County Department of Emergency Services

2

OFFICE OF EMERGENCY MANAGEMENT
COUNTY OF CUMBERLAND
637 BRIDGETON AVENUE
BRIDGETON, NEW JERSEY 08302

December 17, 2009

James Mallon
Public Service Enterprise Group Power, LLC
PO Box 236
M/C ND7
Hancocks Bridge, NJ 08038

PSEG SITE EARLY SITE PERMIT APPLICATION
EMERGENCY PLAN AND EVACUATION TIME ESTIMATE

Dear Mr. Mallon:

The Cumberland County Office of Emergency Management has received a copy of the Early Site Permit Emergency Plan and the final updated Evacuation Time Estimate study to support the Early Site Permit License Application for up to two (2) proposed new generating units adjacent to Salem and Hope Creek nuclear generating stations (hereafter collectively referred to as the "PSEG Site"). The Office of Emergency Management believes the proposed emergency plan is practicable. The Office of Emergency Management has also reviewed the updated Evacuation Time Estimate and concurs with the information in the final report.

It is our understanding that the Early Site Permit License Application is being developed in accordance with 10 CFR Part 52 and will be submitted to the Nuclear Regulatory Commission during the second quarter of 2010. Emergency planning provisions of 10 CFR §. 52 and the application process require PSEG to obtain certifications (assurances) from local and state governmental agencies with emergency planning responsibilities that the agency will participate in emergency planning and support emergency response to any new plant, if constructed. The Cumberland County Office of Emergency Management provides the following assurances:

- The proposed emergency plan is practicable;
- The Cumberland County Office of Emergency Management will fully participate in any further development of the plan, and required field demonstrations for this Emergency Plan;
- The Cumberland County Office of Emergency Management is committed to executing our responsibilities under the plans in the event of an emergency.

Over the years, the Cumberland County Office of Emergency Management has maintained a successful working partnership with PSEG in support of the existing Salem and Hope Creek nuclear generating stations. It is our commitment to support emergency preparedness for this, as well as hazards that may potentially impact the citizens of Cumberland County. Therefore, we will continue to work with PSEG and the State of New Jersey Office of Emergency Management in their planning efforts for the ESP for the PSEG Site.

It is our understanding that the specific nature of arrangements in support of emergency preparedness for operation of any new plant will be clearly established in a properly executed and binding Memorandum of Understanding that will be included in the emergency plan, if and when, PSEG proceeds with construction and operation of a new plant.

Respectfully,

Joseph C. Sever
Coordinator
Cumberland County Office of Emergency Management

LOWER ALLOWAYS CREEK TOWNSHIP
OFFICE OF THE MAYOR
PO BOX 157
501 LOCUST ISLAND ROAD
HANCOCK'S BRIDGE, NEW JERSEY 08038
(856) 935-1549 ext #624 (856) 935-7666 Fax
lactwpclerk@yahoo.com

James Mallon
Public Service Enterprise Group Power, LLC
PO Box 236
M/C ND7
Hancocks Bridge, NJ 08038

RE: PSEG SITE EARLY SITE PERMIT APPLICATION
EMERGENCY PLAN AND EVACUATION TIME ESTIMATE

Dear Mr. Mallon,

The Lower Alloways Creek Township Emergency Management Office has received a copy of the Early Site Permit Emergency Plan and the final updated Evacuation Time Estimate study to support the Early Site Permit License Application for up to two (2) proposed new generating units adjacent to Salem and Hope Creek nuclear generating stations (hereafter collectively referred to as the "PSEG Site"). Lower Alloways Creek Township Emergency Management believes the proposed emergency plan is practicable. Lower Alloways Creek Township Emergency Management has also reviewed the updated Evacuation Time Estimate and concurs with the information in the final report.

It is our understanding that the Early Site Permit License Application is being developed in accordance with 10 CFR Part 52 and will be submitted to the Nuclear Regulatory Commission during the second quarter of 2010. Emergency planning provisions of 10 CFR § 52 and the application process require PSEG to obtain certifications (assurances) from local and state governmental agencies with emergency planning responsibilities that the agency will participate in emergency planning and support emergency response to any new plant, if constructed. Lower Alloways Creek Township Emergency Management provides the following assurances:

- The proposed emergency plan is practicable;
- The Lower Alloways Creek Township Emergency Management will fully participate in any further development of the plan, and required field demonstrations for this Emergency Plan;
- The Lower Alloways Creek Township Emergency Management is committed to executing our responsibilities under the plans in the event of an emergency.

Over the years, Lower Alloways Creek Township Emergency Management has maintained a successful working partnership with PSEG in support of the existing Salem and Hope Creek nuclear generating stations. It is our commitment to support emergency preparedness for this, as well as all hazards that may potentially impact the citizens of Lower Alloways Creek Township. Therefore, we will continue to work with PSEG and the State of New Jersey Office of Emergency Management in their planning efforts for the ESP for the PSEG Site.

It is our understanding that the specific nature of arrangements in support of emergency preparedness for operation of any new plant will be clearly established in a properly executed and binding Memorandum of Understanding that will be included in the emergency plan, if and when, PSEG proceeds with construction and operation of a new plant.

Respectfully,

Ellen B. Pompper

Ellen B. Pompper
Mayor of Lower Alloways Creek Township

DEMA

DELAWARE EMERGENCY MANAGEMENT AGENCY

Partners for Protection and Response

December 10, 2009

James Mallon
Public Service Enterprise Group Power, LLC
PO Box 236
M/C ND7
Hancocks Bridge, NJ 08038

PSEG SITE EARLY SITE PERMIT APPLICATION
EMERGENCY PLAN AND EVACUATION TIME ESTIMATE

Dear Mr. Mallon:

The Delaware Emergency Management Agency (DEMA) has received a copy of the Early Site Permit Emergency Plan and the final updated Evacuation Time Estimate study to support the Early Site Permit License Application for up to two (2) proposed new generating units adjacent to Salem and Hope Creek Nuclear Generating Stations (hereafter collectively referred to as the "PSEG Site"). DEMA believes the proposed emergency plan is practicable. DEMA has also reviewed the updated Evacuation Time Estimate and concurs with the information in the final report.

It is our understanding that the Early Site Permit License Application is being developed in accordance with 10 CFR Part 52 and will be submitted to the Nuclear Regulatory Commission during the second quarter of 2010. Emergency planning provisions of 10 CFR § 52 and the application process require PSEG to obtain certifications (assurances) from local and state governmental agencies with emergency planning responsibilities that the agency will participate in emergency planning and support emergency response to any new plant, if constructed. DEMA provides the following assurances:

- The proposed emergency plan is practicable;
- DEMA will fully participate in any further development of the plan, and required field demonstrations for this Emergency Plan;
- DEMA is committed to executing our responsibilities under the plans in the event of an emergency.

Over the years, DEMA has maintained a successful working partnership with PSEG in support of the existing Salem and Hope Creek Nuclear Generating Stations. It is our commitment to support emergency preparedness for this, as well as all hazards that

State of Delaware, Department of Safety and Homeland Security

165 Brick Store Landing Road • Smyrna, DE • 19977
302 • 659 • DEMA (3362) / 877 • SAY • DEMA (877-729-3362) (In-State Only)
Fax: 302 • 659 • 6855 http://dema.delaware.gov

may potentially impact the citizens of the State of Delaware. Therefore, we will continue to work with PSEG in their planning efforts for the ESP for the PSEG Site.

It is our understanding that the specific nature of arrangements in support of emergency preparedness for operation of any new plant will be clearly established in a properly executed and binding Memorandum of Understanding that will be included in the emergency plan, if and when, PSEG proceeds with construction and operation of a new plant.

Respectfully,

James E. Turner III 12/9/09
Director
Delaware Emergency Management Agency

Christopher A. Coons
County Executive

Dave Carpenter, Jr.
Coordinator of Emergency Planning

NEW CASTLE COUNTY DEPARTMENT OF PUBLIC SAFETY
OFFICE OF EMERGENCY MANAGEMENT

December 10, 2009

James Mallon
Public Service Enterprise Group Power, LLC
PO Box 236
M/C ND7
Hancocks Bridge, NJ 08038

PSEG SITE EARLY SITE PERMIT APPLICATION
EMERGENCY PLAN AND EVACUATION TIME ESTIMATE

Dear Mr. Mallon:

The New Castle County Office of Emergency Management has received a copy of the Early Site Permit Emergency Plan and the final updated Evacuation Time Estimate study to support the Early Site Permit License Application for up to two (2) proposed new generating units adjacent to Salem and Hope Creek nuclear generating stations (hereafter collectively referred to as the "PSEG Site"). The Office of Emergency Management has also reviewed the updated Evacuation Time Estimate and concurs with the information in the final report, although we believe some data has been minimized.

It is our understanding that the Early Site Permit License Application is being developed in accordance with 10 CFR Part 52 and will be submitted to the Nuclear Regulatory Commission during the second quarter of 2010. Emergency planning provisions of 10 CFR § 52 and the application process require PSEG to obtain certifications (assurances) from local and state governmental agencies with emergency planning responsibilities that the agency will participate in emergency planning and support emergency response to any new plant, if constructed. The New Castle County Office of Emergency Management provides the following assurances:

- The proposed emergency plan is practicable;
- The New Castle County of Emergency Management will fully participate in any further development of the plan, and required field demonstrations for this Emergency Plan;
- The New Castle County of Emergency Management is committed to executing our responsibilities under the plans in the event of an emergency, as per our standing MOU with PSEG and DEMA, or as revised in the future, and in accordance with available funding.

Over the years, the New Castle County Office of Emergency Management has maintained a successful working partnership with PSEG in support of the existing Salem and Hope Creek nuclear generating stations. It is our commitment to support emergency preparedness for this, as well as all hazards that may potentially impact the citizens of New Castle County. Therefore, we will continue to work with PSEG and the State of Delaware Emergency Management Agency in their planning efforts for the ESP for the PSEG Site.

It is our understanding that the specific nature of arrangements in support of emergency preparedness for operation of any new plant will be clearly established in a properly executed and binding Memorandum of Understanding that will be included in the emergency plan, if and when, PSEG proceeds with construction and operation of a new plant.

Respectfully,

D. Carpenter Jr. CEM®

Dave Carpenter, Jr., CEM®
Coordinator of Emergency Planning
New Castle County Office of Emergency Management

cc: A/Director of Public Safety and CAO Rick S. Gregory
DE REP file/Renewal License documents

Kent County

Department of Public Safety

Chief Colin T. Faulkner
Director
Department of Public Safety

Dean R. Dobbert, MD, FACEP
Medical Director
Division of Emerg. Med. Services

911 Public Safety Blvd.
Dover, DE 19901
(302) 735-2200
Fax (302) 735-2186

John Willson, Deputy
Asst. Dir. of Public Safety
Division of Emerg. Med. Services

William R. Dempsey, Jr.
Asst. Dir. of Public Safety
Division of Emerg. Comm.

J. Allen Metheny, Sr.
Asst. Dir. of Public Safety
Division of Emerg. Mgmt.

December 2, 2009

James Mallon
Public Service Enterprise Group Power, LLC
P.O. Box 236
M/C ND7
Hancocks Bridge, NJ 08038

**PSEG SITE EARLY SITE PERMIT APPLICATION
EMERGENCY PLAN AND EVACUATION TIME ESTIMATE**

Dear Mr. Mallon:

Kent County Emergency Management has received a copy of the Early Site Permit Emergency Plan and the final updated Evacuation Time Estimate study to support the Early Site Permit License Application for up to two (2) proposed new generating units adjacent to Salem and Hope Creek nuclear generating stations (hereafter collectively referred to as the "PSEG Site"). Kent County Emergency Management believes the proposed emergency plan is practicable. Kent County Emergency Management has also reviewed the updated Evacuation Time Estimate and concurs with the information in the final report.

It is our understanding that the Early Site Permit License Application is being developed in accordance with 10 CFR Part 52 and will be submitted to the Nuclear Regulatory Commission during the second quarter of 2010. Emergency planning provisions of 10 CFR § 52 and the application process require PSEG to obtain certifications (assurances) from local and state governmental agencies with emergency planning responsibilities that the agency will participate in emergency planning and support emergency response to any new plant, if constructed. Kent County Emergency Management provides the following assurances:

- The proposed emergency plan is practicable;
- Kent County Emergency Management will fully participate in any further development of the plan, and required field demonstrations for this Emergency Plan;
- Kent County Emergency Management is committed to executing our responsibilities under the plans in event of an emergency.

"Serving Kent County With Pride"

Over the years, Kent County Emergency Management has maintained a successful working partnership with PSEG in support of the existing Salem and Hope Creek nuclear generating stations. It is our commitment to support emergency preparedness for this, as well as all hazards that may potentially impact the citizens of Kent County. Therefore, we will continue to work with PSEG and the State of Delaware Emergency Management Agency in their planning efforts for the ESP of the PSEG Site.

It is our understanding that the specific nature of arrangements in support of emergency preparedness for operation of any new plant will be clearly established in a properly executed and binding Memorandum of Understanding that will be included in the emergency plan, if and when, PSEG proceeds with construction and operation of a new plant.

Respectfully,

Chief Colin Faulkner
Director
Kent County Emergency Management

ATTACHMENT 3
MEMORANDA OF UNDERSTANDING

NOTE

This attachment contains Memoranda of Understanding from offsite support organizations that support Salem and Hope Creek Generation Stations. As PSEG moves forward with the new plant development, the Memoranda of Understanding will be revised, as necessary, to include information to support the new plant.

ATTACHMENT 3
MEMORANDA OF UNDERSTANDING

TABLE OF CONTENTS

ATTACHMENT 3
MEMORANDA OF UNDERSTANDING

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MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated January 5, 2003, between PSEG Nuclear, LLC, and the **Department of Commerce - National Weather Service**, regarding response to an accident at either Salem or Hope Creek Generating Stations has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

Gary S Szatkowski
Signature

04-11-2008
Date

GARY S SZATKOWSKI
Print Name

METEOROLOGIST IN CHARGE
Title

**2002
MEMORANDUM OF UNDERSTANDING
BETWEEN
THE DEPARTMENT OF COMMERCE - NATIONAL WEATHER SERVICE,
AND
PSEG NUCLEAR, LLC
FOR
RADIOLOGICAL EMERGENCY PREPAREDNESS**

I. PURPOSE

This Memorandum of Understanding (MOU) constitutes a mutually agreed upon understanding between the Department of Commerce - National Weather Service, and PSEG Nuclear, LLC (hereinafter referred to as PSEG Nuclear) setting forth the agreements, commitments, obligations, and conditions to provide radiological assistance in the event of an accident at the Hope Creek or Salem Generating Stations threatening public life or property.

II. MEMORANDUM OF UNDERSTANDING

It is understood that the National Weather Services (NWS) shall support and make available the following during any and all emergency drills, exercises, and/or actual emergencies at Artificial Island from the NWS office in Mt. Holly, New Jersey (PHI/Mt. Holly):

1. Detailed localized weather forecasts (2 hours to 3 days).

2. Philadelphia NWS hourly observations (including, but not limited to, wind direction, speed, and cloud cover).

3. "Special observations" taken during the previous hour.

4. Hourly observations from other NWS stations in the vicinity of the plant.

5. Radar reports of precipitation near Artificial Island.

6. Notification to Artificial Island Generating Stations of any and all special weather bulletins and/or conditions pertaining to the Artificial Island area including, but not limited to, hurricanes, winter storms, thunderstorms, and tornados.

7. Requests for such services from Philadelphia/Mt. Holly New Jersey NWS station shall be from PSEG personnel in the Control Room, Technical Support Center, or the Emergency Operations Facility.

8. This information shall be provided to PSEG on a (twenty-four) 24 hour-a-day basis by contacting the Weather Specialist on duty at (609) 261-6604.

9. This MOU supersedes and voids any and all previous Memoranda of Understanding between the Department of Commerce – National Weather Service and PSEG Nuclear for the purpose of providing radiological assistance to the public in the event of an accident threatening public life or property.

10. Either party to this MOU may terminate upon sixty (60) days advance written notice to the other party.

11. This MOU shall be effective immediately upon the signing of all the parties hereunto.

IN WITNESS WHEREOF, the parties hereunto execute this Memorandum of Understanding this ______ day of ____________ 2002:

Gary S. Szatkowski — 12/26/02
Gary Szatkowski
MIC NWSFO PHI

DATE

H W Keiser — 1/5/03
Harold W. Keiser
President and Chief Nuclear Officer
PSEG Nuclear, LLC

DATE

MEMORANDUM OF UNDERSTANDING - 2008

The following agreements have been reviewed:

The agreement between the PSEG Nuclear, LLC, **New Jersey State Police,** and the **New Jersey Department of Environmental Protection** dated October 9, 1990;

Clarification to Section II.C this section is revised to reflect the following:

For events classified in accordance with Salem or Hope Creek Emergency Classification Guides related to the health and safety of the public or on-site personnel, or protection of the environment, for which a news release is planned or notification to other government agencies has been or will be made which are not declared as an Emergency Class (as specified in Paragraph A above) notification will be provided within four (4) hours of the declaration of the event or prior to the issuance of a news release.

Reason for clarification: Previous reference to 10 CFR numbers has been changed.

The agreement between **Maryland Emergency Management Agency** and the State of New Jersey Office of Emergency Management dated June 16, 1990;

The agreement between the **Commonwealth of Pennsylvania** and the State of New Jersey dated April 10, 1990.

The above agreements are currently satisfactory and subsequently, remain in force.

Signature — Date: 4-25-08

RICHARD SENSI
Print Name

LT. Unit Supervisor /LERP UNIT
Title

MEMORANDUM OF UNDERSTANDING
BETWEEN
NEW JERSEY DIVISION OF STATE POLICE
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
AND
PUBLICE SERVICE ELECTRIC & GAS COMPANY
TO PROVIDE FOR THE IMPLEMENTATION
OF THE STATE OF NEW JERSEY RADIOLOGICAL RESPONSE PLAN
FOR NUCLEAR POWER PLANT

I. PURPOSE:

The purpose of this Memorandum of Understanding is to establish conditions upon which Public Service Electric & Gas Company (the Utility) will notify the State Government of New Jersey (Commissioner of the N.J. Department of Environmental Protection and Superintendent of the N.J. Division of State Police) in the event of an accident which has the potential for radioactive exposure or contamination of members of the public of their property. Proper and timely flow of information throughout the duration of any such accident is essential in order for the Government of the State of New Jersey to discharge its obligation to maintain public health and safety by implementing protective actions as described in the State of New Jersey Radiological Emergency Response Plan for Nuclear Power Plants (NJRERP) or its successors.

II. DEFINITIONS:

To minimize the possibility of communications breakdown, the definitions listed in the State of New Jersey Radiological Emergency Response Plan for Nuclear Power Plants (NJRERP) shall apply throughout this Memorandum of Understanding.

III. AGREEMENT:

The following terms shall be binding upon the State and the Utility:

A. The Utility and State shall cooperate at all times in developing, reviewing, and modifying protective action plans for accidents which endanger the public.

B. The State and Utility shall join in at least one annual exercise.

C. ~~The Utility shall provide and maintain a Nuclear~~ Emergency Response Telephone System which is monitored 24 hours a day. This telephone is located in the Shift Supervisor's Office, the onsite Technical Support Center and the offsite Emergency Operations Facility, which will have the sole purpose of maintaining communications with State Government in the event of a suspected or confirmed accident endangering the public. The Division of State Police, in the Communications Bureau, will provide an emergency telephone which is monitored 24 hours a day. The State will provide a telephone with an unlisted number in the office of the New Jersey State Department of Environmental Protection, Bureau of Nuclear Engineering (BNE). These telephone numbers will be exchanged by the State and the Utility. Both the State and the Utility further agree not to divulge the unlisted numbers to any other party.

D. The Utility shall install and maintain, at each reactor site; wind speed and direction Indicators to provide information for implementing protective actions.

E. The Utility shall notify the State as soon as possible but no later than fifteen minutes after the declaration of any incident defined in their utility's emergency plan as an unusual event, alert, site area Emergency or general emergency. In addition to the above conditions, the Utility will notify the State of plant conditions which will generate public, government, or media concern about plant safety. At minimum, the State will receive notification as stipulated in the appended Statement of Agreement and Conditions of Notification - Artificial Island Generating Stations. The content of this section shall not be construed to imply regulatory authority supplanting or in addition to the Nuclear Regulatory Commission's (NPC) regulatory authority.

F. The Utility will provide the State with information needed to protect the public as soon as it is available.

G. The Utility shall furnish the State with two (2) copies of its facility Emergency Plan and amendments thereto as they are issued. The State shall furnish the Utility with (2) copies of its NJRERP and amendments thereto as they are issued.

H. The Utility has the right and, in a case in which the Bureau of Nuclear Engineering personnel are unavailable, the duty to recommend protective action to the State of New Jersey.

I. The notification shall be made by the Utility, by telephone to New Jersey State Police by a format agreed to by both the Utility and the State. Technical information essential for evaluation and management of the accident shall be given to designated NJ DEP Bureau of Nuclear Engineering personnel.

J. An accident shall be deemed to have terminated when, in the judgement of the State, there is no longer need for consideration of further protective actions as defined in the NJRERP.

K. Throughout the emergency, the Utility will work closely with and coordinate all media news releases relating to the status of the plant with the Governor's Office, and the State Police, the State Department of Environmental Protection, and the Nuclear Regulatory Commission. The Utility will bear the responsibility for news releases relating to the status of the plant until the Governor declares a formal State of Emergency. With the declaration of formal State of Emergency, all news releases will be made jointly by the Governor of his representative and the Utility after agreement is reached on content. All news releases issued by the Utility during an emergency, prior to a declaration of a formal state of emergency will be immediately hand delivered to State representatives at the Emergency News Center and will be passed by telefacsimile to the State EOC and the BNE headquarters. All State releases will be hand delivered to PSE&G representative at the Emergency News Center and passed by telefacsimile to the Public Information Department at Artificial Island.

L. This Memorandum of Understanding supersedes and voids all previous Memoranda of Understanding between the State Department of Environmental Protection, the Division of State Police and the Utility for the purpose of providing protection to the public in the event of accident threatening public life or property.

M. This agreement shall be effective immediately upon execution of the parties hereto.

IN WITNESS WHEREOF the parties have hereunto executed this Statement of Agreement.

Judith A. Yaskin
Commissioner
New Jersey State Department of Environmental Protection

Date 10/9/90

Colonel Justin J. Dintino
Superintendent
New Jersey State Police

Date 7/12/90

Steven E. Miltenberger
Vice President - Nuclear
Public Service Electric & Gas Company

Date 9-12-90

STATEMENT OF AGREEMENT

AND

CONDITIONS OF NOTIFICATION

ARTIFICIAL ISLAND GENERATING STATIONS

Public Service Electric and Gas Company (hereafter called PSE&G) will provide notification to the State of New Jersey, Division of State Police, Office of Emergency Management (hereafter called OEM) and the State of New Jersey, Department of Environmental Protection, Bureau of Nuclear Engineering (hereafter called BNE) in accordance with the conditions discussed below:

I. NOTIFICATION METHODS/LOCATION

All notification calls will be made to the Communications Center of the New Jersey State Police in West Trenton, New Jersey. The primary means of communications will be the Artificial Island Nuclear Emergency Telecommunications System to the extension assigned to the Communications Bureau/OEM Operations Room. Normal commercial communications will be utilized as the secondary means of communications. The OEM and BNE will coordinate internal procedures for ensuring that the appropriate cognizant officials of the OEM and BNE are subsequently notified by the New Jersey State Police Communications Bureau.

II. NOTIFICATIONS TO BE PERFORMED

A. Notification of any event declared as one of the Emergency Classes specified in either the Salem Generating Station or Hope Creek Generating Station Emergency Plans (or Artificial Island Emergency Plan when it supersedes existing plans) will be provided within fifteen (15) minutes of the declaration of that event.

B. With the exception of paragraph II. C below, a notification of any event declared in accordance with the guidelines contained in Title 10, Code of Federal Regulation (CFR), Chapter 50, Paragraph 50.72 (b), "Non-emergency events" will be provided within the first working day following the declaration of the event.

C. For events classified in accordance with Title 10 CFR, Chapter 50, Paragraph 50.72 (b) (2) (vi), which are not declared as an Emergency Class (as specified in Paragraph II A above) notification will be provided within four (4) hours of the declaration of the event, or prior to the issuance of a news release.

III. CLARIFICATION OF CONDITIONS OF NOTIFICATIONS

A. It shall be understood that the notification requirement for any one event will be fulfilled if that notification is performed in accordance with II A above.

B. Follow-up notifications and communications for those events handled in accordance with II A above shall be conducted as specified in the appropriate emergency plan and emergency plan procedures.

C. Follow-up information for any event notification made in accordance with Paragraphs II B or II C above shall be requested through either the Manager - Licensing & Regulation, Nuclear Department, PSE&G, or the Emergency Preparedness Manager, Nuclear Department, PSE&G.

D. "Next Working Day", will be the next regularly schedule PSE&G work day (8:00 a.m. - 4:30 p.m.) immediately following the event. This specifically excludes weekends and PSEG company holidays.

E. A copy of each Licensee Event Report (or supplementary Licensee Event Report "associated with the event notification") will be provided to the BNE for all follow-up activities reported to the NRC. All substantive LER questions on behalf of the BNE shall be directed in writing to the Manager - Licensing & Regulation, Nuclear Department, PSE&G.

V. FINAL IMPLEMENTATION

This agreement shall be effective on the date of the last signature on the document.

IN WITNESS WHEREOF the parties have hereunto executed this Memorandum of Understanding.

Judith A. Yaskin
Commissioner
New Jersey State Department
of Environmental Protection

Date: 12/9/98

Colonel Justin J. Dintino
Superintendent
New Jersey State Police

Date:

Steven E. Miltenberger
Vice President-Nuclear
Public Service Electric
& Gas Company

Date: 9-12-90

MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated September 12, 2005, between Salem-Hope Creek Generating Stations, and the **State of Delaware Department of Safety and Homeland Security Delaware Emergency Management Agency (DEMA)**, regarding response to an accident at either Salem or Hope Creek Generating Stations has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

Signature: [signature]

Date: 5/9/08

James E Turner, III
Print Name

Director, DEMA
Title

LETTER OF AGREEMENT

BETWEEN

PSEG NUCLEAR

AND

STATE OF DELAWARE
DEPARTMENT OF SAFETY AND HOMELAND SECURITY
DELAWARE EMERGENCY MANAGEMENT AGENCY (DEMA)

Our agency has reviewed the Memorandum of Understanding contained in the Agreements Section of the State of Delaware Radiological Emergency Plan.

We concur that the MOU is still effective and that our agency shall adhere to the principles set forth in the MOU.

Senior Vice President PSEG Nuclear	5/1/08 Date	Director Delaware Emergency Management Agency, of the Department of Safety and Homeland Security	4/14/08 Date

**MEMORANDUM OF UNDERSTANDING
BETWEEN
SALEM-HOPE CREEK GENERATING STATIONS
AND
STATE OF DELAWARE
DEPARTMENT OF SAFETY AND HOMELAND SECURITY
DELAWARE EMERGENCY MANAGEMENT AGENCY (DEMA)**

TO PROVIDE FOR THE IMPLEMENTATION OF PROTECTIVE ACTIONS ON BEHALF OF THE GENERAL PUBLIC IN THE EVENT OF AN ACCIDENT

WHEREAS, SALEM-HOPE CREEK GENERATING STATIONS (herein referred to as SHCGS) is authorized to operate nuclear facilities in Lower Alloways Creek Township, New Jersey (herein referred to as SHCGS operated nuclear generating facilities) under licenses granted by the U.S. Nuclear Regulatory Commission (NRC); and

WHEREAS, the NRC requires that the level of onsite and offsite emergency preparedness provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency; and

WHEREAS, a portion of the State of Delaware is included in the emergency planning zone for SHCGS operated nuclear generating facilities; and

WHEREAS, the Federal Emergency Management Agency (FEMA) must make findings and determinations as to whether the State of Delaware Radiological Emergency Plan is adequate and capable of being implemented; and

WHEREAS, the State of Delaware has requested funding pursuant to 20 Del. C. § 3108 for activities and equipment associated with its development and maintenance of a Radiological Emergency Plan which satisfies NRC and FEMA rules, regulations and requirements for radiological emergency preparedness as they pertain to SHCGS operated nuclear generating facilities;

THEREFORE, the parties hereto in consideration of the COVENANTS set forth herein agree as follows:

1. SHCGS agrees, pursuant to 20 Del. C. § 3108 in accordance with the provisions of this Memorandum of Understanding, to fund activities and equipment associated with the development and maintenance of a Radiological Emergency Plan for the State of Delaware in support of the SHCGS operated nuclear generating facilities;

2. In consideration of this funding, the Director of the Delaware Emergency Management Agency (DEMA) (herein referred to as DEMA Director), Department of Safety and Homeland Security, State of Delaware, pursuant to 20 Del. C. § 3108 shall be responsible for maintaining in full effect at all times relevant to this agreement the provisions of the Delaware Radiological Emergency Plan and supporting documents for SHCGS operated nuclear generating facilities;

3. For the purpose of this Memorandum of Understanding, the fiscal year shall be from July 1st to June 30th. Sixty (60) days prior to the beginning of each fiscal year, the DEMA Director or designee shall submit a budget to SHCGS for activities and equipment associated with the Delaware Radiological Emergency Plan for the SHCGS operated nuclear generating facilities which are not otherwise funded through appropriations available to the Delaware Emergency Management Agency. Under no circumstances will SHCGS provide funding for activities or equipment for which funding from other sources is available;

4. Thirty (30) days prior to the beginning of a fiscal year, SHCGS shall notify the DEMA Director or designee of the acceptability and approval of those budget items for which SHCGS will provide funding;

5. Funds shall be provided by SHCGS for those accepted and approved budget items;

6. The DEMA Director or designee shall be responsible for insuring that funding provided is used exclusively for SHCGS approved budget items;

7. The DEMA Director or designee shall maintain a detailed account of all expenditures of SHCGS provided funds in accordance with generally accepted accounting principles;

8. SHCGS reserves the right to audit and/or require accounting for all goods and services for which it has provided funding;

9. The DEMA Director or designee shall supply an accounting of actual, as opposed to estimated, expenses for which SHCGS provided funding on a quarterly basis to SHCGS President and Chief Nuclear Officer;

10. Approval of reallocation of funds will reside with DEMA and will be annotated in the quarterly DEMA budget report provided to SHCGS;

11. At the conclusion of each fiscal year, unexpended budget funds shall be reported to SHCGS. The disposition of these funds will be at the discretion of SHCGS;

12. Funding provided under this Memorandum of Understanding shall be for the exclusive use of developing and maintaining the Delaware Radiological Emergency Plan for SHCGS operated nuclear facilities;

13. This agreement shall be effective upon signing by both parties but may be terminated by either party upon sixty (60) days of written notice to the other party. This written notice shall be sent by registered letter to:

Senior Vice President &
Chief Nuclear Officer
PSEG Nuclear, LLC
P.O. Box 236
Hancock's Bridge, NJ 08038

Secretary
Department of Safety and Homeland Security
P.O. Box 818
Dover, DE 19903

I. PURPOSE

The purpose of this Memorandum of Understanding as set forth in 20 Del. C. § 3108 is to establish conditions upon which SHCGS will notify the State of Delaware Department of Safety and Homeland Security, Delaware Emergency Management Agency, of a radiological public safety accident, as hereinafter defined, or occurrences and conditions potentially leading to a radiological public safety accident requiring consideration being given to implementation of protective actions at any level. Proper and timely flow of information throughout the duration of any such accident, occurrences or conditions is essential in order for the Government of the State of Delaware to discharge its obligation to maintain public health and safety by implementing the State of Delaware Radiological Emergency Plan (REP).

II. DEFINITIONS

To minimize the possibility of communications breakdown, the following definitions shall apply throughout this Memorandum of Understanding:

A. Salem-Hope Creek Generating Stations - The collective name identifying the licensee site for Salem and Hope Creek Generating Stations.

B. Authority - The Director of the State of Delaware Department of Safety and Homeland Security, Delaware Emergency Management Agency is charged with the obligation, authority and responsibility, pursuant to the provisions of Delaware Code, Title 20, Chapter 31, annotated as amended, of instituting appropriate public protective actions in the event of an emergency.

C. Controlled Release - Any release of radioactive materials from Salem-Hope Creek Generating Stations which is planned and controlled by the stations.

D. DEMA - State of Delaware Department of Safety and Homeland Security, Delaware Emergency Management Agency.

E. REP - Delaware Radiological Emergency Plan. A broad, flexible plan designed to maintain public confidence and protect the population in the event of an emergency which could affect the citizens of the State of Delaware.

F. Emergency Action Levels

Unusual Event - Unusual Events, as used for emergency planning purposes, characterize off-normal plant conditions that may not in themselves be particularly significant from an emergency preparedness standpoint, but could reasonably have the potential to increase in significance if proper action is not taken or if circumstances beyond the control of the operating staff render the situation more serious from a safety standpoint. No uncontrolled releases of radioactive materials requiring offsite response or monitoring are expected unless further degradation of safety systems occur. For all of these situations the State will be notified as soon as the event has been declared (within fifteen [15] minutes).

Alert - The Alert Action level is the lowest level where some necessity for emergency planning offsite response may be anticipated. Even so, from the standpoint of Federal, State or Local authority such notification is advisory in nature for Alert level condition. This class includes physical occurrences within the plant which may require station staff emergency organization response. The initial assessment leading to this class should indicate that it is unlikely that an offsite hazard will be created. This class is associated with judgment that the emergency situation can be corrected and controlled by the plant staff. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels. For all of these situations, the State will be notified as soon as the event has been declared (within fifteen [15] minutes). Furthermore, the onsite Technical Support Center will be activated and the near-site Emergency Operations Facility may be activated.

Site Area Emergency - The Site Area Emergency action level reflects conditions where there is a clear potential for significant releases, such releases are likely, or they are occurring, but in all cases where a core meltdown situation is not indicated based on current information. Any releases are not expected to exceed EPA Protective Action Guideline exposure levels except near site boundary. For all of these situations, the State will be notified as soon as an event has been declared (within fifteen [15] minutes). Furthermore, the onsite Technical Support Center, and the near-site Emergency Operations Facility will be activated.

General Emergency - The General Emergency action level reflects accident situations involving actual imminent substantial core degradation or melting with the potential for loss of contaminant integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area. For all of these situations, DEMA and/or the Delaware State Police Headquarters Communication Center will be notified as soon as an event has been declared (within fifteen [15] minutes). Furthermore, the onsite Technical Support Center, and the near-site Emergency Operations Facility will be activated. The recommendation for any offsite action involving the public, sheltering out to a fixed distance, or evacuation out to a fixed distance will be communicated to the State at the earliest possible time following the declaration of a General Emergency.

G. Hope Creek Generating Station - A nuclear power reactor owned in part and operated by SHCGS situated within the State of New Jersey, and located within ten miles of the State of Delaware.

H. Nuclear Emergency Telephone System (NETS) - An installed telecommunications branch exchange owned and operated by the Licensee for the purpose of emergency communications with the State, county and local governments and the Licensee's emergency response facilities.

I. Offsite - All areas outside the nuclear generating station's security perimeters.

J. Onsite - The nuclear generating stations and all property within the security perimeter.

K. Plume Exposure Emergency Planning Zone (Plume EPZ) - The area located within approximately ten miles of the Salem-Hope Creek Generating Stations.

L. Protective Action Guides - A sequence of graded projected absorbed doses to individuals in the general population at which various protective actions should be considered following a radiological incident.

M. Radiological Public Safety Accident - An incident which may include unwanted or unplanned movement of the fission product inventory leading to the discharge of fission products beyond facility boundaries above prescribed normal allowable limits as set forth in the Facility Technical Specifications.

N. Salem Generating Station - A nuclear power reactor or reactors owned, in part, and operated by SHCGS situated within the State of New Jersey, and located within ten miles of the State of Delaware.

O. Sector - 22 1/2 degree division of the Emergency Planning Zone.

P. State - State of Delaware

Q. Unplanned Releases - Any release of radioactive material which is not a controlled release.

R. Licensee – SHCGS.

III. AGREEMENT

The following terms shall be binding upon the State and the Licensee:

A. The Licensee and the State shall cooperate at all times in developing, reviewing, modifying and exercising protective action plans for radiological public safety accidents.

B. The State and Licensee shall join in at least one annual coordinated exercise. The Licensee shall be responsible for coordinating such an annual exercise.

C. The Licensee and the State shall annually review the REP. Each party reserves the right to suggest change at any time.

D. The Licensee shall at all times provide and maintain dedicated telephones located in the shift managers' office, the onsite Technical Support Centers and the near-site Emergency Operations Facility. The dedicated telephones, an emergency telephone circuit which is part of NETS, shall be for the purpose of maintaining communication with the State in the event of a confirmed or suspected radiological public safety accident. The Licensee shall henceforth provide similar telephones, to be located in the offices of DEMA, New Castle County 911 Center, Kent County 911 Center, the Emergency Alert System ("EAS") Gateway Section and the Delaware State Police
Headquarters Communications Center. The dedicated telephones will be the primary means of communications.

E. Communications verification will be scheduled and initiated by the Licensee. These verifications will occur at least once each calendar month.

F. The Licensee shall maintain wind direction and wind speed instruments at Salem-Hope Creek Generating Stations to provide meteorological data during a radiological public safety accident.

G. Throughout the entire duration of a radiological public safety accident, the DEMA Director and/or designees shall have access to the near-site Emergency Operations Facility upon presentation of an authorized Delaware Emergency Worker Card.

H. The Licensee shall furnish the State with a copy of its Facility Emergency Plan and amendments thereto as they are issued. DEMA shall furnish the Licensee with three (3) copies of its REP and amendments thereto as they are issued. The Licensee shall furnish a copy of Event Classification Guides for Salem and Hope Creek and the Emergency Plan Attachments.

I. In the event of a radiological public safety accident, the Licensee shall have the right and obligation to recommend protective actions.

J. It is the Licensee's duty and obligation to notify the State (within fifteen [15] minutes), upon declaration of an event which is classified as an Unusual Event, Alert, Site Area Emergency or General Emergency.

K. Initial notification shall be made by dedicated telephone to the Delaware State Police Headquarters Communications Center. Delaware State Police will notify DEMA.

L. Licensee will characterize the plume using various techniques. This may include techniques such as identifying plume centerline, plume edges, vegetation and soil sampling. State of Delaware will monitor and sample plume at leading edge. This does not preclude Delaware teams from traversing the plume. All attempts will be made to maintain As Low As Reasonably Achievable ("ALARA") radiological exposure for emergency workers. It is at the discretion of the DEMA Director whether or not to deploy sampling teams dependent on specific circumstances such as: evacuated area, road conditions, etc.

M. The Licensee and the State shall cooperate at all times in the exchange of data relating to the analysis of water, milk, finfish/shellfish, vegetation and soil samples obtained from the ingestion pathway.

N. Message forms for the initial and follow-up contact shall be agreed to by the State and Licensee. These message forms shall be used for all required notifications.

O. The Licensee shall provide a person to coordinate Licensee information with the State for Alert, Site Area Emergency and General Emergency events. This person shall be available to the State and shall be located at the near-site Emergency Operations Facility or the State Emergency Operations Center (EOC), if requested by the DEMA Director, throughout the radiological public safety accident.

P. A radiological public safety accident shall be deemed to have terminated when, in the judgment of the State, there is no longer an immediate need for either consideration of further protective actions or surveillance related to protective actions.

Q. To maintain public confidence and to avoid public apprehension, information shall be released to the public as soon as possible in a coordinated manner. The State and the Licensee shall exert best efforts to affect such coordination. To ensure coordination, the Licensee shall provide for a location at or near Salem-Hope Creek Generating Stations where the State and Licensee media representatives may, if appropriate, jointly issue their information releases. This condition in no way abridges the right of the Licensee or State to release information to the public. The Licensee and the State agree to exert their best efforts to advise each other by telephone of any independent information release to the mass media prior to issuing such a release concerning a radiological public safety accident. In keeping with this delineation of authority and responsibility, each party further agrees to restrict public statements to those areas for which each party is responsible. The Licensee and State agree to hold cooperative annual meetings among personnel responsible for public contact.

R. The Licensee shall provide a controlled copy of Salem/ Hope Creek Generating Stations Dose Projection Programs for ongoing comparison of Delaware's Dose Projection Model.

S. The Licensee shall exert best efforts to incorporate into Facility Emergency Plan Implementing Procedures the requirements of this Memorandum of Understanding relating to Emergency Plan Exercises and review as referred to in Paragraphs B, C, and E; provision for establishing an emergency telephone and posting of initial communications message, as referred to in Paragraphs D and N.

T. The Licensee and State shall cooperate in developing a Station Status Check List which may be used to:

1) Evaluate severity of the accident;
2) Provide information as to the level of protective actions which may be needed.

U. The Licensee and State shall provide Emergency Plan Information for Salem /Hope Creek Generating Stations.

V. The Licensee shall provide the State with appropriate drill information.

W. The Licensee is responsible for the disposal of radiological waste related to an accident at Salem-Hope Creek Generating Stations, at a waste disposal facility site approved by the Nuclear Regulatory Commission (NRC) and the State in which the disposal site is located. Licensee is responsible for packaging and assuring the proper packaging of radiological waste material from decontamination operations, as a result of a radiological accident at Salem-Hope Creek Generating Stations, in accordance with the Federal procedures required for Low Specific Activity (LSA) waste as defined in Title 49, Code of Federal Regulations. The Licensee will arrange for transportation and disposal of LSA material.

X. It is expressly understood that the State, by entering into this Memorandum of Understanding, assumes no responsibility or liability relating to the operation of the Salem-Hope Creek Generating Stations and that the Licensee shall indemnify, defend and hold harmless the State from any claim, liabilities, loss or damage resulting from any action, causes of actions claims which shall be caused by or in any way result from or arise out of any act, omission or negligence of the Licensee or its agents or employees.

Y. The terms of this Memorandum of Understanding shall apply to the Salem-Hope Creek Generating Stations herein above defined.

Z. This agreement shall be effective immediately upon signature of parties hereto.

This Memorandum of Understanding supersedes and voids all previous Memorandums of Understanding between the Licensee and the State for the purpose of providing for the implementation of protective actions on behalf of the general public in the event of a radiological public safety accident.

IN WITNESS WHEREOF, the parties hereunto execute this Memorandum of Understanding.

16 a-6 05

Secretary
Department of Safety and Homeland Security
State of Delaware

Date

12 SEP05

Senior Vice President and Chief Nuclear Officer
PSEG Nuclear, LLC

Date

Salem/Hope Creek Generating Stations and Department of Safety and Homeland Security

Approved as to form only:
Attorney General State of Delaware

By: Patricia D. Murphy

06/17/05
Date

MEMORANDUM OF UNDERSTANDING - 2008

The following agreements have been reviewed:

The agreement between the PSEG Nuclear, LLC, **New Jersey State Police,** and the **New Jersey Department of Environmental Protection** dated October 9, 1990;

Clarification to Section II.C this section is revised to reflect the following:

For events classified in accordance with Salem or Hope Creek Emergency Classification Guides related to the health and safety of the public or on-site personnel, or protection of the environment, for which a news release is planned or notification to other government agencies has been or will be made which are not declared as an Emergency Class (as specified in Paragraph A above) notification will be provided within four (4) hours of the declaration of the event or prior to the issuance of a news release.

Reason for clarification: Previous reference to 10 CFR numbers has been changed.

The agreement between **Maryland Emergency Management Agency** and the State of New Jersey Office of Emergency Management dated June 16, 1990;

The agreement between the **Commonwealth of Pennsylvania** and the State of New Jersey dated April 10, 1990.

The above agreements are currently satisfactory and subsequently, remain in force.

[signature] 4-25-08

Signature Date

RICHARD SENSI

Print Name

LT. Unit Supervisor /LERP UNIT

Title

MEMORANDUM OF UNDERSTANDING

BETWEEN THE

MARYLAND EMERGENCY MANAGEMENT AGENCY

AND THE

STATE OF NEW JERSEY OFFICE OF EMERGENCY MANAGEMENT

I. Purpose

This Memorandum of Understanding (MOU) constitutes a mutually agreed upon understanding between the State of Maryland and the New Jersey Office of Emergency Management providing for coordinated State response to nuclear accidents at the Hope Creek and Salem Generating Stations.

II. Memorandum of Understanding

It is understood that:

1. The State of Maryland has established its basic plan for emergency operations in the Maryland Emergency Operations Plan. Annex Q, the Radiological Emergency Plan, details emergency response to accidents at nuclear power facilities affecting the State.

2. The State of New Jersey Office of Emergency Management has established its basic plan for emergency operations in the State of New Jersey Emergency and Disaster Operations Plan. Attachment D, the Radiological Emergency Response Plan, details emergency response to accidents at nuclear power facilities in New Jersey.

3. The New Jersey Office of Emergency Management will provide prompt notification when a Site or General Emergency is declared at Hope Creek or Salem Generating Stations.

4. Continuous coordination, including timely updates on the status of an accident, between both States shall be accomplished in accordance with the respective emergency plans.

5. The New Jersey Office of Emergency Management shall review annually Annex Q and provide written suggested revisions to the Maryland Emergency Management Agency.

6. The Maryland Emergency Management Agency shall review annually the New Jersey Radiological Emergency Response Plan, Attachment D, and provide written suggested revisions to the New Jersey Office of Emergency Management.

7. The New Jersey Office of Emergency Management shall be placed on the distribution list for the State of Maryland Emergency Operations Plan, Annex Q, to include timely issuance of formal revisions.

8. The Maryland Emergency Management Agency shall be placed on the distribution list for the New Jersey Emergency and Disaster Operations Plan, Attachment D; and the Salem and Hope Creek Nuclear Generating Station Emergency Plans to include timely issuance of formal revisions.

9. The Maryland Emergency Management Agency and New Jersey Office of Emergency Management accept and shall adhere to the principles set forth in this Memorandum of Understanding.

Director, Maryland Emergency Management Agency — Date: May 14, 1990

Director, Office of Emergency Management, Department of Law & Public Safety
Division of State Police
State of New Jersey — Date: 6/16/1990

MEMORANDUM OF UNDERSTANDING - 2008

The following agreements have been reviewed:

The agreement between the PSEG Nuclear, LLC, **New Jersey State Police,** and the **New Jersey Department of Environmental Protection** dated October 9, 1990;

Clarification to Section II.C this section is revised to reflect the following:

For events classified in accordance with Salem or Hope Creek Emergency Classification Guides related to the health and safety of the public or on-site personnel, or protection of the environment, for which a news release is planned or notification to other government agencies has been or will be made which are not declared as an Emergency Class (as specified in Paragraph A above) notification will be provided within four (4) hours of the declaration of the event or prior to the issuance of a news release.

Reason for clarification: Previous reference to 10 CFR numbers has been changed.

The agreement between **Maryland Emergency Management Agency** and the State of New Jersey Office of Emergency Management dated June 16, 1990;

The agreement between the **Commonwealth of Pennsylvania** and the State of New Jersey dated April 10, 1990.

The above agreements are currently satisfactory and subsequently, remain in force.

Signature

4-25-08
Date

RICHARD SENSI
Print Name

LT. Unit Supervisor /REP Unit
Title

PEMA
PENNSYLVANIA EMERGENCY MANAGEMENT AGENCY

PENNSYLVANIA EMERGENCY
MANAGEMENT AGENCY
2605 Interstate Drive
Harrisburg, Pennsylvania 17110-9364

March 24, 2006

Lt. Col. Lori Henn-Bell
Deputy Superintendent Homeland Security
New Jersey State Police
Office of Emergency Management
P. O. Box 7068, River Road
West Trenton, NJ 08268-0068

Dear Lt. Col. Henn-Bell:

In order for the Commonwealth of Pennsylvania to remain in compliance with Federal Regulations, the established Mutual Statement of Agreement between the Commonwealth of Pennsylvania and your state was reviewed regarding coordination of off-site response to nuclear incidents for Commonwealth-based nuclear power plants. The Agreement is in consonance with Nuclear Regulatory Commission (NRC) and Federal Emergency Management Agency (FEMA) guidance as outlined in NUREG-0654/FEMA-REP-1, Revision 1 and Pennsylvania Consolidated Statutes, Title 35.

The purpose of this letter is to inform you the Agreement between the Commonwealth of Pennsylvania and your state was reviewed and remains in effect. The Commonwealth further acknowledges the Agreement will continue to remain in full force and effect until such time as either of the parties decides that the Agreement needs to be revised or updated. The Agreement will be reviewed for substantive changes, confirmed each year and updated as necessary. Barring substantive changes, the Agreement will remain in effect. Signatory confirmation is not required.

Should there be any substantive changes on your part regarding the Agreement, please contact me at 717-651-2123. No response to this letter is required if there are no changes.

Sincerely,

Eldon E. Beachley

Eldon E. Beachley
Chief, Technological Hazards

EEB/arb

cc: Jon Christiansen

PENNSYLVANIA EMERGENCY MANAGEMENT AGENCY
P.O. BOX 3321
HARRISBURG, PENNSYLVANIA 17105-3321

March 22, 1990

Colonel Justin J. Dintino
Superintendent
New Jersey State Police
Post Office Box 7068
West Trenton, New Jersey 08625

Dear Colonel Dintino:

1. This letter constitutes a mutual Statement of Agreement between the Commonwealth of Pennsylvania and the State of New Jersey, regarding state-to-state coordination of response to nuclear incidents at the Philadelphia Electric Company's Peach Bottom Atomic Power Station and Limerick Generating Station; the Public Service Electric and Gas Company's Artificial Island Nuclear Generating Station; and GPU Nuclear Corporation's Oyster Creek Nuclear Generating Station.

2. The Commonwealth of Pennsylvania has established its basic plan for emergency operations in the "Commonwealth of Pennsylvania Emergency Operations Plan." Annex E, "Radiological Emergency Response to Nuclear Power Plant Incidents," to the Emergency Operations Plan details emergency response to incidents at nuclear power plants located within or affecting the Commonwealth.

3. The State of New Jersey has established its plan for response to nuclear power plant incidents in the "State of New Jersey Radiological Emergency Response Plan for Nuclear Power Plants."

4. The Pennsylvania Emergency Management Agency shall initiate and conduct appropriate and timely response to incident occurring at the Peach Bottom Atomic Power Station or Limerick Generating Station as detailed in Annex E, "Radiological Emergency Response to Nuclear Power Plant Incidents," to include notification of and coordination with the New Jersey Division of State Police, Emergency Management Section.

5. Since portions of New Jersey are within the 50-mile ingestion exposure pathway emergency planning zones of the Peach Bottom Atomic Power Station and the Limerick Generating Station, the Pennsylvania Emergency Management Agency shall notify the New Jersey Division of State Police, Emergency Management Section, upon occurrence of an Alert, Site Area Emergency or General Emergency at the aforementioned plants.

6. The New Jersey Division of State Police, Emergency Management Section, shall initiate and conduct appropriate and timely response to incidents occurring at the Artificial Island Nuclear Generating Station or the Oyster Creek Nuclear Generating Station, as detailed in the New Jersey

Radiological Emergency Response Plan, to include notification and coordination with the Pennsylvania Emergency Management Agency.

7. Since portions of Pennsylvania are within the 50-mile ingestion exposure pathway emergency planning zones of the Artificial Island Nuclear Generating Station and the Oyster Creek Nuclear Generating Station, the New Jersey Division of State Police, Emergency Management Section, shall notify the Pennsylvania Emergency Management Agency in Harrisburg by telephone (717/783-8150) upon occurrence of an Unusual Event, Alert, Site Area Emergency or General Emergency at the aforementioned plants.

8. Technical information relative to response to a nuclear incident at one of the aforementioned plants will be provided respectively by and to the Bureau of Radiation Protection, Pennsylvania Department of Environmental Resources and the New Jersey Bureau of Nuclear Engineering in accordance with the existing Agreement between these two Agencies.

9. The New Jersey Division of State Police, Emergency Management Section, shall participate with the Pennsylvania Emergency Management Agency in the coordination of radiological emergency response planning and operations for agricultural, dairy and food product control within the 50-mile ingestion exposure pathway emergency planning zones of the aforementioned nuclear power plants.

10. The New Jersey Division of State Police, Emergency Management Section, shall participate, through coordination with the Pennsylvania Emergency Management Agency, in nuclear power plant training tests and exercises for each of the aforementioned nuclear facilities.

11. The New Jersey Division of State Police, Emergency Management Section, is on the distribution list for the "Commonwealth of Pennsylvania Emergency Operations Plan" including Annex E, "Radiological Emergency Response to Nuclear Power Plant Incidents," and shall receive changes to this plan as they are issued.

12. The Pennsylvania Emergency Management Agency is on the distribution list for the "State of New Jersey Radiological Emergency Response Plan for Nuclear Power Plants," and shall receive changes to this plan as they are issued.

13. The New Jersey Division of State Police, Emergency Management Section, shall provide review annually Annex E to the Commonwealth's Emergency Operations Plan and provide written recommended revisions to the Pennsylvania Emergency Management Agency, as deemed appropriate and necessary.

14. The Pennsylvania Emergency Management Agency shall review annually the "State of New Jersey Radiological Emergency Response Plan for Nuclear Power Plants," and provide written recommended revisions to the New Jersey Division of State Police, Emergency Management Section, as deemed appropriate and necessary.

15. The Pennsylvania Emergency Management Agency and the New Jersey Division of State Police, Emergency Management Section, accept and shall adhere to the principles set forth in this Statement of Agreement.

Sincerely,

Joseph L. LaFleur

Joseph L. LaFleur
Director
Pennsylvania Emergency
Management Agency

AGREED:

Justin J. Dintino DATE: 4-10-90

Colonel Justin J. Dintino
Superintendent
New Jersey State Police

MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated January 14, 2003, between PSEG Nuclear, LLC, and the **Cumberland County Office of Emergency Management**, regarding response to an accident at either Salem or Hope Creek Generating Stations has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

Joseph Carl Sever
Signature

4/16/08
Date

Joseph Carl Sever
Print Name

Coordinator
Title

2002
MEMORANDUM OF UNDERSTANDING
BETWEEN
CUMBERLAND COUNTY OFFICE OF EMERGENCY MANAGEMENT
AND
PSEG NUCLEAR, LLC
FOR
RADIOLOGICAL EMERGENCY PREPAREDNESS

I. PURPOSE

This Memorandum of Understanding (MOU) constitutes a mutually agreed upon understanding between the Cumberland County Office of Emergency Management (hereinafter referred to as Cumberland County) and PSEG Nuclear, LLC (hereinafter referred to as PSEG Nuclear) setting forth the agreements, commitments, obligations, and conditions to provide notification in the event of an accident at the Hope Creek or Salem Generating Stations threatening public life or property.

II. MEMORANDUM OF UNDERSTANDING

It is understood that:

To provide for prompt notification of the public, Cumberland County understands that the Operations Superintendent (OS), or the Emergency Duty Officer (EDO), or the Emergency Response Manager (ERM) at Salem or Hope Creek Generating Stations will contact the New Jersey Office of Emergency Management (NJOEM) for all emergency classifications. This is in compliance with the requirements of the Nuclear Regulatory Commission in NUREG 0654/Federal Emergency Management Agency REP-1 (Draft January, 1980). The NJOEM will contact Cumberland County for all emergency classifications. If PSEG Nuclear is unable to make contact with NJOEM, Cumberland County will be directly contacted regarding emergency classification.

The Cumberland County 9-1-1 Communications Center Senior Dispatcher on duty shall be responsible for the immediate notification of the Cumberland County Emergency Management Coordinator, who has the authority and responsibility to initiate prompt notification of the public in Cumberland County. The Cumberland County Deputy Coordinator shall act as the alternate to the Coordinator and shall have the authority and responsibility to initiate prompt notification of the public in the event the Cumberland County Emergency Management Coordinator is not available.

The following telephone numbers are provided for the County 9-1-1 Communication Center:

(856) 455-8770; or
(856) 455-8526

Cumberland County shall participate in the implementation of the Emergency Plan for Salem and Hope Creek Generating Stations and shall agree to:

1. Operate the Cumberland County Emergency Operations Center;

2. Coordinate the overall emergency response of county and local departments and organizations;

3. Designate Cumberland County Emergency Management Coordinator to serve as the point-of-contact for Cumberland County with State and Federal Agencies;

4. Implement prompt notification of the public based on information supplied by the State, or PSEG Nuclear if the State cannot be contacted;

5. Coordinate emergency response training for County Personnel;

6. Verify the notification of a all emergency classifications from NJOEM or PSEG Nuclear if NJOEM cannot be contacted;

7. Initiate the notification of county and local officials;

8. Notify assisting agencies and departments to evacuate the public from affected areas.

9. Provide notification to the Cumberland County Emergency Ambulance units to assist and cooperate with the PSEG Nuclear Emergency Medical Response Units.

10. Cooperate with PSEG Nuclear, State, and Federal Agencies to provide for the safety and well being of its citizens.

11. This MOU supersedes and voids any and all previous Memoranda of Understanding between the Cumberland County Office of Emergency Management and PSEG Nuclear for the purpose of providing protection to the public in the event of an accident threatening public life or property.

12. Either party to this MOU may terminate upon sixty (60) days advance written notice to the other party.

13. This MOU shall be effective immediately upon the signing of all the parties hereunto.

IN WITNESS WHEREOF, the parties hereunto execute this Memorandum of Understanding this 14th day of January 2003.

Joseph C. Sever
Cumberland County
Coordinator
Office of Emergency
Management

January 14, 2003
DATE

Harold W. Keiser
President and Chief Nuclear Officer
PSEG Nuclear, LLC

1-14-03
DATE

MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated September 12, 2005, between PSEG Nuclear, LLC, and the **Salem County Department of Emergency Services**, regarding response to an accident at either Salem or Hope Creek Generating Stations has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

Patrick m. Spring
Signature

3-31-08
Date

Patrick m. Spring
Print Name

Executive Director of Emergency Services
Title

**MEMORANDUM OF UNDERSTANDING
BETWEEN
SALEM COUNTY DEPARTMENT OF EMERGENCY SERVICES
AND
PSEG NUCLEAR, LLC
FOR
RADIOLOGICAL EMERGENCY PREPAREDNESS**

I. PURPOSE

This Memorandum of Understanding (MOU) constitutes a mutually agreed upon understanding between the Salem County Department of Emergency Services (hereinafter referred to as Salem County) and PSEG Nuclear, LLC (hereinafter referred to as "PSEG Nuclear") setting forth the agreements, commitments, obligations, and conditions to provide notification and assistance in the event of an accident at the Hope Creek or Salem Generating Stations threatening public life or property.

II. MEMORANDUM OF UNDERSTANDING

To provide for prompt notification of the public, Salem County understands that the Shift Manager (SM), or the Emergency Duty Officer (EDO), or the Emergency Response Manager (ERM) at Salem or Hope Creek Generating Stations will contact the New Jersey Office of Emergency Management (NJOEM) for all emergency classifications. This is in compliance with the requirements of the Nuclear Regulatory Commission in NUREG 0654/Federal Emergency Management Agency REP-1 (January, 1980). The NJOEM will contact Salem County for all emergency classifications. If PSEG Nuclear is unable to make contact with NJOEM, Salem County will be directly contacted regarding emergency classification.

The Salem County 9-1-1 Dispatchers shall be notified and shall be responsible for the immediate notification of the Salem County Emergency Management Coordinator who has the responsibility to initiate prompt notification of the public in Salem County. The Salem County Emergency Management Deputy Coordinator shall act as the alternate to the Salem County Emergency Management Coordinator and shall have the authority and responsibility to initiate prompt notification of the public in the event the Salem County Emergency Management Coordinator is not available.

Two telephone numbers are provided to contact the County Fire & Disaster Dispatchers:

Primary: A dedicated telephone line is also provided between the Control Centers and PSEG Nuclear.

Secondary: (856) 769-2959 (unlisted number) or (856) 769-1955.

Salem County shall participate in the implementation of the Emergency Plan for Salem and Hope Creek Generating Stations and shall agree to:

1. Operate the Salem County Emergency Operations Center;

2. Coordinate the overall emergency response of all Salem County and local departments and organizations;

3. Designate a Radiological Assessment Officer to serve as the point-of-contact for Salem County with State and Federal Agencies;

4. Implement prompt notification of the public based on information supplied by the State, or PSEG Nuclear if the State cannot be contacted;

5. Coordinate emergency response training of Salem County personnel, which will be provided by PSEG Nuclear and the State/County;

6. Verify the notification of all emergency classifications from NJOEM, or PSEG Nuclear if NJOEM cannot be contacted;

7. Initiate the notification of county and local officials;

8. Notify assisting agencies and departments to evacuate the public from affected areas;

9. Provide notification to the Salem County Emergency Ambulance units to assist and cooperate with the PSEG Nuclear Emergency Medical Response units;

10. Authorize PSEG Nuclear and any of its agents access to the Emergency News Center (ENC) and use of any and all materials, equipment, and facilities therein for the purposes of training, drills, exercises, and/or emergency situations. In the event of an emergency, PSEG Nuclear will have priority access and full use of the ENC;

11. Cooperate with PSEG Nuclear, State, and Federal Agencies to provide for the safety and well being of its citizens;

12. Notify, as soon as reasonably possible, PSEG Nuclear of any release, discharge, or emission, whether intentional or accidental, of any hazardous or toxic materials, substances, aerosols, spills, liquids, or gases that reasonably have the potential of threatening the health and safety of personnel or property at Artificial Island;

13. This MOU supersedes and voids any and all previous Memoranda of Understanding between the Salem County Department of Emergency Services and PSEG Nuclear for the purpose of providing protection to the public in the event of an accident threatening public life or property;

14. Either party to this MOU may terminate upon sixty (60) day advance written notice to the other party;

15. This MOU shall be effective immediately upon the signing of all the parties hereunto.

IN WITNESS WHEREOF, the parties hereunto execute this Memorandum of Understanding:

Carl W. Wentzell
Salem County Deputy Coordinator
Department or Emergency Services

28 July 05
Date

William Levis
Senior Vice President & Chief Nuclear Officer
PSEG Nuclear, LLC

12 SEP 05
Date

MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated March 26, 2003, between PSEG Nuclear, LLC, and the **Kent County Department of Public Safety, Kent County Emergency Operations Center**, regarding response to an accident at either Salem or Hope Creek Generating Stations has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

Signature

4/18/08

Date

Colin T. Faulkner

Print Name

Director of Public Safety

Title

**MEMORANDUM OF UNDERSTANDING
BETWEEN
KENT COUNTY DEPARTMENT OF PUBLIC SAFETY, KENT COUNTY
EMERGENCY OPERATIONS CENTER AND
PSEG NUCLEAR, LLC
FOR
RADIOLOGICAL EMERGENCY PREPAREDNESS**

I. PURPOSE

This Memorandum of Understanding (MOU) constitutes a mutually agreed upon understanding between the Kent County Emergency Operations Center, Department of Public Safety, (hereinafter referred to as Kent County) and PSEG Nuclear, LLC (hereinafter referred to as PSEG Nuclear) setting forth the agreements, commitments, obligations, and conditions to provide notification in the event of an accident at the Hope Creek or Salem Generating Stations threatening public life or property.

II. MEMORANDUM OF UNDERSTANDING

To provide for prompt notification of the public, Kent County understands that the Operations Superintendent, or the Emergency Duty Officer, or the Emergency Response Manager at Salem or Hope Creek Generating Stations will contact DEMA directly should a general emergency be declared at Salem or Hope Creek Generating Stations. Delaware Emergency Management Agency (DEMA)or Delaware State Police (DSP) Communications will provide prompt notification to Kent County. Kent County will be contacted directly by PSEG Nuclear if DEMA or DSP Communications cannot be contacted. This is in compliance with the requirements of the Nuclear Regulatory Commission in the NUREG 0654/Federal Emergency Management Agency REP-1, REV 1 (November, 1980).

The Kent County Emergency Dispatch Center shall be notified by DEMA or DSP Communications and shall be responsible to initiate prompt notification of the public in Kent County. The Assistant Director of the Kent County Division of Emergency Management shall have the authority and responsibility to initiate prompt notification of the public. In the event the Assistant Director is not available, the Kent County Director of Public Safety will serve as the alternate and have the authority and responsibility for public notification.

Communication lines have been established between the Kent County Dispatch Center and the generating stations, include hot lines and commercial telephone lines.

Kent County shall participate in Delaware's implementation of the Emergency Plan for Salem and Hope Creek Generating Stations and shall agree to:

1. Operate the Kent County Emergency Operations Center;

2. Coordinate the overall emergency response of all Kent County and local departments and organizations;

3. Designate a Kent County Emergency Operations Center Director to serve as the point-of-contact for Kent County with State and Federal Agencies;

4. Implement prompt notification of the public based on information supplied by PSEG Nuclear or when so directed by the State Emergency Operations Center;

5. Coordinate emergency response training of Kent County Personnel, which will be provided by the State Emergency Operations Center (EOC).

6. Verify the notification of any emergency notification from PSEG Nuclear (Unusual Event, Alert, Site Area Emergency or General Emergency). Kent County will only be notified directly from PSEG Nuclear, if Delaware State Police Communications or DEMA could not be notified.

7. Initiate the notification of county and local officials;

8. Notify assisting agencies and departments of Protective Actions required for the public in affected areas;

9. Provide notification to the Kent County Emergency Medical Services units to assist and cooperate with the PSEG Nuclear Emergency Medical Response Units.

10. Cooperate with PSEG Nuclear, State, and Federal Agencies to provide for the safety and well-being of its citizens.

11. This MOU supersedes and voids any and all previous Memoranda of Understanding between the Kent County Department of Public Safety, Kent County Emergency Operations Center and PSEG Nuclear for the purpose of providing protection to the public in the event of an accident threatening public life or property.

12. Either party to this MOU may terminate upon sixty-(60) days advance written notice to the other party.

13. This MOU shall be effective immediately upon the signing of all the parties hereunto.

IN WITNESS WHEREOF, the parties hereunto execute this Memorandum of Understanding this 26 day of March, 2002 3

Colin Faulkner
Director –
Kent County Department of Public Safety

March 13, 2003
DATE

J. Allen Methany Sr.
J.Allen Methany, Sr.
Assistant Director -
Kent County Division of Emergency Management

March 11, 2003
DATE

Harold W. Keiser
President and Chief Nuclear Officer
PSEG Nuclear, LLC

3/26/03
DATE

MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated September 12, 2005, among PSEG Nuclear, LLC, **New Castle County, Delaware,** and the **Delaware Emergency Management Agency**, regarding response to an accident at either Salem or Hope Creek Generating Stations has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

James E. Turner III
Signature

5/9/08
Date

James E. Turner III
Print Name

DEMA Director
Title

LETTER OF AGREEMENT

BETWEEN

NEW CASTLE COUNTY

DELAWARE EMERGENCY MANAGEMENT

AND

PSEG NUCLEAR

Our agency has reviewed the Memorandum of Understanding contained in the Agreements Section of the State of Delaware Radiological Emergency Plan.

We concur that the MOU is still effective and that our agency shall adhere to the principles set forth in the MOU.

4/7/2008
Dave Carpenter, Jr. Date
Coordinator
New Castle County Office of Emergency Management

4.8.08
Jeffrey Bullock Date
Chief Administrative Officer / Interim
Public Safety Director
New Castle County Department
of Public Safety

James E. Turner, III Date
Director
DE Emergency Management
Agency

AGREEMENT AMONG NEW CASTLE COUNTY, DELAWARE,

DELAWARE EMERGENCY MANAGEMENT AGENCY AND PSEG NUCLEAR, LLC
FOR

RADIOLOGICAL EMERGENCY PREPAREDNESS

THIS AGREEMENT is made among **PSEG Nuclear, LLC, NEW CASTLE COUNTY,** a political subdivision of the State of Delaware (hereinafter referred to as the "County"), and **Delaware Emergency Management Agency.**

WHEREAS, the State of Delaware in conjunction with New Castle County has adopted an emergency plan and procedure in case of an emergency at the Salem or Hope Creek Nuclear Generating Stations; and

WHEREAS, in order to provide prompt notification of New Castle County in the event of an Alert, Site Area or General Emergency as defined in NUREG 0654/Federal Emergency Management Agency REP-1, Rev. 1, an agreement to provide such notification has been reached.

NOW, THEREFORE, the parties hereto agree as follows:

Section 1. In the case of an Alert, Site Area or General Emergency at the Salem or Hope Creek Nuclear Generating Stations, New Castle County understands that the Senior Shift Supervisor, the Emergency Duty Officer or the Emergency Response Manager at Salem or Hope Creek Generating Stations will contact the Delaware Emergency Management Agency (DEMA) and/or the Delaware State Police (DSP) Headquarters Communications directly. DEMA will inform New Castle County Office of Emergency Management and the New Castle County Department of Public Safety of an Alert, Site Area, or General Emergency, if activated. Otherwise, DEMA will notify the New Castle County Fireboard. PSEG Nuclear, LLC will only contact New Castle County if DEMA or DSP Headquarters Communications cannot be reached. PSEG Nuclear, LLC will contact the New Castle County Fireboard via the communications link

commonly known as the "Hotline" as provided and maintained by PSEG Nuclear, LLC at its sole expense, with commercial phones as alternates, within the time frame established in Section 4A below. This is in compliance with the requirements of the Nuclear Regulatory Commission in the NUREG 0654/Federal Emergency Management Agency REP-1, Rev 1 (November 1980).

Section 2. The New Castle County Director of Public Safety has the authority and responsibility to support and assist the DEMA implementation in the prompt notification of the public in New Castle County in the event of an Alert, Site Area or General Emergency. The New Castle County Coordinator of Emergency Planning will act as the alternate to the Director of Public Safety in the event the Director of Public Safety is not available.

Section 3. The County agrees to participate in the State of Delaware's implementation of the emergency plan for Salem and Hope Creek Nuclear Generating Stations and agrees to:

a) Operate the New Castle County Emergency Operations Center;

b) Coordinate the overall emergency response of County Departments and organizations;

c) Designate New Castle County's Director of Public Safety, or alternate, to serve as the New Castle County point of contact with State and Federal agencies;

d) Support the State of Delaware's implementation of prompt notification of the public of New Castle County;

e) Verify the notification of an Alert, Site Area or General Emergency from DEMA; initiate the notification of County emergency response personnel; and assist the State of Delaware in the notification of the public of affected areas; and

f) Coordinate emergency response training of New Castle County personnel.

Section 4. DEMA agrees to:

a) Notify the New Castle County Office of Emergency Management and the New Castle County Director of Public Safety or the New Castle County Fireboard in a timely manner of an Alert, Site Area or General Emergency at the Salem or Hope Creek Nuclear Generating Stations in accordance with the terms of Section 1 hereof;

b) Provide the County at the time of notification of an Alert, Site Area, or General Emergency with a protective action recommendation in response to the Emergency.

Section 5. PSEG Nuclear, LLC agrees to:

a) For emergency classification, namely, notification of an Alert, Site Area or General Emergency, PSEG Nuclear, LLC agrees to notify the County within 15 minutes if the DSP Headquarters Communications or DEMA cannot be promptly contacted.

This action does not relieve PSEG Nuclear, LLC of its responsibility to notify the DSP Headquarters Communications and/or DEMA in the event of a declaration of emergency at Salem or Hope Creek Nuclear Generating Stations.

b) Reimburse the County for all reasonable costs that are proximately caused by an emergency at the Salem or Hope Creek Generating Station. Such liability shall be in accordance with the Price-Anderson Act, as amended 42 U.S.C. 2210 et seq. In this regard, PSEG Nuclear, LLC hereby agrees to waive any immunity from public liability conferred by Federal or State Law.

Section 6. The County, Delaware Emergency Management Agency, and PSEG Nuclear, LLC agree to cooperate with each other and all State and Federal agencies to provide for the safety and well-being of the citizens of New Castle County with regard to any emergencies arising at the Salem or Hope Creek Nuclear Generating Stations.

Section 7. This agreement shall be adhered to by all parties until one party requests to make relevant and appropriate changes. At such a time, parties hereto shall attempt to renegotiate this Agreement in accordance with all-applicable Federal, State or County laws or regulations. In the event, during the terms of this Agreement, that any applicable Federal, State or County laws or regulations change, this Agreement shall be deemed to be amended in accordance with such applicable Federal, State or County laws or regulations.

Section 8. This Agreement cannot be varied, altered, amended, or changed, or any part hereof, without a document signed by all parties hereto. This agreement represents the entire Agreement between the parties and no other Agreement shall be binding unless in writing and signed by all parties hereto.

Section 9. This Agreement shall be governed by the laws of the State of Delaware.

IN WITNESS WHEREOF, the parties do hereby set their hands and seals the date and year indicated below.

Section 10. This Memorandum of Understanding supercedes and voids all previous Memorandums of Understanding among New Castle County, Delaware, Delaware Emergency Management Agency, and PSEG Nuclear, LLC for the purpose of providing protection to the public in the event of a nuclear accident threatening public life or property.

ACTING FOR
Hon. Christopher A. Coons
County Executive
New Castle County

7/20/05
Date

Guy H. Sapp
Director
New Castle County Department of Public Safety

7/15/05
Date

Mr. William Levis
Chief Nuclear Officer
PSEG Nuclear, LLC

9/12/05
Date

Mr. James E. Turner, III
Director
Delaware Emergency Management Agency

8/8/05
Date

Approved
Attorney General State of Delaware

By: Patricia D. Murphy

8/2/05
Date

MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated March 12, 2007, between PSEG Nuclear, LLC and the **Township of Lower Alloways Creek**, regarding response to an accident at either Salem or Hope Creek Generating Stations has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

Ellen B. Pompper
Signature

4-15-08
Date

Ellen B Pompper
Print Name

Mayor
Title

RONALD L. CAMPBELL SR.
ID # 2359349
NOTARY PUBLIC OF NEW JERSEY
Commission Expires 5/2/2012

Ronald L. Campbell Sr.
4/15/08

MEMORANDUM OF UNDERSTANDING BETWEEN PSEG NUCLEAR, LLC AND THE TOWNSHIP OF LOWER ALLOWAYS CREEK REGARDING NOTIFICATION OF CERTAIN EVENTS AND CONDITIONS AND RESPONSIBILITIES OF BOTH PARTIES IN THE EVENT OF A LABOR CONTINGENCY

I. PURPOSE

It is recognized that for both the safety and reassurance of the public of the Township of Lower Alloways Creek (LAC), a mechanism must be established for communication between PSEG Nuclear, LLC (PSEG Nuclear) and responsible officials of LAC regarding conditions or events at, or related to, PSEG Nuclear. It is also recognized that in the event of labor contingencies or incidents, i.e., disputes involving a potential threat or threat to the public peace and good order, a plan must be in effect. The purpose of this Memorandum of Understanding (MOU) is to set forth those conditions, plans, or events under which PSEG Nuclear will notify LAC, and the mechanics by which such notification will be carried out. The responsibilities of LAC are also determined in this MOU.

II. AGREEMENT

PSEG Nuclear and LAC have agreed upon the following terms:

1. PSEG Nuclear will notify LAC by telephone with regard to each and every condition or event listed in Enclosure 1 and in regard to any drill in the time frame indicated. Notification will be by means of a dedicated telephone line to the Township Municipal Building or the LAC Police Department telephone line for Type 1 Events of Enclosure 1.

2. LAC will maintain equipment and/or personnel in the Municipal Building at all times to record and transmit to responsible LAC officials the message described in Paragraph (1).

3. LAC will not make public announcements or initiate contacts with the media on the sole basis of the messages described in Paragraph (1) except to prevent panic, injury to person or damage to property.

4. PSEG Nuclear will keep available, on a 24-hour basis, an employee or a designated substitute (Enclosure 3) who will be able to notify and/or respond to inquiries from the LAC officials listed in Enclosure 2 regarding conditions or events at, or related to, the inquiry. He or she will seek out the necessary information and respond to the inquiring official as soon as possible. PSEG Nuclear will provide the names and telephone numbers to the aforesaid LAC officials listed in Enclosure 2 or to their successors in office whose names shall be transmitted to PSEG Nuclear from time-to-time.

5. This Section 5 of the MOU sets forth guidelines for both parties in the event of a labor contingency or incident involving a potential threat or threat to the public peace and good order. This section shall become effective when it becomes necessary for either party to take any action contained herein regarding a potential labor contingency or incident as aforesaid. This section of the MOU shall remain in effect until such time as both parties agree that conditions are such that it need not be in force.

A. NOTIFICATION

PSEG Nuclear agrees to notify LAC of any potential labor contingency or incident that affects the normal operations at its nuclear facility as soon as PSEG Nuclear becomes aware of the problem. LAC agrees to notify PSEG Nuclear of any potential labor contingency or incident that will affect the normal operations at the nuclear facility as soon as LAC becomes aware of the problem.

B. INJUNCTION HEARINGS

PSEG Nuclear agrees to notify LAC of injunction meetings or hearings as soon as they are scheduled as a result of a labor contingency or incident at the nuclear facility. LAC agrees that it will endeavor to have those officials who are responsible for the policing of the labor contingency or incident present at all injunction meetings or hearings. Such police presence shall be requested and paid for by PSEG Nuclear pursuant to the terms of this agreement. In the event that it is necessary, LAC agrees to furnish testimony at any injunction hearing as to conditions at the strike line and the conduct of the pickets. Both parties agree that close coordination during the meetings or hearings be maintained to minimize the problems of enforcing the terms of any injunction throughout the duration of the dispute.

C. LIAISON

Whenever this section of the MOU becomes effective the communication between PSEG Nuclear and LAC will be accomplished by the Security Manager or Site Vice President for PSEG Nuclear and the Chief of Police of LAC or their designees. Additional lines of communication may be arranged upon the concurrence of the Senior Vice President and Chief Nuclear Officer of PSEG Nuclear and the Mayor of LAC.

D. MEETINGS

PSEG Nuclear and LAC agree to schedule meetings to address problems during the term of the contingency or incident. The frequency of the meetings may increase or decrease as conditions warrant.

E. REQUEST FOR POLICE OR MUTUAL AID ASSISTANCE

Whenever it is deemed necessary by PSEG Nuclear to enlist additional LAC police personnel and/or enlist mutual aid assistance from other municipal police departments or forces to protect the public peace and good order during a labor contingency, incident, or any other reason within PSEG Nuclear's discretion, such requests must be made by PSEG Nuclear to the LAC Chief of Police. PSEG Nuclear shall specifically specify the number of officers and/or equipment it is requesting, as well as the time frame for which it is requesting such coverage. Any request shall be for a minimum of four (4) hours of time for LAC police personnel. For threats classified under the Department of Homeland Security as Orange or higher, PSEG Nuclear shall reimburse LAC Township for coverage at the security checkpoint for 48 hours. Coverage beyond 48 hours will be mutually agreed upon based on the nature of the threat. Upon any extension of the initial request for police personnel or mutual aid assistance made by PSEG Nuclear, such assistance shall not be sent by LAC until additional funds are deposited in trust to cover said expenses.

It is understood that this section does not, in any way, affect the ability of the LAC Police Department to exercise its sole judgment to exercise police powers it deems to be in the best interests of the municipality, regardless of whether any police assistance was requested. Should the police assistance arise from activities resulting from or relating to "general nuclear operations", which include but is not limited to nuclear energy protests, pickets, or other matters which may be deemed exclusive to the business of producing nuclear energy, then PSEG Nuclear shall be required to reimburse LAC pursuant to and in the amounts outlined in this agreement. Should the police assistance arise from something other than "general nuclear operations", which would include but not be limited to general criminal offenses, PSEG Nuclear will have no obligation to reimburse the Township.

F. PAYMENT OF EXPENSES

Upon such request, or anytime prior thereto, PSEG Nuclear shall provide sufficient monies to cover all reasonable costs and expenses necessary for the requested coverage. Such costs will be at 1 ½ times the wages paid to the officers providing the coverage. By executing this agreement PSEG Nuclear and LAC acknowledge that the prices listed are reasonable.

G. DISAGREEMENT OVER POLICE COVERAGE RESPONSIBILITIES

In the event of a disagreement between the parties to this MOU over the necessity for LAC personnel assistance and/or mutual aid, the question shall be referred for resolution to the Salem County Prosecutor, whose decision shall be determinative and final.

H. REPORT REQUIREMENTS

When PSEG Nuclear requests assistance, LAC agrees to furnish a monthly report, which shall set forth the names of all mutual aid personnel and LAC police personnel utilized, and the hours worked during that period.

III. GENERAL PROVISIONS

1. Either party to this MOU may terminate this MOU upon sixty (60) days advance written notice to the other party.
2. This MOU is intended to supersede and be in substitution of any prior Memorandum of Understanding between the parties.

ENCLOSURE 1

CONDITIONS OR EVENTS REQUIRING NOTIFICATION OF LOWER ALLOWAYS CREEK TOWNSHIP

TYPE	CONDITION OR EVENT	TIME FRAME	REFERENCE DOCUMENT
1	Emergency events classified as defined in Salem & Hope Creek Emergency Classification Guides (ECG)	Immediately following the notification of the State of New Jersey and Delaware for events classified as an Unusual Event, Alert, Site Area Emergency and/or a General Emergency.	ECG Sections 1-9(1)
2	Transportation of high or low level radioactive material or other dangerous material from Artificial Island over any streets of Township by PSEG Nuclear or its consignee.	Prior to shipment.	Procedure for rad/non-rad shipments.
3	Scheduled or unscheduled shutdown for testing, maintenance or refueling.	As soon as nature of shutdown is known.	Condition of previous LAC MOU.
4	Unscheduled trip/scram	As soon as sufficient details are available.(2)	ECG Reportable Action Levels (RAL) 11.3.2.
5	Unusual movements of equipment or large numbers of personnel, which may significantly affect local or area traffic patterns.	As soon as sufficient details are available.(2)	ECG RAL 11.8.2.b
6	On-site drills requiring LAC notification.	Prior to drill.	Emergency Plan Drill Checklist
7	Any condition or event not included in Items 1 through 5 judged of significant public interest to warrant press inquiry.(3)	As soon as sufficient details are available.(2)	ECG RAL 11.4.2.b, 11.4.2.c, 11.5.2.a&b, 11.8.2.a, 11.9.2.b, 11.10.2

NOTES:

1. This notification is provided to facilitate possible site evacuation.

2. The term "Sufficient Details" means enough information to provide the general understanding of the condition or event to the public, but the time frame is not to exceed 12 hours. However, in any case, notification will be made prior to or simultaneous with the release of any information to the news media.

3. Any condition or event which requires PSEG Nuclear Communications staff to contact the press, shall also require that staff to contact LAC Township prior to or simultaneous with communication to the press. If a press release is written about the incident, it shall be telecopied to, or simultaneous with, the time it is sent to the news media.

ENCLOSURE 2

OFFICIALS OF THE TOWNSHIP OF LOWER ALLOWAYS CREEK

NAME

TOWNSHIP COMMITTEE

MAYOR ELLEN B. POMPPER

DEPUTY MAYOR DONNA RHUBART

WALLACE BRADWAY

GEORGE STILES

SHERMAN WOOD

CHIEF OF POLICE & EMERGENCY MANAGEMENT COORDINATOR (EMC)
LEE PETERSON

TOWNSHIP CLERK RONALD L CAMPBELL SR.

ENCLOSURE 3

PSEG EMPLOYEES AUTHORIZED TO RESPOND TO INQUIRIES FROM LAC TOWNSHIP OFFICIALS

PUBLIC INFORMATION EVENTS

1. Joe Delmar, Manager - Nuclear Communications
2. David Burgin, Manager - Emergency Preparedness
3. Skip Sindoni, Director - Power Communications
4. Karen Miller

SECURITY EVENTS

1. Security Manager

   or

   Security Technical Analyst

2. Bob Braun, Site Vice President - Salem

   George Barnes, Site Vice President - Hope Creek

IV. WITNESS

In witness whereof the parties have hereunto executed this Memorandum of Understanding.

DATED: 2/20/07 TOWNSHIP OF LOWER ALLOWAYS CREEK

ATTEST:

~~Township~~ Clerk
DEPUTY

BY: Ellen B. Pompper
ELLEN POMPPER
Mayor

DATED: 3/12/07 PSEG NUCLEAR, LLC

ATTEST:

Ann Shimp
ANN SHIMP
Executive Assistant

BY:
WILLIAM LEVIS
President & CNO, PSEG Nuclear LLC

Ann L. Shimp
Notary Public of New Jersey
My Commission Expires October 17, 2007

2006
MEMORANDUM OF UNDERSTANDING
BETWEEN
PUBLIC SERVICE ENTERPRISE GROUP NUCLEAR, LLC
AND
THE MEMORIAL HOSPITAL OF SALEM COUNTY

I. PURPOSE

This Memorandum of Understanding (MOU) constitutes a mutually agreed upon understanding between the Memorial Hospital of Salem County, (hereinafter referred to as MHSC) and PSEG Nuclear, LLC (hereinafter referred to as PSEG Nuclear) setting forth the agreements, commitments, obligations, and conditions to provide medical services in the event of an accident at the Hope Creek or Salem Generating Stations threatening public life or property.

II. MEMORANDUM OF UNDERSTANDING

It is understood that:

PSEG Nuclear is authorized to operate nuclear facilities on Artificial Island, Lower Alloways Creek Township, New Jersey (hereinafter referred to as Artificial Island) under licenses granted by the U.S. Nuclear Regulatory Commission (NRC);

PSEG Nuclear is required to maintain radiological emergency preparedness in accordance with their operating licenses and federal regulations of the NRC and the Federal Emergency Management Agency (hereinafter referred to as FEMA) applicable to emergency preparedness;

The NRC requires that the state of onsite and offsite emergency preparedness provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency;

MHSC has agreed to provide emergency medical services in support of PSEG Nuclear operations at Artificial Island; and

MHSC has requested reimbursement for the activities associated with its development and maintenance of a Radiological Medical Emergency Preparedness Plan, (hereinafter referred to as the EPP), which will satisfy the NRC and FEMA rules, regulations, and requirements for emergency medical services as they pertain to Artificial Island;

THEREFORE, the parties hereto in consideration of the covenants set forth herein agree as follows:

1. PSEG Nuclear agrees, in accordance with the provisions of this Memorandum of Understanding, to reimburse activities associated with the development and maintenance of the EPP for the MHSC in support of Artificial Island;

2. In consideration of this funding, MHSC shall be responsible for maintaining in full effect at any and all times the provisions of the EPP and implementing documents for PSEG Nuclear facilities at Artificial Island;

3. The maximum amount of this reimbursement shall not exceed Seventy-Five Thousand Dollars ($75,000) for any one calendar year.

4. MHSC shall provide written notification of these charges and invoice for the program costs by July 1st of each calendar year;

5. PSEG Nuclear will provide payment of these charges by September 1st of each calendar year;

6. Reimbursement provided under this MOU shall be for the exclusive purpose of maintaining the EPP at MHSC for Artificial Island;

7. PSEG Nuclear reserves the right to audit and/or require an accounting for any and all goods and services for which PSEG Nuclear has provided reimbursement;

8. This MOU shall be effective until December 31, 2010;

9. This MOU supersedes and voids any and all previous Memoranda of Understanding between the Memorial Hospital of Salem County and PSEG Nuclear for the purpose of providing medical services in the event of an accident threatening public life or property;

10. Either party to this MOU may terminate upon sixty (60) days advance written notice to the other party.

11. This MOU shall be effective immediately upon the signing of all the parties hereunto.

IN WITNESS WHEREOF, the parties hereunto execute this Memorandum of Understanding this 12th day of April, 2006:

By: [signature]
Bill Levis
Vice President and Chief Nuclear Officer
PSEG Nuclear, LLC

DATE: 5/5/06

By: Angela M Marchi
Angela Marchi
CEO
The Memorial Hospital of Salem County

DATE: 4/12/06

MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated September 8, 2004, between PSEG Nuclear, LLC, and **GE Nuclear Energy**, regarding response to an accident at Hope Creek Generating Station has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

Signature	12/22/08 Date
Stephen P. Kopera Print Name	
Sales Manager - PSEG Title	

GE Nuclear Energy

General Electric Company
640 Freedom Business Center
King of Prussia, PA 19406

July 28, 2004
G-KT1-4-014

David Burgin
Emergency Preparedness Manager
Hope Creek Generating Station
PSEG Nuclear LLC
P.O. Box 236
Hancocks Bridge, NJ 08038

Subject: Hope Creek Generating Station BWR Nuclear Emergency Support Program

Dear Mr. Burgin,

GE Nuclear Energy (GE) is pleased to continue to offer PSEG Nuclear, LLC (PSEG Nuclear) our BWR Emergency Support Program as detailed in Service Information Letter SIL No. 324, Revision 6. This letter, when signed below and returned to GE, will satisfy the notification requirements as set forth in paragraph 1 under Recommendations (Page 2 of SIL 324, Rev. 6).

In addition, this letter, when signed below, will serve as PSEG Nuclear's consent to record all telephone communications between the site and GE, should the Emergency Response Program be activated. PSEG Nuclear's consent is required to comply with California law that requires consent of all parties to a recorded communication. The primary purpose of recording conversations is to ensure that all inputs provided to GE by PSEG Nuclear can be properly reviewed by GE personnel for accuracy and verification as may be required.

PSEG Nuclear agrees that in the event it requests assistance under GE's Emergency Support Program, that the furnishing of such services will be governed by the Terms and Conditions of the "Agreement Respecting the Transfer of Hope Creek Generating Station", effective August 21, 2000 which makes applicable to PSEG Nuclear, LLC the terms and conditions of the "Contract between Public Service Electric and Gas Company and General Electric Company Concerning the Sale of Equipment and Services", effective September 15, 1989", as amended, and that the services will be provided at GE's then current standard rates and charges.

While GE stands ready to serve your emergency needs, we hope this service is never required.

Sincerely,

Patrick Looney

Patrick Looney
Nuclear Account Manager
(610) 992-6108

Accepted by: David Burgin
David Burgin, PSEG Nuclear, LLC

Title: Emergency Preparedness Manager

Date: 9-8-04

INPO®

Institute of Nuclear Power Operations

Suite 100
700 Galleria Parkway, SE
Atlanta, GA 30339-5943
770-644-8000
FAX 770-644-8549

September 30, 2008

Dear Ladies and Gentlemen:

This letter certifies that the plant emergency assistance agreement between INPO and its member utilities remains in effect. In the event of an emergency at your utility, INPO will assist you in acquiring the help of other organizations in the industry, as described in Section 1 of the Emergency Resources Manual, INPO 03-001. If requested, INPO will provide the following assistance:

- Facilitate technical information flow from the affected utility to the nuclear industry.
- Locate replacement equipment and personnel with technical expertise.
- Obtain technical information and industry experience regarding plant component and systems.
- Provide an INPO liaison to facilitate interface.

This agreement will remain in effect until terminated in writing. Should you have questions, please call Mark Lemke at (770) 644-8761 or e-mail lemkems@inpo.org.

Sincerely,

George Felgate
Vice President
Operations Division

GF:jkm

MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated January 10, 2003, between PSEG Nuclear, LLC, and Westinghouse Electric Company, LLC, regarding response to an accident at Salem Generating Stations has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

Signature

1-23-2009
Date

DOUGLAS H. WARREN
Print Name

MANAGER CUSTOMER PROJECTS
Title

2003
MEMORANDUM OF UNDERSTANDING
BETWEEN
WESTINGHOUSE ELECTRIC COMPANY, LLC
AND
PSEG NUCLEAR, LLC
FOR
RADIOLOGICAL EMERGENCY PREPAREDNESS

I. PURPOSE

This Memorandum of Understanding (MOU) constitutes a mutually agreed upon understanding between Westinghouse Electric Company, LLC (hereinafter referred to as Westinghouse) and PSEG Nuclear, LLC (hereinafter referred to as PSEG Nuclear) setting forth the agreements, commitments, obligations, and conditions to provide assistance in the event of an accident at the Salem Generating Stations threatening public health and safety.

II. MEMORANDUM OF UNDERSTANDING

It is understood that:

1. If an event at a nuclear power plant occurs that might require full-scale Westinghouse Emergency Response, the plant operator should immediately contact an initial Westinghouse Contact (as identified in the Emergency Response Plan (ERP) Roster in the order specified). This notification will initiate the actions described in Section 2 of the Westinghouse Emergency Response Plan (ERP), and as shown in Figure A-1.

2. Upon full activation, communication links and advisories will be established as shown on Figure A-2. The primary link will be between the site and the initial Westinghouse contact as described in Section 2.2.1 until the plan is fully activated.

3. When the plan is fully activated, the prime link is between the ERP Director and the Utility Recovery Manager. Support links will also be established with the Onsite Technical Support Center and the Site Emergency News Center.

4. Advisory communications will be made, as appropriate with the U.S. NRC, (RRG), Institute for Nuclear Power Operations Regulatory Response, NSA, other

Westinghouse plants, Architects/Engineers, etc.

5. This MOU supersedes and voids any and all previous Memoranda of Understanding between Westinghouse and PSEG Nuclear for the purpose of providing protection to the public in the event of an accident threatening public life or property.

6. Either party to this MOU may terminate upon sixty (60) days advance written notice to the other party.

7. This MOU shall be effective immediately upon the signing of all the parties hereunto.

IN WITNESS WHEREOF, the parties hereunto execute this Memorandum of Understanding this __6th____ day of _January_______2003:

M P Osborne

M. P. Osborne
Customer Projects Manager
Westinghouse Electric Company, LLC

6 January 2003

DATE

H Keiser

Harold W. Keiser
President and Chief Nuclear Officer
PSEG Nuclear, LLC

1-10-03

DATE

WESTINGHOUSE PROPRIETARY CLASS 2

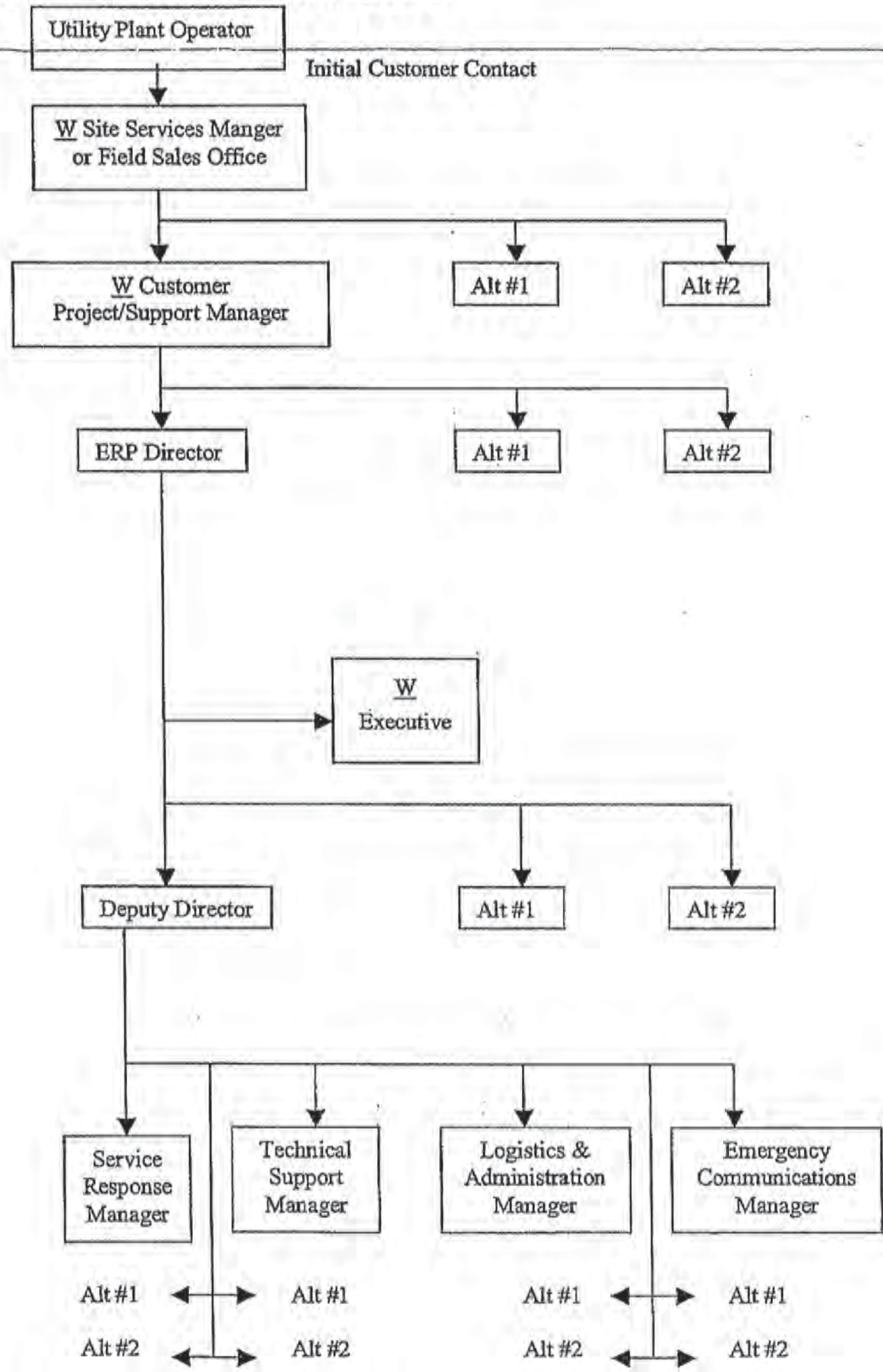

Figure A-1. ERP Communications Plan – Activation

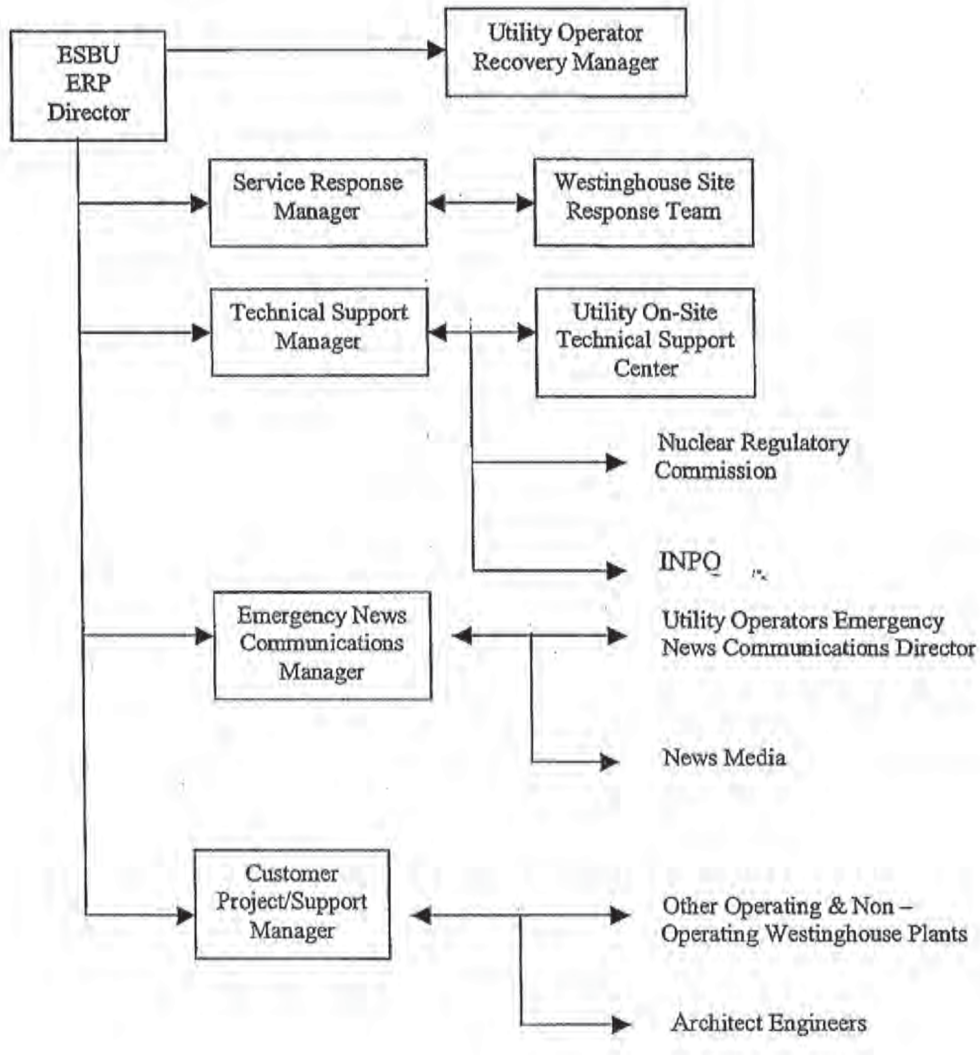

Figure A-2. ERP Communications Plan - Advisory

MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated January 28, 2003, between PSEG Nuclear, LLC, and **Haz/Med Consultants**, regarding response to an accident at either Salem or Hope Creek Generating Stations has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

Tony Serratore, RN
Signature

3/31/08
Date

Tony Serratore, RN
Print Name

President
Title

**2002
MEMORANDUM OF UNDERSTANDING
BETWEEN
HAZ/MED CONSULTANTS
AND
PSEG NUCLEAR, LLC
FOR
RADIOLOGICAL EMERGENCY PREPAREDNESS**

I. PURPOSE

This Memorandum of Understanding (MOU) constitutes a mutually agreed upon understanding between Haz/Med Consultants (HMC) and PSEG Nuclear, LLC (hereinafter referred to as PSEG Nuclear) setting forth the agreements, commitments, obligations, and conditions to provide medical assistance in the event of an accident at the Hope Creek or Salem Generating Stations threatening public life or property.

II. MEMORANDUM OF UNDERSTANDING

It is understood that Haz/Med Consultants shall: Provide training in accordance with "industry standards" to personnel at the Memorial Hospital of Salem County and Christiana Care Health Services to enable those personnel to effectively and efficiently treat radioactively contaminated individuals.

2. Provide training in accordance with "industry standards" to off-site emergency services personnel who would respond to and transport contaminated injured personnel.

3. Provide training in accordance with "industry standards" to PSEG Nuclear radiation protection and site protection personnel who would initially respond to and transport contaminated injured personnel.

4. Develop, implement, and assess drills to evaluate the radiation programs at Memorial Hospital of Salem County and Wilmington Medical Center. This includes both verbal and written critiques of the exercise participants.

5. Develop and maintain procedures for the support of hospitals that implement the radiation program.

6. Conduct an annual inventory of the support hospital's radiation emergency equipment and supplies.

7. Provide, as needed, on a 24-hour per day on-call basis qualified consultants to assist the support hospitals in treating patients who have been contaminated with or overexposed to radioactive materials. This may be by telephone or on-site, depending on the magnitude of the incident.

8. Provide, as needed, bioassay capabilities to analyze samples taken as part of treatment of a contaminated or overexposed patient.

9. Provide dose assessment assistance in the evaluation of the patient and management of the treatment.

10. Provide, as requested, for drill or actual emergencies, a health physics spokesperson at the PSEG Nuclear Emergency News Center.

11. This MOU supersedes and voids any and all previous Memoranda of Understanding between Haz/Med Consultants and PSEG Nuclear for the purpose of providing medical assistance in the event of an accident threatening public life or property.

12. Either party to this MOU may terminate upon sixty (60) days advance written notice to the other party. The fee schedule for services will be in accordance with the attached addendum.

13. This MOU shall be effective immediately upon the signing of all the parties hereunto.

IN WITNESS WHEREOF, the parties hereunto execute this Memorandum of Understanding this 15 day of January 2003

Tony Serratore, RN — 1/15/03

Tony Serratore
President
Haz/Med Consultants

DATE

Harold W. Keiser — 1/28/03

Harold W. Keiser
President and Chief Nuclear Officer
PSEG Nuclear, LLC

DATE

ADDENDUM

SCOPE OF SERVICES:

Haz/Med Consultants agrees to perform all services and provide all materials as set forth in the aforementioned bid and contract.

PRICING POLICY:

In order to provide PSEG Nuclear the opportunity to keep the total price of the contract as reasonable as possible, it is the policy of Haz/Med Consultants (HMC) that PSEG Nuclear should only pay for the training and drill support, and services that are actually provided by HMC. This would allow PSEG Nuclear the latitude not to have to pay for services that are scheduled, but have to be canceled due to outside concerns, such as training sessions, drills, etc.

EXPENSES:

Expenses will be billed at cost, and will include airfare, car rental, lodging, meals, mileage, tolls, parking, materials purchase, shipping and handling. It is the policy of HMC to procure the lowest travel fares possible to keep expenses as low as reasonably achievable. If, in the event, PSEG Nuclear is able to obtain a lower cost than what HMC has provided, then HMC shall reimburse PSEG Nuclear for the difference.

FEE SCHEDULE:

All consulting, training, drill support, audits, administrative support, such as procedure revision, etc. will be billed at the rate of $750.00 per day, per person (consultant).

NOTE: Emergency consultants, physician response, dose assessment, calibration, and bioassay analysis will be billed at the daily rate on an "as needed" basis. This avoids paying unreasonable fees for services that may be used infrequently.

FINANCIAL QUOTE:

The final figure for the contract will be determined by the actual number of days required by PSEG Nuclear.

For further information, contact:

Tony Serratore: Office (609) 440-7188
E-Mail HazMed@Verizon.net

Address: 8296 Portofino Dr. #302
Champions Gate, FL 33896

MEMORANDUM OF UNDERSTANDING - 2008

The agreement dated December 10, 2003, between PSEG Nuclear, LLC, and the **Wilmington Fire Department**, regarding response to an accident at either Salem or Hope Creek Generating Stations has been reviewed. The agreement is currently satisfactory and subsequently, remains in force.

Willie J Patrick Jr
Signature

3/31/2008
Date

Willie J. Patrick JR
Print Name

Chief of Fire / EFO
Title

2003
MEMORANDUM OF UNDERSTANDING
BETWEEN
WILMINGTON FIRE DEPARTMENT
AND
PSEG NUCLEAR LLC
FOR
RADIOLOGICAL EMERGENCY PREPAREDNESS

I. PURPOSE

This Memorandum of Understanding (MOU) constitutes a mutually agreed upon understanding between the Wilmington Fire Department of Wilmington, Delaware, and PSEG Nuclear LLC (hereinafter referred to as PSEG Nuclear) setting forth the agreements, commitments, obligations, and conditions to provide assistance in the event of an accident at the Hope Creek or Salem Generating Stations threatening public life or property.

II. MEMORANDUM OF UNDERSTANDING

It is understood that:

1. The Wilmington Fire Department's Marine Unit will respond to the above-mentioned facilities when requested through the Delaware Emergency Management Agency. This procedure is outlined in the State of Delaware Emergency Operations Plan.
2. The Wilmington Fire Department will participate in Training Exercises at the mutual agreement of the parties.
3. PSEG Nuclear indemnifies the Wilmington Fire Department for any and all liability related to activities performed under this MOU, whether based upon contract, tort (including negligence), warranty, strict liability, or otherwise, for any losses, damages, costs or expenses of any kind whatsoever arising out of, resulting from, or related to the performance or breach of this MOU, however, PSEG Nuclear shall not, under any circumstances, be liable for any special, indirect, incidental, punitive, or consequential losses, damages, costs, or expenses whatsoever. Any action against the PSEG Nuclear arising out of, resulting from, or related to the performance or breach of this MOU shall be filed not later than one year after the cause or action has accrued.
4. This MOU supersedes and voids any and all previous Memoranda of Understanding between the Wilmington Fire Department and PSEG Nuclear for the purpose of providing assistance to the public in the event of an accident threatening public life or property.

Wilmington Fire Department & PSEG

5. Either party to this MOU may terminate upon sixty (60) days advance written notice to the other party.

6. This MOU shall be effective immediately upon the signing of all the parties hereunto.

IN WITNESS WHEREOF, the parties hereunto execute this Memorandum of Understanding this ______ day of ____________ 2003:

David S. Burgin
Emergency Preparedness Manager
PSEG Nuclear, LLC

12/9/03
Date

James W. Ford, Jr.
Chief of Fire
Wilmington Fire Department
Wilmington, DE

11/21/03
Date

A. Christopher Bakken, III
Senior Vice President Site Operations

12-10-03
Date

3.8-6 AREVA and PSEG Nuclear, LLC

NOTE

This attachment contains Memoranda of Understanding from offsite support organizations that support Salem and Hope Creek Generation Stations. As PSEG moves forward with the new plant development, the Memoranda of Understanding will be revised, as necessary, to include information to support the new plant.

3-8.7 Mitsubishi and PSEG Nuclear, LLC

NOTE

This attachment contains Memoranda of Understanding from offsite support organizations that support Salem and Hope Creek Generation Stations. As PSEG moves forward with the new plant development, the Memoranda of Understanding will be revised, as necessary, to include information to support the new plant.

PSEG Site
ESP Application
Part 5, Emergency Plan

ATTACHMENT 4
RADIOLOGICAL ASSISTANCE PROGRAM

TABLE OF CONTENTS

National Response Framework

January 2008

NOTE: Only the Nuclear Radiological Incident Annex of the National Response Framework is included in this Emergency Plan attachment. The entire National Response Framework is available on the Department of Homeland Security website.

Homeland Security

Coordinating Agency:

Department of Defense
Department of Energy
Department of Homeland Security
Environmental Protection Agency
National Aeronautics and Space Administration
Nuclear Regulatory Commission

Cooperating Agencies:

Department of Agriculture
Department of Commerce
Department of Defense
Department of Energy
Department of Health and Human Services
Department of Homeland Security
Department of the Interior
Department of Justice
Department of Labor
Department of State
Department of Transportation
Department of Veterans Affairs
Environmental Protection Agency
Nuclear Regulatory Commission

INTRODUCTION

Purpose

The Nuclear/Radiological Incident Annex (NRIA) to the *National Response Framework (NRF)* describes the policies, situations, concepts of operations, and responsibilities of the Federal departments and agencies governing the immediate response and short-term recovery activities for incidents involving release of radioactive materials to address the consequences of the event. These incidents may occur on Federal-owned or -licensed facilities, privately owned property, urban centers, or other areas and may vary in severity from the small to the catastrophic. The incidents may result from inadvertent or deliberate acts. The NRIA applies to incidents where the nature and scope of the incident requires a Federal response to supplement the State, tribal, or local incident response.

The purpose of this annex is to:

- Define the roles and responsibilities of Federal agencies in responding to the unique characteristics of different categories of nuclear/radiological incidents.

- Discuss the specific authorities, capabilities, and assets the Federal Government has for responding to nuclear/radiological incidents that are not otherwise described in the NRF.

- Discuss the integration of the concept of operations with other elements of the NRF, including the unique organization, notification, and activation processes and specialized incident-related actions.

- Provide guidelines for notification, coordination, and leadership of Federal activities.

Because there are several categories of potential incidents and impacted entities, this annex identifies different Federal agencies as "coordinating agencies" and "cooperating agencies" and associated strategic concepts of operations based on the authorities, responsibilities, and capabilities of those departments or agencies. In addition, this annex describes how other Federal departments and agencies support the Department of Homeland Security (DHS) when DHS leads a large-scale multiagency Federal response.

Scope

This annex applies to two categories of nuclear and radiological incidents: (1) inadvertent or otherwise accidental releases and (2) releases related to deliberate acts. These incidents may also include potential release of radioactive material that poses an actual or perceived hazard to public health, safety, national security, and/or the environment. The category covering inadvertent releases includes: two categories of nuclear facilities (commercial or weapons production facilities), lost radioactive material sources, transportation accidents involving nuclear/radioactive material, domestic nuclear weapons accidents, and foreign accidents involving nuclear or radioactive material that impact the United States or its territories, possessions, or territorial waters. The second category includes, but is not limited to, response to the effects of deliberate attacks perpetrated with radiological dispersal devices (RDDs), nuclear weapons, or improvised nuclear devices (INDs).

This annex applies whenever a Federal response is undertaken unilaterally pursuant to Federal authorities, or when an incident exceeds or is anticipated to exceed State, tribal, or local resources. The level of Federal response to a specific incident is based on numerous factors, including, the ability of State, tribal, and local officials to respond; the type, amount, and custody of (or authority over) radioactive material involved; the extent of the impact or potential impact on the public and environment; and the size of the affected area.

If any agency or government entity becomes aware of an overt threat or act involving nuclear/radiological material/device or indications the event is not inadvertent or otherwise accidental, the Department of Justice (DOJ) should be notified through the Federal Bureau of Investigation (FBI). The Attorney General has lead responsibility for criminal investigations of terrorist acts or terrorist threats by individuals or groups inside the United States, or directed at United States citizens or institutions abroad, where such acts are within the Federal criminal jurisdiction of the United States. Generally acting through the FBI, the Attorney General, in cooperation with other Federal departments and agencies engaged in activities to protect our national security, shall also coordinate the activities of the other members of the law enforcement community to detect, prevent, preempt, and disrupt terrorist attacks against the United States. For investigations pertaining to nuclear/radiological incidents, the coordinating agencies and cooperating agencies perform the functions delineated in this annex and provide technical support and assistance to the FBI in the performance of its law enforcement and criminal investigative mission. Further details regarding the FBI response are outlined in the Terrorism Incident Law Enforcement and Investigation Annex.

In situations resulting from a deliberate act, NRIA response actions will be coordinated with the *NRF* and the Terrorism Incident Law Enforcement and Investigation Annex and the Catastrophic Incident Annex, as appropriate.

Policies

Authorities applicable to this annex include Homeland Security Presidential Directive (HSPD) 5 ("Management of Domestic Incidents"), the National Strategy to Combat Weapons of Mass Destruction, the Homeland Security Act of 2002, the Post-Katrina Emergency Management Reform Act of 2006 (PKEMRA), and the National Strategy for Homeland Security.

The coordinating agencies may take appropriate independent emergency actions within the limits of their own statutory authority to protect the public, mitigate immediate hazards, and gather information concerning the emergency to avoid delay. Key authorities used by the coordinating agencies in carrying out their responsibilities are described in the bullets below. Some of these authorities apply to multiple coordinating agencies.

- **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** – CERCLA gives the Federal Government the authority to respond to releases or threatened releases of hazardous substances (including radionuclides) that may endanger public health or the environment. CERCLA also gives the Federal Government the authority to compel responsible parties to respond to releases of hazardous substances.[1] CERCLA is implemented through the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), a regulation found in 40 Code of Federal Regulation (CFR) Part 300. At the on-scene level, this response authority is implemented by Federal On-Scene Coordinators (OSCs). OSCs may assist State and local governments in responding to releases, but also have the authority to direct the response when needed to ensure protection of public health and the environment. Typical response actions include, but are not limited to: air monitoring, assessment of the extent of the contamination, stabilization of the release, decontamination, and waste treatment, storage, and disposal. Four Federal agencies have OSC authority for hazardous substance emergencies: the Environmental Protection Agency (EPA), DHS/U.S. Coast Guard (USCG), the Department of Defense (DOD), and the Department of Energy (DOE).

- **Atomic Energy Act (AEA) of 1954 (as amended)** – The AEA provides DOD and DOE responsibilities for protection of certain nuclear materials, facilities, information, and nuclear weapons under their control. The AEA (42 U.S.C. §§ 2011–2297 (2003)) and the Energy Reorganization Act of 1974 (5 U.S.C. §§ 5313–5316, 42 U.S.C. §§ 5801–5891 (2002)) provide the statutory authority for both DOE and the Nuclear Regulatory Commission (NRC), and the foundation for NRC regulation of the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, to promote the common defense and security, and to protect the environment. For incidents involving NRC- or Agreement State-regulated facilities, activities, or material, the NRC has the authority to perform an independent assessment of the safety of the facility or material; evaluate licensee protective action recommendations; perform oversight of the licensee (monitoring, advising, assisting, and/or directing); and report information, as appropriate, to media and public entities. The AEA also charges EPA with additional responsibilities regarding radiation matters that directly or indirectly affect public health.

- **Executive Order 12656 of November 18, 1988** – This Executive order directs the Secretary of Energy to "manage all emergency planning and response activities pertaining to Department of Energy nuclear facilities."

- **Title 50, U.S. Code, War and National Defense** – Title 50, U.S.C. § 797 makes it a crime to willfully violate a regulation or order promulgated by the Secretary of Defense, or by a military commander designated by the Secretary of Defense, for the protection or security of military equipment or other property or places subject to the jurisdiction, administration, or custody of DOD. As it applies to nuclear/radiological accidents or incidents, this statute provides a military commander the authority to establish a temporary National Defense Area (NDA) around an accident/incident site to protect nuclear weapons and materials in DOD custody. This statute is executed within the Department by DOD Instruction 5200.08, "Security of DOD Installations and Resources." DODI 5200.08 is the natural, legal extension of statutory authority found in 50 U.S.C. § 797.

- **Public Health Service Act (PHSA)** – The PHSA directs EPA to support State and local authorities in their preparedness and response activities regarding public health emergencies. This support could include providing training, technical advice, and direct assistance. The PHSA created the Environmental Health Service, whose mission included radiological health. This mission was carried out by the Bureau of Radiological Health

[1] The definition of "release" under CERCLA excludes releases of source, byproduct, or special nuclear material from a nuclear incident at certain facilities licensed by the Nuclear Regulatory Commission.

(BRH). Reorganization Plan Number 3 of 1970, which created EPA, transferred certain radiological health functions of the BRH to the EPA.

The *NRF*, like its predecessor, the *National Response Plan (NRP)*, supersedes the *Federal Radiological Emergency Response Plan (FRERP)* dated May 1, 1996.

DHS/Federal Emergency Management Agency (FEMA) is responsible for maintaining and updating this annex. DHS/FEMA accomplishes this responsibility through the Federal Radiological Preparedness Coordinating Committee (FRPCC).

When DHS initiates the response mechanisms of the *NRF*, including the Emergency Support Functions (ESFs), appropriate *NRF* Support Annexes, and this annex, existing interagency plans that address nuclear/radiological incident management (e.g., the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)) are incorporated as supporting plans and/or operational supplements to the *NRF*.

For incidents not led by DHS, other Federal agency response plans provide the primary Federal response protocols. In these cases, the Federal agency that is coordinating the Federal response may use the procedures outlined in the *NRF* and in appropriate *NRF* annexes to coordinate the delivery of Federal resources to State, tribal, and local governments, and to coordinate assistance among Federal agencies for incidents requiring Federal coordination.

Certain Federal agencies are authorized to respond directly to specific nuclear/radiological incidents. Nothing in this annex alters or impedes the ability of Federal departments and agencies to carry out their specific authorities and perform their responsibilities under law. This annex does not create any new authorities nor change any existing ones.

Federal response actions will be carried out commensurate with the appropriate health and safety laws and guidelines. For example, if the area is contaminated by radioactive material, and appropriate personal protective equipment and capabilities are not available, response actions may be delayed until the material has dissipated to a safe level for emergency response personnel or until appropriate personal protective equipment and capabilities arrive.

The Federal Government has established protective action guidance (PAGs) for radiological incidents. Specific PAGs have also been established for RDD/INDs.

Federal coordination centers and agency teams provide their own logistical support consistent with agreed-upon interagency execution plans. State, tribal, and local governments are encouraged to coordinate their efforts with the Federal effort, but maintain their own logistical support, consistent with applicable authorities and requirements.

The Federal response to any nuclear/radiological incident shall be coordinated with the State, tribal, and local government or the Federal agencies having jurisdiction over the area affected by the incident. Response to nuclear/radiological incidents affecting land owned by the Federal Government is coordinated with the agency responsible for managing that land to ensure that incident management activities are consistent with Federal statutes governing use and occupancy. In the case of tribal lands, tribal governments have a special relationship with the U.S. Government, and Federal, State, and local governments may have limited or no authority on specific tribal reservations. Further guidance is provided in the Tribal Relations Support Annex.

Headquarters Planning and Preparedness

Under existing regulations, the FRPCC provides a national-level forum for the development and coordination of radiological planning and preparedness policies and procedures. It also provides policy guidance for Federal radiological incident management activities in support of State, tribal, and local government radiological emergency planning and preparedness activities. The FRPCC is an interagency body consisting of the coordinating and cooperating agencies discussed in this annex, chaired by DHS/FEMA.

The FRPCC also coordinates research-study efforts of its member agencies related to State, tribal, and local government radiological emergency preparedness to ensure minimum duplication and maximum benefits to State and local governments. The FRPCC coordinates planning and validating requirements of each agency, reviewing integration requirements and incorporating agency-specific plans, procedures, and equipment into the response system.

As part of their preparedness for nuclear/radiological emergencies, Federal agencies participate in exercises to test and evaluate response plans.

Regional Planning and Preparedness

Coordinating agencies may have regional offices or field structures that provide a forum for information-sharing, consultation, and coordination of Federal agency regional awareness, prevention, preparedness, response, and recovery activities for radiological incidents. These regional offices may also assist in providing technical assistance to State and local governments and evaluating radiological plans and exercises.

Regional Assistance Committees (RACs) in the DHS/FEMA regions serve as the primary coordinating structures at the Federal regional level. RAC membership mirrors that of the FRPCC, and RACs are chaired by a DHS/FEMA regional representative. Additionally, States send representatives to RAC meetings and participate in regional exercise and training activities. The RACs provide a forum for information-sharing, consultation, and coordination of Federal regional awareness, prevention, preparedness, response, and recovery activities. The RACs also assist in providing technical assistance to State and local governments in evaluating radiological plans and exercises.

SITUATION

A nuclear/radiological incident may result from a deliberate act, an accident, or general mismanagement, and may center around different materials or industrial practices, including:

- Commercial nuclear facilities.
- Federal nuclear weapons facilities.
- Radioactive material sources, industrial uses, or technologically enhanced, naturally occurring radioactive material.
- Transportation incidents involving nuclear/radioactive material.
- Domestic nuclear weapons accidents.
- Foreign incidents involving nuclear or radioactive materials.

- Terrorism involving facilities or nuclear/radiological materials, including use of RDDs or INDs.

The most common nuclear/radiological incidents have to do with the loss, theft, or mismanagement of relatively small radioactive material sources, or technologically enhanced, naturally occurring radioactive material, where some exposure of individuals or dispersal into the environment occurs. These are handled at the local level with occasional Federal assistance. Generally, greater regulatory control, safeguards, and security accompany larger quantities of radioactive materials, which pose a greater potential threat to human health and the environment.

Virtually any facility or industrial practice (including transportation of materials) may be vulnerable to a deliberate act, such as terrorism, or an accident of some sort that could release radioactive material, including a fire. Major fixed facilities, such as Federal nuclear weapons facilities, commercial nuclear fuel cycle facilities (uranium enrichment, fuel fabrication, power reactors, and disposal), and some non-fuel cycle industries (such as radiation source and radiopharmaceutical manufacturers) pose a risk of accidents and could also be breached in a deliberate act, such as terrorism.

A radiological dispersal device is any device used to spread radioactive material into the environment with malicious intent. The harm caused by an RDD is principally contamination, and denial of use of the contaminated area, perhaps for many years. The costs to the Nation associated with an effective RDD could be very significant. Of greatest concern to U.S. security is the potential for a terrorist attack using a nuclear weapon. A nuclear device could originate directly from a nuclear state, be modified from preexisting weapons components, or be fashioned by terrorists from the basic fissile nuclear materials (uranium-235 or plutonium-239). Even a small nuclear detonation in an urban area could result in over 100,000 fatalities (and many more injured), massive infrastructure damage, and thousands of square kilometers of contaminated land.

PLANNING ASSUMPTIONS

Radiological incidents may not be immediately recognized as such until the radioactive material is detected or the health effects of radiation exposure are manifested in the population and identified by the public health community.

An act of nuclear or radiological terrorism, particularly an act directed against a large population center within the United States, can have major consequences that can overwhelm the capabilities of many local, tribal, and/or State governments to respond, and may seriously challenge existing Federal response capabilities.

An act or threat of nuclear or radiological terrorism will trigger concurrent activation of the Terrorism Law Enforcement and Investigation Annex.

A nuclear or radiological incident may require concurrent implementation of the NCP to address radiological, as well as chemical or biological, releases into the environment.

An incident involving the potential release of radioactivity may require implementation of protective measures, such as evacuation and shelter-in-place. State, tribal, and local governments have primary responsibility for implementing protective measures for the public.

An expeditious Federal response is required to mitigate the consequences of a nuclear/radiological incident. The Federal Government response to nuclear or radiological terrorist threats/incidents includes, but is not limited to, the following assumptions:

- The response to a radiological threat or actual incident requires an integrated Federal Government response.

- In the case of a nuclear terrorist attack, the plume may be dispersed over a large area over time, requiring response operations to be conducted over a multijurisdictional and/or multistate region.

- A terrorist attack may involve multiple incidents, and each location may require an incident response and a crime scene investigation simultaneously.

RESPONSIBILITIES

General

Incidents will be managed at the lowest possible level; as incidents change in size, scope, and complexity, the response will adapt to meet requirements, as described in the *NRF*. In accordance with HSPD--5, "the Secretary of Homeland Security is the principal Federal official for domestic incident management. The Secretary is responsible for coordinating Federal operations within the United States to prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies. The Secretary shall coordinate the Federal Government's resources utilized in response to or recovery from terrorist attacks, major disasters, or other emergencies . . ." Domestic incident management includes preventing, preparing for, responding to, and recovering from terrorist attacks (except for those law enforcement coordination activities assigned to the Attorney General and generally delegated to the Director of the FBI set forth in HSPD-5, paragraph 8. When exercising this role, the Secretary is supported by other coordinating agencies and cooperating agencies. For incidents wherein the Secretary is not fulfilling domestic incident management responsibilities, the coordinating agency will be the responsible agency for domestic incident management as defined by their authorities. Such incidents include, but are not limited to, loss of radiography sources, discovery of orphan radiological sources, and incidents/emergencies at nuclear facilities below the classification of General Emergency, as defined by the cognizant coordinating agency.

- For this annex, coordinating agencies provide the leadership, expertise, and authorities to implement critical and specific nuclear/radiological aspects of the response, and facilitate nuclear/radiological aspects of the response in accordance with those authorities and capabilities. The coordinating agencies are those Federal agencies that own, have custody of, authorize, regulate, or are otherwise assigned responsibility for the nuclear/radioactive material, facility, or activity involved in the incident. These Federal agencies have nuclear/radiological authorities, technical expertise, and/or assets for responding to the unique characteristics of nuclear/radiological incidents that are not otherwise described in the *NRF*. Coordinating agencies are listed in Table 1. The specific role of each coordinating agency will be determined by the scope of their particular authorities over relevant aspects of the incident, as described in more detail in this annex.

- Cooperating agencies include other Federal agencies that provide additional technical and resource support specific to nuclear/radiological incidents to DHS and the coordinating agencies. The capabilities provided by cooperating agencies are described in Table 5 at the end of this annex.

- Other Federal agencies may also provide support to DHS and the coordinating agency in accordance with the ESF and Support Annexes.

Coordinating Agencies

For nuclear/radiological incidents, the coordinating agencies include the following Federal agencies:

- Department of Defense (DOD) or Department of Energy (DOE), as appropriate, for incidents involving nuclear/radiological materials or facilities owned or operated by DOD or DOE.
- DOD or DOE, as appropriate, for incidents involving a nuclear weapon, special nuclear material, and/or classified components under DOD or DOE custody.
- National Aeronautics and Space Administration (NASA) for nuclear material under NASA custody.
- The NRC, for incidents involving materials or facilities licensed by the NRC or Agreement States.
- DHS, generally through Customs and Border Protection (CBP), for incidents involving the inadvertent import of radioactive materials as well as any other incidents where radioactive material is detected at borders.
- EPA or DHS/USCG, as appropriate, for environmental response and cleanup for incidents not otherwise covered above.
- DHS for all deliberate attacks involving nuclear/radiological facilities or materials, including RDDs and INDs.

Table 1 provides an overview of the coordinating agencies and the types of nuclear/radiological incidents in which they will be involved. The specific responsibilities of coordinating agencies are further described in Table 2.

Table 1: Coordinating Agencies for Nuclear/Radiological Incidents

NOTE: When exercising domestic incident management responsibilities, the Secretary of Homeland Security is supported by other coordinating agencies and cooperating agencies. For incidents wherein the Secretary is not fulfilling domestic incident management responsibilities, the coordinating agency will be the responsible agency for domestic incident management as defined by their authorities.

Nuclear/Radiological Facilities or Materials Involved in Incident	Coordinating Agency
Nuclear facilities: (1) Owned or operated by DOD or DOE (2) Licensed by NRC or Agreement State (3) Not licensed, owned, or operated by a Federal agency or an Agreement State, or currently or formerly licensed facilities for which the owner/operator is not financially viable or is otherwise unable to respond	(1) DOD or DOE (2) NRC (3) EPA
Radioactive materials being transported: (1) Materials shipped by or for DOD or DOE[2] (2) Shipment of NRC or Agreement State-licensed materials (3) Shipment of materials in certain areas of the coastal zone that are not licensed or owned by a Federal agency or Agreement State (see DHS/USCG list of responsibilities for further explanation of "certain areas") (4) All others	(1) DOD or DOE (2) NRC (3) DHS/USCG (4) EPA
Radioactive materials in space vehicles impacting within the United States: (1) Managed by NASA or DOD (2) Not managed by DOD or NASA and impacting certain areas of the coastal zone (3) All others	(1) NASA or DOD (2) DHS/USCG (3) EPA
Foreign, unknown, or unlicensed material:[3] (1) Incidents involving inadvertent import of radioactive materials (2) Incidents involving foreign or unknown sources of radioactive material in certain areas of the coastal zone (3) All others	(1) DHS/CBP (2) DHS/USCG (3) EPA
Nuclear weapons	DOD or DOE (based on custody at time of incident)
All deliberate attacks involving nuclear/radiological facilities or materials, including RDDs or INDs [4,5]	DHS

[2] The coordinating agency is either DOD or DOE, depending on which of these agencies has custody of the material at the time of the incident.
[3] The DHS Domestic Nuclear Detection Office (DNDO) coordinates the adjudication of unresolved radiation detection alarms (see Table 5 for additional information).
[4] For deliberate attacks, DHS assumes its domestic incident management responsibilities under HSPD-5, paragraph 4, and is also the coordinating agency for implementing the activities in this annex with respect to deliberate attacks.
[5] For deliberate attacks, DOJ assumes those law enforcement coordination activities under HSPD-5, paragraph 8.

Table 2 below presents the specific responsibilities of each coordinating agency, as specified by statutory authorities or other mandating doctrine.

Table 2: Coordinating Agency-Specific Key Responsibilities for a Nuclear/Radiological Incident

Agency	Description
Department of Defense	As indicated in Table 1, DOD is the coordinating agency for Federal actions related to radiological incidents involving: nuclear weapons in DOD custody; DOD facilities, including U.S. nuclear-powered ships; or material otherwise under DOD jurisdiction (e.g., transportation of material shipped by or for DOD). Under CERCLA, Executive Order 12580, and the NCP, DOD is responsible for hazardous substance responses to releases on or from DOD facilities or vessels under the jurisdiction, custody, or control of DOD, including transportation-related incidents. For responses under these circumstances, DOD provides a Federal OSC responsible for taking all CERCLA response actions, which includes on-site and off-site response actions (40 CFR 300.120(c) and 40 CFR 300.175(b)(4)). For incidents where the incident is on, or where the sole source of the nuclear/radiological release is from, any facility or vessel under DOD jurisdiction, custody, or control, DOD is responsible for: • Mitigating the consequences of an incident. • Providing notification and appropriate protective action recommendations to State, tribal, and/or local government officials. • Minimizing the radiological hazard to the public. For radiological incidents involving a nuclear weapon, special nuclear material, and/or classified components that are in DOD custody, DOD may establish a National Defense Area. DOD will coordinate with State and local officials to ensure appropriate public health and safety actions are taken outside the NDA. DOD will lead the overall response to safeguard national security information and/or restricted data, or equipment and material. DOD may also include lands normally not under DOD control as part of the established NDA for the duration of the incident. DOD coordinates the Federal response for incidents involving the release of nuclear/radioactive materials from DOD space vehicles or joint space vehicles with significant DOD involvement. A joint venture is an activity in which the U.S. Government has provided extensive design/financial input; has provided and maintains ownership of instruments, spacecraft, or the launch vehicle; or is intimately involved in mission operations. A joint venture with a foreign nation is not created by simply selling or supplying material to a foreign country for use in its spacecraft. In the event that DHS assumes overall management of the Federal response under HSPD-5 to an accidental or inadvertent incident involving DOD facilities or materials, DOD will support DHS under the *NRF* and the *National Incident Management System (NIMS)*, including acting as the coordinating agency for this annex. DOD will manage the response within the boundaries of the DOD facility or NDA.

<table>
<tr><th>Agency</th><th>Description</th></tr>
<tr><td>Department of Energy</td><td>
As indicated in Table 1, DOE is the coordinating agency for the Federal response to a nuclear/radiological release at a DOE facility or involving DOE materials (e.g., during the use, storage, and shipment of a variety of radioactive materials; the shipment of spent reactor fuel; the production, assembly, and shipment of nuclear weapons and special nuclear materials; the production and shipment of radioactive sources for space ventures; and the storage and shipment of radioactive and mixed waste).
Under CERCLA, Executive Order 12580, and the NCP, DOE is responsible for hazardous substance responses to releases on or from DOE facilities or vessels under the jurisdiction, custody, or control of DOE, including transportation-related incidents. For responses under these circumstances, DOE provides a Federal OSC responsible for taking all CERCLA response actions, which includes on-site and off-site response actions (40 CFR 300.120(c) and 40 CFR 300.175(b)(5)).
For incidents at nuclear/radiological facilities that it owns or operates, or incidents involving transportation of DOE nuclear/radiological materials, DOE is responsible for:

Mitigating the consequences of an incident.
Providing notification and appropriate protective action recommendations to State, tribal, and/or local government officials.
Minimizing the radiological hazard to the public.

For radiological incidents involving a nuclear weapon, special nuclear material, and/or classified components that are in DOE custody, DOE may establish a National Security Area (NSA). DOE will coordinate with State and local officials to ensure appropriate public health and safety actions are taken outside the NSA. DOE will lead the overall response to safeguard national security information and/or restricted data, or equipment and material. DOE may also include lands normally not under DOE control as part of the established NSA for the duration of the incident.
DOE Accident Response Group (ARG) teams will deploy to mitigate the consequences of a nuclear weapon accident in conjunction with specialized assets from DOD, regardless of whether DOE or DOD has custody of the weapon or special nuclear material.
In the event that DHS assumes overall management of the Federal response under HSPD-5 to an accidental or inadvertent incident involving DOE facilities or materials, DOE will support DHS under the NRF and NIMS, including acting as the coordinating agency for this annex. DOE will manage the response within the boundaries of the DOE facility or NSA.
</td></tr>
</table>

Agency	Description
Department of Homeland Security	The Secretary of Homeland Security is the principal Federal official for domestic incident management. Domestic incident management includes preventing, preparing for, responding to, and recovering from terrorist attacks (except for those law enforcement coordination activities assigned to the Attorney General and generally delegated to the Director of the FBI), major disasters, or other emergencies. For deliberate attacks, DHS assumes its domestic incident management responsibilities under HSPD-5, paragraph 4, and is also the coordinating agency for implementing the activities in this annex with respect to deliberate attacks. Under the Homeland Security Act, DHS has control of the Nuclear Incident Response Team (NIRT). DHS/CBP coordinates the Federal response for incidents involving the inadvertent import of radioactive material. For incidents at the border, DHS/CBP maintains radiation detection equipment and nonintrusive inspection technology at ports of entry and Border Patrol checkpoints to detect the presence of radiological substances transported by persons, cargo, mail, or conveyance arriving from foreign countries.
DHS/U.S. Coast Guard	As indicated in Table 1, DHS/USCG is the coordinating agency for the Federal response to incidents involving the release of nuclear/radioactive materials that occur in certain areas of the coastal zone, including: • Release from transportation incidents involving the release of nuclear/radioactive materials that are not licensed or owned by a Federal agency or Agreement State. • Incidents involving space vehicles not managed by DOD or NASA that impact certain areas of the coastal zone. • Incidents involving foreign or unknown sources of radioactive material. "Certain areas" of the coastal zone, for the purposes of this document, means the following areas of the coastal zone ("coastal zone" as defined by the NCP): • Vessels, as defined in 33 CFR 160. • Areas seaward of the shoreline to the outer edge of the Economic Exclusion Zone. • Within the boundaries of the following waterfront facilities subject to the jurisdiction of DHS/USCG: those regulated by 33 CFR 126 (Dangerous cargo handling), 127 (LPG/LNG), 128 (Passenger terminals), 140 (Outer continental shelf activities), 154-156 (Waterfront portions of oil and hazmat bulk transfer facilities – delineated as per the NCP), 105 (Maritime security – facilities). For incidents that have cross-boundary impacts, there will be only one OSC during the course of a response incident and the agencies involved should reference the NCP [40 CFR 300.140(b)] to determine which agency will assume the lead. DHS/USCG will give prime consideration to the area vulnerable to the greatest threat in determining whether to transition to another coordinating agency. DHS/USCG coordinates agency response for these incidents during the prevention and emergency response phase, and transfers responsibility for later response phases to the appropriate agency.

Agency	Description
Environmental Protection Agency	As indicated in Table 1, EPA is the coordinating agency for the Federal environmental response to incidents that occur at facilities not licensed, owned, or operated by a Federal agency or an Agreement State, or currently or formerly licensed facilities for which the owner/operator is not financially viable or is otherwise unable to respond. EPA is also the coordinating agency for the Federal environmental response to incidents involving the release of nuclear/radioactive materials that occur in the inland zone and in areas of the coastal zone not addressed by DHS/USCG, including: • Transportation incidents involving the release of nuclear/radioactive materials that are not licensed or owned by a Federal agency or Agreement State. • Incidents involving space vehicles not managed by DOD or NASA or addressed by DHS/USCG. • Incidents involving foreign, unknown, or unlicensed radiological sources that have actual, potential, or perceived radiological consequences in the United States or its territories, possessions, or territorial waters, and that are not addressed by DHS/CBP or DHS/USCG. When acting as the coordinating agency, EPA coordinates the Federal environmental response. For a DHS-led Federal response, EPA will generally be providing that response coordination support to DHS through this annex and ESF #10 – Oil and Hazardous Materials Response. For an EPA-led Federal response, EPA will generally be responding under the NCP (which is an operational supplement to the *NRF*). For some incidents, EPA may also be relying upon its Public Health Service Act authorities.
National Aeronautics and Space Administration	As indicated in Table 1, NASA is the coordinating agency for the Federal response to incidents involving the release of nuclear/radioactive materials from NASA space vehicles or joint space vehicles with significant NASA involvement. For radiological incidents involving nuclear material in NASA custody, NASA may establish an NSA, and will coordinate with State and local officials to ensure appropriate public health and safety actions are taken outside the NSA. In the event that DHS assumes overall management of the Federal response under HSPD-5 to an accidental or inadvertent incident involving NASA space vehicles, NASA will support DHS under the *NRF* and *NIMS*, including acting as the coordinating agency for this annex. NASA will manage the response within the boundaries of the NSA.

Agency	Description
Nuclear Regulatory Commission	As indicated in Table 1, the NRC is the coordinating agency for incidents at or caused by a facility or an activity that is licensed by the NRC or an Agreement State. These facilities include, but are not limited to, commercial nuclear power plants, fuel cycle facilities, DOE-owned gaseous diffusion facilities operating under NRC regulatory oversight, independent spent fuel storage installations, radiopharmaceutical manufacturers, and research reactors. The NRC licensee primarily is responsible for taking action to mitigate the consequences of an incident and providing appropriate protective action recommendations to State, local, and/or tribal government officials. The NRC: • Performs an independent assessment of the incident and potential off-site consequences and, as appropriate, provides recommendations concerning any protective measures. • Performs oversight of the licensee, to include monitoring, evaluation of protective action recommendations, advice, assistance, and, as appropriate, direction. • Dispatches, if appropriate, an NRC site team of technical experts to the licensee's facility. Under certain extraordinary situations involving public health/safety or national defense/security, the NRC may order the transfer of special nuclear materials and/or the operation of certain facilities regulated by the NRC. The NRC closely coordinates its actions with State and local government officials during an incident by providing advice, guidance, and support as needed. In the event that DHS assumes overall management of the Federal response under HSPD-5 to an accidental or inadvertent incident involving an NRC-regulated facility, the NRC will support DHS under the *NRF* and *NIMS*, including acting as the coordinating agency for this annex.

KEY FEDERAL RADIOLOGICAL RESOURCES/ASSETS

In carrying out their responsibilities, DHS and the coordinating agencies may request specialized assets for nuclear/radiological response. Some of the assets are provided by individual cooperating agencies (through ESF activations or their own authorities), while others may be interagency. Key specialized Federal nuclear/radiological assets and teams are described below, while the procedures for activating these resources are described in the Concept of Operations section of this annex.

- **Federal Radiological Monitoring and Assessment Center (FRMAC)** – The FRMAC is responsible for coordinating all environmental radiological monitoring, sampling, and assessment activities for the response. The FRMAC is a DOE-led interagency asset that is available on request to respond to nuclear/radiological incidents. DOE leads the FRMAC for the initial response, then transitions FRMAC leadership to EPA for site cleanup. The FRMAC is established at or near the incident location in coordination with DHS, the coordinating agency, other Federal agencies, and State, tribal, and local authorities.

  A FRMAC normally includes representation from DOE, EPA, the Department of Commerce, the DHS National Communications System, the U.S. Army Corps of Engineers (USACE), and other Federal agencies as needed. Regardless of who is designated as the coordinating agency, when the FRMAC is activated, DOE, through the FRMAC or DOE Consequence Management Home Team (CMHT), coordinates all Federal environmental and agricultural

radiological monitoring and assessment activities for the initial phases of the response. When the FRMAC is transferred to EPA, EPA assumes responsibility for coordination of radiological monitoring and assessment activities. (See the Recovery section of this annex for information on the FRMAC transfer.)

Some participating Federal agencies have radiological planning and emergency responsibilities as part of their statutory authority. The monitoring and assessment activity coordinated by the FRMAC does not alter these responsibilities but complements them by providing for coordination of the Federal radiological monitoring and assessment response activities.

- **DOE Aerial Measuring System (AMS)** – The DOE AMS characterizes ground-deposited radiation from aerial platforms. These platforms include fixed-wing and rotary-wing aircraft with radiological measuring equipment, computer analysis of aerial measurements, and equipment to locate lost radioactive sources, conduct aerial surveys, or map large areas of contamination.

- **DOE Accident Response Group (ARG)** – The DOE ARG response element comprises scientists, technical specialists, crisis managers, and equipment ready to respond to the scene of a U.S. nuclear weapon accident to make the weapon safe for shipment.

- **DOE National Atmospheric Release Advisory Center (NARAC)** – The DOE NARAC provides a computer-based emergency preparedness and response predictive modeling capability. The NARAC is an off-site resource that supports the incident response remotely. NARAC provides real-time computer predictions of the atmospheric transport of material from radioactive releases and of the downwind effects on health and safety. When measurement data become available, they are used to improve model predictions.

- **DOE Radiation Emergency Assistance Center/Training Site (REAC/TS)** – The DOE REAC/TS provides medical advice, specialized training, and on-site assistance for the treatment of all types of radiation exposure accidents. Additionally, through the Cytogenetic Biodosimetry Laboratory (CBL), REAC/TS provides for postexposure evaluation of radiation dose received.

- **DOE Radiological Assistance Program (RAP) Team** – DOE RAP teams are located at various DOE Operations Offices, Site Offices, and National Laboratories. They can be dispatched to a radiological incident from Regional DOE Offices in response to a radiological incident. RAP teams provide first-responder radiological assistance to protect the health and safety of the general public, responders, and the environment and to assist in the detection, identification and analysis, and response to events involving radiological/nuclear material. Deployed RAP teams provide traditional field monitoring and assessment support as well as a search capability.

- **Nuclear Incident Response Team (NIRT)** – The NIRT consists of (1) the DOE resources described above and (2) EPA entities that perform such support functions (including radiological emergency response functions) and related functions. Under the Homeland Security Act of 2002, DHS has the authority to activate NIRT assets. When activated, the NIRT operates under DHS direction, authority, and control. When not operating as part of the NIRT, these assets remain under the control of the parent agency.

- **The Interagency Modeling and Atmospheric Assessment Center (IMAAC)** – The IMAAC is an interagency center responsible for production, coordination, and dissemination of the Federal consequence predictions for an airborne hazardous material release. Through a partnership of the Departments of Homeland Security, Energy, Defense, and Commerce (through the National Oceanic and Atmospheric Administration (NOAA)), EPA, NASA, and

NRC, the IMAAC provides the single Federal atmospheric prediction of hazardous material concentration to all levels of the Incident Command. The IMAAC is an off-site resource that supports the incident response remotely. The NARAC is the interim IMAAC.

- **Advisory Team for Environment, Food, and Health** – The Advisory Team includes representatives from EPA, the Department of Agriculture (USDA), the Food and Drug Administration (FDA), the Centers for Disease Control and Prevention (CDC), and other Federal agencies. The Advisory Team develops coordinated advice and recommendations on environmental, food, health, and animal health matters for the Incident Command/Unified Command (IC/UC), DHS, the Joint Federal Office (JFO) Unified Coordination Group, the coordinating agency, and/or State, tribal, and local governments, as appropriate. The Advisory Team uses information provided by the IMAAC, FRMAC, and other relevant sources. The Advisory Team provides Federal advice in matters related to the following:

    - Environmental assessments (field monitoring) required for developing recommendations with advice from State, tribal, and local governments and/or the FRMAC.
    - Protective Action Guides (PAGs) and their application to the emergency.
    - Protective Action Recommendations (PARs) using data and assessment from the FRMAC.
    - Protective actions to prevent or minimize contamination of milk, food, and water, and to prevent or minimize exposure through ingestion.
    - Recommendations for minimizing losses of agricultural resources from radiation effects.
    - Availability of food, animal feed, and water supply inspection programs to ensure wholesomeness.
    - Relocation, reentry, and other radiation protection measures prior to recovery.
    - Recommendations for recovery, return, and cleanup issues.
    - Health and safety advice or information for the public and for workers.
    - Estimated effects of radioactive releases on human health and the environment.
    - Other matters, as requested by the IC or coordinating agency.

- **EPA Radiological Emergency Response Team (RERT)** – The EPA RERT provides resources, including personnel, specialized equipment, technical expertise, and laboratory services to aid coordinating and cooperating agencies and State, tribal, and local response organizations in protecting the public and the environment from unnecessary exposure to ionizing radiation from radiological incidents. The RERT is a designated Special Team under the NCP. It may become part of the FRMAC if one is established. The RERT provides the following:
    - Monitoring, sampling, laboratory analyses, and data assessments using field emergency response assets.
    - Technical advice and assistance for containment, cleanup, restoration, and recovery following a radiological incident.
    - Assistance in the development and implementation of a long-term monitoring plan and long-term recovery plans.
    - Coordination with fixed laboratory assets for indepth analysis and evaluation of large numbers of site-specific emergency response samples.

- **EPA RadNet** – The EPA RadNet comprises a system of fixed and deployable radiation monitoring stations. The RadNet fixed monitoring stations provide a nationwide environmental monitoring network for assessment of nationwide impacts from a radiological incident. The deployable component can provide site-specific emergency monitoring for further assessment of localized impacts during radiological emergencies.

Although there are other assets that are capable of being used in nuclear/radiological incidents, their primary function is addressed elsewhere in the *NRF* or the annexes.

CONCEPT OF OPERATIONS

This concept of operations is applicable to potential and actual radiological/nuclear incidents requiring Federal coordination as delineated in this annex.

General

The owner/operator of a nuclear/radiological facility or materials (e.g., DOE, DOD, or NRC licensee) primarily is responsible for mitigating the consequences of an incident; providing notification and appropriate protective action recommendations to State, local, and/or tribal government officials; and minimizing the radiological hazard to the public. For incidents involving fixed facilities, the owner/operator has primary responsibility for actions within the facility boundary and may also have responsibilities for response and recovery activities outside the facility boundary under applicable legal obligations (e.g., contractual; licensee; CERCLA). For areas surrounding a nuclear/radiological incident location, State, tribal, and local governments have primary responsibility for protecting life, property, and the environment. This does not, however, relieve nuclear/radiological facility or material owners/operators from applicable legal obligations.

State, tribal, and local governments and owners/operators of nuclear/radiological facilities or activities should request assistance through established regulatory communication and response protocols. However, they may request assistance directly from DHS, other Federal agencies, and/or State governments with which they have preexisting arrangements or relationships, providing that the agency with regulatory authority is also notified.

State, tribal, and local governments are encouraged to integrate their radiological monitoring and assessment activities with the FRMAC.

Notification

The owner/operator of a nuclear/radiological facility or owner/transporter of nuclear/radiological material is generally the first to become aware of an incident and notifies State, tribal, and local authorities and the coordinating agency.

Federal, State, tribal, and local governments that become aware of a radiological incident should notify the coordinating agency and the DHS National Operations Center (NOC) at 202-282-8101 and comply with other appropriate statutory requirements for notification. For example, releases of reportable quantities of any listed hazardous materials as described within 40 CFR Part 302 must be reported to the National Response Center at 1-800-424-8802. Further, State, tribal, and local law enforcement agencies should continue to contact the local FBI/Joint Terrorism Task Force regarding ongoing terrorist activities, events, instances, or investigations. The coordinating agency provides notification of a radiological incident to the NOC and other Federal agencies, as appropriate. If a State requests radiological assistance directly from a Federal agency for a nuclear/radiological incident that falls under the jurisdiction of another coordinating agency, that Federal agency shall notify the coordinating agency of the request.

Activation

Once notified, the coordinating agency initiates response in accordance with its authorities. DHS reviews the situation and determines whether to assume Federal leadership for the overall response in accordance with the *NRF*.

Coordinating agencies and cooperating agencies provide representatives to the *NRF* elements (e.g., JFO, NOC, etc.) when appropriate. For Stafford Act incidents, DHS/FEMA may issue mission assignments to Federal agencies to support such activities.

If DHS does not assume Federal leadership for the response, a coordinating agency may request that DHS activate *NRF* elements to support the response. The coordinating agency may request assistance from other Federal agencies.

The coordinating agency also will be represented in appropriate positions within the Command Staff in the IC/UC structure (as defined by *NIMS*), and coordinates Federal radiological response activities at appropriate field facilities.[6] Coordinating agencies and cooperating agencies provide personnel to other sections of the IC/UC as needed.

For any nuclear/radiological incident, the coordinating and cooperating agencies may establish a field facility; assist State, tribal, and local response organizations; monitor and support owner/operator activities (when there is an owner or operator); provide technical support to the owner/operator, if requested; and serve as a Federal source of information about incident conditions.

Table 3 below summarizes the activation process for some of the key Federal radiological/nuclear assets.

Table 3: Activation of Key Assets for Nuclear/Radiological Incidents

Asset	Activation Process
IMAAC	DHS, coordinating agencies, and the authorized IMAAC requestors (as designated in the IMAAC Standard Operating Procedures) may request IMAAC activation directly from the IMAAC or from the NOC Watch at 202-282-8101. The NOC Watch ensures that Federal agencies are notified when the IMAAC has been activated for the purpose of generating the single and interagency coordinated Federal prediction of atmospheric dispersions and their consequences.
Advisory Team	DHS, coordinating agencies, and State, tribal, and local governments may request support from the Advisory Team by contacting the CDC Director's Emergency Operations Center (EOC) at 770-488-7100. DOE will request activation of the Advisory Team whenever the FRMAC is activated.
FRMAC and DOE Assets (AMS, ARG, RAP, REAC/TS, NARAC, CMHT)	Coordinating agencies and State, tribal, and local governments may request a FRMAC or other support from DOE or DHS. The FRMAC and all other DOE National Nuclear Security Administration (NNSA) assets may be requested through the DOE 24-hour Watch Office at 202-586-8100. Requests for RAP teams may also be directed to the appropriate Regional DOE Office. DOE may respond to a request for assistance by initially dispatching a RAP team. If the situation requires more assistance than a RAP team can provide, DOE alerts or activates additional resources.
NIRT	The NIRT is activated when DHS, in consultation with EPA and DOE, determines that the severity of an incident warrants the NIRT assets. The NOC will notify EPA and DOE when the NIRT is activated.
RERT	DHS and coordinating agencies may request support from the EPA RERT by contacting the National Response Center at 1-800-424-8802.

[6] Appropriate field facilities may include an Incident/Area Command Post, Emergency Operations Center, Emergency Operations Facility, Emergency Control Center, etc.

ICS Implementation

The initial response to domestic incidents is typically handled at the local level. Local responders are responsible for implementing an Incident Command System (ICS) to manage the incident response. Federal agencies will integrate into the Incident Command (IC) in support of the local jurisdictions. Most incidents under this annex will be multiagency/multijurisdictional responses and the ICS Command function will be managed by a Unified Command (UC).

The coordinating agency is expected to participate in the IC/UC at the highest level (e.g., at the Area Command level if established). Other agencies may also participate in the IC/UC when consistent with ICS principles.

The key Federal radiological assets will integrate into the IC/UC as appropriate. Specifically, the RAP team incorporates into the Operations Section of the IC/UC.

Because the primary function of the FRMAC is to provide information for planning incident response operations, planning for FRMAC activities is expected to incorporate into IC/UC in the Planning Section, consistent with ICS principles. FRMAC personnel will work within the ICS to develop the Monitoring and Sampling Plan and ensure that it is reflected in and consistent with the Incident Action Plan (IAP). The AMS normally reports to the FRMAC and operates in accordance with the IAP. The FRMAC structure will remain flexible and will be tailored to specific incident requirements.

During the initial phases of the incident, when DOE is responsible for the FRMAC, it will be established organizationally as a discrete unit within the IC/UC structure to coordinate all radiological monitoring and assessment activities in support of State, tribal, and local authorities, the coordinating agency, and DHS.

The Advisory Team is expected to integrate into the Planning Section to provide technical expertise to the IC/UC and coordinating agency. The Advisory Team may also provide liaisons to and/or coordinate with the JFO and State, tribal, and local government EOCs, as needed.

RESPONSE ACTIVITIES

Table 4 presents the specific capabilities and responsibilities carried out by coordinating agencies and cooperating agencies to support State, tribal, and local activities during the response.

Table 4: Nuclear/Radiological Incident Response Activities

Response Activity	Federal Agency Capabilities/Responsibilities
Incident Security	• DOD, DOE, or NASA may establish NDAs or NSAs for special nuclear materials under their control, to safeguard classified information and/or restricted data, or equipment and material, and place non-Federal lands under Federal control for the duration of the incident. DOD, DOE, or NASA, as appropriate, coordinates security in and around these locations, as necessary. • For incidents at other Federal or private facilities, the owner/operator provides security within the facility boundaries. If a release of radioactive material occurs beyond the facility boundaries, State, tribal, or local governments provide security for the release area. • State, tribal, and local governments provide security for radiological incidents occurring on public lands (e.g., a transportation incident) other than within NDAs or NSAs. • ESF #13 – Public Safety and Security may be activated to provide additional security resources and capabilities (e.g., for an RDD/IND).
Unknown Material Identification	The DHS Domestic Nuclear Detection Office (DNDO) Joint Analysis Center (JAC) may respond to a State, tribal, local, or coordinating agency request for assistance in identifying an unknown nuclear/radiological material. The DNDO coordinates the technical adjudication of a radiation detection alarm and recommends technical Federal asset responses as required.
Atmospheric Plume Modeling	• When DHS coordinates the overall Federal response, the IMAAC generates the single and interagency coordinated Federal prediction of atmospheric dispersions and their consequences. The IMAAC predictions are used for risk management decisions, public information, and operational response. The IMAAC may also generate predictions for other incidents requiring Federal coordination. • Plume models are initially generated using default assumptions and then are refined over time as actual data from on-scene responders become available. • The coordinating agency is responsible for ensuring the outputs from the IMAAC are shared with all appropriate response organizations.

Response Activity	Federal Agency Capabilities/Responsibilities
Environmental Monitoring and Sampling for Characterization and Reentry	• Federal responders may provide radiological monitoring and assessment data directly to State, tribal, and local governments as requested in support of protective action decisionmaking. • If the FRMAC is not stood up, the coordinating agency assumes responsibility for coordinating the Federal monitoring and assessment activities with State, tribal, and local governments. Support may be provided to the coordinating agency by ESF #10 when appropriate. • When a FRMAC is established, the FRMAC assumes responsibility for coordinating Federal monitoring and assessment activities. DOE will provide a mechanism for transmitting data to and from the FRMAC within *NIMS*/ICS protocols. Until the FRMAC is operational, Federal first responders continue to provide data directly to State, tribal, and local governments, and coordinate radiological monitoring and assessment data with the DOE Consequence Management Home Team (CMHT) or the Consequence Management Response Team (CMRT). • When requested, DOE and other Federal agencies may provide radiation safety support for reentry to critical infrastructure and for other critical activities. • The coordinating agency is responsible for ensuring that all outputs from the FRMAC are shared with all appropriate response organizations. • DOE initially has the FRMAC lead, but the FRMAC lead will transition to EPA for recovery/remediation. • For incidents involving terrorism, any participating Federal agency may raise issues regarding the sharing of sensitive data for responder and public safety that cannot be resolved at the Incident Command level to the Unified Coordination Group for resolution.
Emergency Worker Monitoring	• Each response agency has the responsibility to monitor the safety of its own workers. • The Occupational Safety and Health Administration provides support and regulatory oversight, as necessary, through the Worker Safety and Health Support Annex.
Protective Action Recommendations	• Federal PARs may include advice and assistance on measures to avoid or reduce exposure of the public to radiation from a release of radioactive material. This includes advice on emergency actions such as sheltering, evacuation, prophylactic use of potassium iodide, and administration of other pharmaceutical countermeasures. It also includes advice on long-term measures, such as food restrictions, temporary relocation, or permanent resettlement, to avoid or minimize exposure to residual radiation or exposure through the ingestion pathway. • Data in support of health and safety will be shared among response agencies prior to development of formal PARs. Incident-specific Federal PARs are developed by the Advisory Team and are largely based on EPA's PAGs for radiological incidents. • Federal PARs are coordinated through the IC/UC (which includes the coordinating agency) and multiagency coordination groups. The coordinating agency is responsible for ensuring that all outputs from the Advisory Team are shared with appropriate response organizations. • State, tribal, and local governments are responsible for implementing protective actions as they deem appropriate.

Response Activity	Federal Agency Capabilities/Responsibilities
Population Monitoring	• The Department of Health and Human Services (HHS), through ESF #8 – Public Health and Medical Services and in consultation with the coordinating agency, coordinates Federal support for external monitoring of people. • HHS assists local and State health departments in establishing a registry of potentially exposed individuals, performing dose reconstruction, and conducting long-term monitoring of this population for potential long-term health effects.
Laboratory Analysis	Federal agencies provide laboratory capabilities for certain types of analyses. Examples of capabilities include FDA (HHS) for food and agriculture analysis; CDC (HHS) for bioassays; and EPA and DOE for environmental samples.
Environmental Monitoring and Sampling for Cleanup Verification	• Responsibility for this activity is defined by applicable laws and regulations, and is typically the responsibility of nuclear/radiological facility and material owners and operators. • EPA may provide support under ESF #10 when appropriate.
Release of Public Information	For incidents in which DHS leads the overall Federal response (under HSPD-5), DHS/ESF #15 – External Affairs coordinates the release of Federal public information regarding the incident. Otherwise, the coordinating agency is responsible for the release of Federal public information.
Population Decontamination	• Decontamination of possibly affected victims is accomplished locally and is the responsibility of State, tribal, and local governments. • Federal resources are provided at the request of, and in support of, the affected State(s). HHS, through ESF #8 and in consultation with the coordinating agency, coordinates Federal support for population decontamination. • HHS assists and supports State, tribal, and local governments in performing monitoring for internal contamination and administering available pharmaceuticals for internal decontamination, as deemed necessary by State health officials.
Emergency Worker Decontamination	• The FRMAC provides support for decontamination of Federal, State, and local emergency responders integrating into the FRMAC. • Agencies are responsible for decontamination of their own workers not integrated in the FRMAC.
Response Equipment Decontamination	• The FRMAC provides support for decontamination of Federal, State, and local equipment integrating into the FRMAC. • Agencies are responsible for decontamination of their own equipment that is not integrated in the FRMAC.
Fatality Management	Fatality management is primarily a State responsibility. HHS coordinates the Federal support to the States.
Contaminated Animal Management	• USDA provides support for assessment, control, and decontamination of contaminated animals, including companion animals, livestock, poultry, and wildlife. • USDA provides support for stabilization and disposition of contaminated animal carcasses, with additional support from ESF #3 – Public Works and Engineering and ESF #10.

Response Activity	Federal Agency Capabilities/Responsibilities
Contaminated Agricultural Product Management	USDA provides support under ESF #11 – Agriculture and Natural Resources, with additional support from ESF #3 and ESF #10 for the assessment, stabilization, and disposal of contaminated animal products and plant materials including food, feed, fiber, and crops.
Radioactive Waste Storage and Disposal	• Responsibility for this activity is defined by applicable laws and regulations, and is typically the responsibility of nuclear/radiological facility and material owners and operators. • EPA may provide support under ESF #10 when appropriate. • DOD/USACE and other Federal agencies may provide additional support as needed for RDD/IND incidents.
Contaminated Debris Removal	• Responsibility for this activity is defined by applicable laws and regulations, and is typically the responsibility of nuclear/radiological facility and material owners and operators. • Support is provided as a joint effort between ESF #3 (DOD/USACE) and ESF #10 (EPA).
Environmental Remediation	• Responsibility for this activity is defined by applicable laws and regulations, and is typically the responsibility of nuclear/radiological facility and material owners and operators. • EPA may provide support under ESF #10 when appropriate. • DOD/USACE and other Federal agencies may provide additional support as needed for RDD/IND incidents.

RECOVERY

When DHS is coordinating the Federal response, it coordinates, in concert with cognizant State, tribal, and local governments, overall Federal recovery pursuant to the *NRF*. The coordinating agency maintains responsibility for managing the Federal technical radiological cleanup activities in accordance with its statutory authorities, responsibilities and *NRF* mechanisms.

For all other radiological incidents, the coordinating agency coordinates environmental remediation/cleanup in concert with cognizant State, tribal, and local governments, and owners/operators, as applicable. While retaining technical lead for these activities, the coordinating agency may request support from a cooperating agency that has cleanup/recovery experience and capabilities (e.g., EPA, USACE).

State, tribal, and local governments primarily are responsible for planning the recovery of the affected area. (The term "recovery," as used here, encompasses any action dedicated to the continued protection of the public and resumption of normal activities in the affected area.) Recovery planning generally does not take place until the initiating conditions of the incident have stabilized and immediate actions to protect public health, safety, and property are accomplished. Upon request, the Federal Government assists State, tribal, and local governments with developing and executing recovery plans.

Private owners/operators have primary responsibility for recovery planning activities and eventual cleanup within their facility boundaries and may have responsibilities for recovery activities outside their facility under applicable legal obligations (e.g., contractual, licensee, CERCLA).

The DOE FRMAC Director works closely with the FRMAC's Senior EPA representative to facilitate a smooth transition of the Federal radiological monitoring and assessment coordination

responsibility to EPA at a mutually agreeable time, and after consultation with DHS, the Unified Coordination Group, and State, tribal, and local governments. The following conditions are intended to be met prior to transfer:

- The immediate emergency condition is stabilized;
- Off-site releases of radioactive material have ceased, and there is little or no potential for further unintentional off-site releases;
- The off-site radiological conditions are evaluated and the immediate consequences are assessed;
- An initial long-range monitoring plan has been developed in conjunction with the affected State, tribal, and local governments and appropriate Federal agencies; and
- EPA has received adequate assurances from the other Federal agencies that they are committing the required resources, personnel, and funds for the duration of the Federal response.

Radiological monitoring and assessment activities are normally terminated when the coordinating agency, in consultation with other participating agencies and State, tribal, and local governments, determines that:

- There is no longer a threat to public health and safety or the environment;
- State, tribal, and local resources are adequate for the situation; and
- There is mutual agreement among the agencies involved to terminate monitoring and assessment.

FEDERAL CAPABILITIES AND ASSETS

In addition to leading specific portions of a response, coordinating agencies, along with other Federal agencies, may bring specific expertise pertinent to nuclear/radiological incidents. Table 5 below identifies the specific support that these agencies may provide.

Table 5: Additional Federal Agency Capabilities for a Nuclear/Radiological Incident

Agency	Capabilities
Department of Agriculture	(See the ESF #11 Annex and the Food and Agriculture Incident Annex for additional USDA responsibilities.) • Assists in the planning and collection of agricultural samples within the Ingestion Exposure Pathway Emergency Planning Zone. • Assesses damage to crops, soil, livestock, poultry, and processing facilities and incorporates the findings in a damage assessment report. • Assists in the evaluation and assessment of data to determine the impact of the incident on agriculture. • Provides support and advice on screening and decontamination of pets and farm animals that may have been exposed to radiation or contaminated with radioactive materials.

Agency	Capabilities
Department of Agriculture (Continued)	• Assists in the planning and operational aspects of animal carcasses disposal. • Inspects and assists in the collection of samples of crops, meat and meat products, poultry and poultry products, and egg products to ensure that they are safe for human consumption. • Assists, in conjunction with HHS, in monitoring the production, processing, storage, and distribution of food through the wholesale level to eliminate contaminated product and to ensure that the levels of contamination in the product are safe and below the derived intervention levels (DILs).
Department of Commerce	• Provides near or on-scene weather observations upon request. • Prepares forecasts tailored to support emergency incident management activities. • Participates in the IMAAC by providing atmospheric transport and dispersion (plume) modeling assessment and forecasts, surface weather observations, and weather forecasts to the IMAAC, when activated. • When the IMAAC is not activated, provides atmospheric transport and dispersion (plume) modeling assessment and forecasts to the coordinating agency, in accordance with established procedures. • Maintains and further develops the HYSPLIT transport and dispersion model. • Archives, as a special collection, the meteorological data from national observing and numerical weather analysis and prediction systems applicable to the monitoring and assessment of the response. • Provides assistance and reference material for calibrating radiological instruments. • Provides support in the testing and evaluation of radiation shielding materials. • In the event of materials potentially crossing international boundaries, provides atmospheric transport and dispersion products to international hydrometeorological services and associated agencies through the mechanisms afforded by the World Meteorological Organization. • Provides radioanalytical measurement support and instrumentation. • Provides assistance for collection and monitoring for marine and estuary contamination assessment. • Advises and provides assistance on building operations (e.g., HVAC) for contamination control and decontamination processes. • Provides laboratory support for analysis of materials and environmental samples.

Agency	Capabilities

Department of Defense	• Provides Defense Support of Civil Authorities (DSCA) in response to requests for assistance during domestic incidents. With the exception of support provided under Immediate Response Authority, the obligation of DOD resources to support requests for assistance is subject to the approval of the Secretary of Defense. Under certain critical circumstances, the President or Secretary of Defense may direct DSCA activities without a specific request. Details regarding DSCA and immediate response are provided in the *NRF* Core Document.
	• Provides Defense Support of Civil Authorities (DSCA) in response to requests for assistance during domestic incidents. With the exception of support provided under Immediate Response Authority, the obligation of DOD resources to support requests for assistance is subject to the approval of the Secretary of Defense. Under certain critical circumstances, the President or Secretary of Defense may direct DSCA activities without a specific request. Details regarding DSCA and immediate response are provided in the *NRF* Core Document.
	• May provide DOD and DOD-funded assets for the response to radiological incidents, to include:
	  • Weapons of Mass Destruction Civil Support Teams (WMD CSTs) – National Guard teams that assess a suspected WMD attack, advise civilian responders on appropriate actions through on-site testing and expert reachback, and facilitate the arrival of additional State and Federal military forces. Each team consists of 22 personnel and is equipped with personal protective equipment for operating in unknown hazardous environments, NBC (nuclear, biological, and chemical) detectors, sampling/analytical systems, a decontamination system, and communications equipment used to reach back to experts via satellite. These are State assets that can be federalized. There is nominally one CST per State, as well as one each in Guam, Puerto Rico, the Virgin Islands, and the District of Columbia.
	  • CBRN (chemical, biological, radiological, and nuclear) Enhanced Response Force Packages (CERFPs) – National Guard elements that provide an immediate response capability to a Governor. The CERFPs are capable of searching an incident site (including damaged buildings), rescuing any casualties, decontaminating them, and performing medical triage and initial treatment to stabilize them for transport to a medical facility. This includes extracting anyone trapped in the rubble. The CERFP is composed of four elements staffed by personnel from already established National Guard units. The elements are search and extraction, decontamination, medical, and security. The CERFP command and control team directs the overall activities of the CERFP and coordinates with the Joint Task Force – State and the Incident Commander. There is at least one CERFP in each FEMA region.
	  • CBRNE (chemical, biological, radiological, nuclear, and high-yield explosive) Consequence Management Response Forces (CCMRF) – Multiservice (active and reserve component military) follow-on assets designed to augment the CSTs and CERFPs, if necessary. Specific CCMRF capabilities include, but are not limited to, robust command and control, technical search and rescue, explosive ordnance disposal, aviation evacuation, specialized medical response teams, and enhanced chemical, biological, and nuclear detection/decontamination.

Agency	Capabilities
Department of Defense (Continued)	• DOD advisory teams – Various teams that may deploy, either independently or as part of the CCMRFs, that provide guidance and advice to the Incident Commander on potential health hazards, radiation injury treatment, survey data evaluations, population monitoring, etc. These include the Consequence Management Advisory Team (CMAT), U.S. Air Force Radiation Assessment Team (AFRAT), the U.S. Army's Radiological Advisory Medical Team (RAMT), and the Armed Forces Radiobiology Research Institute's Medical Radiobiological Advisory Team (MRAT). • Provides immediate assistance under Immediate Response Authority for any civil emergency that may require immediate action to save lives, prevent human suffering, or mitigate great property damage. When such conditions exist and time does not permit prior approval from higher headquarters, local military commanders and responsible officials from DOD components and agencies are authorized by DOD directive, subject to any supplemental direction that may be provided by their DOD component, to take necessary action to respond to requests of civil authorities. All such necessary action is referred to as "Immediate Response."
Department of Defense/U.S. Army Corps of Engineers	(See the ESF #3 – Public Works and Engineering Annex for additional information.) • For RDD/IND incidents, provides response and cleanup support as a cooperating agency. • Integrates and coordinates with other agencies, as requested, to perform any or all of the following: • Radiological survey functions. • Gross decontamination. • Site characterization. • Contaminated water and debris management. • Site remediation.
Department of Energy	• Develops and maintains FRMAC policies and procedures, determines FRMAC composition, and maintains FRMAC operational readiness. • Coordinates Federal radiological environmental monitoring and assessment activities as lead technical organization in the FRMAC (emergency phase), regardless of who is designated the coordinating agency. • Maintains technical liaison with State and local agencies with monitoring and assessment responsibilities. • Maintains a common set of all radiological monitoring data in an accountable, secure, and retrievable form and ensures the technical integrity of FRMAC data. • Provides monitoring data and interpretations, including exposure rate contours, dose projections, and any other requested radiological assessments, to the coordinating agency and to the States. • Provides, in cooperation with other Federal agencies, the personnel and equipment to perform radiological monitoring and assessment activities, and provides on-scene analytical capability supporting assessments. • Requests supplemental assistance and technical support from other Federal agencies as needed.

Agency	Capabilities
Department of Energy (Continued)	• Arranges consultation and support services through appropriate Federal agencies to all other entities (e.g., private contractors) with radiological monitoring functions and capabilities and technical and medical expertise for handling radiological contamination and population monitoring. • Works closely with the Senior EPA representative to facilitate a smooth transition of the Federal radiological monitoring and assessment coordination responsibility to EPA at a mutually agreeable time and after consultation with the States and coordinating agency. • Provides, in cooperation with other Federal and State agencies, personnel and equipment, including portal monitors, to support initial external screening and provides advice and assistance to State and local personnel conducting screening/decontamination of persons leaving a contaminated zone. • Provides plume trajectories and deposition projections from NARAC for emergency response. • Provides source term estimates to the IMAAC and/or coordinating agency when limited or no information is available, based on DOE's unique experience in developing source terms for INDs and RDDs. • Upgrades, maintains, coordinates, and publishes documentation needed for the administration, implementation, operation, and standardization of the FRMAC. • Maintains and improves the ability to provide wide-area radiation monitoring now resident in the AMS. • Maintains and improves the ability to provide medical assistance, advisory teams, and training related to nuclear/radiological accidents and incidents now resident in the REAC/TS. • Maintains and improves the ability to provide predictive modeling of airborne hazards and to correct modeled results through integration of actual radiation measurements obtained from both airborne and ground sources, resident in the FRMAC. The NARAC maintains and improves their ability to model the direct results (blast, thermal, radiation, EMP) of a nuclear detonation. • Maintains and improves the first-response ability to assess an emergency situation and to advise decisionmakers on what further steps can be taken to evaluate and minimize the hazards of a radiological emergency resident in the RAP. • Maintains and improves the ability to respond to an emergency involving U.S. nuclear weapons resident in the ARG. • Maintains and improves the ability of CMHTs and CMRTs to provide initial planning, coordination, and data collection and assessment prior to or in lieu of establishment of a FRMAC. • Maintains and improves the ability of the DOE Nuclear/Radiological Advisory Team to provide advice and limited technical assistance, including search, diagnostics, and effects prediction, as part of a Domestic Emergency Support Team. • Maintains and improves the ability of Radiological Triage to determine, through remote analysis of nuclear spectra collected on-scene, if a radioactive object contains special nuclear materials. • Assigns a Senior Energy Official (SEO) for any response involving the deployment of the DOE/NNSA emergency response assets. The SEO will integrate into an appropriate position in the IC/UC and is responsible for the coordination and employment of these assets at the scene of a radiological event. The deployed assets will work in support of and under the direction of the SEO.

Agency	Capabilities
Department of Health and Human Services	(See the ESF #8 Annex for additional information.) • Conducts epidemiological surveillance and provides guidance on methods to detect symptoms consistent with exposure to radioactive materials. • Collects samples of agricultural products to monitor and assess the extent of contamination as a basis for recommending or implementing protective actions (through the FRMAC). • Provides advice on proper medical treatment of the general population and response workers exposed to or contaminated by radioactive materials. • Provides available medical countermeasures through deployment of the Strategic National Stockpile. • Provides assessment and treatment teams for those exposed to or contaminated by radiation. • Provides advice and guidance in assessing the impact of the effects of radiological incidents on the health of persons in the affected area. • Manages long-term public monitoring and supports follow-on personal data collection, collecting and processing of blood samples and bodily fluids/matter samples, and advice concerning medical assessment and triage of victims. Tracks patient treatment and long-term health effects.
Department of Homeland Security/Customs and Border Protection	• For incidents at the border, maintains radiation detection equipment and nonintrusive inspection technology at ports of entry and Border Patrol checkpoints to detect the presence of radiological substances transported by persons, cargo, mail, or conveyance arriving from foreign countries. • Through its National Targeting Center, provides extensive analytical and targeting capabilities to identify and interdict suspect nuclear/radiological materials. • Through the CBP Weapons of Mass Destruction Teleforensic Center, provides 24/7 support to DHS/CBP and other Federal law enforcement personnel in the identification of interdicted suspect hazardous material as well as providing a link for coordination with and triage to other Federal agencies as appropriate for the type of incident. • Through the CBP Laboratories and Scientific Services (LSS), staffs WMD Response Teams in strategic locations nationwide to screen and identify potential radiological threat materials as well as reduce the hazards that may exist by establishing temporary containment parameters.
Department of Homeland Security/Domestic Nuclear Detection Office (DNDO)	• Supports the deployment of an enhanced global nuclear detection system to detect and report on attempts to import, possess, store, transport, develop, or use an unauthorized nuclear explosive device, fissile material, or radiological material in the United States. • Through the DNDO Joint Analysis Center, provides a coordinated technical adjudication of a nuclear/radiation detection alarm, and recommends technical Federal asset responses as required.
Department of Homeland Security/Federal Emergency Management Agency	Serves as the annex coordinator for this annex.

Agency	Capabilities
Department of Homeland Security/U.S. Coast Guard	• Because of its unique maritime jurisdiction and capabilities, is prepared to provide appropriate security, command and control, transportation, and support to other agencies that need to operate in the maritime domain. • Maintains the National Response Center, which is staffed by Coast Guard personnel who maintain a 24-hour-a-day, 365-day-a-year telephone watch.
Department of the Interior (DOI)	• Provides resources, including personnel, equipment, and laboratory support, to advise and assist in evaluating processes affecting radioisotopes in soils. • Provides resources, including personnel and equipment, to advise and assist in the development of geographic information systems databases to be used in the analysis and assessment of contaminated areas. • Provides liaison between federally recognized tribal governments and Federal, State, and local agencies for coordination of response activities. Additionally, DOI advises and assists DHS on economic, social, and political matters in the U.S. insular areas should a radiological incident occur in these areas.
Department of Justice/Federal Bureau of Investigation	• Has lead responsibility for criminal investigations of terrorist acts or terrorist threats by individuals or groups inside the United States, or directed at U.S. citizens or institutions abroad, where such acts are within the Federal criminal jurisdiction of the United States. • Manages, leads, and coordinates all law enforcement and investigative activities with regard to the response to terrorist acts or threats, including tactical operations, crime scene investigation, crisis negotiation, and intelligence gathering and dissemination. • Coordinates the activities of the law enforcement community to detect, prevent, preempt, and disrupt terrorist attacks against the United States. Further details regarding the FBI response are outlined in the Terrorism Incident Law Enforcement and Investigation Annex.
Department of Labor/Occupational Safety and Health Administration	• Provides advice and technical assistance to DHS, the coordinating agency, and State, tribal, and local governments concerning the health and safety of response workers implementing the policies and concepts in this annex. • Provides assistance with developing site health and safety plans. • Provides monitoring for emergency response workers through the Worker Safety and Health Support Annex. • Provides technical assistance with emergency worker decontamination.
Department of State	• Serves as the U.S. Government lead in notification of the International Atomic Energy Agency (IAEA) in accordance with the Convention on Early Notification of a Nuclear Accident. • Serves as the U.S. Government lead in notification to foreign governments. Will immediately notify Canada and Mexico to negotiate cooperative and collaborative cross-border activities. • Serves as the U.S. Government lead in requesting or accepting assistance in accordance with the IAEA Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency.
Department of Transportation	(See the ESF #1 – Transportation Annex for further information.) Provides technical advice and assistance on the transportation of radiological materials and the impact of the incident on the transportation infrastructure.

Agency	Capabilities
Department of Veterans Affairs	Provides medical assistance using the Medical Emergency Radiological Response Team, which provides direct patient treatment, assists and trains local health care providers in managing, handling, and treatment of radiation-exposed and -contaminated casualties, assesses the impact on human health, and provides consultation and technical advice to local, State, and Federal authorities.
Environmental Protection Agency	(See the ESF #10 Annex for additional information.) • Provides resources, including personnel, equipment, and laboratory support (including mobile laboratories) to assist DOE in monitoring radioactivity levels in the environment. • Assists in the development and implementation of a long-term monitoring plan and long-term recovery plan. • Provides nationwide environmental monitoring data from the RadNet for assessing the national impact of the incident. • Develops PAG manuals in coordination with the FRPCC. • Recommends acceptable emergency levels of radioactivity and radiation in the environment. • Prepares health and safety advice and information for the public. • Estimates effects of radioactive releases on human health and the environment. • Provides, in cooperation with other Federal agencies, the law enforcement personnel and equipment to conduct law enforcement operations and investigations for nuclear/radiological incidents involving criminal activity that are not terrorism related.
National Aeronautics and Space Administration	• Partners with DOE when preparing for the launch of spacecraft involving significant quantities of DOE-owned nuclear material by providing additional specialized radiological monitoring equipment and radiological accident response personnel. However, NASA Centers maintain limited quantities of radiological monitoring equipment that could be utilized in response to radiological incidents. • In conjunction with EPA and NOAA, may task certain NASA orbiting assets to provide supplemental data to monitor incidents occurring in Earth's atmosphere.
Nuclear Regulatory Commission	• Provides technical assistance to include source term estimation, plume dispersion, and dose assessment calculations. • Provides assistance in Federal radiological monitoring and assessment activities.

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ATTACHMENT 5

EMERGENCY ACTION LEVELS

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5.1 AP1000 - Emergency Action Levels

As identified in the NRC letter to the Nuclear Energy Institute (NEI) dated December 2, 2008, certain aspects of the AP1000 Emergency Action Levels (EALs) required by 10 CFR 50.47(b)(4) and Appendix E.IV.B cannot be completed at this time. This is due to actual set points that cannot be derived until actual as-built information is available and certain Technical Specifications are finalized.

PSEG has elected to submit a Radiological Emergency Plan including Section 5.0, “Emergency Classification System” which addresses the four critical elements of an EAL scheme and contains general information regarding response to each emergency classification.

In the COL application, PSEG will make a commitment to adopt its EAL scheme by utilizing the guidance in the NRC approved version of NEI 07-01 at least 180 days prior to initial fuel load of the unit.

Any deviations or differences in the proposed EALs from the applicable template will be justified. Development of EALs in accordance with the guidance presented in NEI 07-01 and submittal of these EALs to the NRC at least 180 days prior to fuel load is a proposed license condition.

5.2 ABWR - Emergency Action Levels

As identified in the NRC letter to the Nuclear Energy Institute (NEI) dated December 2, 2008, certain aspects of the ABWR Emergency Action Levels (EALs) required by 10 CFR 50.47(b)(4) and Appendix E.IV.B cannot be completed at this time. This is due to actual set points that cannot be derived until actual as-built information is available and certain Technical Specifications are finalized.

PSEG has elected to submit a Radiological Emergency Plan including Section 5.0, “Emergency Classification System” which addresses the four critical elements of an EAL scheme and contains general information regarding response to each emergency classification.

In the COL application, PSEG will make a commitment to adopt its EAL scheme by utilizing the guidance in the NRC approved version of NEI 99-01 at least 180 days prior to initial fuel load of the unit.

Any deviations or differences in the proposed EALs from the applicable template will be justified. Development of EALs in accordance with the guidance presented in NEI 99-01 and submittal of these EALs to the NRC at least 180 days prior to fuel load is a proposed license condition.

5.3 US-APWR - Emergency Action Levels

As identified in the NRC letter to the Nuclear Energy Institute (NEI) dated December 2, 2008, certain aspects of the US-APWR Emergency Action Levels (EALs) required by 10 CFR 50.47(b)(4) and Appendix E.IV.B cannot be completed at this time. This is due to actual set points that cannot be derived until actual as-built information is available and certain Technical Specifications are finalized.

PSEG has elected to submit a Radiological Emergency Plan including Section 5.0, “Emergency Classification System” which addresses the four critical elements of an EAL scheme and contains general information regarding response to each emergency classification.

In the COL application, PSEG will make a commitment to adopt its EAL scheme by utilizing the guidance in the NRC approved version of NEI 99-01 at least 180 days prior to initial fuel load of the unit.

Any deviations or differences in the proposed EALs from the applicable template will be justified. Development of EALs in accordance with the guidance presented in NEI 99-01 and submittal of these EALs to the NRC at least 180 days prior to fuel load is a proposed license condition.

5.4 U.S. EPR - Emergency Action Levels

As identified in the NRC letter to the Nuclear Energy Institute (NEI) dated December 2, 2008, certain aspects of the U.S. EPR Emergency Action Levels (EALs) required by 10 CFR 50.47(b)(4) and Appendix E.IV.B cannot be completed at this time. This is due to actual set points that cannot be derived until actual as-built information is available and certain Technical Specifications are finalized.

PSEG has elected to submit a Radiological Emergency Plan including Section 5.0, “Emergency Classification System” which addresses the four critical elements of an EAL scheme and contains general information regarding response to each emergency classification.

In the COL application, PSEG will make a commitment to adopt its EAL scheme by utilizing the guidance in the NRC approved version of NEI 99-01 at least 180 days prior to initial fuel load of the unit.

Any deviations or differences in the proposed EALs from the applicable template will be justified. Development of EALs in accordance with the guidance presented in NEI 99-01 and submittal of these EALs to the NRC at least 180 days prior to fuel load is a proposed license condition.

PSEG Site
ESP Application
Part 5, Emergency Plan

ATTACHMENT 6

AP1000 – SPECIFIC INFORMATION

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SECTION 1: INTRODUCTION

1. AP1000 DESCRIPTION

The PSEG Site is owned and operated by PSEG. An area map showing geographical location of the facility is provided in Section 1 of this Emergency Plan.

This Emergency Plan Attachment provides unit specific details for the AP1000 reactor. This includes a unit description, such as type of reactor, relationship to other units, special emergency equipment, Emergency Response Organization staffing, Emergency Action Levels (EALs), and any emergency facility locations which differ from those described in the emergency plan to provide a full understanding and representation of the PSEG Site's emergency response capabilities.

The Westinghouse Advanced Passive PWR AP1000 is a 1117 MWe pressurized water reactor (PWR) with thermal power of 3415 MWt. The AP1000 design includes advanced passive safety features and extensive plant simplifications to enhance the safety, construction, operation, and maintenance of the plant. If selected, the AP1000 would be constructed as a dual-unit plant.

Safety systems use natural driving forces such as pressurized gas, gravity flow, natural circulation flow, and convection. Safety systems do not use active components (such as pumps, fans or diesel generators) and are designed to function without safety-grade support systems (such as ac power, component cooling water, service, and HVAC). The number and complexity of operator actions required to control the safety systems are minimized; the approach is to eliminate operator action rather than automate it. Major safety systems are passive; they require no operator action for 72 hours after an accident, and maintain core and containment cooling for a protracted time without ac power.

The AP1000 is designed to meet U. S. NRC deterministic criteria and probabilistic risk criteria with large margins. Safety analysis has been completed and documented in the Design Control Document (DCD) and Probabilistic Risk Analysis (PRA). Predicted core damage frequency of 2.4E-07/year is well below the 1E-05/year requirement, and frequency of significant release of 1.95E-08/year is well below the 1E-06/year requirement.

An important aspect of the AP1000 design philosophy focuses on plant operability and maintainability. The AP1000 design includes features such as simplified system design

to improve operability while reducing the number of components and associated maintenance requirements.

The AP1000 has a well-designed design basis that has been confirmed through thorough engineering analyses and testing. Some of the high-level design characteristics of the plant are:

- Occupational radiation exposure expected to be below 0.7 person-Sv/yr (70 person-rem/yr).
- Security enhanced with all safe shutdown equipment located in safely reinforced concrete nuclear island buildings.
- In-vessel retention of core debris following core melt which significantly reduces the uncertainty in the assessment of containment failure and radioactive release to the environment due to ex-vessel severe accident phenomena.
- No reactor pressure vessel penetrations below the top of the core. This eliminates the possibility of a loss of coolant accident by leakage from the reactor vessel, which could lead to core uncovery.

<u>Overview of the AP1000 Design:</u>

The power block complex of each AP1000 unit consists of five principal building structures: the nuclear island, the Turbine Building, the Annex Building, the Diesel Generator Building and the Radwaste Building. Each of these building structures is constructed on individual basemats.

- The nuclear island consists of the Containment Building, the Shield Building, and the Auxiliary Building, all of which are constructed on a common base-mat.

  a. The containment contains a 16-foot (4.9 m) diameter main equipment hatch and a personnel airlock at the operating deck level, and a 16-foot (4.9 m) diameter maintenance hatch and a personnel airlock at grade level. The Reactor Building is a Shield Building surrounding the containment. The Containment Building is the containment vessel and all structures contained within the containment vessel. The principal systems located within the Containment Building are the reactor coolant system, the passive core cooling system, and the reactor coolant purification portion of the chemical and volume control system.

b. The Shield Building is the structure and annulus area that surrounds the containment vessel. The functions of the Shield Building are:

- In conjunction with the internal structures of the Containment Building, providing the required shielding for the reactor coolant system and all the other radioactive systems and components housed in the containment.
- Providing the required shielding for radioactive airborne materials that may be dispersed in the containment as well as radioactive particles in the water distributed throughout the containment.
- Serving as an integral part of the passive containment cooling system.
- Protecting the containment vessel and the reactor coolant system from the effects of tornadoes and tornado produced missiles.

c. The Auxiliary Building contains the Control Room, I&C systems, electrical power systems, fuel handling area, mechanical equipment areas, containment penetration areas, and the main steam and feedwater valve compartments. The Auxiliary Building provides the following:

- Protection and separation for the safety-related seismic Category I mechanical and electrical equipment located outside the containment building.
- Protection for the safety-related equipment against the consequences of either a postulated internal or external event.
- Shielding for the radioactive equipment and piping that is housed within the building.

The Auxiliary Building contains all of the containment penetration areas for mechanical, electrical, and instrumentation and control penetrations. The Auxiliary Building provides separation of the radioactive piping penetration areas from the non-radioactive penetration areas and separation of the electrical and instrumentation and control penetration areas from the mechanical penetration areas. Separation of redundant divisions of instrumentation and control and electrical equipment is also provided. The main steam and feedwater isolation valve compartment is contained within the Auxiliary Building. The Auxiliary Building provides an adequate venting area for the main steam and feedwater isolation valve compartment in the event of a postulated leak in either a main steam line or feedwater line.

- The Turbine Building houses the main turbine, generator, and associated fluid and electrical systems. It provides weather protection for the laydown and maintenance of major turbine/generator components. The Turbine Building also houses the makeup water purification system.

- The Annex Building provides the main personnel entrance to the power generation complex. It includes access-ways for personnel and equipment to the clean areas of the nuclear island in the Auxiliary Building and to the radiological control area. The building includes the health physics facilities for the control of entry to and exit from the radiological control area as well as personnel support facilities such as locker rooms. The building also contains the non-1E ac and dc electric power systems, the ancillary diesel generators and their fuel supply, other electrical equipment, the Technical Support Center, and various heating, ventilating and air conditioning systems.

  The Annex Building includes the health physics facilities and provides personnel and equipment access-ways to and from the Containment Building and the rest of the radiological control area via the Auxiliary Building. Large, direct access-ways to the upper and lower equipment hatches of the Containment Building are provided for personnel access during outages and for large equipment entry and exit. The building includes a hot machine shop for servicing radiological control area equipment. The hot machine shop includes decontamination facilities including a portable decontamination system that may be used for decontamination operations throughout the nuclear island.

- The Diesel Generator Building houses two identical slide along diesel generators separated by a three-hour fire wall. These generators provide backup power for plant operation in the event of disruption of normal power sources.

- The Radwaste Building includes facilities for segregated storage of various categories of waste prior to processing, for processing by mobile systems, and for storing processed waste in shipping and disposal containers. Dedicated floor areas and trailer parking space for mobile processing systems are provided for the following:

  - Contaminated laundry shipping for off-site processing
  - Dry waste processing and packaging
  - Hazardous/mixed waste shipping for off-site processing
  - Chemical waste treatment
  - Empty waste container receiving and storage

- Storage and loading packaged wastes for shipment

The Radwaste Building also provides for temporary storage of other categories of plant wastes.

SECTION 2: EMERGENCY FACILITIES AND EQUIPMENT

1. UNIT-SPECIFIC EMERGENCY FACILITIES

Section 9 of this Plan contains information regarding the function and operation of the emergency response facilities. This section describes the AP1000 design-specific Control Room, Operations Support Center (OSC), and Technical Support Center (TSC).

a. <u>Control Room</u>

The Control Room is located in the Auxiliary Building (of each unit). The Control Rooms include the main control area, operations staff areas, and offices for the shift. Plant operations are directed from the Control Room. Nuclear Plant Instrumentation, Area and Process Radiation Monitoring System Instrumentation, Controls and Instrumentation for Reactor and Turbine Generator operation are provided here.

Control Room habitability and radiation protection is served by the nuclear island non-radioactive ventilation system (VBS) and the emergency habitability system (VES), as described in Sections 9.4 and 6.4 respectively, of the DCD. A description of the Control Room is in the DCD. Emergency equipment available to the Control Room is listed and maintained in accordance with emergency plan implementing procedures and/or administrative procedures.

b. <u>OSC</u>

There is an OSC for each unit. The OSC is located inside the Protected Area on the second floor of the Annex Building adjacent to the Unit 1 and 2 Control Rooms. The OSC is separate from the Control Room and the TSC. The total area for each OSC is approximately 2888 square feet in the ALARA Support Center and Office Area. This location includes separate areas for coordinating and planning OSC activities. Additional space is available in adjacent offices and locker rooms to accommodate additional personnel, as required.
Both the Control Room and TSC have diverse means of communication with various plant locations including the OSC. During an emergency, if the OSC

becomes uninhabitable, an alternate location for OSC activities is designated. Evacuation of the OSC is conducted in accordance with emergency plan implementing procedures.

c. TSC

There is a TSC for each unit. The TSC is located within the Protected Area in the passage from the Annex Building to the Control Room. Each TSC command room covers 2144 square feet with four (4) adjoining conference rooms which cover 988 square feet. Each TSC is sized for a minimum of 25 persons, including 20 persons designated by PSEG and five NRC personnel.

The TSC is designed as follows:

- Exterior walls, roof, and floor are built to seismic Category II requirements.
- Served by the nuclear island nonradioactive ventilation system (VBS), as described in Section 9.4 of the DCD. Provided with radiation protection equivalent to Control Room habitability requirements, such that the dose to an individual in the TSC for the duration of a design basis accident is less than 5 Rem TEDE.
- Environmentally controlled to provide room air temperature, humidity and cleanliness appropriate for personnel and equipment.
- Reliable power for habitability systems and battery pack emergency lighting are provided.
- Equipment is non-safety related and non-redundant.
- Using human factors criteria contained in APP-GW-GLR-136, AP1000 *Human Factors Program Implementation for the Emergency Operations Facility and Technical Support Center.*

During an emergency, if the TSC becomes uninhabitable, an alternate location for TSC activities is designated. Evacuation of the TSC is conducted in accordance with emergency plan implementing procedures.

d. On-Site Laboratories

The radiochemistry laboratory in the Auxiliary Building is available for emergency response during an accident. The laboratory can receive power from the plant's diesel generators. General capabilities include:

- Radionuclide identification in various sample media.
- Analysis and measurement of radionuclides in samples taken within the plant and samples taken in the plant site and off-site environment.

e. Decontamination Facilities

The personnel decontamination facility is located in the Annex Building and contains provisions for radiological decontamination of personnel, their wounds, supplies, instruments and equipment. This facility has extra clothing and decontaminants suitable for the type of contamination expected, including radioiodine skin contamination.

2. ASSESSMENT/MONITORING RESOURCES

a. On-Site Meteorological Monitoring Instrumentation

The PSEG Site uses the existing Salem and Hope Creek Generating Stations' meteorological monitoring program. The meteorological program is in accordance with the recommendation of NRC Regulatory Guide 1.23 "Onsite Meteorological Program" and Section 2.3.3 of NUREG 75/087 (Rev. 3).

b. On-Site Radiological Monitoring Instrumentation

The on-site radiation monitoring capability includes an installed process, effluent, and area radiation monitoring system (RMS); portable survey instrumentation; counting equipment for radiochemical analysis; and a personnel dosimetry program to record integrated exposure. Some on-site equipment is particularly valuable for accident situations.

1. Area Radiation Monitoring

The area monitoring system provides information on existing radiation levels in various areas of the plant to ensure safe occupancy. It is equipped with Control Room and local readout and audible alarms to warn personnel of a raised radiation level.

2. Radiological Noble Gas Effluent Monitoring

The wide range gas monitors are installed on normal station effluent release points. Each monitor system has a microprocessor which uses digital

processing techniques to analyze data and control monitor functions. These monitors provide readout and alarm functions to the Control Room.

3. Radioiodine and Particulate Effluent Monitoring

   The wide range gas monitor includes a sampling rack for collection of the auxiliary building vent stack particulate and radioiodine samples. Filter holders and valves are provided to allow grab sample collection for isotopic analyses in the plant's counting rooms. The sampling rack is shielded to minimize personnel exposure. The sampling media is analyzed by a gamma ray spectrometer which uses a gamma spectrometer system. In addition, silver zeolite cartridges are available to further reduce the interference of noble gases.

4. High-Range Containment Radiation Monitors

   High-range containment radiation monitors are installed. The monitors detect and measure the radiation level within the reactor containment during and following an accident. The monitors are in range of postulated accidents and in support of emergency response.

5. In-Plant Iodine Instrumentation

   Effective monitoring of increasing iodine levels in buildings under accident conditions includes the use of portable instruments using silver zeolite as a sample media. It is expected that a sample can be obtained, purged, and analyzed for iodine content within a two-hour time frame.

c. On-Site Process Monitors

An adequate monitoring capability exists to properly assess the plant status for all modes of operation and is described in each unit's DCD. The operability of the post-accident instrumentation ensures information is available on selected plant parameters to monitor and assess important variables following an accident. Instrumentation is available to monitor the parameters in Technical Specifications.

The unit's emergency operating procedures assist personnel in recognizing inadequate core cooling using applicable instrumentation.

d. Seismic Monitors

The units have four triaxial acceleration sensor units, and they are connected to a time-history analyzer. The time-history analyzer recording and playback system is located in a panel in the nuclear island in a room near the Control Room. Seismic event data from these is recorded on a solid-state digital recording system at 200 samples per second per data channel.

This solid-state recording and analysis system has internal batteries and a charger to prevent the loss of data during a power outage, and to allow data collection and analysis in a seismic event during which the power fails. Normally, 120-volt alternating current power is supplied from the non-Class 1E dc and uninterruptible power supply system. The system uses triaxial acceleration sensor input signals to initiate the time-history analyzer recording and Control Room alarms. The system initiation value is adjustable from 0.002 g to 0.02 g.

The time-history analyzer starts recording triaxial acceleration data from each of the triaxial acceleration sensors after the initiation value has been exceeded. Pre-event recording time is adjustable from 1.2 to 15.0 seconds and is set to record at least 3 seconds of pre-event signal. Post-event run time is adjustable from 10 to 90 seconds. A minimum of 25 minutes of continuous recording is provided. Each recording channel has an associated timing mark record with 2 marks per second, with an accuracy of about 0.02 percent.

The sensor installation anchors are rigid so that the vibratory transmissibility over the design spectra frequency range is essentially unity.

Each sensor unit contains three accelerometers mounted in a mutually orthogonal array with one horizontal axis parallel to the major axis assumed in the seismic analysis. The triaxial acceleration sensors have a dynamic range of 1000 to 1 (0.001 to 1.0 g) and a frequency range of 0.2 to 50 hertz.

One sensor unit is located in the free field. A second sensor unit is located on the nuclear island basemat in the spare battery charger room. A third sensor unit is located on the shield building structure. The fourth sensor unit is located on the containment internal structure on the east wall of the east steam generator compartment just above the operating floor.

Seismic instrumentation is not located on equipment, piping, or supports since experience has shown that data obtained at these locations is obscured by vibratory motion associated with normal plant operation.

e. On-Site Fire Detection Instrumentation

The fire detection system is designed in accordance with applicable National Fire Protection Association (NFPA) standards. The system is equipped with electrically supervised ionization smoke and heat detectors to quickly detect any fires and the instrumentation to provide local indication and control room annunciation. In addition to the smoke and heat detection systems, each fire protection carbon dioxide, halon, or water system is instrumented to inform the Control Room of its actuation or of system trouble.

In the event that a portion of the fire detection instrumentation is inoperable, fire watches in affected areas may be required.

Further details on the unit fire detection system can be found in the DCD and Fire Protection Plan.

SECTION 3: REFERENCES

1. THE WESTINGHOUSE AP1000 ADVANCED NUCLEAR PLANT—PLANT DESCRIPTION (2003)

2. AP1000 DESIGN CONTROL DOCUMENT, REV. 17

PSEG Site
ESP Application
Part 5, Emergency Plan

ATTACHMENT 7

ABWR – SPECIFIC INFORMATION

TABLE OF CONTENTS

SECTION 1: INTRODUCTION

1. ABWR DESCRIPTION

The PSEG Site is owned and operated by PSEG. An area map showing geographical location of the facility is provided in Section 1 of this Emergency Plan.

The ABWR is a single-cycle, forced circulation, boiling water reactor (BWR) with a maximum core thermal power of 4300 megawatts thermal (MWt). Unique features of the ABWR design include the internal recirculation pumps, fine-motion control rod drives, microprocessor-based digital control and logic systems, and digital safety systems.

Overview of Plant Buildings

The major buildings comprising the PSEG Site ABWR are the Reactor Building, the Control Building, the Service Building, the Turbine Building, and the Radwaste Building. The following provides a brief description of equipment and facilities associated with the respective buildings:

- The Reactor Building includes the containment, drywell, and major portions of the nuclear steam supply system, steam tunnel, refueling area, diesel generators, essential and non-essential power, emergency core cooling systems (ECCSs), and heating, ventilating, and air conditioning (HVAC) systems.
- The Control Building includes the Control Room, the computer facility, the cable tunnels, some essential switchgear, some essential power, the reactor core cooling water system, and essential HVAC systems.
- The Service Building houses the Technical Support Center, the Operations Support Center, and the counting room for analyzing post-accident samples.
- The Turbine Building includes all equipment associated with the main turbine generator.
- The Radwaste Building includes all equipment associated with the collection and processing of solid and liquid radioactive waste generated by the plant.

Overview of Plant Systems

The major systems comprising the PSEG ABWR are the reactor/core, the reactor core coolant system (RCS), the reactor protection system (RPS), the pressure suppression primary containment system, the electrical power distribution system, the emergency core cooling system (ECCS), and the power conversion system. These systems are described below.

The reactor design consists of the reactor pressure vessel (RPV), pressure containing appurtenances (control rod housings, in-core instrumentation housing, head vent and spray assembly) and internal components. The internal components include the core, the core support structure, the shroud head and steam separator assembly, the steam dryer assembly, the feedwater spargers, the core spray, and the core flooding spargers. Except for zircaloy in the reactor core, the internals are made of stainless steel or other corrosion-resistant alloys.

The reactor core consists of 872 bundles in an 8-by-8 array and 205 control rods operating at a power density of 50 kW/liter. The control rods, which enter from the bottom of the reactor core, perform dual functions of power distribution shaping and reactivity control. Manipulation of selected patterns of rods controls power distribution, while electro-hydraulic drive mechanisms or hydraulic rapid scram insertion controls reactivity.

The reactor coolant system (RCS) includes the nuclear boiling system; the main steam, feedwater, recirculation system; the reactor core isolation cooling (RCIC) system; the residual heat removal system; and the reactor water cleanup system. The design is different from current BWR designs in that 10 reactor internal pumps (RIPs) located within the reactor forcibly circulate reactor coolant. This eliminates large piping connections to the reactor vessel below the core and also eliminates reactor recirculation system piping. Eighteen safety/relief valves in six groups provide RCS overpressure protection.

The reactor protection system (RPS) initiates a rapid, automatic shutdown of the reactor to prevent fuel cladding damage and any nuclear system process barrier damage due to an abnormal transient. The RPS scram logic inputs are from the neutron monitoring system (NMS). The NMS is a system of in-core neutron detectors and out-of-core electronic monitoring equipment.

The ABWR has a pressure suppression primary containment system. The primary containment includes a drywell and a wetwell. The drywell consists of two volumes, an upper drywell surrounding the RPV and a lower drywell that houses RIPs, control rod drives, and service equipment. The wetwell consists of a suppression pool and an air volume that serves as a heat sink during normal and accident conditions. A secondary containment surrounds the primary containment and permits monitoring and treating of all potential radioactive leakage from the primary containment.

The electrical power distribution system is a complete load group distribution system with two independent off-site power sources, the main turbine generator, three on-site standby power sources (emergency diesel generators), and a combustion turbine generator located on-site. During normal plant operations, the main generator supplies power to the main power

transformer (MPT) and three unit auxiliary transformers (UATs) through the main generator output breaker and an isolated phase bus. When the main generator is off line, power is supplied to the UATs and the MPT by the preferred off-site power source.

In the event of a breach in the reactor coolant pressure boundary that results in a loss of reactor coolant, three independent divisions of the ECCS maintain fuel cladding below the temperature limit as defined in 10 CFR 50.46. Each division contains one high-pressure and one low-pressure inventory makeup system. The following systems make up the ECCS:

- High-pressure core flooder (HPCF) system
- RCIC system
- Low-pressure flooder (LPFL) system
- Automatic depressurization system (ADS)

The power conversion system is designed to convert the heat energy generated in the reactor to electrical energy. This system includes the main steam system, main turbine generator system, main condenser, condenser evacuation system, condensate cleanup system, and condensate feedwater pumping and heating system.

SECTION 2: EMERGENCY FACILITIES AND EQUIPMENT

1. UNIT-SPECIFIC EMERGENCY FACILITIES

Section 9 of this Plan contains information regarding the function and operation of the emergency response facilities. This section describes the ABWR design-specific Control Room, Operations Support Center (OSC), and Technical Support Center (TSC).

a. Control Room

The Control Room is located in the Control Building. The Control Room includes the main control area, operations staff areas, and offices for the shift. Plant operations are directed from the Control Room. Nuclear Plant Instrumentation, Area and Process Radiation Monitoring System Instrumentation, Controls and Instrumentation for Reactor and Turbine Generator operation are provided here.

Control Room habitability and radiation protection is described in Sections 9.4 and 6.4 of the DCD, respectively. A description of the Control Room is in the DCD. Emergency

equipment available to the Control Room is listed and maintained in accordance with emergency plan implementing procedures and/or administrative procedures.

b. OSC

The Operations Support Center (OSC) is located inside the Protected Area in the Service Building, which is adjacent to the Control Building. The lunch room located next to the TSC is designated as the OSC. The OSC is non-safety related and is not seismic Category I.

Both the Control Room and TSC have diverse means of communication with various plant locations including the OSC. During an emergency, if the OSC becomes uninhabitable, an alternate location for OSC activities is designated. Evacuation of the OSC is conducted in accordance with emergency plan implementing procedures.

c. TSC

The Technical Support Center (TSC) is located within the Protected Area in the Service Building which is adjacent to the Control Building. The TSC is at least 1875 square feet and is sized for a minimum of 25 persons, including 20 persons designated by PSEG and five NRC personnel. The TSC is non-safety related and is not seismic Category I.

The TSC is designed to include the following:

- Displays for the plant parameters which are included in the fixed position displays on the Control Room panels.
- Voice communications equipment for communication with the Control Room, the Emergency Operations Facility, the Operations Support Center, and the NRC Headquarters and Region 1 Operation Centers.
- Installed area radiation monitors
- Exterior walls, roof, and floor are built to seismic Category II requirements.
- Provided with radiation protection equivalent to Control Room habitability requirements, such that the dose to an individual in the TSC for the duration of a design basis accident is less than 5 rem TEDE.
- Environmentally controlled to provide room air temperature, humidity and cleanliness appropriate for personnel and equipment.

- Reliable power for habitability systems and battery pack emergency lighting are provided.

During an emergency, if the TSC becomes uninhabitable, an alternate location for TSC activities is designated. Evacuation of the TSC is conducted in accordance with emergency plan implementing procedures.

d. On-Site Laboratories

The counting room for analyzing post-accident samples is located in the Service Building. The post-accident sampling is available for emergency response during an accident. General capabilities include:

- Radionuclide identification in various sample media.
- Analysis and measurement of radionuclides in samples taken within the plant and samples taken in the plant site and off-site environment.

e. Decontamination Facilities

The personnel decontamination facility is located in the Service Building adjacent to the main change room and contains provisions for radiological decontamination of personnel, their wounds, supplies, instruments and equipment. This facility has extra clothing and decontaminants suitable for the type of contamination expected, including radioiodine skin contamination.

2. ASSESSMENT / MONITORING RESOURCES

a. On-Site Meteorological Monitoring Instrumentation

The PSEG Site uses the existing Salem and Hope Creek Generating Stations' meteorological monitoring program. The meteorological program is in accordance with the recommendation of NRC Regulatory Guide 1.23 "Onsite Meteorological Program" and Section 2.3.3 of NUREG 75/087 (Rev. 3).

b. On-Site Radiological Monitoring Instrumentation

The on-site radiation monitoring capability includes an installed process, effluent, and area radiation monitoring system (RMS); portable survey instrumentation; counting equipment for radiochemical analysis; and a personnel dosimetry program to record integrated exposure. Some on-site equipment is particularly valuable for accident situations.

1. Area Radiation Monitoring

   The area monitoring system provides information on existing radiation levels in various areas of the plant to ensure safe occupancy. It is equipped with Control Room and local readout and audible alarms to warn personnel of a raised radiation level.

2. Radiological Noble Gas Effluent Monitoring

   The wide range gas monitors are installed on normal station effluent release points. Each monitor system has a microprocessor which uses digital processing techniques to analyze data and control monitor functions. These monitors provide readout and alarm functions to the Control Room.

3. Radioiodine and Particulate Effluent Monitoring

   The wide range gas monitor includes a sampling rack for collection of the auxiliary building vent stack particulate and radioiodine samples. Filter holders and valves are provided to allow grab sample collection for isotopic analyses in the plant's counting rooms. The sampling rack is shielded to minimize personnel exposure. The sampling media is analyzed by a gamma ray spectrometer which uses a gamma spectrometer system. In addition, silver zeolite cartridges are available to further reduce the interference of noble gases.

4. High-Range Containment Radiation Monitors

   High-range containment radiation monitors are installed. The monitors detect and measure the radiation level within the reactor containment during and following an accident. The monitors are in range of postulated accidents and in support of emergency response.

5. In-Plant Iodine Instrumentation

   Effective monitoring of increasing iodine levels in buildings under accident conditions includes the use of portable instruments using silver zeolite as a sample media. It is expected that a sample can be obtained, purged, and analyzed for iodine content within a two-hour time frame.

c. On-Site Process Monitors

An adequate monitoring capability exists to properly assess the plant status for all modes of operation and is described in the DCD. The operability of the post-accident instrumentation ensures information is available on selected plant parameters to monitor and assess important variables following an accident. Instrumentation is available to monitor the parameters in Technical Specifications.

The unit's emergency operating procedures assist personnel in recognizing inadequate core cooling using applicable instrumentation.

d. Seismic Monitors

State-of-the-art solid-state digital instrumentation enables the prompt processing of the data at the plant site. A triaxial time-history accelerometer is provided at each of the following locations:

- One at the finished grade in the free-field
- Three in the Reactor Building
- Two in the Control Building

The seismic instrumentation operates during all modes of plant operation, including periods of plant shutdown. The maintenance and repair procedures provide for keeping the maximum number of instruments in service during plant operation and shutdown.

The design includes provisions for in-service testing. The instruments are capable of periodic channel checks during normal plant operation and are capable of in-place functional testing. The instrumentation on the foundation and at elevations within the same building or structure are interconnected for common starting and common timing, and the instrumentation contains provisions for an external remote alarm to indicate actuation. The pre-event memory of the instrumentation is sufficient to record the onset of the earthquake. It operates continuously during the period in which the earthquake exceeds the seismic trigger threshold and for a minimum of 5 seconds beyond the last trigger level signal. The instrument is capable of a minimum of 25 minutes of continuous recording. The acceleration sensors have a dynamic range of 1000:1 zero to peak (i.e., 0.001g to 1.0g) and the frequency is 0.20 Hz to 50 Hz.

The seismic instrumentation system is triggered by the accelerometer signals. The actuating level is adjustable for a minimum of 0.005g to 0.2g. The trigger is actuated whenever the acceleration exceeds 0.01g. The initial setpoint may be changed (but

exceeds 0.02g) once sufficient plant operating data have been obtained which indicate that a different setpoint would provide better system operation.

The instrumentation is capable of on-line digital recording all components accelerometer signals. The digitized rate of the recorder is at least 200 samples per second, the frequency bandwidth is at least from 0.20 Hz to 50 Hz, and the dynamic range should be 1000:1. The instrumentation is capable of using the recorded signal to calculate the standardized cumulative absolute velocity (CAV) and the 5 percent of critically damped response spectrum.

The instruments are capable of having routine channel checks, functional tests, and calibrations. The CAV shutdown threshold of 0.16g-seconds is calibrated with the October, 1987 Whittier, California earthquake record or an equivalent calibration record provided for this purpose by the manufacturer of the instrumentation. In the event that an earthquake is recorded at the plant site, all calibrations including the CAV are performed to demonstrate that the system was functioning properly at the time of the earthquake.

Activation of the seismic trigger causes an audible and visual annunciation in the Control Room to alert the plant operator that an earthquake has occurred.

e. On-Site Fire Detection Instrumentation

The fire detection system is designed in accordance with applicable National Fire Protection Association (NFPA) standards. The system is equipped with electrically supervised ionization smoke and heat detectors to quickly detect any fires and the instrumentation to provide local indication and control room annunciation. In addition to the smoke and heat detection systems, each fire protection carbon dioxide, halon, or water system is instrumented to inform the Control Room of its actuation or of system trouble.

In the event that a portion of the fire detection instrumentation is inoperable, fire watches in affected areas may be required.

Further details on the unit fire detection system can be found in the unit DCD and Fire Protection Plan.

SECTION 3: REFERENCES

1. THE ABWR PLANT GENERAL DESCRIPTION (DECEMBER 2006)
2. ABWR DESIGN CONTROL DOCUMENT, REV. 0
3. NUREG-1503—FINAL SAFETY EVALUATION REPORT RELATED TO THE CERTIFICATION OF THE ADVANCED BOILING WATER REACTOR DESIGN (JULY 1994)

PSEG Site
ESP Application
Part 5, Emergency Plan

ATTACHMENT 8

US-APWR – SPECIFIC INFORMATION

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SECTION 1: INTRODUCTION

1. US-APWR DESCRIPTION

The PSEG Site is owned and operated by PSEG. An area map showing geographical location of the facility is provided in Section 1 of this Emergency Plan.

The US-APWR is an advanced light water reactor plant designed by Mitsubishi Heavy Industries, Ltd. The US-APWR reactor is a 4-loop pressurized water reactor (PWR) and has a net electrical power rating of approximately 1600 MWe, depending on site conditions. The rated core thermal power level of the US-APWR is 4451 MWt.

<u>Overview of US-APWR Buildings and Systems</u>

The main US-APWR power block is comprised of the following buildings and structures:

- The Reactor Building, including pre-stressed concrete containment vessel
- The Power Source Buildings
- The power source fuel storage vaults
- The essential service water pipe tunnel
- The Auxiliary Building
- The Access Building
- The Turbine Building

The Reactor Building, the Power Source Buildings, the power source fuel storage vaults, and the essential service water pipe tunnel are designed and constructed as safety-related structures, to the requirements of seismic Category I, as defined in Regulatory Guide 1.29. These safety-related structures are designed for the effects of all applicable loads and their combinations, including the postulated seismic response loads. These structures are designed to withstand the effects of such natural phenomena such as hurricanes, floods, tornados, tsunamis, and earthquakes without loss of capability to perform their safety functions. They are also designed to withstand the effects of postulated internal events such as fires and flooding without loss of capability to perform their safety functions.

The remaining power block buildings are designed as non safety-related structures, and are free-standing on separate concrete base mats. The Auxiliary Building and the Turbine Building are designed to meet seismic Category II requirements as defined in Regulatory Guide 1.206. Other structures are designed to American National Standard Institute (ANSI), ASCE, and other applicable codes, and meet non-seismic Category requirements.

Specific information about the US-APWR buildings is as follows:

1. Reactor Building

   The Reactor Building has five main floors and consists of five functional areas:

   - Containment facility and inner structure
   - Safety system pumps and the heat transfer area
   - Fuel storage and handling area
   - Main steam and feedwater area
   - Safety-related electrical area

   The containment facility is comprised of the pre-stressed concrete containment vessel and the annulus enclosing the containment penetration area, and an efficient leak-tight barrier and radiation protection under all postulated conditions, including a Loss of Coolant Accident (LOCA). The pre-stressed concrete containment vessel is designed to endure peak pressure under LOCA conditions. Access galleries are provided for periodic inspection and testing of the circumferential and axial pre-stressing tendons.

   For ease of access during operation, maintenance, repair, and refueling, the following accesses to the pre-stressed concrete containment vessel are also provided:

   - A normal personal airlock, located at floor level below the operating floor
   - An equipment hatch and emergency airlock, located at operating floor level

   The annulus is located adjacent to the pre-stressed concrete containment vessel and includes all penetration areas, to prevent direct release of containment atmosphere to the environment through the containment penetrations. The pressure in the annulus is kept at a slightly negative level following accident conditions to control the release of radioactive materials to the environment.

The radwaste storage pit (RWSP) is located in the lowest part of the containment. The RWSP provides a continuous suction for both the safety injection pumps and the containment spray/residual heat removal pumps, thereby eliminating the switchover of suction source from the injection to the recirculation phase of accident recovery. The RWSP has four recirculation strainers on the floor, and the wall and floor of the RWSP are lined with stainless steel plates.

The reactor vessel is located at the center of the containment and is surrounded by a cylindrical concrete wall as a primary shield. There are four reactor coolant loops, each loop comprised of a steam generator, a reactor coolant pump, and loop piping. Concrete walls surrounding the loops are provided as supporting media and as secondary biological shields. The pressurizer is located in its own compartment and is adjacent to the steam generators to minimize the length of the surge piping to the reactor coolant loop.

A refueling cavity with a stainless steel liner is provided above the reactor vessel for refueling operations. The fuel transfer tube connects this activity to the fuel storage and handling area located outside the containment. The main steam and feedwater pipes that connect to the steam generators are routed within the containment with consideration of minimizing pipe run lengths, while providing sufficient flexibility to accommodate thermal expansion.

The safety system pumps which require sufficient net positive suction head to draw water from the recirculation sumps inside the containment are located at the lowest level of the Reactor Building to secure the required net positive suction head. In addition, they are located adjacent to the containment to minimize pipe lengths. The safety system heat transfers are located on the upper floor of the Reactor Building.

The fuel storage and handling area is located in the Reactor Building. Fuel handling operations are performed on the top floor of the area at the same level as the containment vessel operating floor. The containment emergency airlock is located adjacent to the fuel handling area to facilitate easy access between the containment and the fuel handling area when refueling procedures are in progress. The bridge crane is located to span the spent fuel pit, the transfer canal, and the cask loading pit. The spent fuel cask handling crane is capable of lifting the spent fuel cask from ground level to the operating floor.

The main steam and feedwater piping room is located on the top floor of this area and contains the main steam and feedwater pipes, where they pass between the Turbine Building and the containment.

The safety-related electrical area has two floors and is located in the Reactor Building and under the main steam and piping area. It is normally a nonradioactive zone and is completely separated from the radioactive zones of the Reactor Building.

This area houses the following safety-related facilities:

- Control Room
- Safety metal crad switchgear and load center
- Safety I&C room

Four redundant safety systems containing radioactive material are located in each zone of the four quadrants surrounding the containment structure. Each of the quadrant areas is separated by a physical barrier to assure that the functions of the safety-related systems are maintained in the event of postulated incidents such as fire, floods, and high-energy pipe break events. Non-radioactive safety systems such as emergency feedwater system and core cooling water system and electrical systems are located in the non-radioactive control area of the reactor building. This area is also separated into four divisions by physical barriers to assure that the functions of the safety-related systems are maintained in the event of postulated incidents such as fires, floods, and high-energy pipe break events.

2. Power Source Buildings

Two Power Source Buildings are located adjacent to the Reactor Building. These buildings are freestanding on reinforced concrete mats, and each building contains two identical emergency power sources, which are separated from each other by physical barriers. The safety-related HVAC chillers are also located in these buildings. The electrical, I&C and HVAC equipment related to the EPSs are also contained in the Power Source Buildings.

3. Power Source Fuel Storage Vault

The power source fuel storage vaults are underground structures constructed with reinforced concrete, and classified as seismic Category I. The vaults contain the fuel oil tanks of safety-related turbine generators.

4. Essential Service Water Pipe Tunnel

The essential service water pipe tunnel is an underground structure constructed with reinforced concrete, and is classified as seismic Category I. Terminating in part under the Turbine Building, the structure is isolated from other structures to prevent any seismic interaction. The other termination point is located at the ultimate heat sink related structure that connects to the ultimate heat sink water.

5. Auxiliary Building

The Auxiliary Building is located adjacent to the Reactor Building. The Auxiliary Building contains the main components of the waste disposal system and the non safety-related electrical area. The non safety-related electrical area is normally a non-radioactive zone and is completely separated from the radioactive zones of the Auxiliary Building.

6. Access Building

The Access Building is located adjacent to the Auxiliary Building. The Access Building houses the access control area and the chemical sampling and laboratory area.

7. Turbine Building

The Turbine Building houses the non safety-related equipment of the turbine generator and its auxiliary systems (main condenser, feedwater heaters, moisture separator reheaters, etc.). The turbine generator is a steel structure, which is designed to withstand all loads, including the load of the overhead traveling crane. The foundation of the building is made of concrete.

The building is designed base on the following:

- The Turbine Building is oriented in such a way that any plane perpendicular to the turbine generator axis shall not intersect with the Turbine Building. This arrangement minimizes the probability of a turbine missile striking the Reactor Building.

- The Turbine Building is independent of the Reactor Building to prevent internal hazards in the Turbine Building from spreading.

SECTION 2: EMERGENCY FACILITIES AND EQUIPMENT

1. UNIT-SPECIFIC EMERGENCY FACILITIES

Section 9 of this Plan contains information regarding the function and operation of the emergency response facilities. This section describes the US-APWR design-specific Control Room, Operations Support Center (OSC), and Technical Support Center (TSC).

a. Control Room

The Control Room is located in the Reactor Building. The Control Room includes the main control area, operations staff areas, and offices for the shift. Plant operations are directed from the Control Room. Nuclear Plant Instrumentation, Area and Process Radiation Monitoring System Instrumentation, Controls and Instrumentation for Reactor and Turbine Generator operation are provided here.

Control Room habitability and radiation protection is described in Sections 9.4 and 6.4 respectively, of the DCD. A description of the Control Room is in the DCD. Emergency equipment available to the Control Room is listed and maintained in accordance with emergency plan implementing procedures and/or administrative procedures.

b. OSC

The US-APWR DCD does not include an OSC as part of the standard design; therefore, the location of the OSC is determined at a later date. The OSC is separate from the Control Room and the TSC. This location includes separate areas for coordinating and planning OSC activities.

Both the Control Room and TSC have diverse means of communication with various plant locations including the OSC. During an emergency, if the OSC becomes uninhabitable, an alternate location for OSC activities is designated.

Evacuation of the OSC is conducted in accordance with emergency plan implementing procedures.

c. TSC

The TSC is located within the Protected Area in the Access Building, in close proximity to the Control Room. The TSC is sized for a minimum of 25 persons, including 20 persons designated by PSEG and five NRC personnel.

The TSC is designed as follows:

- Ventilation system which includes high-efficiency particulate air (HEPA) and charcoal absorbers.
- Exterior walls, roof, and floor are built to seismic Category II requirements.
- Provided with radiation protection equivalent to Control Room habitability requirements, such that the dose to an individual in the TSC for the duration of a design basis accident is less than 5 rem TEDE.
- Environmentally controlled to provide room air temperature, humidity and cleanliness appropriate for personnel and equipment.
- Reliable power for habitability systems and battery pack emergency lighting are provided.

During an emergency, if the TSC becomes uninhabitable, an alternate location for TSC activities is designated. Evacuation of the TSC is conducted in accordance with emergency plan implementing procedures.

d. On-Site Laboratories

The radiochemistry laboratory located in the Access Building is available for emergency response during an accident. The laboratory can receive power from the plant's diesel generators. General capabilities include:

- Radionuclide identification in various sample media.
- Analysis and measurement of radionuclides in samples taken within the plant and samples taken in the plant site and off-site environment.

e. Decontamination Facilities

The US-APWR DCD does not include a decontamination facility as part of the standard design; therefore, the location of the decontamination facility is determined at a later

date. It contains provisions for radiological decontamination of personnel, their wounds, supplies, instruments and equipment. This facility has extra clothing and decontaminants suitable for the type of contamination expected, including radioiodine skin contamination.

2. ASSESSMENT/MONITORING RESOURCES

a. On-Site Meteorological Monitoring Instrumentation

The PSEG Site uses the existing Salem and Hope Creek Generating Stations' meteorological monitoring program. The meteorological program is in accordance with the recommendation of NRC Regulatory Guide 1.23 "Onsite Meteorological Program" and Section 2.3.3 of NUREG 75/087 (Rev. 3).

b. On-Site Radiological Monitoring Instrumentation

The on-site radiation monitoring capability includes an installed process, effluent, and area Radiation Monitoring System (RMS); portable survey instrumentation; counting equipment for radiochemical analysis; and a personnel dosimetry program to record integrated exposure. Some on-site equipment is particularly valuable for accident situations.

1. Area Radiation Monitoring

The area monitoring system provides information on existing radiation levels in various areas of the plant to ensure safe occupancy. It is equipped with Control Room and local readout and audible alarms to warn personnel of a raised radiation level.

2. Radiological Noble Gas Effluent Monitoring

The wide range gas monitors are installed on normal station effluent release points. Each monitor system has a microprocessor which uses digital processing techniques to analyze data and control monitor functions. These monitors provide readout and alarm functions to the Control Room.

3. Radioiodine and Particulate Effluent Monitoring

The wide range gas monitor includes a sampling rack for collection of the auxiliary building vent stack particulate and radioiodine samples. Filter holders and valves are provided to allow grab sample collection for isotopic analyses in the plant's counting

rooms. The sampling rack is shielded to minimize personnel exposure. The sampling media is analyzed by a gamma ray spectrometer which uses a gamma spectrometer system. In addition, silver zeolite cartridges are available to further reduce the interference of noble gases.

4. High-Range Containment Radiation Monitors

   High-range containment radiation monitors are installed. The monitors detect and measure the radiation level within the reactor containment during and following an accident. The monitors are in range of postulated accidents and in support of emergency response.

5. In-Plant Iodine Instrumentation

   Effective monitoring of increasing iodine levels in buildings under accident conditions includes the use of portable instruments using silver zeolite as a sample media. It is expected that a sample can be obtained, purged, and analyzed for iodine content within a two-hour time frame.

c. On-Site Process Monitors

An adequate monitoring capability exists to properly assess the plant status for all modes of operation and is described in each unit's DCD. The operability of the post-accident instrumentation ensures information is available on selected plant parameters to monitor and assess important variables following an accident. Instrumentation is available to monitor the parameters in Technical Specifications.

The unit's emergency operating procedures assist personnel in recognizing inadequate core cooling using applicable instrumentation.

d. Seismic Monitors

The seismic instrumentation is solid-state multi-channel digital instrumentation with computerized recording and playback capability that allows the processing of data at the plant site within four hours of a seismic or other dynamic event.

The triaxial time-history accelograph consists of a centralized digital time history analyzer/recorder with multi-channel capability, which is located in a panel adjacent to the Main Control Room, and triaxial accelerator sensors at five different plant locations. These locations correlate to structural elements in the structures that have been

modeled as mass points in the dynamic analysis so that the measured motion can be directly compared to the design spectra. The instrumentation at the five locations is not mounted on equipment, piping supports, or secondary structural frame members.

These locations have been determined to be consistent with maintaining dose rates as low as reasonably practical and maintaining occupational radiation exposures as low as reasonably achievable for access and maintenance of the instrumentation.

The time-history analyzer/recorder has the capability to provide pre-event recording of three seconds minimum and post-event recording time of five seconds minimum, and to record at least 25 minutes of sensed motion. The recorder portion of the time-history analyze has the capability of a sample rate of at least 200 samples per second in each of the three orthogonal directions of the plant, a bandwith of 0.20 Hz t 100 Hz, and a dynamic range of 1,000:1 zero to peak. The triaxial acceleration sensors have the same dynamic range as the time-history analyzer recorder and a frequency of 0.02 Hz to 100 Hz. The triggers of the triaxial acceleration sensor units are capable of being set within the range of 0.001g to 0.02g. Power supply for the seismic monitoring instrumentation system is from the non-Class-1E direct current and uninterruptible power supply system; however, the system is equipped with dedicated back-up batteries and charger in case of power outage or power failure.

The seismic instrumentation serves no safety-related function, and, therefore, has no nuclear safety design requirements. However, its design and location are in accordance with Regulatory Guide 1.12, which requires that seismic instrumentation:

- Is not affected by the failure of adjacent structure, system and components (SSC) during an earthquake;
- Operates during all modes of plant operation, including periods of plant shutdown; and
- Is protected as much as practical against accidental impacts.

As required by Regulatory Guide 1.12, the seismic instrumentation is rigidly mounted and oriented so that the horizontal components are parallel to the horizontal axes of the standard plant used in seismic analyses. These features of the seismic monitoring instrumentation are obtained by qualifying the equipment to IEEE Standard 344-1987.

The triggering of the seismic instrumentation is annunciated in the Control Room.

e. On-Site Fire Detection Instrumentation

The fire detection system is designed in accordance with applicable National Fire Protection Association (NFPA) standards. The system is equipped with electrically supervised ionization smoke and heat detectors to quickly detect any fires and the instrumentation to provide local indication and control room annunciation. In addition to the smoke and heat detection systems, each fire protection carbon dioxide, halon, or water system is instrumented to inform the Control Room of its actuation or of system trouble.

In the event that a portion of the fire detection instrumentation is inoperable, fire watches in affected areas may be required.

Further details on the unit fire detection system can be found in the unit DCD and Fire Protection Plan.

SECTION 3: REFERENCES

1. US-APWR DESIGN DESCRIPTION (OCTOBER 2006)
2. US-APWR DESIGN CONTROL DOCUMENT, REV. 1 (AUGUST 2008)

ATTACHMENT 9

U.S. EPR – SPECIFIC INFORMATION

TABLE OF CONTENTS

SECTION 1: INTRODUCTION

The PSEG Site is owned and operated by PSEG Power. An area map showing geographical location of the facility is provided in Section 1 of this Emergency Plan.

1. U.S. EPR DESCRIPTION

The PSEG unit is an AREVA U.S. Evolutionary Power Reactor (EPR) which is an evolutionary Pressured Water Reactor (PWR) designed by Framatome ANP, Inc., a jointly-owned subsidiary of AREVA and Siemens. It is a four loop plant with a rated thermal power of 4,590 MWt. The primary system design, loop configuration, and main components are similar to those of currently operating PWRs.

The U. S. EPR safety design features include four redundant trains of emergency core cooling, containment and Shield Building, and a core melt retention system for severe accident mitigation, which meet applicable regulatory and commercial requirements.

The safety design of the U. S. EPR is based primarily on deterministic analyses complemented by probabilistic analyses. The deterministic approach is based on the “defense-in-depth” concept which comprises four levels:

1. A combination of conservative design, quality assurance, and surveillance activities to prevent departures from normal operation

2. Detection of deviations from normal operation and protection devices and control systems to cope with them (this level of protection is provided to ensure the integrity of the fuel cladding and of the reactor coolant pressure boundary (RCPB) in order to prevent accidents)

3. Engineered safety features and protective systems that are provided to mitigate accidents and consequently to prevent their evolution into severe accidents

4. Measures to preserve the integrity of the containment and enable control/mitigation of severe accidents

Low probability events with multiple failures and coincident occurrences up to the total loss of safety-grade systems are considered in addition to the deterministic design basis. Representative scenarios are defined for preventing both core melt and large releases in order to develop parameters for risk reduction features. A probabilistic approach is used to define these events and assess the specific measures available for their management. Consistent with

international and U. S. probabilistic safety objectives, the frequency of core melt is less than 10-5/reactor-year including all events and all reactor states.

Design provisions for the reduction of the residual risk, core melt mitigation, and prevention of large releases are:

- Prevention of high pressure core melt by high reliability of decay heat removal systems, complemented by primary system overpressure protection (OPP)
- Primary system discharge into the containment in the event of a total loss of secondary side cooling
- Features for corium spreading and cooling
- Prevention of hydrogen detonation by reducing the hydrogen concentration in the containment at an early stage with catalytic hydrogen recombiners
- Control of the containment pressure increase by a dedicated severe accident heat removal system (SAHRS) consisting of a spray system with recirculation through the cooling structure of the melt retention device

External events such as an aircraft hazard, explosion pressure wave (EPW), seismic events, missiles, tornado, and fire have been considered in the design of Safeguard Buildings and the hardening of the Shield Building.

Overview of the U. S. EPR Design

The U. S. EPR is furnished with a four-loop, pressurized water, reactor coolant system (RCS) composed of a reactor vessel that contains the fuel assemblies, a pressurizer including control systems to maintain system pressure, one reactor coolant pump (RCP) per loop, one SG per loop, associated piping, and related control and protection systems.

The RCS is contained within a concrete Containment Building. The Containment Building is enclosed by a Shield Building with an annular space between the two buildings. The post-tensioned concrete shell of the Containment Building is furnished with a steel liner and the Shield Buildings comprise the Reactor Building. The Reactor Building is surrounded by four Safeguard Buildings and a Fuel Building. The internal structures and components within the Reactor Building, Fuel Building, and two Safeguard Buildings (including the plant Control Room) are protected against aircraft hazard and external explosions. The other two Safeguard Buildings are not protected against hazard or external explosions. However, they are separated

by the Reactor Building, which restricts damage from these external events to a single safeguards building.

Redundant capacity safety systems for certain major safety systems are separated into four divisions. With four divisions, one division can be out-of-service for maintenance and one division can fail to operate, while the remaining two divisions are available to perform the necessity safety functions, even if one is ineffective due to the initiating event.

In the event of a loss of off-site power, each safeguard division is powered by a separate emergency diesel generator (EDG). In addition to the four safety-related diesels that power various safeguards, two independent diesel generators are available to power essential equipment during a postulated Station Blackout (SBO) event—loss of off-site ac power with coincident failure of all four EDGs.

Water storage for safety injection is provided by the In-containment refueling water storage tank (IRWST). Also inside containment, below the reactor pressure vessel (RPV), is a dedicated spreading area for molten core material following a postulated worst-case severe accident.

The fuel pool is located outside the Reactor Building in a dedicated building to simplify access for fuel handling during plant operation and handling of fuel casks. The Fuel Building is protected against aircraft hazard and external explosions. Fuel pool cooling is assured by two redundant, safety-related cooling trains.

SECTION 2 EMERGENCY FACILITIES AND EQUIPMENT

1. UNIT-SPECIFIC EMERGENCY FACILITIES

Section 9 of the Plan contains information regarding the function and operation of the emergency response facilities. This section describes the U.S. EPR design-specific Control Room, Operations Support Center (OSC), and Technical Support Center (TSC).

a. Control Room

The Control Room is located in the Safeguards Building 2. Plant operations are directed from the Control Room. Nuclear Plant Instrumentation, Area and Process Radiation Monitoring System Instrumentation, Controls and Instrumentation for Reactor and Turbine Generator operation are provided in the Control Room. Control Room habitability and radiation protection are described in Sections 9.4 and 6.4 of the DCD, respectively. A description of the Control Room is in the DCD. Emergency equipment

available to the Control Room is listed and maintained in accordance with emergency plan implementing procedures and/or administrative procedures.

b. OSC

The Operations Support Center (OSC) is located in the Access Building within the Protected Area, separate from the Control Room and the TSC. Both the Control Room and TSC have diverse means of communication with various plant locations including the OSC. During an emergency, if the OSC becomes uninhabitable, an alternate location for OSC activities is designated. Evacuation of the OSC is conducted in accordance with emergency plan implementing procedures.

c. TSC

The Technical Support Center (TSC) is located on the Control Room floor level outside the Control Room and has a separate access. It is located in the fully hardened Safeguards Building 2. Therefore, the TSC is protected against radiological hazards, internal and external missiles, and seismic activity.

The minimum size of the working space of the TSC is 1875 square feet. The TSC is sized for a minimum of 25 persons, including 20 persons designated by PSEG and five NRC personnel.

The TSC is designed to include the following:

- Displays for the plant parameters which are included in the fixed position displays on the Control Room Panels
- Voice communications equipment for communication with the Control Room, the Emergency Operations Facility, the Operations Support Center, and the NRC Headquarters and Region 1 Operation Centers
- Installed area radiation monitors
- Exterior walls, roof, and floor are built to seismic Category II requirements

- Provided with radiation protection equivalent to Control Room habitability requirements, such that the dose to an individual in the TSC for the duration of a design basis accident is less than 5 rem TEDE
- Environmentally controlled to provide room air temperature, humidity and cleanliness appropriate for personnel and equipment
- Reliable power for habitability systems and battery pack emergency lighting are provided

During an emergency, if the TSC becomes uninhabitable, an alternate location for TSC activities is designated. Evacuation of the TSC is conducted in accordance with emergency plan implementing procedures.

d. On-Site Laboratories

The radiochemistry laboratories located in the Auxiliary Building are available for emergency response during an accident. The on-site laboratory sampling system is designed to provide gas and liquid samples of containment atmosphere following an accident.

All modules, the sampling box and the local control cabinet are located in the Fuel Building. To ensure protection of the operating staff while taking a sample in the sampling box, all modules and pipes which convey highly contaminated fluids are located behind a biological shield.

General capabilities include:

- Radionuclide identification in various sample media
- Analysis and measurement of radionuclides in samples taken within the plant and samples taken in the plant site and Off-Site environment

e. Decontamination Facilities

The personnel decontamination facility is located in the Access Building and contains provisions for radiological decontamination of personnel, their wounds, supplies, instruments and equipment. This facility has extra clothing and decontaminants suitable for the type of contamination expected, including radioiodine skin contamination.

2. ASSESSMENT / MONITORING RESOURCES

a. On-Site Meteorological Monitoring Instrumentation

The PSEG Site uses the existing Salem and Hope Creek Generating Stations' meteorological monitoring program. The meteorological program is in accordance with the recommendation of NRC Regulatory Guide 1.23 "Onsite Meteorological Program" and Section 2.3.3 of NUREG 75/087 (Rev. 3).

b. On-Site Radiological Monitoring Instrumentation

The on-site radiation monitoring capability includes an installed process, effluent, and area radiation monitoring system (RMS); portable survey instrumentation; counting equipment for radiochemical analysis; and a personnel dosimetry program to record integrated exposure. Some on-site equipment is particularly valuable for accident situations.

1. Area Radiation Monitoring

The area monitoring system provides information on existing radiation levels in various areas of the plant to ensure safe occupancy. It is equipped with Control Room and local readout and audible alarms to warn personnel of a raised radiation level.

2. Radiological Noble Gas Effluent Monitoring

The wide range gas monitors are installed on normal station effluent release points. Each monitor system has a microprocessor which uses digital processing techniques to analyze data and control monitor functions. These monitors provide readout and alarm functions to the Control Room.

3. Radioiodine and Particulate Effluent Monitoring

The wide range gas monitor includes a sampling rack for collection of the auxiliary building vent stack particulate and radioiodine samples. Filter holders and valves are provided to allow grab sample collection for isotopic analyses in the plant's counting rooms. The sampling rack is shielded to minimize personnel exposure. The sampling media is analyzed by a gamma ray spectrometer which uses a gamma spectrometer system. In addition, silver zeolite cartridges are available to further reduce the interference of noble gases.

4. High-Range Containment Radiation Monitors

   High-range containment radiation monitors are installed. The monitors detect and measure the radiation level within the reactor containment during and following an accident. The monitors are in range of postulated accidents and in support of emergency response.

5. In-Plant Iodine Instrumentation

   Effective monitoring of increasing iodine levels in buildings under accident conditions includes the use of portable instruments using silver zeolite as a sample media. It is expected that a sample can be obtained, purged, and analyzed for iodine content within a two-hour time frame.

c. On-Site Process Monitors

   An adequate monitoring capability exists to properly assess the plant status for all modes of operation and is described in each unit's DCD. The operability of the post-accident instrumentation ensures information is available on selected plant parameters to monitor and assess important variables following an accident. Instrumentation is available to monitor the parameters in Technical Specifications. The unit's emergency operating procedures assist personnel in recognizing inadequate core cooling using applicable instrumentation.

d. Seismic Monitors

   The seismic monitoring system (SMS) measures and records the acceleration (earthquake ground motion) of selected structures. Earthquakes produce frequency dependent accelerations which, when detected by the remote sensing devices, are permanently recorded as information which defines the seismic input. The system remains in a standby condition until an earthquake, above a preset target acceleration, causes the remote unit(s) to activate the recording circuits and signals the Main Control Room (MCR) that a seismic event is being recorded.

   The SMS consists of field-mounted sensors, recording and data storage equipment, central controller, power supply, and ancillary support equipment. The system equipment cabinet houses the seismic recorders, central controller, and power supplies. The equipment cabinet is located in the computer room of SB Division 2. All equipment

except for the field-mounted triaxial accelerometers is located in this seismically qualified equipment rack.

The field-mounted sensors are triaxial accelerometers (three elements supplied and mounted in a mutually orthogonal array) that produce a response that is proportional to the time varying acceleration at the location of the sensor. The sensors are rigidly mounted and located free-field, in the primary containment structure, and an independent Seismic Category I structure not influenced by or connected to the primary containment structure. The accelerometers are chosen to respond to a maximum acceleration that is 1.2 times the SSE acceleration for the intended instrument location. The accelerometer outputs are used by the seismic recorders to produce time-history accelerographs.

Each seismic recorder (or data acquisition unit) is of modular design and mounted in the system cabinet. The sampling rate of the recorder is a minimum of 200 samples per second for each of the three directions (axis). Bandwidth is at least 0.20 to 50 Hz. The dynamic range of the recorder is at least 1000:1 zero-to-peak, and the instrumentation is able to record at least 1.0 g zero-to-peak. The trigger threshold is selectable from 0.01 to 100 percent of full scale with the trigger set 0.001g to 0.02g but not more than 0.02g. The recorders record pre-earthquake data three seconds prior to the trigger actuation and continue to record the motion during the period in which the earthquake motion exceeds the seismic trigger threshold, and continue to record low-amplitude motion for a minimum of five seconds beyond the last exceedance of the seismic trigger threshold. Additional prevent memory (for up to 30 seconds of pre-earthquake recording) is provided for “P” wave correlation.

The central controller (or computer) is used to provide control and monitoring of all of the recorders or data acquisition units, interfaces with external control systems and alarm functions. The controller provides two seismic triggered annunciations in the MCR; the first indicates a seismic event occurrence, and the second indicates exceedance of the OBE. The seismic event alarm is triggered by the digital recorders, and the OBE exceedance alarm is triggered by the centralized computer.

The system components are powered from the plant-supplied, non-vital batterybacked uninterruptible power supply (UPS) to provide continuous operation following a station blackout. A backup battery system is provided for each recorder adequate to supply

power to the equipment for a minimum of 25 minutes in a 24-hour period without recharging. The system equipment cabinet includes an internal UPS and charger capable of operating the central controller and support equipment.

Seismic instrumentation is not located on equipment, piping, or supports since experience has shown that data obtained at these locations is obscured by vibratory motion associated with normal plant operation.

e. On-Site Fire Detection Instrumentation

The fire detection system is designed in accordance with applicable National Fire Protection Association (NFPA) standards and detection is generally provided in areas containing safety related components/systems as recommended in Regulatory Guide 1.189, “Fire Protection for Operating Nuclear Power Plants.” The plant fire alarm system is furnished with electrically supervised circuits that monitor field input devices and output devices such as suppression releasing and alarm notification devices. Instrumentation is provided in the Control Room and at local fire control panels to alert operators of the location of a detected fire, the release of a suppression system. Or the annunciation of a trouble condition within a portion of the system.

The system is equipped with electrically supervised ionization smoke and heat detectors to quickly detect any fires and the instrumentation to provide local indication and control room annunciation. In addition to the smoke and heat detection systems, each fire protection carbon dioxide, halon, or water system is instrumented to inform the Control room of its actuation or of system trouble.

In the event that a portion of the fire detection instrumentation is inoperable, fire watches in affected areas may be required.

Further details on the unit fire detection system can be found in the unit DCD and Fire Protection Plan.

SECTION 3: REFERENCES

1. BELL BEND NUCLEAR POWER PLANT COLA, EMERGENCY PLAN, REV. 1

2. U.S. EPR DESIGN CONTROL DOCUMENT, REV. 0

ATTACHMENT 10

Emergency Planning-Inspections, Tests, Analyses, and Acceptance Criteria (EP-ITAAC)

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
1.0 Emergency Classification System			
10 CFR 50.47(b)(4) – A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and state and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial off-site response measures.	1.1 A standard emergency classification and emergency action level (EAL) scheme exists, and identifies facility system and effluent parameters constituting the bases for the classification scheme. [D.1**] [D.1** corresponds to NUREG-0654/FEMA-REP-1 evaluation criteria.]	1.1.1 An inspection of the Control Room, Technical Support Center (TSC), and Emergency Operations Facility (EOF) will be performed to verify that they have displays for retrieving facility system and effluent parameters as specified in the Emergency Classification and EAL scheme, and the displays are functional. 1.1.2 An analysis of the EAL technical bases will be performed to verify as-built, site-specific implementation of the EAL scheme.	1.1.1(a) The parameters referenced in the Emergency Classification and EAL scheme are retrievable in the Control Room, TSC and EOF. 1.1.1(b) The ranges of the displays encompass the values specified in the Emergency Classification and EAL scheme. 1.1.2 The EAL scheme is consistent with Regulatory Guide 1.101, Emergency Planning and Preparedness for Nuclear Power Reactors.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
2.0 Notification Methods and Procedures			
10 CFR 50.47(b)(5) – Procedures have been established for notification, by the licensee, of state and local response organizations and for notification of emergency personnel by all organizations; the content of initial and follow-up messages to response organizations and the public has been established; and means to provide early notification and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone have been established.	2.1 The means exist to notify responsible state and local organizations within 15 minutes after the licensee declares an emergency. [E.1]	2.1 A test will be performed to demonstrate the capabilities for providing initial notification to the off-site authorities after a simulated emergency classification.	2.1 The States of Delaware and New Jersey, and Kent, New Castle, Cumberland, and Salem counties received notification within 15 minutes after the declaration of an emergency from the Control Room, TSC and EOF.
	2.2 The means exist to notify emergency response personnel. [E.2]	2.2 A test of the primary and back-up ERO notification systems will be performed.	2.2 A test of the primary and back-up ERO notification system resulted in: a. ERO personnel received the notification message. b. Mobilization communication validated by personnel response to the notification system or by telephone. c. Response to electronic notification and plant public address system demonstrated during normal working hours, and off hours.
	2.3 The means exist to notify and provide instructions to the populace within the plume exposure EPZ. [E.6]	2.3 A full test of the Prompt Alerting and Notification System (ANS) and the Emergency Alert System (EAS) capabilities will be conducted.	2.3 Notification and clear instructions to the public accomplished in accordance with the emergency plan requirements.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
3.0 Emergency Communications			
10 CFR 50.47(b)(6) – Provisions exist for prompt communications among principal response organizations to emergency personnel and to the public.	3.1 The means exist for communications among the Control Room, TSC, EOF, principal state and local emergency operations centers (EOCs), and field monitoring teams. [F.1.d]	3.1(a) A test will be performed to demonstrate (both primary and secondary methods/systems) the ability to communicate from the Control Room, TSC and the EOF to responsible State and local government agencies.	3.1(a) Demonstrated (both primary and secondary methods/systems) the ability to communicate from the Control Room, TSC and the EOF to responsible State and local government agencies.
		3.1(b) A test will be performed to demonstrate (both primary and secondary methods/systems) the ability to communicate from the TSC and the EOF to PSEG field monitoring teams.	3.1(b) Demonstrated (both primary and secondary methods/systems) the ability to communicate from the TSC and the EOF to PSEG field monitoring teams.
	3.2 The means exist for communications from the Control Room, TSC, and EOF to the NRC headquarters and regional office EOCs (including establishment of the Emergency Response Data System (ERDS) [or its successor system] between the on-site computer system and the NRC Operations Center.) [F.1.f]	3.2 A test will be performed to demonstrate the ability to communicate from the Control Room, TSC and the EOF to the NRC Operations Centers utilizing the ENS. The Health Physics Network (HPN) is tested to ensure communications between the TSC and EOF with the NRC Operations Centers. ERDS is established [or its successor system] between the on-site computer systems and the NRC Operations Centers.	3.2 Communications established between the Control Room, TSC and EOF to the NRC headquarters and regional office EOCs utilizing the ENS. The TSC and EOF demonstrated communications with the NRC Operations Center using the HPN. The access port for ERDS [or its successor system] is provided and successfully completes a transfer of data from the Unit to the NRC Operations Center.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
4.0 Public Education and Information			
10 CFR 50.47(b)(7) – Information is made available to the public on a periodic basis on how they will be notified and what their initial actions should be in an emergency (e.g., listening to a local broadcast station and remaining indoors), the principal points of contact with the news media for dissemination of information during an emergency (including the physical location or locations) are established in advance, and procedures for coordinated dissemination of information to the public are established.	4.1 The licensee has provided space which may be used for a limited number of the news media. [G.3.b]	4.1 An inspection of the as-built facility/area provided for the news media will be performed in the Emergency News Center/Joint Information Center (ENC/JIC).	4.1 The ENC/JIC included equipment to support ENC/JIC operations, including communications with: a. TSC and EOF b. Principal state and local EOCs c. The news media Designated space is available for news media briefings.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
5.0 Emergency Facilities and Equipment			
10 CFR 50.47(b)(8) – Adequate emergency facilities and equipment to support the emergency response are provided and maintained.	5.1 The licensee has established a Technical Support Center (TSC) and an onsite Operations Support Center (OSC). [H.1] [H.9].	5.1.1 An inspection of the as-built TSC and OSC will be performed, including a test of the capabilities.	5.1.1 The TSC size is consistent with NUREG-0696. The TSC has at least 1875 ft^2 of floor space (75 ft^2 per person for a minimum of 25 persons). 5.1.2 Communication equipment is installed in the TSC and OSC, and voice transmission and reception are accomplished. 5.1.3 The TSC ventilation system includes a high efficiency particulate air (HEPA), and charcoal filter and radiation monitors are installed. 5.1.4 The TSC has the means to receive, store, process, and display plant and environmental information, and enable the initiation of emergency measures and the conduct of emergency assessment. These capabilities are demonstrated during testing and acceptance activities. 5.1.5 A reliable and back-up electrical power supply is available for the TSC. 5.1.6 There is an OSC located inside the Protected Area.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
5.0 Emergency Facilities and Equipment (cont.)			
	5.2 The licensee has established an EOF. [H.2]	5.2 An inspection of the EOF will be performed, including a test of the capabilities.	5.2.1 Demonstrated communications between the Control Room, TSC, EOF, field monitoring teams, NRC, responsible State and county agencies, and the ENC/JIC. 5.2.2 The parameters referenced in the Emergency Classification and EAL scheme are retrievable in the EOF. 5.2.3 Demonstrated the capability of the EOF to handle events at two or more reactors on the site, including the capabilities to discriminate plant data, staffing and operation of the facility.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
6.0 Accident Assessment			
10 CFR 50.47(b)(9) – Adequate methods, systems, and equipment for assessing and monitoring actual or potential off-site consequences of a radiological emergency condition are in use.	6.1 The means exist to provide initial and continuing radiological assessment throughout the course of an accident. [I.2]	6.1 A test of the emergency plan will be conducted by performing a drill or exercise to verify the capability to perform accident assessment.	6.1 Using selected monitoring parameters specified in the PSEG Site Emergency Plan, including EALs (ITAAC Acceptance Criteria 1.1.1), simulated degraded plant conditions are assessed and protective actions are initiated in accordance with the following criteria: a. Demonstrated the ability to obtain onsite radiological surveys and samples. b. Demonstrated the ability to continuously monitor and control radiation exposure to emergency workers. c. Demonstrated the ability to assemble and deploy field monitoring teams within 60 minutes from the decision to do so. d. Demonstrated the ability to satisfactorily collect and disseminate field team data. e. Demonstrated the ability to develop dose projections.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
6.0 Accident Assessment (cont.)			
			f. Demonstrated the ability to make the decision whether to issue radioprotective drugs, (KI), to on-site emergency workers. g. Demonstrated the ability to develop appropriate protective action recommendations (PARs) and notify appropriate authorities within 15 minutes of development.
	6.2 The means exist to determine the source term of releases of radioactive material within plant systems, and the magnitude of the release of radioactive materials based on plant system parameters and effluent monitors. [I.3]	6.2 A test will be performed to demonstrate that the means exist to determine the source term of releases of radioactive material within plant systems, and the magnitude of the release of radioactive materials based on plant system parameters and effluent monitors.	6.2 Demonstrated through training or drills that Emergency Plan Implementing Procedures (EPIPs) provide direction to accurately calculate the source terms and the magnitude of the release of postulated accident scenario releases.
	6.3 The means exist to continuously assess the impact of the release of radioactive materials to the environment, accounting for the relationship between effluent monitor readings, and on-site and off-site exposures and contamination for various meteorological conditions. [I.4]	6.3 A test will be performed that provides evidence that the impact of a radiological release to the environment can be assessed by using the relationship between effluent monitor readings, and on-site and off-site exposures and contamination for various meteorological conditions.	6.3 Demonstrated through training or drills that EPIPs provide direction to continuously assess the impact of the release of radioactive materials to the environment, accounting for the relationship between effluent monitor readings, and on-site and off-site exposures and contamination for various meteorological conditions.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
6.0 Accident Assessment (cont.)			
	6.4 The means exist to acquire and evaluate meteorological information. [I.5]	6.4 A test will be performed to acquire and evaluate meteorological data/information.	6.4 Demonstrated that meteorological data necessary to implement the EPIPs is retrievable in the Control Room, TSC and EOF.
	6.5 The means exist to determine the release rate and projected doses if the instrumentation used for assessment is off-scale or inoperable. [I.6]	6.5 A test will be performed of the capabilities to determine the release rate and projected doses if the instrumentation used for assessment is off-scale or inoperable.	6.5 Demonstrated through training or drills that EPIPs provide direction to determine release rate and projected dose rates when instruments are off-scale or inoperable.
	6.6 The means exist for field monitoring within the plume exposure EPZ. [I.7]	6.6 A test will be performed of the capabilities for field monitoring within the plume exposure EPZ.	6.6 Demonstrated through training or drills the field monitoring teams were dispatched and able to locate and monitor a radiological release within the plume exposure EPZ during a radioactive release scenario.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
6.0 Accident Assessment (cont.)			
	6.7 The means exist to make rapid assessments of actual or potential magnitude and locations of radiological hazards through liquid or gaseous release pathways, including activation, notification means, field team composition, transportation, communication, monitoring equipment, and estimated deployment times. [I.8]	6.7 A test will be performed of the capabilities to make rapid assessments of actual or potential magnitude and locations of radiological hazards through liquid or gaseous release pathways, including activation, notification means, field team composition, transportation, communication, monitoring equipment, and estimated deployment times.	6.7 Demonstrated through training or drills using EPIPs: a. A qualified field monitoring team was promptly notified, activated, briefed and dispatched from the EOF during a radiological release scenario. b. The team used monitoring equipment, transportation, communication from the field and located specific sampling locations. c. The team made rapid assessment of actual or potential magnitude and locations of any radiological hazards from simulated liquid or gaseous releases.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
6.0 Accident Assessment (cont.)			
	6.8 The capability exists to detect and measure radioiodine concentrations in air in the plume exposure EPZ, as low as 10^{-7} µCi/cc (microcuries per cubic centimeter) under field conditions. [I.9]	6.8 A test will be performed of the capabilities to detect and measure radioiodine concentrations in air in the plume exposure EPZ, as low as 10^{-7} µCi/cc (micro-curies per cubic centimeter) under field conditions.	6.8 A field monitoring team demonstrated, in accordance with the appropriate EPIP(s), the use of sampling and detection equipment for air concentrations in the plume exposure EPZ during a radioactive release scenario, as low as 10^{-7} µCi/cc.
	6.9 The means exist to estimate integrated dose from the projected and actual dose rates, and for comparing these estimates with the EPA protective action guides (PAGs). [I.10]	6.9 A test will be performed of the capabilities to estimate integrated dose from the projected and actual dose rates, and for comparing these estimates with the EPA protective action guides.	6.9 Personnel demonstrated the ability to estimate integrated dose from the dose assessment program and the field monitoring team reading during a radioactive release scenario. The results were successfully compared with the EPA Protective Action Guides (PAGs).

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
7.0 Protective Response			
10 CFR 50.47(b)(10) – A range of protective actions has been developed for the plume exposure EPZ for emergency workers and the public. In developing this range of actions, consideration has been given to evacuation, sheltering, and, as a supplement to these, the prophylactic use of potassium iodide (KI), as appropriate. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure EPZ appropriate to the locale have been developed.	7.1 The means exist to warn and advise on-site individuals of an emergency, including those in areas controlled by the operator, including:[J.1] 1. Employees not having emergency assignments. 2. Visitors. 3. Contractor and construction personnel. 4. Other people who may be in the public access areas, on or passing through the site, or within the owner controlled area.	7.1 A test will be performed of the capabilities to warn and advise on-site individuals of an emergency, including those in the owner controlled area and the immediate vicinity.	7.1 Demonstrated the ability to warn and advise on-site individuals including: 1. Non-essential employees. 2. Visitors. 3. Contractor and construction personnel. 4. Other people within the owner controlled area and the immediate vicinity.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills			
10 CFR 50.47(b)(14) – Periodic exercises are (will be) conducted to evaluate major portions of emergency response capabilities, periodic drills are (will be) conducted to develop and maintain key skills, and deficiencies identified as a result of exercises or drills are (will be) corrected.	8.1 Licensee conducts a full participation exercise to evaluate major portions of emergency response capabilities, which includes participation by each state and local agency within the plume exposure EPZ, and each state within the ingestion control EPZ. [N.1]	8.1 A full participation exercise (test) will be conducted within the specified time periods of Appendix E to 10 CFR, Part 50.	8.1.1 The exercise is completed within the specified time periods of 10 CFR Part 50, Appendix E; on-site exercise objectives have been met, and there are no uncorrected on-site exercise deficiencies. *A. Accident Assessment and Classification* 1. Demonstrated the ability to identify initiating conditions, determine emergency action level (EAL) parameters, and correctly classify the emergency throughout the exercise. Standard Criteria: a. Determined the correct highest emergency classification level based on events which were in progress, considering past events and their impact on the current conditions, within 15 minutes from the time the initiating condition(s) or EAL is identified.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			B. Notifications 1. Demonstrated the ability to alert, notify and mobilize site emergency response personnel. Standard Criteria: a. Completed the designated checklist and performed the plant page announcement of the emergency classification. b. Activated the emergency outdial system within about 10 minutes of the initial event classification for an Alert or higher. 2. Demonstrated the ability to notify responsible State agencies within 15 minutes and the NRC within 60 minutes after declaring an emergency. Standard Criteria: a. Transmitted information using the designated checklist in accordance with approved Emergency Plan documents within 15 minutes of event classification.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			b. Transmitted follow-up notification information using the designated checklist in accordance with approved Emergency Plan documents. c. Transmitted information using designated checklist within 60 minutes of event classification to the NRC. 3. Demonstrated the ability to warn or advise on-site individuals of emergency conditions. Standard Criteria: a. Initiated notification of on-site individuals (via public address, OCA sirens or telephone) using designated checklist. 4. Demonstrated the capability of the Prompt Alerting and Notification System (ANS) to operate properly for public notification when required.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			Standard Criteria: a. ≥ 90% of the sirens operate properly as indicated by the siren feedback system. *C. Emergency Response* 1. Demonstrated the capability to direct and control emergency operations. Standard Criteria: a. Overall Emergency Command and Control demonstrated in the Control room (simulator) in the early phase of the emergency and by the TSC within 90 minutes from initial event classification of Alert or higher. 2. Demonstrated the ability to transfer the Emergency Coordinator function from the SM in the Control room (simulator) to the EDO in the TSC and later to the ERM in the EOF.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			Standard Criteria: a. Briefings were conducted prior to turnover responsibility. Personnel documented transfer of duties. 3. Demonstrated the ability to prepare for 24-hour staffing requirements. Standard Criteria: a. Completed 24-hour staff assignments. 4. Demonstrated the ability to perform assembly and accountability for all personnel in the Protected Area (PA) within 30 minutes of an emergency (after accountability message has been announced) requiring Protected Area accountability.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			Standard Criteria: a. Protected Area (PA) personnel accountability completed within 30 minutes of an emergency (after accountability message has been announced) requiring PA accountability. *D. Emergency Response Facilities* 1. Demonstrated activation of the Operations Support Center (OSC) and full functional operation of the TSC and EOF within 90 minutes of event classification. Standard Criteria: a. The TSC, and OSC activated within 90 minutes of the initial classification of an Alert or higher. b. The EOF activated within 90 minutes of the initial classification of SAE or higher.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			2. Demonstrated the adequacy of equipment, security provisions, and habitability precautions for the TSC, OSC, EOF and ENC/JIC, as appropriate. Standard Criteria: a. Demonstrated the adequacy of the emergency equipment in the emergency response facilities including availability and general consistency with the Emergency Plan Implementing Procedures (EPIPs). b. Personnel assigned to the ERO implemented and followed applicable EPIPs. c. The SRPT (onshift), Radiological Assessment Coordinator (TSC), and Radiological Support Manager (EOF) implemented the designated checklist if an on-site/off-site release occurred.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			3. Demonstrated the adequacy of communications for all emergency support resources. Standard Criteria: a. Emergency response communications listed in the EPIPs are available and operational. b. Communications systems are tested in accordance with the TSC, OSC and EOF activation checklists. c. Emergency response facility personnel are able to operate all specified communications systems. d. Clear primary and backup communications links are established and maintained for the duration of the exercise. *E. Radiological Assessment and Control* 1. Demonstrated the ability to obtain on-site radiological surveys and samples.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			Standard Criteria: a. Radiation Protection Technicians demonstrated the ability to obtain appropriate instruments (range and type) and perform surveys. b. Airborne samples taken when the conditions indicate the need for the information. 2. Demonstrated the ability to continuously monitor and control radiation exposure to emergency workers. Standard Criteria: a. Emergency workers issued self-reading dosimeters when radiation levels require, and exposures controlled to 10 CFR 20 limits (unless the SM or Emergency Duty Officer, or designee, authorizes emergency limits).

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			b. Exposure records are available from the site database(primary), a personal computer database (backup) or a hard copy report(backup) 3. Demonstrated the ability to assemble and dispatch field monitoring teams. Standard Criteria: a. An on-site Field Monitoring Team is ready to be deployed within 60 minutes of being requested from the declaration of an Alert or higher. 4. Demonstrated the ability to satisfactorily collect and disseminate field team data. Standard Criteria: a. Field team data to be collected is dose rate or counts per minute (cpm) from the plume, both open and closed window, and air sample (gross/net cpm) for particulate and iodine, if applicable.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			b. Radiological data disseminated from the Field Team to the Offsite Field Team Coordinator / Communicator. 5. Demonstrated the ability to develop dose projections. Standard Criteria: a. The Shift Radiation Protection Technician (SRPT) performed timely and accurate dose projections, in accordance with the EPIPs. 6. Demonstrated the ability to develop appropriate Protective Action Recommendations (PARs), and notified NJ and DE within 15 minutes of a General Emergency declaration or of an update of the previously issued PARs.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			Standard Criteria: a. Total Effective Dose Equivalent (TEDE) and Committed Dose Equivalent (CDE) dose projections from the dose assessment computer code, established in accordance with the EPIPs. b. PARS developed within 15 minutes of data availability. c. PARs transmitted via voice, fax, or electronically within 15 minutes as required by the EPIPs. *F. Public Information* 1. Demonstrated the capability to develop and disseminate clear, accurate, and timely information to the news media. Standard Criteria: a. Media briefings provided within approximately 60 minutes of activation of the ENC/JIC.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			2. Demonstrated the capability to establish and effectively operate rumor control in a coordinated fashion. Standard Criteria: a. Calls answered in a timely manner with the correct information. b. Calls returned or forwarded, as appropriate, to demonstrate responsiveness. c. Rumors identified and addressed. G. *Evaluation* 1. Demonstrated the ability to conduct a post-exercise critique, to determine areas requiring improvement and corrective action. Standard Criteria: a. Drill and Exercise objectives developed to allow for performance evaluation.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
8.0 Exercises and Drills (cont.)			
			b. Significant problems in achieving the objectives discussed to ensure understanding of why objectives were not fully achieved. 8.1.2 On-site emergency response personnel were mobilized in sufficient numbers to fill emergency response positions identified in Section 3, Emergency Response Organization, and they successfully performed assigned responsibilities. 8.1.3 The exercise was completed within the specified time periods of Appendix E to 10 CFR Part 50, off-site exercise objectives were met, and there were no uncorrected off-site exercise deficiencies; or a license condition requires off-site deficiencies to be corrected prior to operation above 5% of rated thermal power.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
9.0 Implementing Procedures			
10 CFR Part 50, App. E.V – No less than 180 days prior to the scheduled issuance of an operating license for a nuclear power reactor or a license to possess nuclear material, the applicant's detailed implementing procedures for its emergency plan shall be submitted to the Commission.	9.1 The licensee has submitted detailed implementing procedures for its emergency plan no less than 180 days prior to fuel load.	9.1 An inspection of the submittal letter will be performed.	9.1 The licensee has submitted detailed EPIPs for the onsite emergency plan no less than 180 days prior to fuel load.

KLD ENGINEERING, P.C.

PSEG Site

Development of Evacuation Time Estimates

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EXECUTIVE SUMMARY

This report describes the analyses undertaken and the results obtained by a study to develop Evacuation Time Estimates (ETE) for the PSEG Site located in Salem County, New Jersey. Evacuation time estimates are part of the required planning basis and provide PSEG and State and local governments with site-specific information needed for Protective Action decision-making.

In the performance of this effort, guidance is provided by documents published by Federal Government agencies. Most important of these are:

- Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG-0654/FEMA-REP-1, Rev. 1, November 1980.
- Analysis of Techniques for Estimating Evacuation Times for Emergency Planning Zones, NUREG/CR-1745, November 1980.
- Development of Evacuation Time Estimates for Nuclear Power Plants, NUREG/CR-6863, January 2005.

Overview of Project Activities

This project began in March, 2009 and extended over a period of 5 months. The major activities performed are briefly described in chronological sequence:

- Attended "kick-off" meetings with PSEG personnel and emergency management personnel representing state and local governments.
- Accessed U.S. Census Bureau data files for the year 2000. Studied Geographical Information Systems (GIS) maps of the area in the vicinity of the PSEG Site, then conducted a detailed field survey of the highway network.
- Synthesized this information to create an analysis network representing the highway system topology and capacities within the Emergency Planning Zone (EPZ), plus a Shadow Region covering the region between the EPZ boundary and approximately 15 miles radially from the plant.
- Designed and sponsored a telephone survey of residents within the EPZ to gather focused data needed for this ETE study that were not contained within the census database. The survey instrument was reviewed and modified by State and county personnel prior to the survey.
- Data collection forms (provided to the counties at the kickoff meeting) were returned with data pertaining to employment, transients, and special facilities in each county.
- The traffic demand and trip-generation rates of evacuating vehicles were estimated from the gathered data. The trip generation rates reflected the

estimated mobilization time (i.e., the time required by evacuees to prepare for the evacuation trip) computed using the results of the telephone survey of EPZ residents.

- Following Federal guidelines, the EPZ is subdivided into 12 Emergency Response Planning Areas (ERPA). These ERPA are then grouped within circular areas or "keyhole" configurations (circles plus radial sectors) that define a total of 17 Evacuation Regions.
- The time-varying external circumstances are represented as Evacuation Scenarios, each described in terms of the following factors: (1) Season (Summer, Winter); (2) Day of Week (Midweek, Weekend); (3) Time of Day (Midday, Evening); and (4) Weather (Good, Rain, Snow). One special scenario involving the construction phase at the PSEG Site was considered.
- The Planning Basis for the calculation of ETE is:
  - A rapidly escalating accident at the PSEG Site that quickly assumes the status of General Emergency such that the Advisory to Evacuate is virtually coincident with the siren alert.
  - While an unlikely accident scenario, this planning basis will yield ETE, measured as the elapsed time from the Advisory to Evacuate until the last vehicle exits the impacted Region, that represent "upper bound" estimates. This conservative Planning Basis is applicable for all initiating events.
- If the emergency occurs while schools are in session, the ETE study assumes that the children will be evacuated by bus directly to reception centers located outside the EPZ. Parents, relatives, and neighbors are advised to not pick up their children at school prior to the arrival of the buses dispatched for that purpose. The ETE for schoolchildren are calculated separately.
- Evacuees who do not have access to a private vehicle will either ride-share with relatives, friends or neighbors, or be evacuated by buses provided as specified in the county evacuation plans. Those in special facilities will likewise be evacuated with public transit, as needed: bus, van, or ambulance, as required. Separate ETE are calculated for the transit-dependent evacuees and for those evacuated from special facilities.

Computation of ETE

A total of 255 ETE were computed for the evacuation of the general public. Each ETE quantifies the aggregate evacuation time estimated for the population within one of the 17 Evacuation Regions to completely evacuate from that Region, under the circumstances defined for one of the 15 Evacuation Scenarios (17 x 15 = 255). Separate ETE are calculated for transit-dependent evacuees, including schoolchildren for applicable scenarios.

Except for Region R03, which is the evacuation of the entire EPZ, only a portion of the

people within the EPZ would be advised to evacuate. That is, the Advisory to Evacuate applies only to those people occupying the specified impacted region. It is assumed that 100 percent of the people within the impacted region will evacuate in response to this Advisory. The people occupying the remainder of the EPZ outside the impacted region may be advised to take shelter.

The computation of ETE assumes that a portion of the population within the EPZ but outside the impacted region, will elect to “voluntarily” evacuate. In addition, a portion of the population in the Shadow Region beyond the EPZ that extends from the EPZ boundary to a distance of approximately 15 miles from the PSEG Site, will also elect to evacuate. These voluntary evacuees could impede those who are evacuating from within the impacted region. The impedance that could be caused by voluntary evacuees is considered in the computation of ETE for the impacted region.

The computational procedure is outlined as follows:

- A link-node representation of the highway network is coded. Each link represents a unidirectional length of highway; each node usually represents an intersection or merge point. The capacity of each link is estimated based on the field survey observations and on established procedures.
- The evacuation trips are generated at locations called “zonal centroids” located within the EPZ. The trip generation rates vary over time reflecting the mobilization process, and from one location (centroid) to another depending on population density and on whether a centroid is within, or outside, the impacted area.
- The computer models compute the routing patterns for evacuating vehicles that are compliant with federal guidelines (outbound relative to the location of PSEG Site), then simulate the traffic flow movements over space and time. This simulation process estimates the rate that traffic flow exits the impacted region. The following federal guidelines were adhered to in computing the ETE presented in this study:
  - 10CFR50, Appendix E – “Emergency Planning and Preparedness for Production and Utilization Facilities”
  - Appendix 4 to NUREG-0654/FEMA-REP-1, Rev. 1 - “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants"
  - Supplement 2 to NUREG-0654/FEMA-REP-1, Rev. 1 – "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants - Criteria for Emergency Planning in an Early Site Permit Application"
  - NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants” – Section 13.3 – “Emergency Planning”
  - NUREG/CR-6863 – “Development of Evacuation Time Estimate Studies for Nuclear Power Plants”

  - Regulatory Guide 1.206 – "Combined License Applications for Nuclear Power Plants" – Section C.I.13.3 – "Emergency Planning"
  - NUREG-0654/FEMA-REP-1, Rev. 1, Supp. 3 , "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants - Criteria for Protective Action Recommendations for Severe Accidents"
- The ETE statistics provide the elapsed times for 50 percent, 90 percent, 95 percent and 100 percent, respectively, of the population within the impacted region, to evacuate from within the impacted region. These statistics are presented in tabular and graphical formats. **The 90th percentile ETE should be considered when making protective action decisions because the 100th percentile ETE are prolonged by those relatively few people who take longer to mobilize.** Page 27 of NUREG/CR-6953, Volume 2 (NRC public telephone survey) indicates that an evacuation tail of approximately 10% of the EPZ population is appropriate for ETE studies. The evacuation tail prolongs the ETE as a result of those stragglers who take longer to mobilize. Thus, a tail of 10% would imply using the 90th percentile ETE.

  The use of a public outreach (information) program to emphasize the need for evacuees to minimize the time needed to prepare to evacuate (secure the home, assemble needed clothes, medicines, etc.) should also be considered.

<u>Traffic Management</u>

This study references the comprehensive traffic management plan provided by Delaware Emergency Management Agency and the State of New Jersey Radiological Emergency Response Plan, and identifies critical intersections.

<u>Selected Results</u>

A compilation of selected information is presented on the following pages in the form of Figures and Tables extracted from the body of the report; these are described below.

- Figure 6-1 displays a map of the PSEG Site showing the layout of the 12 Emergency Response Planning Areas (ERPA) that comprise, in aggregate, the EPZ.
- Table 3-1 presents the estimates of permanent resident population in each ERPA based on the 2000 Census data. Extrapolation to the year 2010 reflects population growth rates in each county derived from census data.
- Table 6-1 defines each of the 17 Evacuation Regions in terms of their respective groups of ERPA.
- Table 6-2 lists the Evacuation Scenarios.
- Tables 7-1B and 7-1D are compilations of ETE. These data are the times needed to *clear the indicated regions* of 90 and 100 percent of the population occupying these regions, respectively. These computed ETE include

consideration of mobilization time and of estimated voluntary evacuations from other regions within the EPZ and from the shadow region.

- Table 8-6A presents ETE for the schoolchildren in good weather.
- Table 8-8A presents ETE for the transit-dependent population in good weather.
- Figure H-8 presents an example of an Evacuation Region (Region R08) to be evacuated under the circumstances defined in Table 6-1. Maps of all regions are provided in Appendix H.

Conclusions

- General population ETE were computed for 255 unique cases – a combination of 17 unique Evacuation Regions and 15 unique Evacuation Scenarios. Tables 7-1A through 7-1D document these ETE for the 50^{th}, 90^{th}, 95^{th} and 100^{th} percentiles respectively. These ETE range from 2:00 (hr:min) to 2:55 at the 90^{th} percentile.
- Inspection of Table 7-1B and 7-1D indicates that the ETE for the 100^{th} percentile are nearly double those for the 90^{th} percentile. This is the result of the long tail of the evacuation curve caused by those evacuees who take longer to mobilize. See Figure 7-6.
- Comparison of Scenarios 6 (winter, midweek, midday, year 2010, no construction) and 13 (winter, midweek, midday, year 2019, with construction and refueling outage) in Table 7-1B indicates that construction/refueling activities add approximately 30 minutes, on average, to the ETE. Note, however, that most of this increase in ETE is due to the growth of population in the Delaware portion of the EPZ between year 2010 and year 2019, not because of the construction/outage vehicles (see Table 3-1).
- PSEG is considering a proposed causeway connecting the new site with local roads in Elsinboro township, which will be used by construction workers and new plant personnel. As documented in Appendix N, the use of the proposed causeway reduces the ETE for the 2-mile Region (Region R01) and 5-mile Region (Region R02) by 40 and 10 minutes, respectively, at the 90^{th} percentile and 40 and 25 minutes, respectively at the 95^{th} percentile. The ETE for the full EPZ (Region R03) is unaffected by the use of the proposed causeway.
- Middletown, Delaware and Salem, New Jersey are the two most congested areas during an evacuation. The last location in the EPZ to exhibit traffic congestion is Salem; this is the result of a large number of vehicles evacuating through Salem, using a limited number of evacuation routes. All congestion within the EPZ clears by 3 hours after the Advisory to Evacuate. See Figures 7-3 through 7-5.
- Special population ETE were computed for schools, medical facilities, transit-dependent persons and homebound special needs persons. These ETE are within a similar range as the general population ETE, with the exception of the transit-dependent ETE which do exceed general population ETE for some bus routes. See Section 8.

- The general population ETE at the 100th percentile closely parallels the trip generation time…further evidence of the long evacuation tail. See Table I-1.
- The general population ETE is not significantly impacted by the voluntary evacuation of vehicles in the Shadow Region. See Table I-2.
- The use of gantry lights on the existing access road in order to provide an additional lane outbound during an evacuation has no impact on the ETE. The traffic signal at the intersection of the existing PSEG Site access road and Salem-Hancocks Bridge Road is a bottleneck for those vehicles evacuating the site; adding an additional outbound lane does not remove this bottleneck. See Table I-3.
- The use of Intelligent Transportation Systems (ITS) technologies and traffic management techniques may benefit the evacuation process and may decrease ETE. Conservatively, this study assumes that no ITS technologies or traffic management techniques are in place. See Section 9 and Appendix G.

Figure 6-1. PSEG Site EPZ ERPAs

Table 3-1. EPZ Permanent Resident Population		
ERPA	**2000 Population**	**2010 Population**
New Jersey		
1	844	862
2	2,992	3,067
3	6,900	6,595
4	241	242
5	431	437
6	446	491
7	279	299
8	**No Population**	
NJ Total	**12,133**	**11,993**
Delaware		
A	4,904	5,343
B	8,240	11,202
C	10,364	16,496
D	**No Population**	
DE Total	**23,508**	**33,041**
EPZ TOTAL	**35,641**	**45,034**
	EPZ Population Growth:	**26.4%**

Table 6-1. Description of Evacuation Regions*

Region	Description	ERPA											
		New Jersey								Delaware			
		1	2	3	4	5	6	7	8	A	B	C	D
R01	2-Mile	x							x				x
R02	5-Mile	x							x	x			x
R03	Entire EPZ	x	x	x	x	x	x	x	x	x	x	x	x
5-Mile Ring and Downwind to EPZ Boundary													
Region	Wind Direction Towards:	ERPA											
		New Jersey								Delaware			
		1	2	3	4	5	6	7	8	A	B	C	D
R04	NNW	x		x		x			x	x		x	x
R05	N	x		x	x	x			x	x		x	x
R06	NNE, NE	x	x	x	x	x			x	x			x
R07	ENE	x	x	x	x		x		x	x			x
R08	E, ESE	x	x				x	x	x	x			x
R09	SE	x					x	x	x	x			x
R10	SSE	x						x	x	x	x		x
R11	S, SSW, SW	x							x	x	x		x
R12	WSW, W, WNW	x							x	x	x	x	x
R13	NW	x							x	x		x	x
2-Mile Ring and Downwind to EPZ Boundary													
Region	Wind Direction Towards:	ERPA											
		New Jersey								Delaware			
		1	2	3	4	5	6	7	8	A	B	C	D
R14	NNE, NE	x	x	x	x	x			x				x
R15	ENE	x	x	x	x		x		x				x
R16	E, ESE	x	x				x	x	x				x
R17	SE	x					x	x	x				x
N/A	NNW	Refer to Region R04											
	N	Refer to Region R05											
	SSE	Refer to Region R10											
	S, SSW, SW	Refer to Region R11											
	WSW, W, WNW	Refer to Region R12											
	NW	Refer to Region R13											
2-Mile Ring and Downwind to 5 Miles													
Region	Wind Direction Towards:	ERPA											
		New Jersey								Delaware			
		1	2	3	4	5	6	7	8	A	B	C	D
N/A	NNE, NE, ENE, E, ESE, SE	Refer to Region R01											
N/A	N, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW	Refer to Region R02											
x = ERPA EVACUATES		ERPA SHELTERS IN PLACE											
***Adapted from Region definitions in County/State Radiological Emergency Plans**													

Table 6-2. Evacuation Scenario Definitions						
Scenario	**Season[1]**	**Day of Week**	**Time of Day**	**Weather**	**Special**	**Year**
1	Summer	Midweek	Midday	Good	None	2010
2	Summer	Midweek	Midday	Rain	None	2010
3	Summer	Weekend	Midday	Good	None	2010
4	Summer	Weekend	Midday	Rain	None	2010
5	Summer	Midweek, Weekend	Evening	Good	None	2010
6	Winter	Midweek	Midday	Good	None	2010
7	Winter	Midweek	Midday	Rain	None	2010
8	Winter	Midweek	Midday	Snow	None	2010
9	Winter	Weekend	Midday	Good	None	2010
10	Winter	Weekend	Midday	Rain	None	2010
11	Winter	Weekend	Midday	Snow	None	2010
12	Winter	Midweek, Weekend	Evening	Good	None	2010
13	Winter	Midweek	Midday	Good	New Plant Construction + Refueling	2019
14	Winter	Midweek	Midday	Good	Scenario 13 with Proposed Causeway	2019
15	Winter	Midweek	Midday	Good	Refueling Only	2019

[1] Winter assumes that school is in session (also applies to spring and autumn). Summer assumes that school is not in session.

Table 7-1B. Time to Clear the Indicated Area of *90* Percent of The Affected Population

	Summer		Summer		Summer		Winter			Winter			Winter		Winter		
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend			Midweek Weekend		Midweek		
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	(12)	Scenario:	(13)	(14)	(15)
	Midday		Midday		Evening		Midday			Midday			Evening		Midday		
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Region Wind Toward:	New Plant Construction + Refueling	Proposed Causeway	Refueling Only
Entire 2-Mile Region, 5-Mile Region, and EPZ																	
R01 2-mile ring	1:50	1:50	1:45	1:45	1:45	R01 2-mile ring	1:50	1:50	2:05	1:45	1:45	2:40	1:45	R01 2-mile ring	2:25	1:45	1:50
R02 5-mile ring	1:35	1:45	1:35	1:40	1:35	R02 5-mile ring	1:35	1:45	2:10	1:35	1:40	2:00	1:35	R02 5-mile ring	1:50	1:40	1:40
R03 Entire EPZ	2:15	2:25	2:00	2:10	2:00	R03 Entire EPZ	2:15	2:25	2:55	2:00	2:10	2:40	2:00	R03 Entire EPZ	2:45	2:45	2:40
5-Mile Ring and Downwind to EPZ Boundary																	
R04 NNW	2:10	2:15	1:50	2:00	1:55	R04 NNW	2:10	2:15	2:50	1:50	1:55	2:30	1:55	R04 NNW	2:35	2:35	2:30
R05 N	2:10	2:15	1:50	2:00	1:55	R05 N	2:10	2:15	2:50	1:50	1:55	2:30	1:55	R05 N	2:35	2:35	2:30
R06 NNE, NE	2:00	2:05	1:40	1:50	1:45	R06 NNE, NE	2:00	2:05	2:35	1:40	1:45	2:15	1:45	R06 NNE, NE	2:15	2:15	2:00
R07 ENE	1:55	2:00	1:40	1:45	1:40	R07 ENE	1:55	2:00	2:30	1:35	1:45	2:15	1:40	R07 ENE	2:15	2:15	1:55
R08 E, ESE	1:40	1:50	1:35	1:40	1:40	R08 E, ESE	1:40	1:50	2:15	1:35	1:40	2:05	1:40	R08 E, ESE	1:55	1:45	1:45
R09 SE	1:40	1:45	1:35	1:40	1:35	R09 SE	1:40	1:45	2:10	1:35	1:40	2:05	1:35	R09 SE	1:50	1:40	1:40
R10 SSE	2:00	2:10	1:50	2:00	1:50	R10 SSE	2:00	2:10	2:45	1:50	2:00	2:30	1:50	R10 SSE	2:20	2:15	2:15
R11 S, SSW, SW	2:00	2:10	1:50	2:00	1:50	R11 S, SSW, SW	2:00	2:10	2:45	1:50	2:00	2:30	1:50	R11 S, SSW, SW	2:20	2:15	2:15
R12 W, WSW, WNW	2:10	2:20	2:00	2:10	2:00	R12 W, WSW, WNW	2:10	2:20	2:55	2:00	2:10	2:40	2:00	R12 W, WSW, WNW	2:40	2:40	2:40
R13 NW	2:00	2:05	1:50	1:55	1:50	R13 NW	2:00	2:05	2:40	1:45	1:55	2:25	1:50	R13 NW	2:30	2:30	2:30
2-Mile Ring and Downwind to EPZ Boundary																	
R14 NNE, NE	2:25	2:35	1:55	2:05	2:00	R14 NNE, NE	2:30	2:35	3:05	1:55	2:05	2:40	2:00	R14 NNE, NE	2:45	2:45	2:25
R15 ENE	2:15	2:25	1:50	2:00	1:55	R15 ENE	2:20	2:25	2:55	1:50	1:55	2:40	1:55	R15 ENE	2:40	2:40	2:15
R16 E, ESE	2:00	2:00	1:40	1:40	1:50	R16 E, ESE	2:00	2:00	2:40	1:40	1:45	2:30	1:50	R16 E, ESE	2:25	1:55	2:05
R17 SE	2:00	2:00	1:50	1:50	1:55	R17 SE	2:00	2:00	2:30	1:55	1:55	2:45	1:50	R17 SE	2:25	1:50	2:00

Table 7-1D. Time to Clear the Indicated Area of *100* Percent of The Affected Population

	Summer		Summer		Summer		Winter			Winter			Winter		Winter		
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend			Midweek Weekend		Midweek		
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	(12)	Scenario:	(13)	(14)	(15)
	Midday		Midday		Evening		Midday			Midday			Evening		Midday		
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Region Wind Toward:	New Plant Construction + Refueling	Proposed Causeway	Refueling Only
Entire 2-Mile Region, 5-Mile Region, and EPZ																	
R01 2-mile ring	4:00	4:05	3:10	3:10	3:10	R01 2-mile ring	4:00	4:05	5:10	3:10	3:10	4:10	3:10	R01 2-mile ring	4:00	4:00	4:00
R02 5-mile ring	4:10	4:10	4:10	4:10	4:10	R02 5-mile ring	4:10	4:10	5:10	4:10	4:10	5:10	4:10	R02 5-mile ring	4:10	4:10	4:10
R03 Entire EPZ	6:10	6:10	6:00	6:00	6:00	R03 Entire EPZ	6:10	6:15	6:15	6:00	6:00	6:00	6:00	R03 Entire EPZ	6:10	6:10	6:10
5-Mile Ring and Downwind to EPZ Boundary																	
R04 NNW	6:05	6:10	4:10	4:10	4:10	R04 NNW	6:05	6:10	6:10	4:10	4:20	5:10	4:10	R04 NNW	6:10	6:10	6:10
R05 N	6:05	6:05	4:10	4:10	4:10	R05 N	6:05	6:10	6:10	4:10	4:20	5:10	4:10	R05 N	6:10	6:10	6:10
R06 NNE, NE	6:00	6:00	4:10	4:10	4:10	R06 NNE, NE	6:10	6:10	6:10	4:10	4:10	5:10	4:10	R06 NNE, NE	6:10	6:10	6:00
R07 ENE	6:00	6:00	4:10	4:10	4:10	R07 ENE	6:00	6:10	6:10	4:10	4:10	5:10	4:10	R07 ENE	6:00	6:00	6:00
R08 E, ESE	4:10	4:10	4:10	4:10	4:10	R08 E, ESE	4:10	4:10	5:10	4:10	4:10	5:10	4:10	R08 E, ESE	4:10	4:10	4:10
R09 SE	4:10	4:10	4:10	4:10	4:10	R09 SE	4:10	4:10	5:10	4:10	4:10	5:10	4:10	R09 SE	4:10	4:10	4:10
R10 SSE	6:10	6:10	6:00	6:00	6:00	R10 SSE	6:10	6:10	6:10	6:00	6:00	6:00	6:00	R10 SSE	6:10	6:10	6:10
R11 S, SSW, SW	6:10	6:10	6:00	6:00	6:00	R11 S, SSW, SW	6:10	6:10	6:10	6:00	6:00	6:00	6:00	R11 S, SSW, SW	6:10	6:10	6:10
R12 W, WSW, WNW	6:10	6:10	6:00	6:00	6:00	R12 W, WSW, WNW	6:10	6:10	6:15	6:00	6:00	6:00	6:00	R12 W, WSW, WNW	6:10	6:10	6:10
R13 NW	6:00	6:05	4:10	4:10	4:10	R13 NW	6:00	6:05	6:10	4:10	4:15	5:10	4:10	R13 NW	6:10	6:10	6:10
2-Mile Ring and Downwind to EPZ Boundary																	
R14 NNE, NE	6:00	6:00	4:10	4:10	4:10	R14 NNE, NE	6:10	6:10	6:10	4:10	4:10	5:10	4:10	R14 NNE, NE	6:10	6:10	6:00
R15 ENE	6:00	6:00	4:10	4:10	4:10	R15 ENE	6:00	6:10	6:10	4:10	4:10	5:10	4:10	R15 ENE	6:00	6:00	6:00
R16 E, ESE	4:10	4:10	4:10	4:10	4:10	R16 E, ESE	4:10	4:10	5:10	4:10	4:10	5:00	4:10	R16 E, ESE	4:10	4:10	4:10
R17 SE	4:10	4:10	3:10	3:10	3:10	R17 SE	4:10	4:10	5:10	3:10	3:10	4:10	3:10	R17 SE	4:10	4:10	4:10

Table 8-6A. School Evacuation Time Estimates - Good Weather										
School	Driver Mobilization Time(min)	Loading Time (min)	Dist. to EPZ Boundary (mi.)	Average Speed (mph)	Adjusted Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bndry to R.C. (mi.)	Travel Time EPZ Bdry to RC (min)	ETE to R.C. (hr:min)
Salem County, NJ Schools										
Lower Alloways Creek Elementary School	90	15	4.61	48.89	45.00	7	**1:55**	10	14	**2:10**
Quinton Elementary School	90	15	4.16	55.23	45.00	6	**1:55**	10	14	**2:05**
Elsinboro Township Elementary School	90	15	5.35	37.95	37.95	9	**1:55**	8	11	**2:05**
John Fenwick Elementary School	90	15	4.28	8.57	8.57	30	**2:15**	10	14	**2:30**
Salem High School	90	15	4.78	9.30	9.30	31	**2:20**	10	14	**2:30**
Salem Middle School	90	15	3.80	12.33	12.33	19	**2:05**	10	14	**2:20**
The ARC of Salem County	90	15	1.22	49.77	45.00	2	**1:50**	10	14	**2:05**
Cumberland County, NJ Schools										
Stow Creek Township Elementary School	90	15	1.86	60.00	45.00	3	**1:50**	8	11	**2:00**
Woodland Country Day School	90	15	2.28	59.06	45.00	4	**1:50**	8	11	**2:00**
Morris Goodwin Elementary School	90	15	1.47	38.80	38.80	3	**1:50**	8	11	**2:00**
New Castle County, DE Schools										
Van Hook Walsh School Inc.	90	15	5.64	61.37	45.00	8	**1:55**	16	22	**2:15**
Everett Meredith Middle School	90	15	11.98	40.23	40.23	18	**2:05**	20	27	**2:30**
Groves Adult High Shool	90	15	11.98	40.23	40.23	18	**2:05**	13	18	**2:25**
Middletown High School	90	15	10.91	42.06	42.06	16	**2:05**	20	27	**2:30**
Silver Lake Elementary School	90	15	11.95	40.29	40.29	18	**2:05**	13	18	**2:25**
St. Andrew's School	90	15	8.90	16.18	16.18	34	**2:20**	20	27	**2:50**
St. Anne's Episcopal School	90	15	8.90	16.18	16.18	34	**2:20**	16	22	**2:45**
Townsend Elementary School	90	15	6.73	21.73	21.73	19	**2:05**	13	18	**2:25**
AdvoServ School	90	15	3.58	15.90	15.90	14	**2:00**	16	22	**2:25**
Alfred Waters Middle School	90	15	13.53	47.73	45.00	19	**2:05**	13	18	**2:25**
Brick Mill Elementary School	90	15	10.89	42.07	42.07	16	**2:05**	13	18	**2:20**
Cedar Lane Elementary School	90	15	13.53	47.73	45.00	19	**2:05**	13	18	**2:25**
Gunning Bedford Middle School	90	15	3.94	13.98	13.98	17	**2:05**	16	22	**2:25**
Kathleen H. Wilbur Elementary School	90	15	1.29	52.23	45.00	2	**1:50**	16	22	**2:10**
Louis L. Redding Middle School	90	15	11.76	40.68	40.68	18	**2:05**	20	27	**2:30**
Southern Elementary School	90	15	3.94	13.98	13.98	17	**2:05**	16	22	**2:25**
St. George's Technical High School	90	15	6.20	16.16	16.16	24	**2:10**	16	22	**2:35**
Appoquinimink Early Childhood Center	90	15	11.98	40.23	40.23	18	**2:05**	20	27	**2:30**
Cedar Lane Early Childhood Center	90	15	13.53	47.73	45.00	19	**2:05**	13	18	**2:25**
Townsend Early Childhood Center	90	15	6.73	21.73	21.73	19	**2:05**	13	18	**2:25**
						Maximum for EPZ:	**2:20**		**Maximum:**	**2:50**
						Average for EPZ:	**2:05**		**Average:**	**2:25**

Table 8-8A. Transit-Dependent Evacuation Time Estimates - Good Weather

Route Number	Bus Number	Single Wave						Second Wave							
		Mobilization (min)	Route Distance (mi.)	Average Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE	ETE to Rec. Ctr (min)	Unload (min)	Driver Rest (min)	Return time to EPZ (min)	Average Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE
1	1	105	18	17.70	61	30	3:20	130	5	10	13	38.57	28	30	3:40
2A	1	105	20	36.36	33	30	2:50	130	5	10	13	36.36	33	30	3:45
2B	1	105	23	32.09	43	30	3:00	130	5	10	13	37.30	37	30	3:45
3A	1	105	13	14.72	53	30	3:10	130	5	10	13	39.00	20	30	3:30
3B	1	105	4	8.67	37	30	2:55	130	5	10	13	12.63	19	30	3:30
4	1	105	10	37.50	16	30	2:35	130	5	10	13	37.50	16	30	3:25
5	1	105	8	34.29	14	30	2:30	130	5	10	13	34.29	14	30	3:25
6	1	105	18	37.24	29	30	2:45	130	5	10	13	37.24	29	30	3:40
7	1	105	16	36.92	26	30	2:45	130	5	10	13	36.92	26	30	3:35
Blue	1	105	21	20.00	63	30	3:20	150	5	10	22	38.18	33	30	4:10
	2	110	21	20.00	63	30	3:25	155	5	10	22	38.18	33	30	4:15
Green	1	90	24	32.00	45	30	2:45	150	5	10	22	38.92	37	30	4:15
	2	95	24	33.49	43	30	2:50	155	5	10	22	38.92	37	30	4:20
	3	100	24	33.49	43	30	2:55	160	5	10	22	38.92	37	30	4:25
	4	105	24	36.92	39	30	2:55	165	5	10	22	38.92	37	30	4:30
	5	110	24	36.92	39	30	3:00	170	5	10	22	38.92	37	30	4:35
	6	115	24	38.92	37	30	3:05	175	5	10	22	38.92	37	30	4:40
	7	120	24	38.92	37	30	3:10	180	5	10	22	38.92	37	30	4:45
	8	125	24	38.92	37	30	3:15	185	5	10	22	38.92	37	30	4:50
	9	130	24	38.92	37	30	3:20	190	5	10	22	38.92	37	30	4:55
	10	135	24	38.92	37	30	3:25	195	5	10	22	38.92	37	30	5:00
Red	1	90	26	28.36	55	30	2:55	150	5	10	22	37.14	42	30	4:20
	2	95	26	28.89	54	30	3:00	155	5	10	22	37.14	42	30	4:25
	3	100	26	28.89	54	30	3:05	160	5	10	22	37.14	42	30	4:30
	4	105	26	28.89	54	30	3:10	165	5	10	22	37.14	42	30	4:35
	5	110	26	28.89	54	30	3:15	170	5	10	22	37.14	42	30	4:40
Pink	1	105	30	38.30	47	30	3:05	150	5	10	22	38.30	47	30	4:25
	2	110	30	38.30	47	30	3:10	155	5	10	22	38.30	47	30	4:30
Purple	1	105	25	35.71	42	30	3:00	150	5	10	22	36.59	41	30	4:20
	2	110	25	35.71	42	30	3:05	155	5	10	22	36.59	41	30	4:25
Brown	1	90	33	36.67	54	30	2:55	150	5	10	22	36.67	54	30	4:35
	2	95	33	36.67	54	30	3:00	155	5	10	22	36.67	54	30	4:40
	3	100	33	36.67	54	30	3:05	160	5	10	22	36.67	54	30	4:45
	4	105	33	36.67	54	30	3:10	165	5	10	22	36.67	54	30	4:50
						Maximum ETE for Single Wave:	**3:25**							**Maximum ETE for Second Wave:**	**5:00**
						Average ETE for Single Wave:	**3:00**							**Average ETE for Second Wave:**	**4:20**

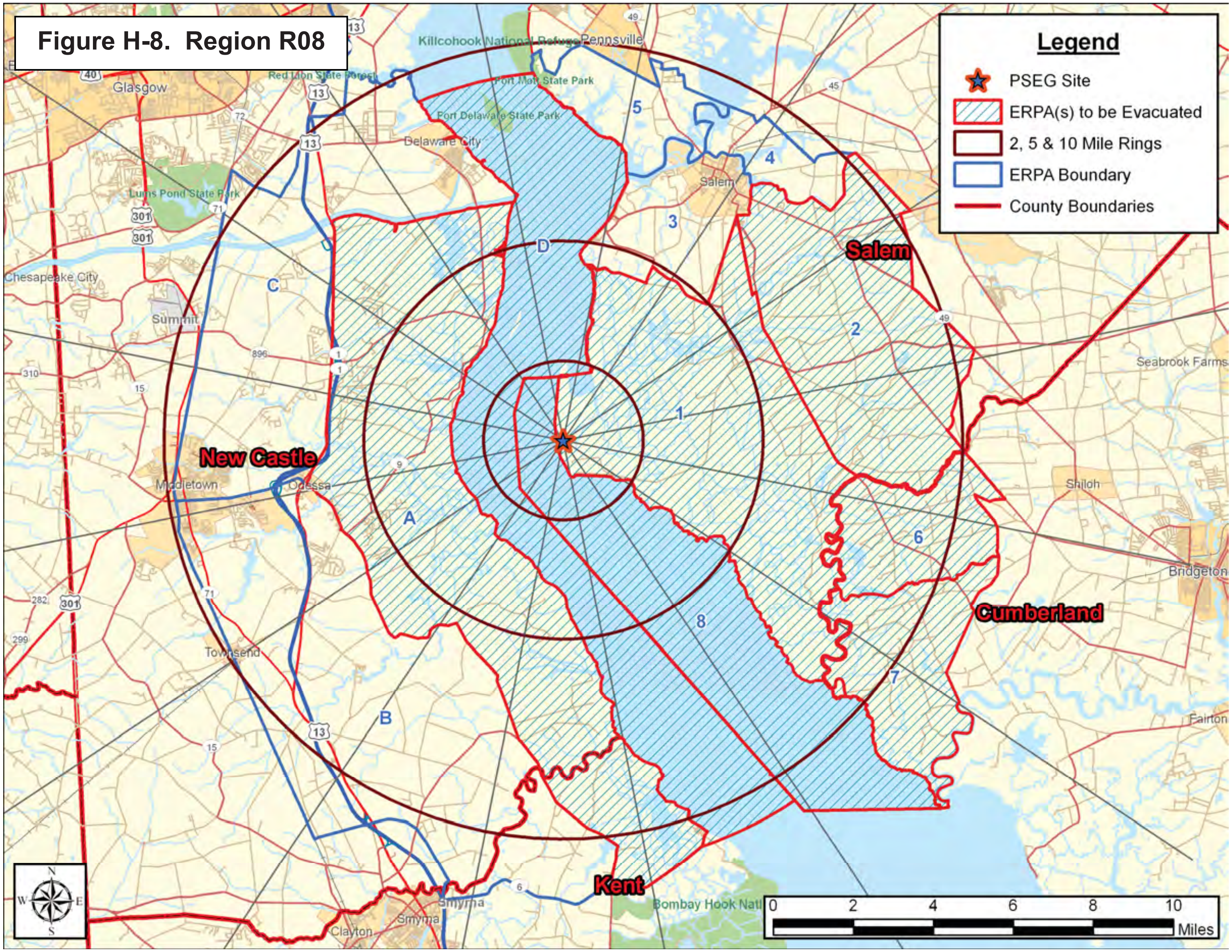


Figure H-8. Region R08
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
New Castle
Salem
Cumberland
Kent
Miles

1. INTRODUCTION

This report describes the analyses undertaken and the results obtained by a study to develop Evacuation Time Estimates (ETE) for the PSEG Site, located in Salem County, New Jersey. ETE provide State and local governments with site-specific information needed for Protective Action decision-making.

In the performance of this effort, guidance is provided by documents published by Federal Government agencies. Most important of these are:

- Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG 0654/FEMA-REP-1, Rev. 1, November 1980.
- Analysis of Techniques for Estimating Evacuation Times for Emergency Planning Zones, NUREG/CR-1745, November 1980.
- Development of Evacuation Time Estimates for Nuclear Power Plants, NUREG/CR-6863, January 2005.

We wish to express our appreciation to all the directors and staff members of the Delaware Emergency Management Agency (DEMA), the New Jersey State Police (NJSP) Emergency Management Section and local and state law enforcement agencies, who provided valued guidance and contributed information contained in this report.

1.1 Overview of the ETE Process

The following outline presents a brief description of the work effort in chronological sequence:

1. Information Gathering:
   - Defined the scope of work in discussions with representatives from Sargent & Lundy and from PSEG.
   - Attended meetings with emergency planners from DEMA and NJSP to identify issues to be addressed and resources available.
   - Conducted a detailed field survey of the Emergency Planning Zone (EPZ) highway system and of area traffic conditions.
   - Obtained demographic data from census and state agencies.
   - Conducted a random sample telephone survey of EPZ residents.

- Conducted a data collection effort to identify and describe schools, special facilities, major employers, transportation providers, and other important sources of information.

2. Estimated distributions of Trip Generation times representing the time required by various population groups (permanent residents, employees, and transients) to prepare (mobilize) for the evacuation trip. These estimates are primarily based upon the random sample telephone survey.
3. Defined Evacuation Scenarios. These scenarios reflect the variation in demand, in trip generation distribution and in highway capacities, associated with different seasons, day of week, time of day and weather conditions.
4. Defined a traffic management strategy. Traffic control is applied at specified Traffic Control Points (TCP) located within the Emergency Planning Zone (EPZ). Local and state police personnel have reviewed all traffic control plans.
5. Used existing Emergency Response Planning Areas (ERPA) to define Evacuation Areas or Regions. The EPZ is partitioned into 12 ERPA along political and geographic boundaries. "Regions" are groups of contiguous ERPA for which ETE are calculated. The configurations of these Regions reflect wind direction and the radial extent of the impacted area. Each Region, other than those that approximate circular areas, approximates a "key-hole section" within the EPZ as recommended by NUREG/CR-6863.
6. Estimated demand for transit services for persons at "Special Facilities" and for transit-dependent persons at home.
7. Prepared the input streams for the IDYNEV system.
   - Estimated the traffic demand, based on the available information derived from Census data, and from data provided by local and state agencies, PSEG and from the telephone survey.
   - Applied the procedures specified in the 2000 Highway Capacity Manual (HCM[1]) to the data acquired during the field survey, to estimate the capacity of all highway segments comprising the evacuation routes.

[1] Highway Capacity Manual (HCM2000), Transportation Research Board, National Research Council, 2000.

- Developed the link-node representation of the evacuation network, which is used as the basis for the computer analysis that calculates the ETE.
- Calculated the evacuating traffic demands for each Region and for each Scenario.
- Specified the candidate destinations of evacuation travel consistent with outbound movement relative to the location of the PSEG Site.

8. Executed the IDYNEV models to provide the estimates of evacuation routing and ETE for all residents, transients and employees ("general population") with access to private vehicles. Generated a complete set of ETE for all specified Regions and Scenarios.
9. Documented ETE in formats in accordance with NUREG- 0654.
10. Calculated the ETE for all transit activities including those for special facilities (schools, health-related facilities, etc.) and for the transit-dependent population.

Steps 7 and 8 are iterated as described in Appendix D.

1.2 The PSEG Site Location

The PSEG Site is located on the southern part of Artificial Island on the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, New Jersey. The site is approximately 18 miles south of Wilmington, Delaware and 30 miles southwest of Philadelphia, Pennsylvania. The Emergency Planning Zone (EPZ) consists of parts of Salem and Cumberland Counties in New Jersey, and parts of New Castle and Kent Counties in Delaware. Figure 1-1 displays the area surrounding the PSEG Site. This map identifies the communities in the area and the major roads.

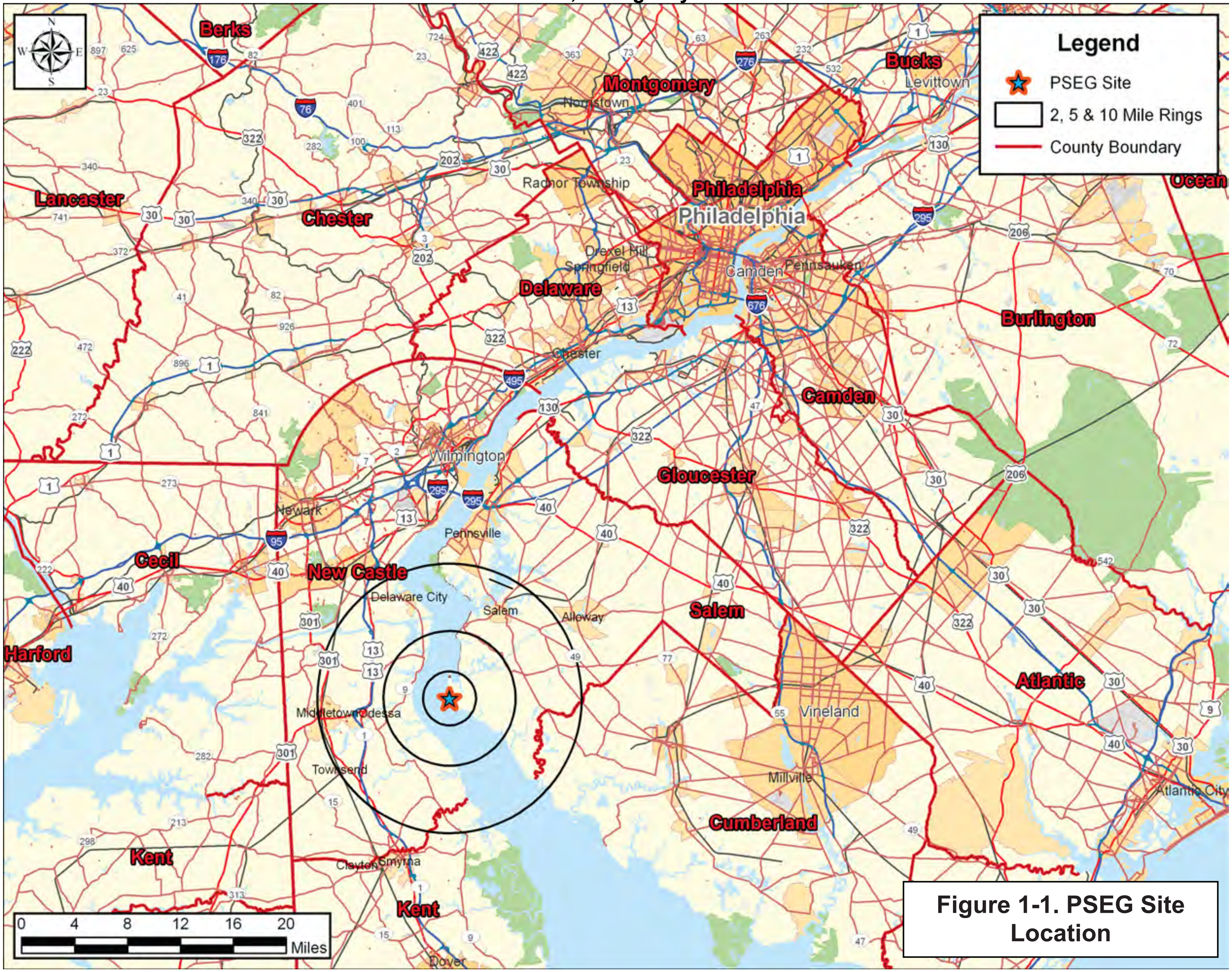


Figure 1-1. PSEG Site Location

1.3 Preliminary Activities

These activities are described below.

Field Surveys of the Highway Network

KLD personnel drove the entire highway system within the EPZ and the Shadow Region covering the region between the EPZ boundary and approximately 15 miles radially from the PSEG Site. The characteristics of each section of highway were recorded. These characteristics include:

• Number of lanes	• Posted speed
• Pavement Width	• Actual free speed
• Shoulder type & width	• Abutting land use
• Intersection configuration	• Control devices
• Lane channelization	• Interchange geometries
• Geometrics: Curves, grades	
• Unusual characteristics: Narrow bridges, sharp curves, poor pavement, flood warning signs, inadequate delineations, etc.	

Video and audio recording equipment were used to capture a permanent record of the highway infrastructure. No attempt was made to meticulously measure such attributes as lane width and shoulder width; estimates of these measures based on visual observation and recorded images were considered appropriate for the purpose of estimating the capacity of highway sections. For example, Exhibit 20-5 in the HCM indicates that a reduction in lane width from 12 feet (the "base" value) to 10 feet can reduce free flow speed (FFS) by 1.1 mph – not a material difference – for two lane highways. Exhibit 12-15 in the HCM shows no sensitivity for the estimates of Service Volumes at Level of Service (LOS) E (near capacity), with respect to FFS. The highway terrain (Level, Rolling, and Mountainous) is a far more important factor than lane and shoulder width when estimating capacity.

The data from the audio and video recordings were used to create detailed GIS shapefiles and databases of the roadway characteristics and of the traffic control devices observed during the road survey; this information was referenced while preparing the input stream for the IDYNEV System.

As documented on page 20-3 of the HCM, the capacity of a two-lane highway is 1700 passenger cars per hour for each direction of travel. For freeway sections, a value of 2250 vehicles per hour per lane is assigned. The road survey has identified several segments which are characterized by adverse geometrics which are reflected in reduced values for both capacity and speed. These estimates reflect the service

volumes for LOS E presented in HCM Exhibit 12-15. These links may be identified by reviewing Appendix K. Link capacity is an input to IDYNEV which computes the ETE. Further discussion of roadway capacity is provided in Section 4 of this report.

Figure 1-2 presents the link-node analysis network that was constructed to model the evacuation roadway network in the EPZ and Shadow Region. The directional arrows on the links and the node numbers have been removed from Figure 1-2 to clarify the figure. The detailed figures provided in Appendix K depict the analysis network with directional arrows shown and node numbers provided. The observations made during the field survey were used to calibrate the analysis network.

Telephone Survey

A telephone survey was undertaken to gather information needed for the evacuation study. Appendix F presents the survey instrument, the procedures used and tabulations of data compiled from the survey returns.

These data were utilized to develop estimates of vehicle occupancy to estimate the number of evacuating vehicles during an evacuation and to estimate elements of the mobilization process. This database was also referenced to estimate the number of transit-dependent residents.

Developing the Evacuation Time Estimates

The overall study procedure is outlined in Appendix D. Demographic data were obtained from several sources, as detailed later in this report. These data were analyzed and converted into vehicle demand data. The vehicle demand was loaded onto appropriate links of the analysis network using Geographic Information System (GIS) mapping software. The IDYNEV system was then used to compute ETE for all Regions and Scenarios.

Analytical Tools

The IDYNEV System that was employed for this study is comprised of several integrated computer models. One of these is the PC-DYNEV (DYnamic Network EVacuation) macroscopic simulation model that was developed by KLD under contract with the Federal Emergency Management Agency (FEMA).

PC-DYNEV consists of three submodels:

- A macroscopic traffic simulation model (for details, see Appendix C).
- An intersection capacity model (for details, see Highway Research Record No. 772, Transportation Research Board, 1980, papers by Lieberman and McShane & Lieberman).

- A dynamic, node-centric routing model that adjusts the "base" routing in the event of an imbalance in the levels of congestion on the outbound links.

Another model of the IDYNEV System is the TRAD (TRaffic Assignment and Distribution) model. This model integrates an equilibrium assignment model with a trip distribution algorithm to compute origin-destination volumes and paths of travel designed to minimize travel time. For details, see Appendix B.

Still another software product developed by KLD, named UNITES (UNIfied Transportation Engineering System) was used to expedite data entry.

The procedure for applying the IDYNEV System within the framework of developing ETE is outlined in Appendix D. Appendix A is a glossary of terms.

For the reader interested in more details of the model than are provided in Appendices B, C and D, and in Highway Research Record No. 772 (discussed in Section 4 of this report), the following references are suggested:

- NUREG/CR-4873 – Benchmark Study of the I-DYNEV Evacuation Time Estimate Computer Code
- NUREG/CR-4874 – The Sensitivity of Evacuation Time Estimates to Changes in Input Parameters for the I-DYNEV Computer Code

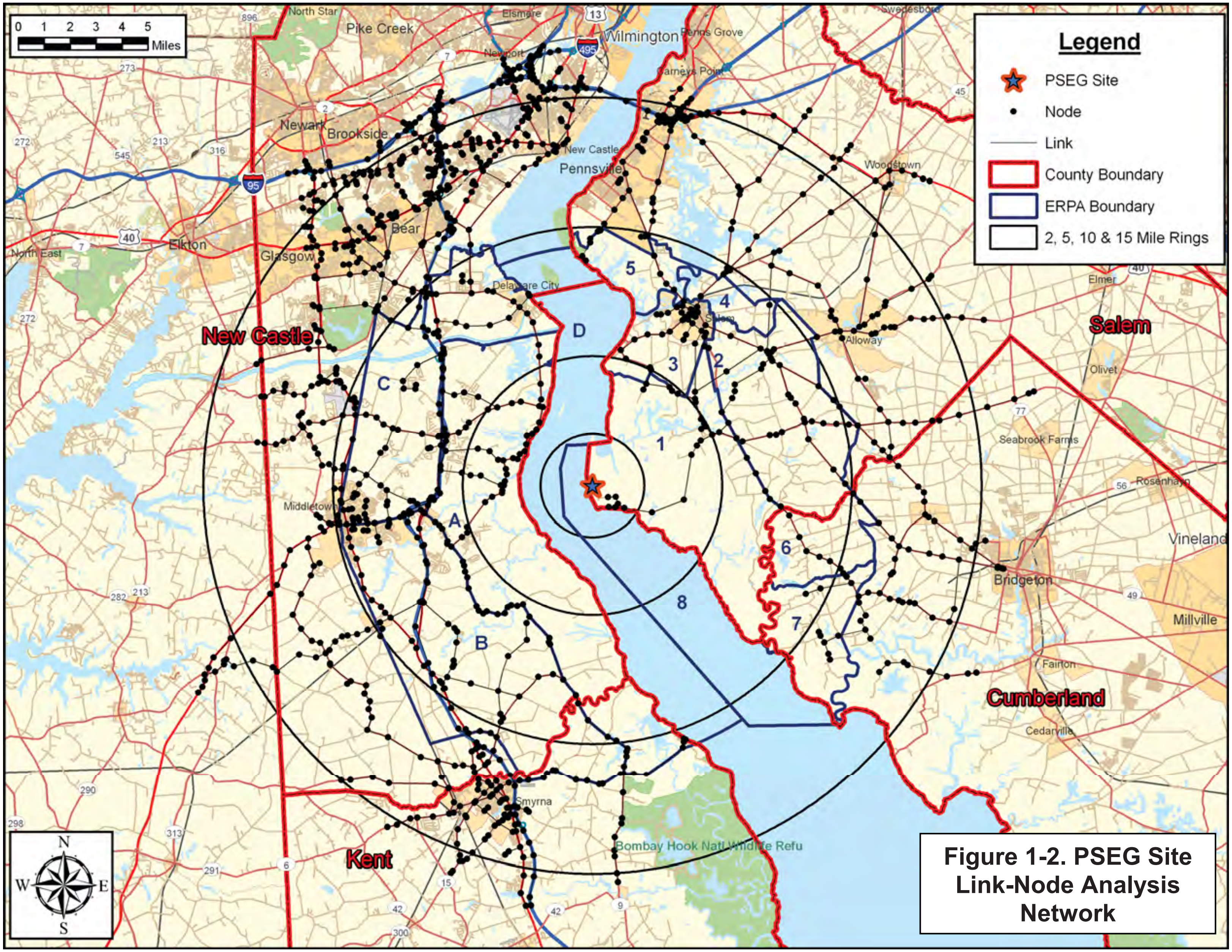


Figure 1-2. PSEG Site Link-Node Analysis Network

The evacuation analysis procedures are based upon the need to:

- Route traffic along paths of travel that will expedite their travel from their respective points of origin to points outside the EPZ.
- Restrict movement toward the PSEG Site to the extent practicable, and disperse traffic demand so as to avoid focusing demand on a limited number of highways.
- Move traffic in directions that are generally outbound, relative to the location of the PSEG Site.

A set of candidate destination nodes on the periphery of the EPZ is specified for each traffic origin (or centroid) within the EPZ. The TRAD model produces output that identifies the "best" traffic routing, subject to the design conditions outlined above. In addition to this information, rough estimates of travel time are provided, together with turn-movement data required by the PC-DYNEV simulation model.

The simulation model is then executed to provide a detailed description of traffic operations on the evacuation network. This description enables the analyst to identify bottlenecks and to develop countermeasures that are designed to expedite the movement of vehicles.

As outlined in Appendix D, this procedure consists of an iterative design-analysis-redesign sequence of activities. If properly done, this procedure converges to yield an evacuation plan which best services the evacuating public.

1.4 Comparison with Prior ETE Study

Table 1-1 presents a comparison of the present ETE study with the 2002 study. The major factors contributing to the differences between the ETE values obtained in this study and those of the previous study can be summarized as follows:

- An increase in permanent resident population.
- Vehicle occupancy and Trip-generation rates are based on the results of a telephone survey of EPZ residents.
- Voluntary and shadow evacuations are considered.
- The highway representation is far more detailed.

Table 1-1. ETE Study Comparisons

Topic	Treatment	
	Previous ETE Study	**Current ETE Study**
Resident Population Basis	ArcGIS Software using 2000 US Census blocks; population extrapolated to 2003. Population = 37,956	ArcGIS Software using 2000 US Census blocks; area ratio method used; population extrapolated to 2010. Population = 45,034
Resident Population Vehicle Occupancy	Average household size for New Jersey and Delaware are 2.60 and 2.57 respectively, 1.25 evacuating vehicles per household, yielding: 2.08 and 2.06 persons/vehicle for New Jersey and Delaware respectively.	2.92 persons/household, 1.35 evacuating vehicles/household yielding: 2.16 persons/vehicle.
Employee Population	Employee estimates based on information provided about major employers in EPZ. 1.16 employees per vehicle derived from 2000 Census.	Employee estimates based on information provided about major employers in EPZ, supplemented by observations of commercial property in EPZ from aerial photography. 1.03 employees per vehicle based on telephone survey results.
Voluntary evacuation from within EPZ in areas outside region to be evacuated	Not considered.	50 percent of population within the circular portion of the region; 35 percent, in annular ring between the circle and the EPZ boundary (see Figure 2-1)
Shadow Evacuation	Not considered.	30% of people outside of the EPZ within the shadow area (see Figure 7-2)

Table 1-1. ETE Study Comparisons (cont.)		
Topic	Treatment	
	Previous ETE Study	Current ETE Study
Network Size	655 Links; 487 Nodes.	1,733 Links; 1,218 Nodes.
Roadway Geometric Data	Field surveys conducted in 2001. Road capacities based on 2000 HCM.	Field surveys conducted in April 2009. Major intersections were video archived. GIS shape-files of signal locations and roadway characteristics created during road survey. Road capacities based on 2000 HCM.
School Evacuation	Direct evacuation to designated Reception Center/Host School.	Direct evacuation to designated Reception Center/Host School.
Transit-Dependent Population	Census data used to provide an estimate of the number of people without access to personal transportation.	Transit-Dependent population estimated using population estimates and results of telephone survey.
Ridesharing	50 percent of transit-dependent persons will ride out with a neighbor or friend.	50 percent of transit-dependent persons will ride out with a neighbor or friend.

Table 1-1. ETE Study Comparisons (cont.)

Topic	Treatment	
	Previous ETE Study	**Current ETE Study**
Trip Generation for Evacuation	Trip Generation curves adapted from telephone survey of Nine Mile Point EPZ in Oswego, New York.	Based on residential telephone survey of specific pre-trip mobilization activities: Residents with commuters returning leave between 30 and 300 minutes. Residents without commuters returning leave between 15 and 240 minutes. Employees and transients leave between 15 and 150 minutes. All times measured from the Advisory to Evacuate.
Weather	Normal, Rain, or Snow. The capacity and free flow speed of all links in the network are reduced by 15% in the event of rain and 25% for snow.	Normal, Rain, or Snow. The capacity and free flow speed of all links in the network are reduced by 10% in the event of rain and 20% for snow.
Modeling	IDYNEV System: TRAD and PC-DYNEV (version 1.0.0.1).	IDYNEV System: TRAD and PC-DYNEV (version 3.0.3.92).
Special Events	None considered.	One considered – construction of new plant coincident with refueling outage at existing unit.
Evacuation Cases	17 Regions (single sector wind direction used) and 10 Scenarios producing 170 unique cases.	17 Regions (central sector wind direction and each adjacent sector technique used) and 15 Scenarios producing 255 unique cases.

Table 1-1. ETE Study Comparisons (cont.)		
Topic	Treatment	
	Previous ETE Study	Previous ETE Study
Evacuation Time Estimates Reporting	ETE reported for 90th and 99th percentile population. Results presented by Region and Scenario.	ETE reported for 50th, 90th, 95th, and 100th percentile population. Results presented by Region and Scenario.
Evacuation Time Estimates for the entire EPZ, 90th percentile	Winter Weekday Midday, Good Weather: 2:05 Summer Weekend, Midday, Good Weather: 1:50	Winter Weekday Midday, Good Weather: 2:15 Summer Weekend, Midday, Good Weather: 2:00

2. STUDY ESTIMATES AND ASSUMPTIONS

This section presents the estimates and assumptions utilized in the development of the evacuation time estimates.

2.1 Data Estimates

1. Population estimates are based upon Census 2000 data, extrapolated to year 2010 using municipality specific population. Estimates of employees who commute into the EPZ to work are based upon the state Journey to Work database for 2000 and surveys of major employers in the EPZ.
2. Population estimates at special facilities are based on available data from state emergency management offices.
3. Roadway capacity estimates are based on field surveys and the application of the Highway Capacity Manual 2000.
4. Population mobilization times are based on a statistical analysis of data acquired from a random sample telephone survey of EPZ residents.
5. The relationship between resident population and evacuating vehicles is developed from the telephone survey. Average values of 2.92 persons per household and 1.35 evacuating vehicles per household are used. The relationship between persons and vehicles for special facilities is as follows:
   a. Employees: 1.03 employees per vehicle (telephone survey results) for all major employers, excluding PSEG
   b. Parks: 2.92 people per vehicle (average household size obtained from the telephone survey results, assuming 1 vehicle per family)
   c. Special Events: 1.30 construction workers per vehicle and 1.00 new plant employees per vehicle for Scenarios 13 and 14. Actual vehicle counts from Traffic Impact Analysis study, included in the Environmental Report, were used for background traffic (Salem/Hope Creek employees and supplemental contractors); therefore, a vehicle occupancy is not needed for these employees.
6. ETE are presented for the evacuation of the 100^{th} percentile of population for each Region and for each Scenario. ETE are presented in tabular format and graphically showing the values of ETE associated with the 50^{th}, 90^{th} and 95^{th} percentiles of population. A Region is defined as a group of Emergency Response Planning Areas (ERPA) that is issued an Advisory to Evacuate.

2.2 Study Methodological Assumptions

1. The ETE is defined as the elapsed time from the Advisory to Evacuate issued to a specific Region of the EPZ, to the time that Region is clear of people.

2. The ETE are computed and presented in a format compliant with NUREG 0654, CR-1745 and CR-6863. The ETE for each evacuation area ("Region" comprised of included ERPA) is presented in both statistical and graphical formats.

3. Evacuation movements (paths of travel) are generally outbound relative to the power station to the extent permitted by the highway network, as computed by the computer models. All major evacuation routes are used in the analysis.

4. Regions are defined by the underlying "keyhole" or circular configurations as specified in NUREG/CR-6863. These Regions, as defined, display irregular boundaries reflecting the geography of the ERPA included within these underlying configurations.

5. Voluntary evacuation is considered as indicated in the accompanying Figure 2-1. Within the circle defined by the distance to be evacuated but outside the Evacuation Region, 50 percent of the people not advised to evacuate are assumed to voluntarily evacuate within the same time-frame. In the outer annular area between the circle defined by the extent of the Evacuation Region and the EPZ boundary, it is assumed that 35 percent of people will voluntarily evacuate. In the area between the EPZ boundary and a 15-mile circular area centered at the plant (the Shadow Region), it is assumed that 30 percent of the people will evacuate voluntarily. Sensitivity studies explored the effect on ETE, of increasing the percentage of voluntary evacuees in the Shadow Region (see Appendix I). The basis of these assumptions on voluntary evacuation is testimony proffered by Dr. Dennis Miletti, a professor at Colorado State University, and one of the nation's top disaster response experts, at Atomic Safety and Licensing Board (ASLB) hearings[1], which were deemed acceptable by the ASLB. The numbers we use are Professor Miletti's best estimates based on his years of experience in evacuation planning and emergency preparedness.

[1] Atomic Safety and Licensing Board (ASLB) hearings on the Seabrook Power Station, December 30, 1988 – Docket Numbers 50-443-OL and 50-444-OL and ASLBP Number 82-471-02-OL.

6. A total of 15 "Scenarios" representing different temporal variations (season, time of day, day of week) and weather conditions are considered. These Scenarios are tabulated below:

Table 2-1. Evacuation Scenario Definitions

Scenario	Season[2]	Day of Week	Time of Day	Weather	Special	Year
1	Summer	Midweek	Midday	Good	None	2010
2	Summer	Midweek	Midday	Rain	None	2010
3	Summer	Weekend	Midday	Good	None	2010
4	Summer	Weekend	Midday	Rain	None	2010
5	Summer	Midweek, Weekend	Evening	Good	None	2010
6	Winter	Midweek	Midday	Good	None	2010
7	Winter	Midweek	Midday	Rain	None	2010
8	Winter	Midweek	Midday	Snow	None	2010
9	Winter	Weekend	Midday	Good	None	2010
10	Winter	Weekend	Midday	Rain	None	2010
11	Winter	Weekend	Midday	Snow	None	2010
12	Winter	Midweek, Weekend	Evening	Good	None	2010
13	Winter	Midweek	Midday	Good	New Plant Construction + Refueling	2019
14	Winter	Midweek	Midday	Good	Scenario 13 + Proposed Causeway	2019
15	Winter	Midweek	Midday	Good	Refueling Only	2019

7. The models of the IDYNEV System were recognized as state of the art by the Atomic Safety & Licensing Board (ASLB) in past hearings. (Sources: Atomic Safety & Licensing Board Hearings on Seabrook and Shoreham; Urbanik[3]). The models have continuously been refined and extended since those hearings and have been independently validated by a consultant retained by the NRC.

[2] Winter assumes that school is in session (also applies to spring and autumn). Summer assumes that school is not in session.

[3] Urbanik, T., et. al. Benchmark Study of the I-DYNEV Evacuation Time Estimate Computer Code, NUREG/CR-4873, Nuclear Regulatory Commission, June, 1988.

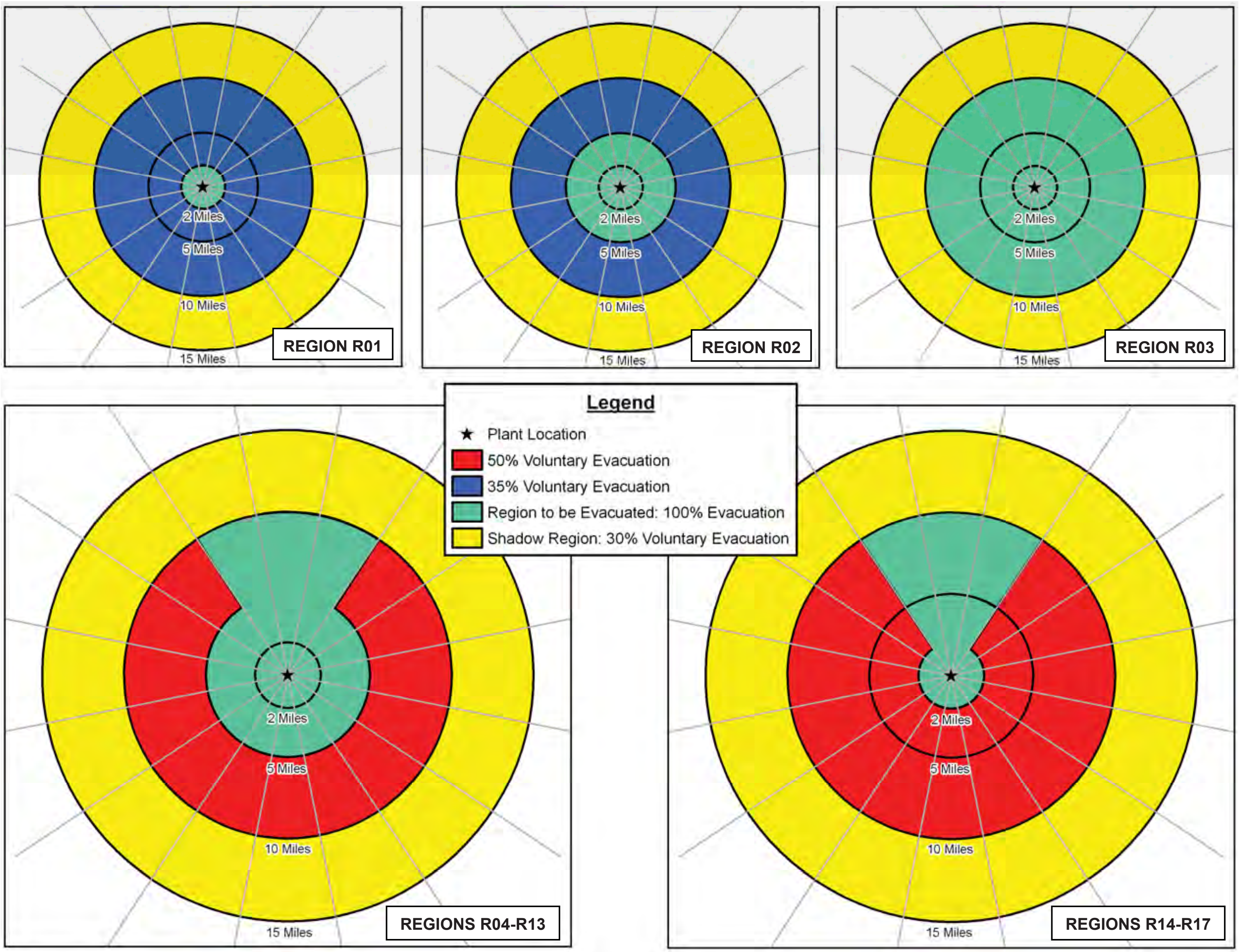


Figure 2-1. Voluntary Evacuation Methodology

2.3 Study Assumptions

1. The Planning Basis Assumption for the calculation of ETE is a rapidly escalating accident that requires evacuation, and includes the following:
   a. Advisory to Evacuate is announced coincident with the siren notification.
   b. Mobilization of the general population will commence within 15 minutes after siren notification.
   c. ETE are measured relative to the Advisory to Evacuate.

2. It is assumed that everyone within the group of ERPA forming a Region that is issued an Advisory to Evacuate will, in fact, respond and evacuate in general accord with the planned routes.

3. It is further assumed that 65 percent of the households in the EPZ have at least 1 commuter; 60 percent of those households with commuters will await the return of a commuter before beginning their evacuation trip, based on the telephone survey results. Therefore 39 percent (65% x 60% = 39%) of EPZ households will await the return of a commuter, prior to beginning their evacuation trip.

4. The ETE will also include consideration of “through” (External-External) trips during the time that such traffic is permitted to enter the evacuated Region. “Normal” traffic flow is assumed to be present within the EPZ at the start of the emergency.

5. Access Control Points (ACP) will be staffed within approximately 90 minutes following the siren notifications, to divert traffic attempting to enter the EPZ. Earlier activation of ACP locations would delay returning commuters. It is assumed that no traffic will enter the EPZ after this 90 minute time period.

6. Traffic Control Points (TCP) within the EPZ will be staffed over time, beginning at the Advisory to Evacuate. Their number and location will depend on the Region to be evacuated and resources available. The objectives of these TCP are:

   a. Facilitate the movements of all (mostly evacuating) vehicles at the location.

   b. Discourage inadvertent vehicle movements towards the power station.

   c. Provide assurance and guidance to any traveler who is unsure of the appropriate actions or routing.

   d. Act as local surveillance and communications center.

   e. Provide information to the emergency operations center (EOC) as needed,

based on direct observation or on information provided by travelers.

In calculating ETE, it is assumed that drivers will act rationally, travel in directions identified in the plan, and obey all control devices and traffic guides. These TCP serve many useful functions, but are not considered in specifying the inputs to the I-DYNEV system used to calculate ETE. Consequently, the results presented in Section 7 and in Appendix J are conservative in that they do not reflect the presence of these TCP. The time needed to mobilize personnel or equipment to staff the TCP will not influence ETE results.

7. Buses will be used to transport those without access to private vehicles:
   a. If schools are in session, transport (buses) will evacuate students directly to the designated host schools.
   b. Day care facilities are required to have a detailed evacuation plan and to provide adequate transportation for all residents. Buses needed to evacuate day care facilities are provided through private contracting.
   c. Buses, wheelchair vans and ambulances will evacuate patients at medical facilities within the EPZ, as needed.
   d. Schoolchildren, if school is in session, are given priority in assigning transit vehicles.
   e. Bus mobilization time is considered in ETE calculations.
   f. Analysis of the number of required “waves” of evacuating transit vehicles is presented.

8. Provisions are made for evacuating the transit-dependent portion of the general population to reception centers by bus, based on the assumption that some of these people will ride-share with family, neighbors, and friends, thus reducing the demand for buses. We assume that the percentage of people who rideshare is 50 percent. This assumption is based upon reported experience for other emergencies[4], which cites previous evacuation experience.

9. Two types of adverse weather scenarios are considered. Rain may occur for either winter or summer scenarios; snow occurs in winter scenarios only. It is assumed that the rain or snow begins at about the same time the evacuation advisory is issued. Thus, transient populations are not affected. That is, no weather-related reduction in the number of transients who may be present in the EPZ is assumed. It is assumed that roads are passable and that the appropriate agencies are plowing the roads as they would normally when snowing.

[4] Institute for Environmental Studies, University of Toronto, THE MISSISSAUGA EVACUATION FINAL REPORT, June 1981. The report indicates that 6,600 people of a transit-dependent population of 8,600 people shared rides with other residents; a ride share rate of 76% (Page 5-10).

Adverse weather scenarios affect roadway capacity and the free flow highway speeds. The factors applied for the ETE study are based on recent research on the effects of weather on roadway operations[5]; the factors are:

Table 2-2. Model Adjustments for Adverse Weather			
Scenario	**Highway Capacity***	**Free Flow Speed***	**Mobilization Time for General Population**
Rain	90%	90%	No Effect
Snow	80%	80%	Clear driveway before leaving home (Source: Telephone Survey)
*Adverse weather capacity and speed values are given as a percentage of good weather conditions. Roads are assumed to be passable.			

10. School buses used to transport students are assumed to transport 70 students per bus for elementary schools and 46 students per bus for middle and high schools, based on discussions with state offices of emergency management. Transit buses used to transport the transit-dependent general population are assumed to transport 30 people per bus.

[5] Agarwal, M. et. Al. Impacts of Weather on Urban Freeway Traffic Flow Characteristics and Facility Capacity, Proceedings of the 2005 Mid-Continent Transportation Research Symposium, August, 2005.

3. DEMAND ESTIMATION

The estimates of demand, expressed in terms of people and vehicles, constitute a critical element in developing an evacuation plan. These estimates consist of three components:

1. An estimate of population within the Emergency Planning Zone (EPZ), stratified into groups (resident, employee, transient).
2. An estimate, for each population group, of mean occupancy per evacuating vehicle. This estimate is used to determine the number of evacuating vehicles.
3. An estimate of potential double-counting of vehicles.

Appendix E presents much of the source material for the population estimates. Our primary source of population data, the 2000 Census, however, is not adequate for directly estimating some transient groups.

Throughout the year, vacationers and tourists enter the EPZ. These non-residents may dwell within the EPZ for a short period (e.g. a few days or one or two weeks), or may enter and leave within one day. Estimates of the size of these population components must be obtained, so that the associated number of evacuating vehicles can be ascertained.

The potential for double-counting people and vehicles must be addressed. For example:

- A resident who works and shops within the EPZ could be counted as a resident, again as an employee and once again as a shopper.
- A visitor who stays at a hotel and spends time at a park, then goes shopping could be counted three times.

Furthermore, the number of vehicles at a location depends on time of day. For example, motel parking lots may be full at dawn and empty at noon. Similarly, parking lots at area parks, which are full at noon, may be almost empty at dawn. Estimating counts of vehicles by simply adding up the capacities of different types of parking facilities will tend to overestimate the number of transients and can lead to ETE that are too conservative.

Analysis of the population characteristics of the PSEG Site EPZ indicates the need to identify three distinct groups:

- Permanent residents - people who are year round residents of the EPZ.
- Transients - people who reside outside of the EPZ who enter the area for a specific purpose (shopping, recreation) and then leave the area.
- Employees - people who reside outside of the EPZ and commute to businesses within the EPZ on a daily basis.

Estimates of the population and number of evacuating vehicles for each of the population groups are presented for each ERPA and by polar coordinate representation (population rose). The PSEG Site EPZ has been subdivided into 12 ERPA. The EPZ is shown in Figure 3-1.

3.1 Permanent Residents

The primary source for estimating permanent population is the latest U.S. Census data. The average household size (2.92 persons/household – See Figure F-1) and the number of evacuating vehicles per household (1.35 vehicles/household – See Figure F-8) were adapted from the telephone survey results.

Population estimates are based upon Census 2000 data, extrapolated to year 2010 using municipality specific population growth rates and the compound growth formula. These growth rates were computed by comparing the Census 2000 data with the year 2007 Census estimates (the latest available on the Census website at the time of this study). Table 3-1 provides the permanent resident population within the EPZ, by ERPA, for year 2000 and year 2010. Table 3-1 shows that the EPZ population has increased 26.4 percent over the last 10 years. Table 3-2 shows the average annual growth rate for each municipality within the EPZ. As indicated, the population in the New Jersey portion of the EPZ is declining, while the population in the Delaware portion of the EPZ is growing rapidly.

The year 2010 permanent resident population is divided by the average household size and then multiplied by the average number of evacuating vehicles per household in order to estimate year 2010 vehicles. Permanent resident population and vehicle estimates for 2010 are presented in Table 3-3. Figures 3-2 and 3-3 present the permanent resident population and permanent resident vehicle estimates by sector and distance from the PSEG Site. This “rose” was constructed using GIS software.

The same population estimation methodology used for the Safety Analysis Report (SAR) was used for this study, including the same growth rates by municipality. Any differences in population estimates presented in the SAR and in the ETE are the result of the use of a 10-mile radius for SAR computations versus the use of the EPZ boundary for the ETE computations. As shown in Figure 3-1, there are several areas in the EPZ that extend beyond the 10-mile radius, as well as some areas where the EPZ boundary is less than 10 miles from the plant. Therefore, the population within the 10-

mile radius will differ from the population within the EPZ boundaries.

It can be argued that this estimate of permanent residents overstates, somewhat, the number of evacuating vehicles, especially during the summer. It is certainly reasonable to assert that some portion of the population would be on vacation during the summer and would travel elsewhere. A rough estimate of this reduction can be obtained as follows:

- Assume 50 percent of all households vacation for a two-week period over the summer.
- Assume these vacations, in aggregate, are uniformly dispersed over 10 weeks, i.e. 10 percent of the population is on vacation during each two-week interval.
- Assume half of these vacationers leave the area.

On this basis, the permanent resident population would be reduced by 5 percent in the summer and by a lesser amount in the off-season. Given the uncertainty in this estimate, we elected to apply no reductions in permanent resident population for the summer scenarios to account for residents who may be out of the area.

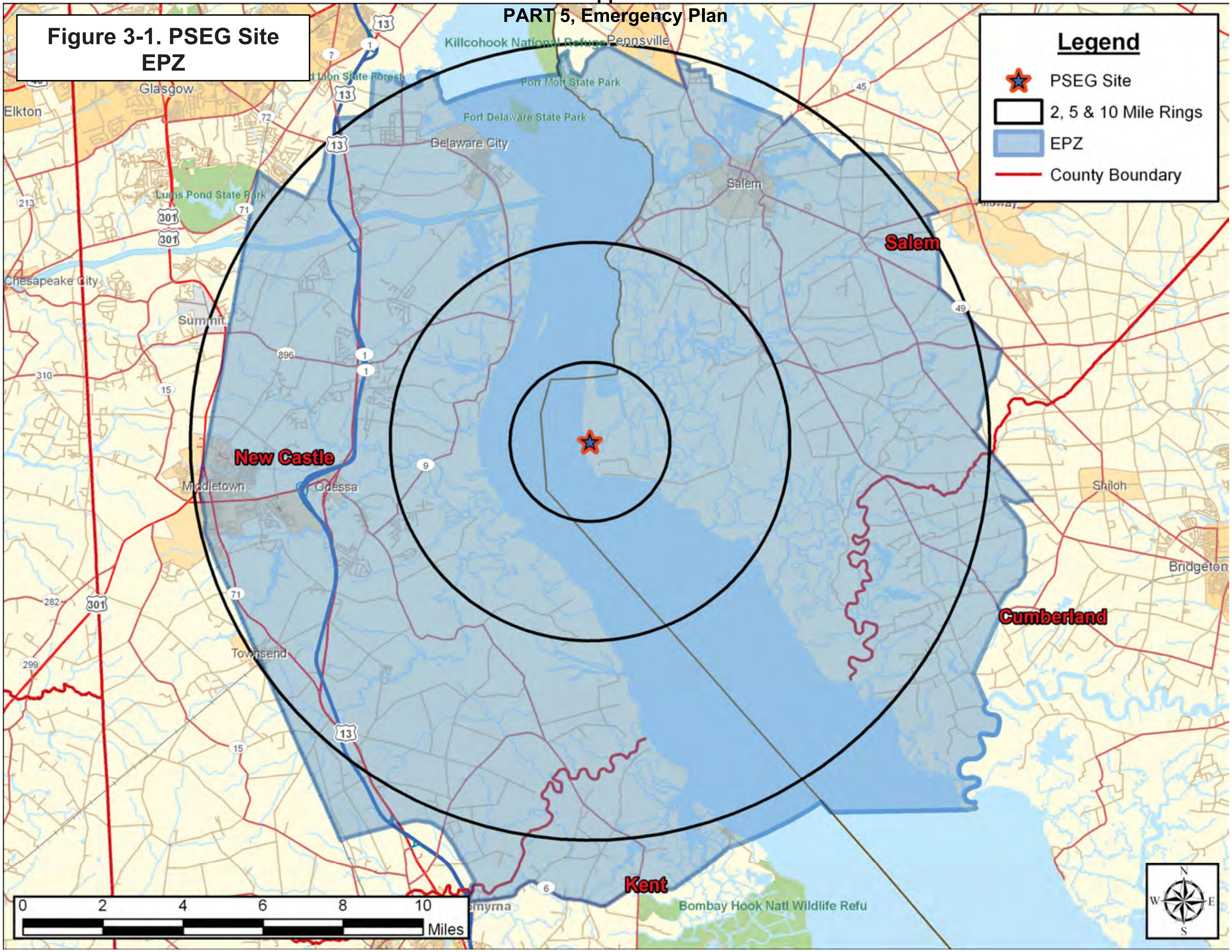


Figure 3-1. PSEG Site EPZ
Legend
PSEG Site
2, 5 & 10 Mile Rings
EPZ
County Boundary
New Castle
Salem
Cumberland
Kent
Killcohook National Refuge
Pennsville
Fort Mott State Park
Fort Delaware State Park
Delaware City
Salem
Glasgow
Elkton
Lums Pond State Park
Chesapeake City
Summit
Middletown
Odessa
Townsend
Shiloh
Bridgeton
Bombay Hook Natl Wildlife Refu
0 2 4 6 8 10 Miles

Table 3-1. EPZ Permanent Resident Population		
ERPA	**2000 Population**	**2010 Population**
New Jersey		
1	844	862
2	2,992	3,067
3	6,900	6,595
4	241	242
5	431	437
6	446	491
7	279	299
8	**No Population**	
NJ Total	**12,133**	**11,993**
Delaware		
A	4,904	5,343
B	8,240	11,202
C	10,364	16,496
D	**No Population**	
DE Total	**23,508**	**33,041**
EPZ TOTAL	**35,641**	**45,034**
	EPZ Population Growth:	**26.4%**

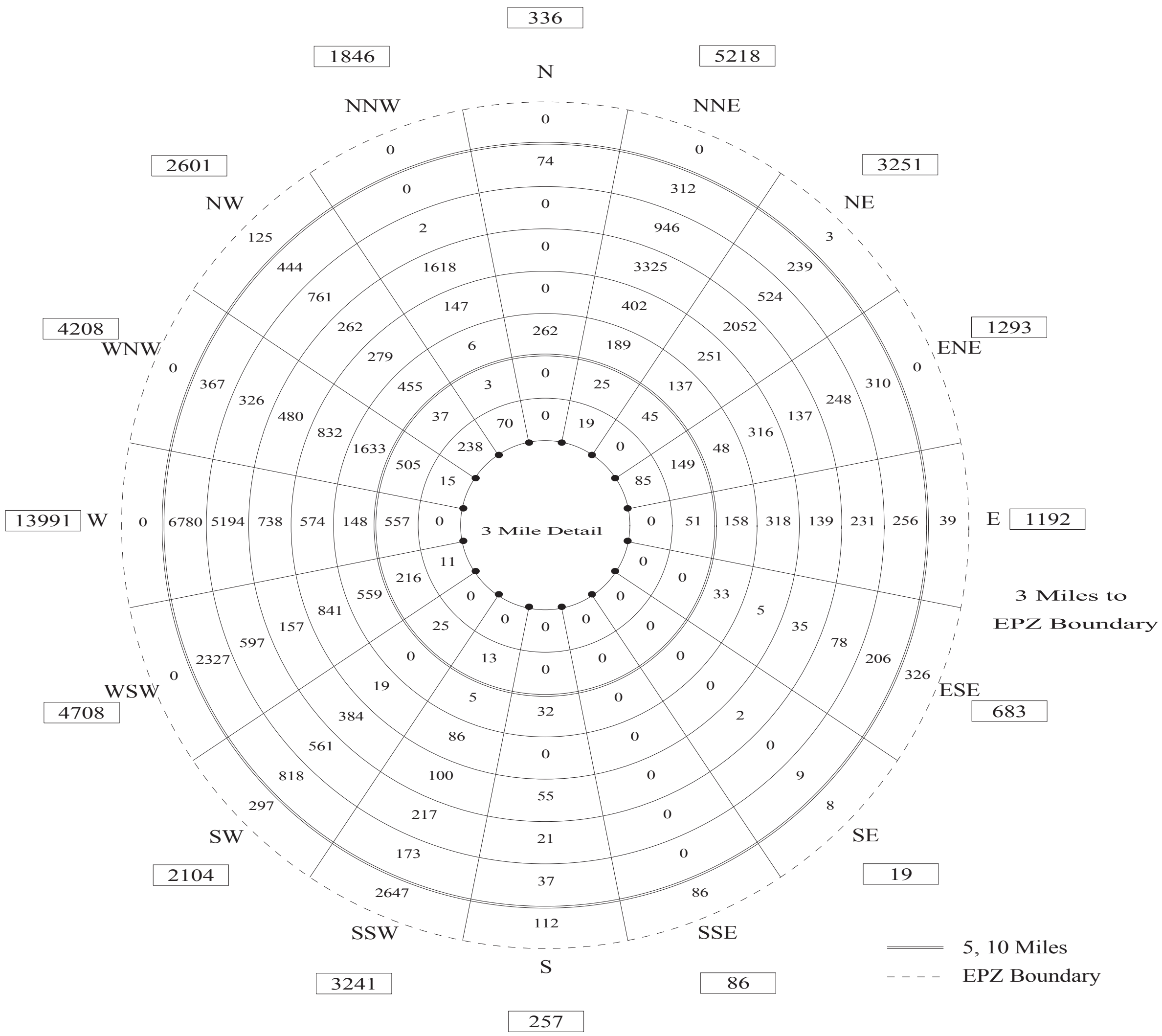
Table 3-2. Annual Population Growth Rates		
Municipality	**Annual Population Growth Rate***	**Population Growth Rate from 2000 to 2010**
New Jersey		
Lower Alloways Creek	0.00245	1.02479
Quinton	0.00265	1.02677
Elsinboro	-0.00505	0.95066
Salem (City)	-0.00442	0.95663
Mannington	-0.00037	0.99634
Pennsville	0.00182	1.01835
Stow Creek	0.00962	1.10042
Greenwich	0.00645	1.06642
Fairfield**	0.01025	1.10738
Shiloh Boro**	0.03073	1.35342
Hopewell**	0.01094	1.11498
Alloway**	0.01293	1.13707
Penns Grove Boro**	-0.00541	0.94721
Pilesgrove**	0.02028	1.22236
Carneys Point**	0.00439	1.04473
Delaware		
Odessa	0.02241	1.24812
Townsend	0.01272	1.13470
Middletown	0.08848	2.33454
Delaware City	0.00608	1.06251
New Castle**	0.00323	1.03277
Clayton**	0.01977	1.21628
Smyrna**	0.05430	1.69689
New Castle County	0.00780	1.08077
Kent County	0.02660	1.30019

*Growth rate was computed using the compound growth formula to compare Year 2000 Census data with Year 2007 Census estimates:

$$\text{Pop 2007} = \text{Pop 2000} \times (1 + \text{Growth Rate})^{7}$$
$$\text{Growth Rate} = (\text{Pop 2007} \div \text{Pop 2000})^{1/7} - 1$$

**Growth rate used exclusively for calculating shadow population

Table 3-3. Permanent Resident Population and Vehicles by ERPA		
ERPA	**2010 Population**	**2010 Vehicles**
New Jersey		
1	862	400
2	3,067	1,413
3	6,595	3,047
4	242	111
5	437	202
6	491	227
7	299	137
8	**No Population**	
NJ Total	**11,993**	**5,537**
Delaware		
A	5,343	2,467
B	11,202	5,172
C	16,496	7,625
D	**No Population**	
DE Total	**33,041**	**15,264**
TOTAL	**45,034**	**20,801**



Resident Population			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	0	0-1	0
1-2	0	0-2	0
2-3	50	0-3	50
3-4	438	0-4	488
4-5	1626	0-5	2114
5-6	3665	0-6	5779
6-7	4070	0-7	9849
7-8	9484	0-8	19333
8-9	9706	0-9	29039
9-10	12352	0-10	41391
10-EPZ	3643	0-EPZ	45034

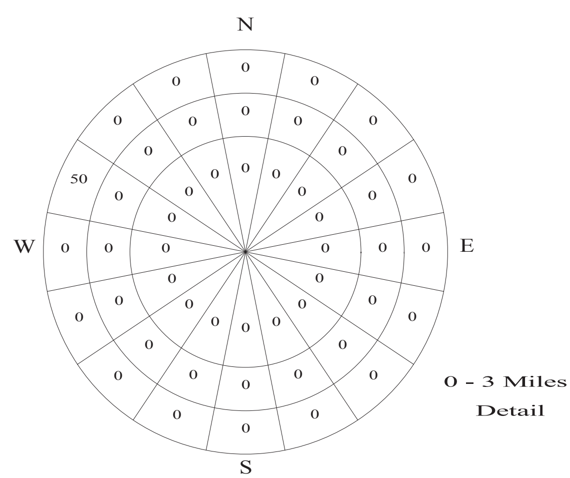
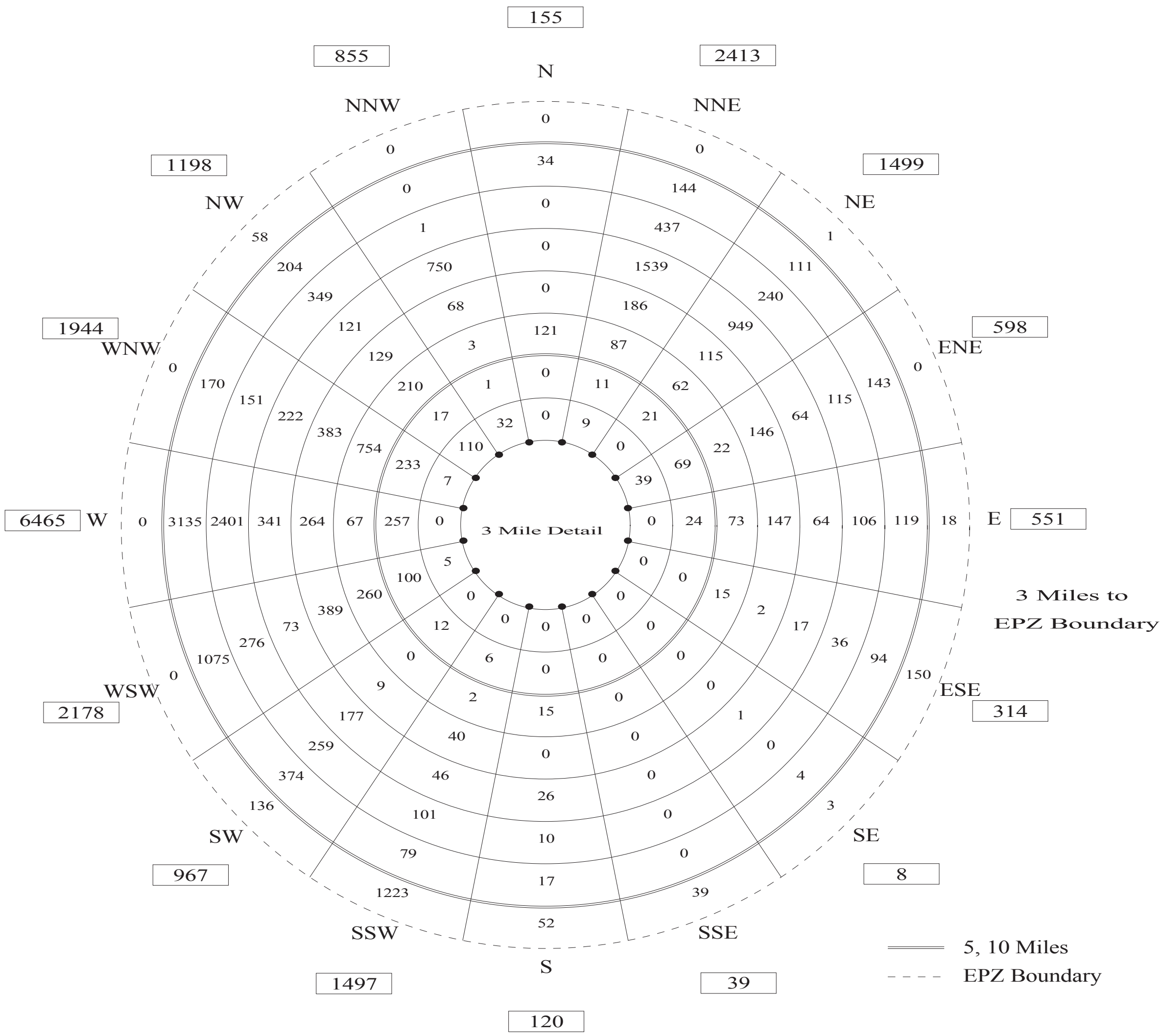


Figure 3-2. Permanent Residents by Sector



Resident Vehicles			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	0	0-1	0
1-2	0	0-2	0
2-3	24	0-3	24
3-4	202	0-4	226
4-5	751	0-5	977
5-6	1691	0-6	2668
6-7	1878	0-7	4546
7-8	4390	0-8	8936
8-9	4482	0-9	13418
9-10	5703	0-10	19121
10-EPZ	1680	0-EPZ	20801

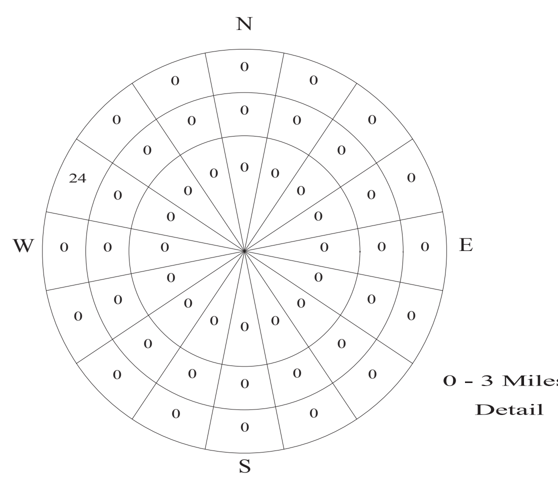


Figure 3-3. Permanent Resident Vehicles by Sector

3.2 Transient Population

Transient population groups are defined as those people (who are not permanent residents, nor commuting employees) who enter the EPZ for a specific purpose (shopping, recreation). Transients may spend less than one day or stay overnight at camping facilities, hotels and motels. The PSEG Site EPZ has a number of areas and facilities that attract transients, including:

- Lodging Facilities
- Marinas
- Wildlife Areas
- Fort Mott State Park
- Fort Delaware State Park

Surveys of lodging facilities within the EPZ were conducted to determine the number of rooms, percentage of occupied rooms, and the number of vehicles per room for each facility. These numbers were used to estimate the number of evacuating vehicles for transients at each of these facilities. A total of 121 transients in 56 vehicles are assigned to lodging facilities in the EPZ.

Fort Mott State Park and Fort Delaware State Park are both Civil War era Forts. Fort Mott State Park is located in New Jersey along the Delaware River and has hiking trails, picnicking facilities, and hosts civil war reenactments. Fort Delaware State Park is located on Pea Patch Island in the middle of the Delaware River. Ferries service the island from Delaware City. Fort Mott and Fort Delaware State Parks attract a peak attendance of 300 people and 200 people, respectively. It is assumed that those people visiting these parks will travel as a family in a single vehicle with an assumed occupancy of 2.92 (average household size within the EPZ according to telephone survey).

Most of the coastal area within the EPZ consists of marshland that is managed as wildlife refuges. There are also many lakes and creeks in the area. Our estimate of tourist population is based on a survey of tourist facilities and of recreational areas attracting day trips, on information provided by state emergency management agencies and on estimates made using overhead imagery of the facilities.

There are three golf courses and several marinas within the EPZ. It is assumed that transients visiting the golf course facilities travel two per vehicle. It is further assumed that transients visit marinas as a family, and a vehicle occupancy of 2.92 transients per vehicle is used (average household size within the EPZ according to telephone survey results). At boat ramps, two passenger car equivalents are used to model vehicles pulling trailers.

Appendix E summarizes the transient data that was estimated for the EPZ. Table E-5

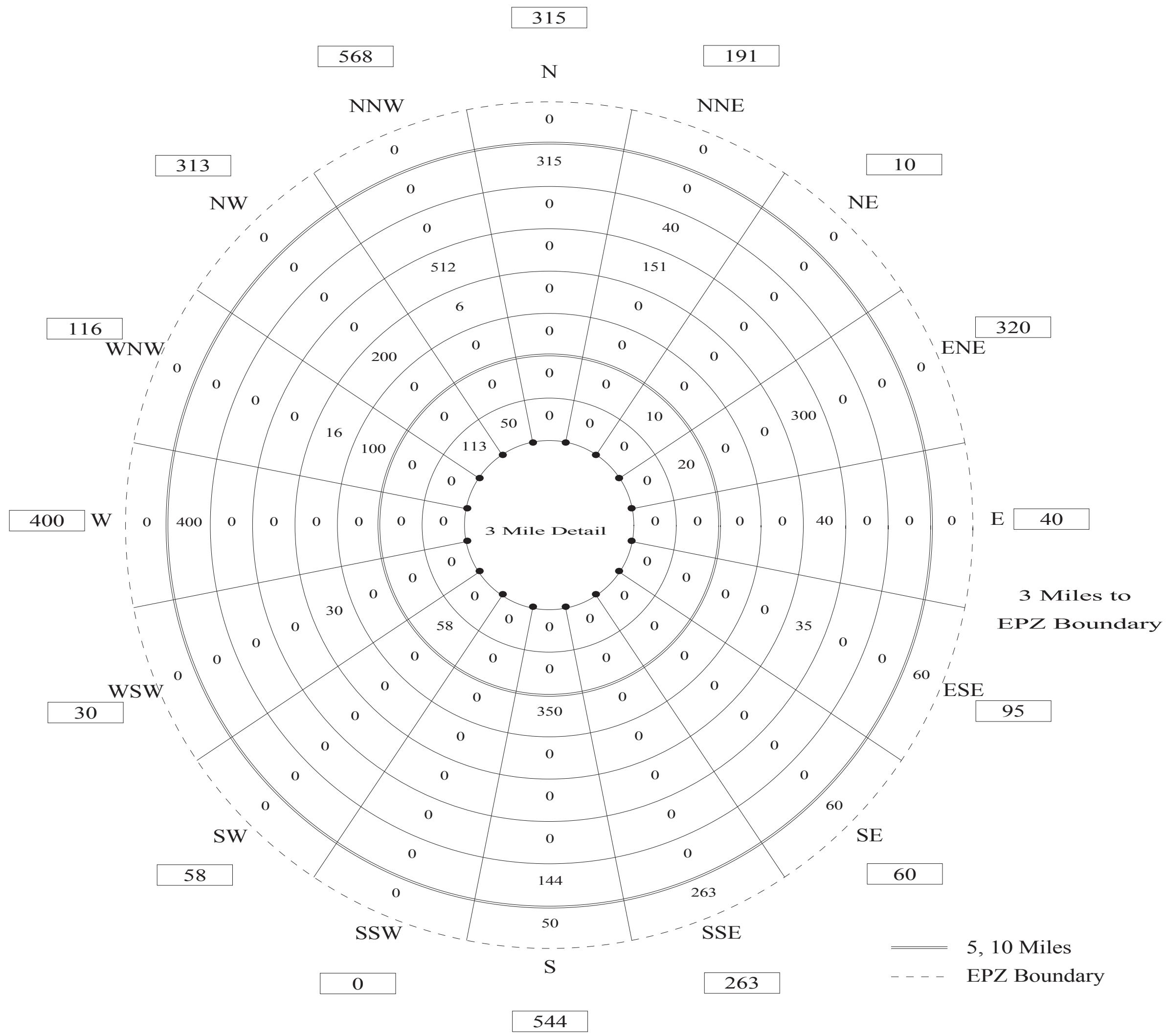
presents the number of transients visiting recreational areas, while Table E-6 presents the number of transients at lodging facilities within the EPZ.

Table 3-4 presents transient population and transient vehicle estimates by ERPA. Figures 3-4 and 3-5 present these data by sector.

Table 3-4. Summary of Transients and Transient Vehicles

ERPA	2009 Transients*	Transient Vehicles
New Jersey		
1	55	19
2	340	164
3	151	79
4	**No Transients**	
5	355	121
6	10	6
7	120	42
8	**No Transients**	
NJ Total	**1,031**	**431**
Delaware		
A	1,128	592
B	330	118
C	834	382
D	**No Transients**	
DE Total	**2,292**	**1,092**
TOTAL	**3,323**	**1,523**

* Transient data were gathered in 2009 through telephone conversations with the transient facilities and through discussions with the New Jersey State Police and the Delaware Emergency Management Agency. Growth rates are not available for transient population as they are for permanent resident population through the Census. Therefore, 2009 was used as the base year for transient data.



Transient Population			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	0	0-1	0
1-2	0	0-2	0
2-3	0	0-3	0
3-4	163	0-4	163
4-5	88	0-5	251
5-6	450	0-6	701
6-7	252	0-7	953
7-8	1038	0-8	1991
8-9	40	0-9	2031
9-10	859	0-10	2890
10-EPZ	433	0-EPZ	3323

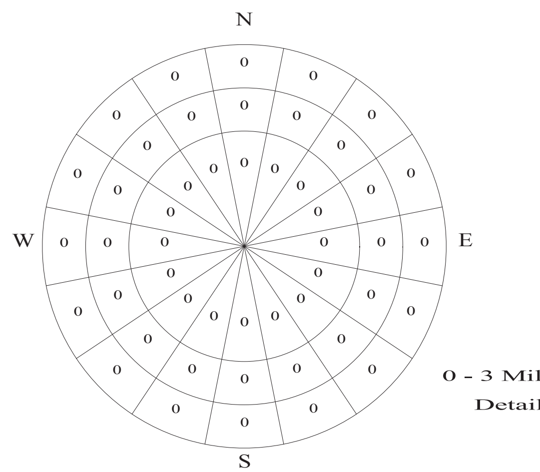
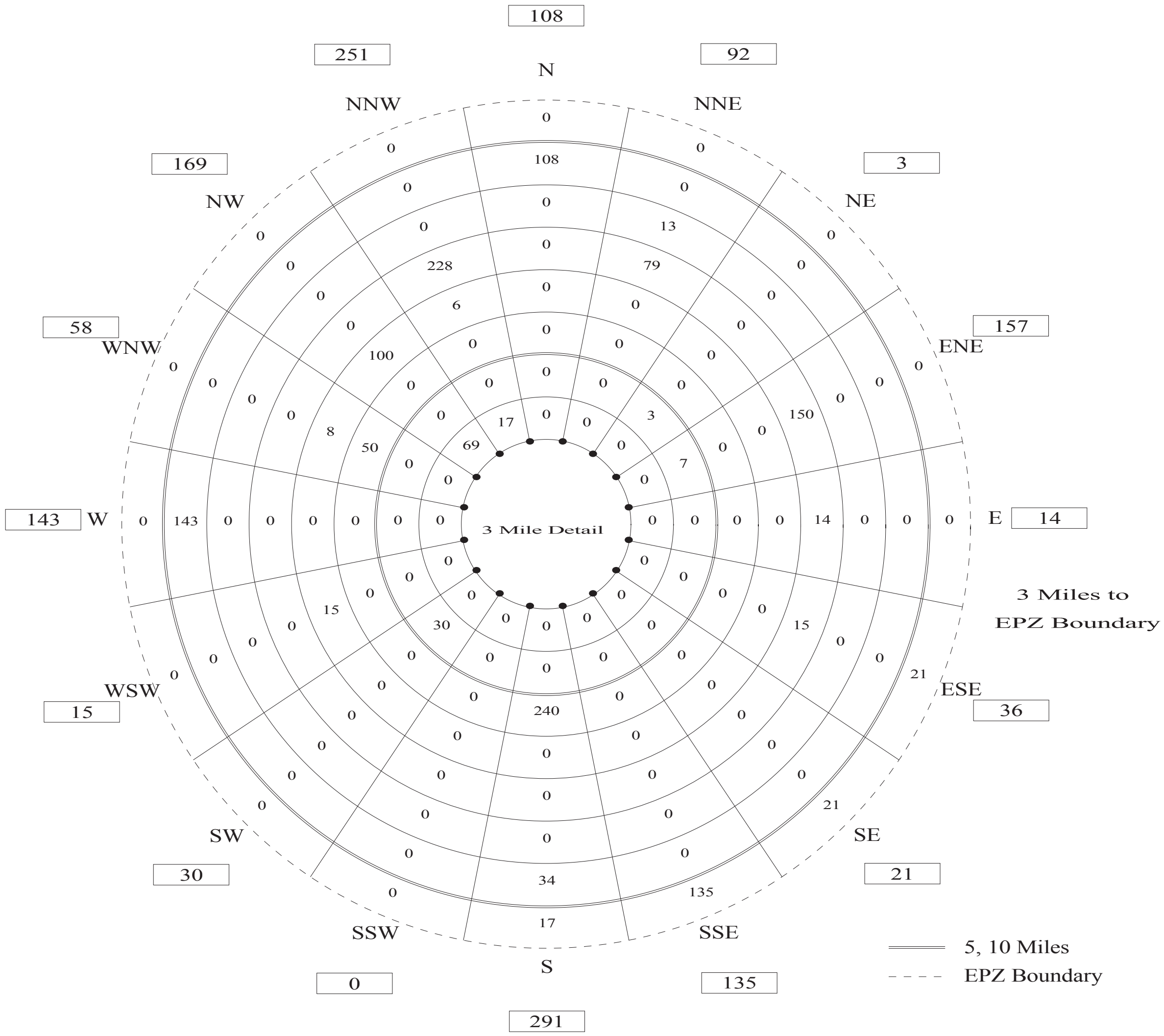


Figure 3-4. Transient Population by Sector



Transient Vehicles			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	0	0-1	0
1-2	0	0-2	0
2-3	0	0-3	0
3-4	86	0-4	86
4-5	40	0-5	126
5-6	290	0-6	416
6-7	129	0-7	545
7-8	486	0-8	1031
8-9	13	0-9	1044
9-10	285	0-10	1329
10-EPZ	194	0-EPZ	1523

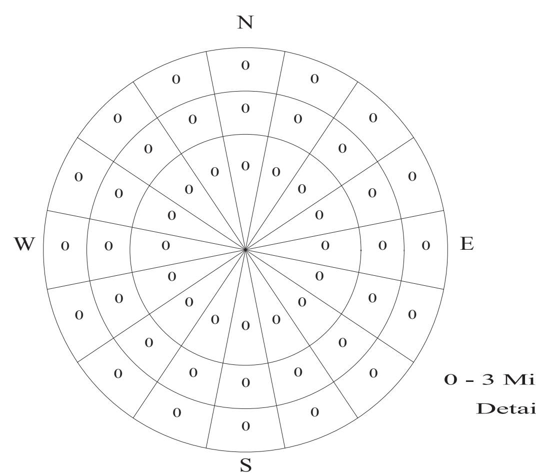


Figure 3-5. Transient Vehicles by Sector

3.3 Employees

Employees who work within the EPZ fall into two categories:

- Those who live and work in the EPZ
- Those who live outside of the EPZ and commute to jobs within the EPZ.

Those of the first category are already counted as part of the permanent resident population. To avoid double counting, we focus only on those employees commuting from outside the EPZ who will evacuate along with the permanent resident population.

Year 2000 Census journey to work data for New Jersey and Delaware was used to estimate the number of employees commuting into the EPZ. For New Jersey, this data defines the number of persons working in a specified municipality by their place of residence (origin-municipality). GIS software was used to estimate the percentage of population in each municipality that resides within the EPZ – these percentages are then applied to the journey to work data to estimate the number of people commuting to work in the New Jersey portion of the EPZ from areas outside of the EPZ. The resulting data indicates that, on average, 76% of workers in New Jersey commute to work from outside the EPZ. The municipality specific percentages are shown in Table E-7. PSEG provided the zip codes their employees commute from; a GIS analysis was done to estimate the percentage of PSEG employees commuting into the EPZ based on the zip code data provided.

The journey to work data available for Delaware is limited to origin and destination by county, not municipality. The State of Delaware only has three counties; therefore this data was not entirely useful. The majority of the population and employment in New Castle County is in Wilmington and Newark, neither of which is located within the EPZ. It is assumed that 75% of employees in the Delaware portion of the EPZ commute to work from outside the EPZ.

Table E-7 identifies the major employers within the EPZ. The names, locations, and the maximum number of employees per shift were identified through review of the local emergency plans, discussions with the New Jersey State Police and the Delaware Emergency Management Agency, and through Internet searches. The Employees (Max Shift) column in Table E-7 is multiplied by the % Non-EPZ factor discussed above to determine the number of employees who are not residents of the EPZ. This removes any employee within the EPZ who would already be counted as a permanent resident.

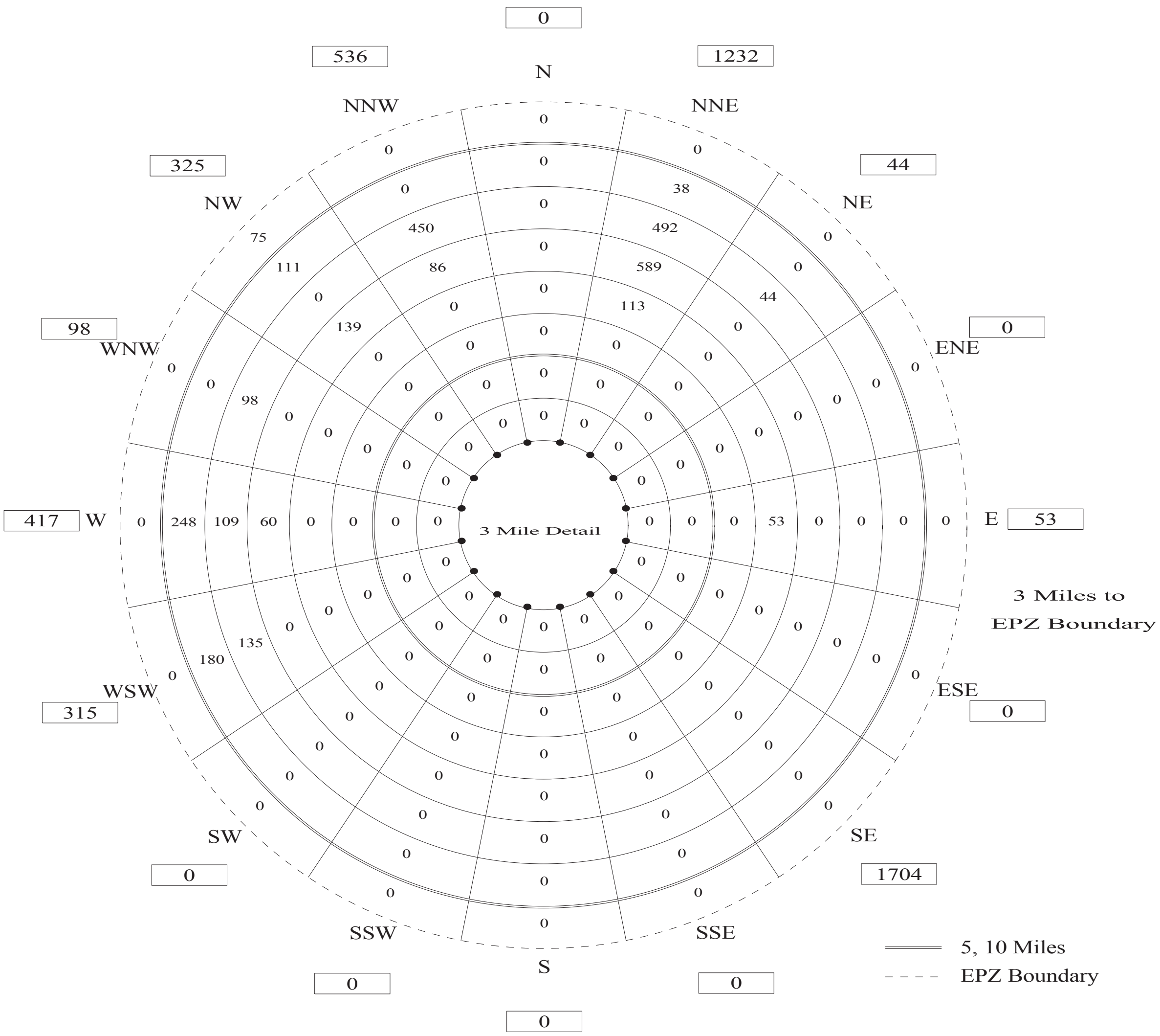
A vehicle occupancy of 1.03 employees per vehicle obtained from the telephone survey was used to determine the number of evacuating employee vehicles for all major employers, except PSEG, which is discussed in Section 3.6.

Table 3-5 presents non-EPZ Resident employee and vehicle estimates by ERPA. Figures 3-6 and 3-7 present these data by sector.

Table 3-5. Summary of Non-EPZ Employees and Employee Vehicles

ERPA	2009 Employees*	Employee Vehicles
New Jersey		
1	1,757	1,415
2	44	43
3	702	681
4	530	514
5	**No Employment**	
6		
7		
8		
NJ Total	**3,033**	**2,653**
Delaware		
A	**No Employment**	
B	469	456
C	1,222	1,184
D	**No Employment**	
DE Total	**1,691**	**1,640**
TOTAL	**4,724**	**4,293**

*Employment data were gathered in 2009 through telephone conversations with major employers and through discussions with the New Jersey State Police and the Delaware Emergency Management Agency. Growth rates are not available for employees as they are for permanent resident population through the Census. Therefore, 2009 was used as the base year for employment data.



Employees			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	1704	0-1	1704
1-2	0	0-2	1704
2-3	0	0-3	1704
3-4	0	0-4	1704
4-5	0	0-5	1704
5-6	0	0-6	1704
6-7	166	0-7	1870
7-8	874	0-8	2744
8-9	1328	0-9	4072
9-10	577	0-10	4649
10-EPZ	75	0-EPZ	4724

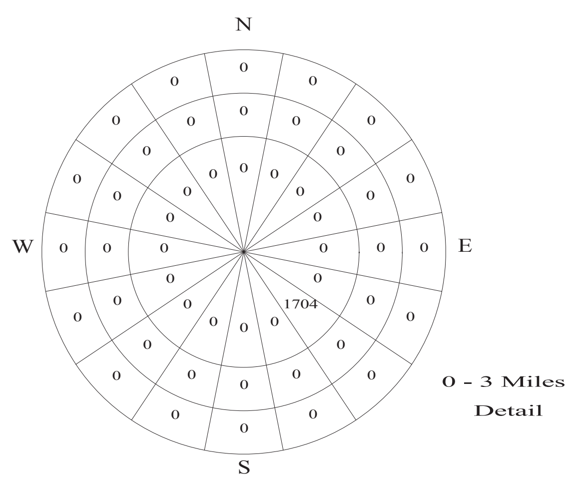
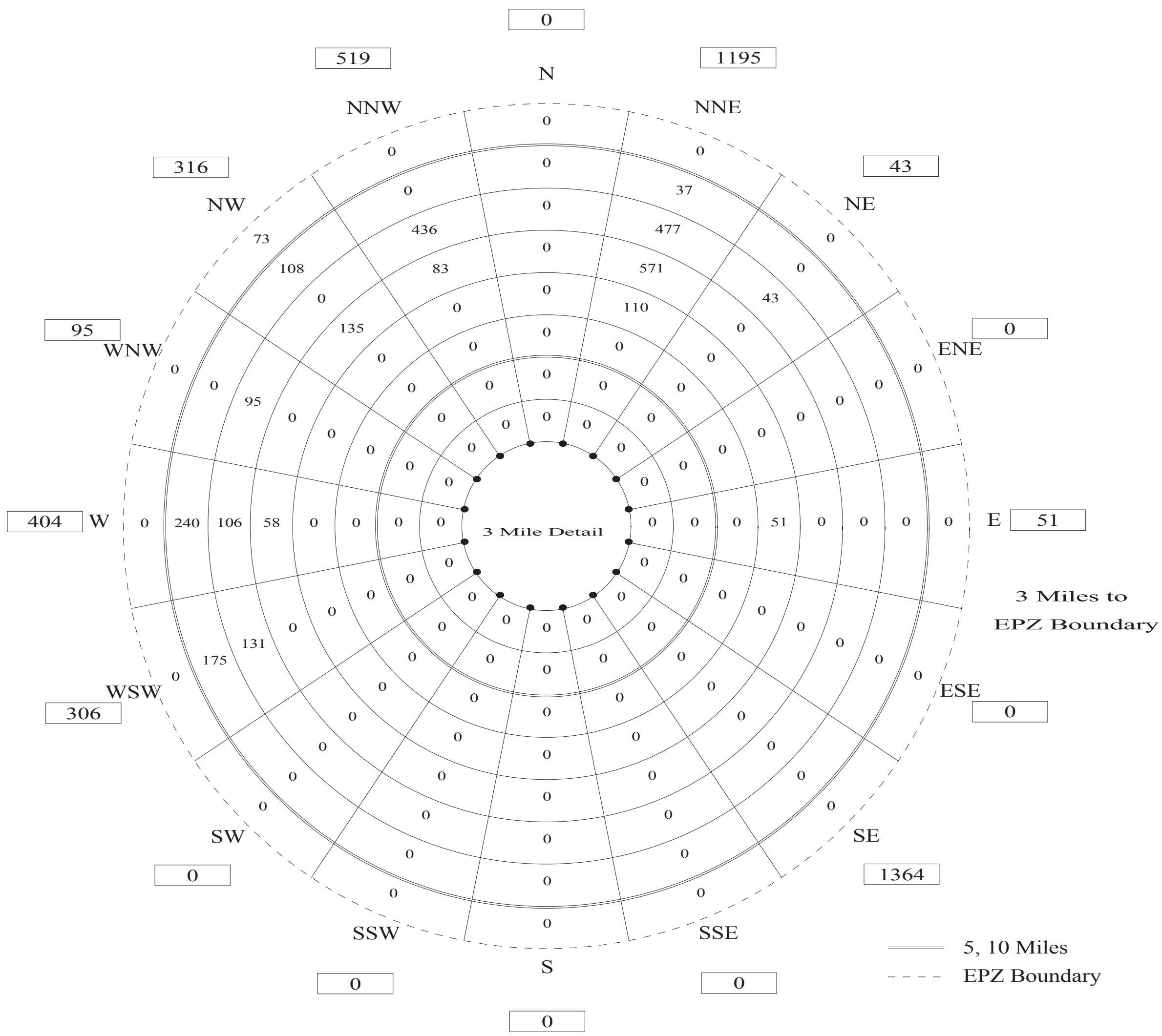


Figure 3-6. Employee Population by Sector



Employee Vehicles			
Miles	Ring Subtotal	Total Miles	Cumulative Total
0-1	1364	0-1	1364
1-2	0	0-2	1364
2-3	0	0-3	1364
3-4	0	0-4	1364
4-5	0	0-5	1364
5-6	0	0-6	1364
6-7	161	0-7	1525
7-8	847	0-8	2372
8-9	1288	0-9	3660
9-10	560	0-10	4220
10-EPZ	73	0-EPZ	4293

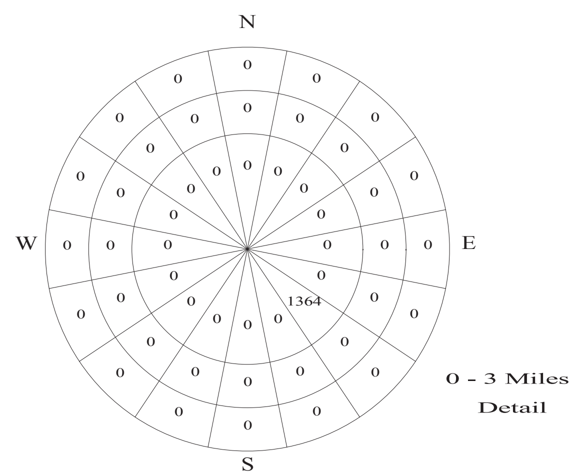


Figure 3-7. Employee Vehicles by Sector

3.4 Medical Facilities

Data was provided by the Delaware Emergency Management Agency for each of the medical facilities within the Delaware portion of the EPZ. Phone calls were made to each of the medical facilities within the New Jersey portion of the EPZ to obtain needed data. Chapter 8 details the evacuation of medical facilities and their patients. The number and type of evacuating vehicles that need to be provided depends on the patients' state of health. Buses can transport up to 30 people; wheelchair vans, up to 4 people; wheelchair buses up to 15 people; and ambulances, up to 2 people.

3.5 Total Demand in Addition to Permanent Population

Vehicles will be traveling through the EPZ (external-external trips) at the time of an accident. After the Advisory to Evacuate is announced, these through-travelers will also evacuate. These through vehicles are assumed to travel on the major routes traversing the EPZ – US Route 13, Delaware Route 1 and New Jersey Route 49. It is assumed that this traffic will continue to enter the EPZ during the first 90 minutes following the Advisory to Evacuate.

Average Annual Daily Traffic (AADT) data was obtained from the State DOT websites to estimate the number of vehicles per hour. The AADT was multiplied by the K-Factor, which is the proportion of the AADT on a roadway segment or link during the design hour, resulting in the design hour volume (DHV). The design hour is the 30th highest hourly traffic volume of the year, measured in vehicles per hour (vph). The DHV is then multiplied by the D-Factor, which is the proportion of the DHV occurring in the peak direction of travel (also known as the directional split). The resulting values are the directional design hourly volumes (DDHV), and are presented in Table 3-6, for each of the routes considered. The DDHV is then multiplied by 1.5 hours (access control points – ACP – are activated at 90 minutes after the advisory to evacuate) to estimate the total source vehicles loaded on the analysis network. As indicated, there are 13,587 vehicles entering the EPZ as external-external trips prior to the activation of the ACP.

3.6 Special Events

As noted in assumption 6 of Section 2.2, three special events (Scenarios 13, 14 and 15) were considered –construction of the new plant coincident with a refueling outage at one of the operational units at the site with the existing access road and with the proposed causeway, and a refueling outage only – all in the year 2019. Consistent with the Traffic Impact Analysis (TIA) study submitted with the Environmental Report, the peak construction period is estimated at October 2019, with workforce estimates of 4,100 total construction workers. There will be three construction shifts, with 2,460 workers (60% of total workforce) during the peak (midday) shift. There are 1,544 PSEG employees and 160 supplemental personnel (contractors) at the site during regular operations, for a total population of 1,704 employees at the site, which agrees with

Figure 3-6 and Table E-7. During an outage, the number of supplemental personnel increases to 850 total employees. Based on traffic count data collected for the TIA study during a 2009 outage and during regular daily operations, there are 1,364 vehicles onsite at the peak time during the midday during regular operations (Figure 11 of the TIA), and 1,293 vehicles onsite at the peak time during the midday during an outage (Figure 14 of the TIA). It is estimated that 600 new plant personnel (including NRC and PSEG personnel overseeing construction) will be at the new site during peak times. Using the data from Figure 14 of the TIA, 44.9% of the new plant personnel are present at the peak time midday. Thus, 269 new plant personnel (600 x 44.9%) are present for Scenarios 13 and 14.

Average vehicle occupancies of 1.30 construction workers per vehicle and 1.00 new plant personnel per vehicle are used to convert workers to vehicles, consistent with the TIA study. The vehicles for the existing unit personnel and outage personnel are taken directly from the traffic counts conducted for the TIA study, as noted above. Therefore, there is no vehicle occupancy factor applied to existing PSEG personnel and outage personnel. Applying the construction and new plant personnel occupancy factors results in 2,161 special event vehicles (2,460 ÷ 1.3 + 269 ÷ 1.0) for Scenarios 13 and 14. The outage vehicles present for Scenario 15 have been grouped with the existing PSEG employees as there is no way to differentiate outage vehicles from existing plant personnel vehicles in the TIA traffic counts. The existing access road was used as a single lane eastbound for the Scenarios 13 and 15. The proposed causeway, modeled as a single lane outbound connecting the PSEG Site to local roads in Elsinboro Township (see Appendix N for additional information), was used for Scenario 14. Permanent resident population and shadow population were extrapolated to 2019 for all special event scenarios. Table 3-7 summarizes the existing plant, new plant, outage and construction personnel and vehicles considered for the special event scenarios.

The existing access road is actually a three lane road with a single lane currently used for each direction of travel and the middle lane unused. In the past, during construction, the center lane was used and the direction of travel in that lane was reversed using gantry lights depending on the time of day. Appendix I explores the sensitivity of ETE for Scenario 13 when using gantry lights to add an additional lane outbound to the existing site access roadway to accommodate the additional traffic. Appendix N compares the ETE for Scenarios 13 and 14 in order to estimate the impact of building the proposed causeway. The ETE presented for Scenarios 13 and 15 are for current roadway conditions (a single lane outbound) on the existing access road.

The annual Olde Tyme Peach Festival in Middletown, Delaware attracts 2,500 additional transients into the EPZ during peak times. A sensitivity study was conducted, and it was found that the ETE are not affected by this event.

Table 3-6. PSEG Site External Traffic								
Delaware*								
Road Name	Direction	Source Link UpNode	Source Link DnNode	AADT	K-Factor	D-Factor	Hourly Volume (DDHV)	Source Vehicles
US Route 13	SB	940	75	24,318	11.01	62.68	1,678	2,517
US Route 13	NB	23	738	17,092	11.01	62.68	1,180	1,770
State Route 1	SB	808	807	35,876	11.01	62.68	2,476	3,714
State Route 1	NB	857	27	40,405	11.01	62.68	2,788	4,182
							Delaware Total:	12,183
New Jersey**								
Road Name	Direction	Source Link UpNode	Source Link DnNode	AADT	K-Factor	D-Factor	Hourly Volume (DDHV)	Source Vehicles
State Route 49	SB	265	266	NJDOT Provides Hourly Volumes			532	798
State Route 49	NB	288	286				404	606
							New Jersey Total:	1,404
							EPZ Total:	13,587

*http://www.deldot.gov/information/pubs_forms/manuals/traffic_counts/2008
** http://www.state.nj.us/transportation/refdata/roadway/traffic_counts

Table 3-7. Summary of Population and Vehicles at PSEG Site for Special Event Scenarios						
Personnel	Scenarios 1 through 12		Scenarios 13 and 14		Scenario 15	
	Population	Vehicles	Population	Vehicles	Population	Vehicles
Existing Plants	1,544	1,364	1,544	1,293	1,544	1,293
Supplemental Contractors (Outage)	160		850		850	
Construction	0	0	2,460	1,892	0	0
New Plant	0	0	269	269	0	0
TOTAL:	1,704	1,364	5,454	3,454	2,394	1,293

4. ESTIMATION OF HIGHWAY CAPACITY

The ability of the road network to service vehicle demand is a major factor in determining how rapidly an evacuation can be completed. The capacity of a road is defined as the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane of roadway during a given time period under prevailing roadway, traffic and control conditions as stated in the 2000 Highway Capacity Manual(HCM).

In discussing capacity, different operating conditions have been assigned alphabetical designations, A through F, to reflect the range of traffic operational characteristics. These designations have been termed "Levels of Service" (LOS). For example, LOS A connotes free-flow and high-speed operating conditions; LOS F represents a forced flow condition. LOS E describes traffic operating at or near capacity.

Another concept, closely associated with capacity, is “Service Volume” (SV). Service volume is defined as “The maximum hourly rate at which vehicles, bicycles or persons reasonably can be expected to traverse a point or uniform section of a roadway during an hour under specific assumed conditions while maintaining a designated level of service.” This definition is similar to that for capacity. The major distinction is that values of SV vary from one LOS to another, while capacity is the service volume at the upper bound of LOS E, only.

This distinction is illustrated in Exhibit 12-15 of the HCM. As indicated there, the SV varies with Free Flow Speed (FFS), Terrain and LOS. However, the SV at LOS E (which approximates capacity) varies only with Terrain. This Exhibit was referenced when estimating capacity for two-lane rural highways within the EPZ and Shadow Region; such highways are predominant within the analysis network.

Other factors also influence capacity. These include, but are not limited to:

- Lane Width
- Shoulder Width
- Pavement Condition
- Percent Truck Traffic
- Weather Conditions (rain, snow, fog, wind speed, ice)

These factors are considered during the road survey and in the capacity estimation process; some factors have greater influence on capacity than others. For example, lane and shoulder width have only a limited influence on free flow speed (FFS) according to Exhibit 20-5 of the HCM. Consequently, lane and shoulder widths at the narrowest points were observed during the road survey and these observations were recorded, but no detailed measurements of lane or shoulder width were taken. The estimated FFS were measured using the survey vehicle’s speedometer and observing local traffic.

As discussed in Section 2.3, it is necessary to adjust capacity figures to represent the

prevailing conditions during inclement weather. Based on limited empirical data, weather conditions such as rain reduce the values of free speed and of highway capacity by approximately 10 percent. Over the last decade new studies have been made on the effects of rain on traffic capacity. These studies indicate a range of effects between 5 and 20 percent depending on wind speed and precipitation rates. As indicated in Section 2.3, we employ a reduction in free speed and in highway capacity of 10 percent and 20 percent for rain and snow, respectively.

Given the population density of Salem and Middletown and the limited number of evacuation routes servicing these areas, congestion arising from evacuation is likely to be significant within these cities. As such, estimates of roadway capacity must be determined with great care. Because of its importance, a brief discussion of the major factors that influence highway capacity is presented in this section.

Rural highways generally consist of: (1) one or more uniform sections with limited access (driveways, parking areas) characterized by "uninterrupted" flow; and (2) approaches to at-grade intersections where flow can be "interrupted" by a control device or by turning or crossing traffic at the intersection. Due to these differences, separate estimates of capacity must be made for each section. Often, the approach to the intersection is widened by the addition of one or more lanes (turn pockets or turn bays), to compensate for the lower capacity of the approach due to the factors there that can interrupt the flow of traffic. These additional lanes are recorded during the field survey and later entered as input to the I-DYNEV system.

4.1 Capacity Estimations on Approaches to Intersections

At-grade intersections are apt to become the first bottleneck locations under local heavy traffic volume conditions. This characteristic reflects the need to allocate access time to the respective competing traffic streams by exerting some form of control. During evacuation, control at critical intersections will often be provided by traffic control personnel assigned for that purpose, whose directions may supersede traffic control devices. The Traffic Management Plan identifies these locations (Traffic Control Points, TCP) and the management procedures applied.

The per-lane capacity of an approach to a signalized intersection can be expressed (simplistically) in the following form:

$$Q_{cap,m} = \left(\frac{3600}{h_m}\right) \bullet \left[\frac{G-L}{C}\right]_m = \left(\frac{3600}{h_m}\right) \bullet P_m$$

where:

Qcap,m	=	Capacity of a single lane of traffic on an approach, which executes movement, *m*, upon entering the intersection; vehicles per hour (vph)
h_m	=	Mean queue discharge headway of vehicles on this lane that are executing movement, *m*; seconds per vehicle

G	=	Mean duration of GREEN time servicing vehicles that are executing movement, m, for each signal cycle; seconds
L	=	Mean "lost time" for each signal phase servicing movement, m; seconds
C	=	Duration of each signal cycle; seconds
P_m	=	Proportion of GREEN time allocated for vehicles executing movement, m, from this lane. This value is specified as part of the control treatment.
m	=	The movement executed by vehicles after they enter the intersection: through, left-turn, right-turn, and diagonal.

The turn-movement-specific mean discharge headway h_m, depends in a complex way upon many factors: roadway geometrics, turn percentages, the extent of conflicting traffic streams, the control treatment, and others. A primary factor is the value of "saturation queue discharge headway", h_{sat}, which applies to through vehicles that are not impeded by other conflicting traffic streams. This value, itself, depends upon many factors including motorist behavior. Formally, we can write,

$$h_m = f_m \left(h_{sat}, F_1, F_2, \ldots \right)$$

where:

h_{sat}	=	Saturation discharge headway for through vehicles; seconds per vehicle
F_1, F_2	=	The various known factors influencing h_m
$f_m (\cdot)$	=	Complex function relating h_m to the known (or estimated) values of $h_{sat}, F_1, F_2, \ldots$

The estimation of h_m for specified values of $h_{sat}, F_1, F_2, \ldots$ is undertaken within the PC-DYNEV simulation model and within the TRAD model by a mathematical model[1]. The resulting values for h_m always satisfy the condition:

$$h_m \geq h_{sat}$$

That is, the turn-movement-specific discharge headways are always greater than, or equal to the saturation discharge headway for through vehicles. These headways (or its inverse equivalent, “saturation flow rate”), may be determined by observation or using the procedures of the Highway Capacity Manual.

The above discussion is necessarily brief given the scope of this ETE report and the complexity of the subject of intersection capacity. In fact, the two longest chapters in the HCM (16 and 17), each well over 100 pages, address this topic. The factors, F_1, F_2, …,

1 Lieberman, E., "Determining Lateral Deployment of Traffic on an Approach to an Intersection", McShane, W. & Lieberman, E., "Service Rates of Mixed Traffic on the far Left Lane of an Approach". Both papers appear in Transportation Research Record 772, 1980.

influencing saturation flow rate are indentified in equation (16-4) and Exhibit 16-7 of the HCM; Exhibit 10-12 identifies the required data and Exhibit 10-7 presents representative values of Service Volume.

The traffic signals within the EPZ and Shadow Region are modeled using a 75-second cycle length (C). The proportion of green time allocated (P) for each approach to each intersection is determined iteratively based on the expected traffic volumes on each approach during evacuation circumstances. The amount of green time (G) allocated ranges from 12 to 57 seconds; 2 seconds of yellow time are indicated for each signal phase and 1 second of all-red time is assigned between signal phases. A lost time (L) of 2.0 seconds is used for each intersection in the analysis.

4.2 Capacity Estimation Along Sections of Highway

The capacity of highway sections -- as distinct from approaches to intersections -- is a function of roadway geometrics, traffic composition (e.g. percent heavy trucks and buses in the traffic stream) and, of course, motorist behavior. There is a fundamental relationship which relates service volume (i.e. the number of vehicles serviced within a uniform highway section in a given time period) to traffic density. Figure 4-1 describes this relationship.

As indicated, there are two flow regimes: (1) Free Flow (left side of curve); and (2) Forced Flow (right side). In the Free Flow regime, the traffic demand is fully serviced; this service volume increases as demand volume and density increase, until the service volume attains its maximum value, which is the capacity of the highway section. As traffic demand and the resulting highway density increase beyond this "critical" value, the rate at which traffic can be serviced (i.e. the service volume) can actually decline below capacity. Therefore, in order to realistically represent traffic performance during congested conditions (i.e. when demand exceeds capacity), it is necessary to estimate the service volume, V_F, under congested conditions.

The value of V_F can be expressed as:

$$V_F = R \times \text{Capacity}$$

where R = Reduction factor which is less than unity.

We have employed a value of R=0.85. The advisability of such a capacity reduction factor is based upon empirical studies that identified a fall-off in the service flow rate when congestion occurs at "bottlenecks" or "choke points" on a freeway system. Zhang and Levinson[2] describe a research program that collected data from a computer-based surveillance system (loop detectors) installed on the Interstate Highway System, at 27 active bottlenecks in the twin cities metro area in Minnesota over a 7-week period. When flow breakdown occurs, queues are formed which discharge at lower flow rates than the

[2] Lei Zhang and David Levinson, "Some Properties of Flows at Freeway Bottlenecks," Transportation Research Record 1883, 2004.

maximum capacity prior to observed breakdown. These queue discharge flow (QDF) rates vary from one location to the next and also vary by day of week and time of day based upon local circumstances. The cited reference presents a mean QDF of 2,016 passenger cars per hour per lane (pcphpl). This figure compares with the nominal capacity estimate of 2,250 pcphpl estimated for the ETE and indicated in Appendix K for freeway links. The ratio of these two numbers is 0.896 which translates into a capacity reduction factor of 0.90. The data collected in the cited reference indicates that the variation of QDF at a location is generally in the range of ±5% about the average QDF. That is, the lower tail of this distribution would be equivalent to a capacity reduction factor of 0.90 - 0.05 = 0.85, which is the figure adopted.

It is seen that a conservative view is taken in estimating the capacity at bottlenecks when congestion develops (this capacity, of course, is the QDF rate discussed above). One could argue that a more representative value for this capacity reduction factor could be 0.90 as discussed above. Given the emergency conditions, a conservative stance is justified. Therefore, a factor of 0.85 is applied only when flow breaks down, as determined by the simulation model.

Rural roads, like freeways, are classified as “uninterrupted flow” facilities. (This is in contrast with urban street systems which have closely spaced signalized intersections and are classified as “interrupted flow” facilities.) As such, traffic flow along rural roads is subject to the same effects as freeways in the event traffic demand exceeds the nominal capacity, resulting in queuing and lower QDF rates. As a practical matter, rural roads rarely break down at locations away from intersections. The breakdowns on rural roads which are experienced on this network occur at intersections where other model logic applies. Therefore, the application of a factor of 0.85 is appropriate on rural roads but rarely, if ever, activated.

The estimated value of capacity is based primarily upon the type of facility and on roadway geometrics. Sections of roadway with adverse geometrics are characterized by lower free-flow speeds and lane capacity. Table 12-15 in the Highway Capacity Manual was referenced to estimate saturation flow rates. The impact of narrow lanes and shoulders on free-flow speed and on capacity is not material, particularly when flow is predominantly in one direction.

The procedure used here was to estimate "section" capacity, V_E, based on observations made traveling over each section of the evacuation network, by the posted speed limits and travel behavior of other motorists and by reference to the 2000 Highway Capacity Manual. It was then determined for each highway section, represented as a network link, whether its capacity would be limited by the "section-specific" service volume, V_E, or by the intersection-specific capacity. For each link, the model selects the lower value of capacity.

4.3 Application to the PSEG Site EPZ

As part of the development of the PSEG Site EPZ traffic network, an estimate of roadway capacity is required. The source material for the capacity estimates presented herein is contained in:

2000 Highway Capacity Manual (HCM)
Transportation Research Board
National Research Council
Washington, D.C.

The highway system in the PSEG Site EPZ consists primarily of three categories of roads and, of course, intersections:

- Two-Lane roads: Local, State
- Multi-Lane Highways (at-grade)
- Freeways

Each of these classifications will be discussed.

4.3.1 Two-Lane Roads

Ref: HCM Chapters 12 and 20

Two lane roads comprise the majority of highways within the EPZ. The per-lane capacity of a two-lane highway is estimated at 1700 passenger cars per hour (pc/h). This estimate is essentially independent of the directional distribution of traffic volume except that, for extended distances, the two-way capacity will not exceed 3200 pc/h. The HCM procedures then estimate Level of Service (LOS) and Average Travel Speed. The evacuation simulation model accepts the specified value of capacity as input and computes average speed based on the time-varying demand: capacity relations.

Based on the field survey and on expected traffic operations associated with evacuation scenarios:

- Most sections of two-lane roads within the EPZ are classified as “Class I”, with "level terrain"; some are “rolling terrain”.
- “Class II” highways are mostly those within city limits (Middletown, Salem).

4.3.2 Multi-Lane Highway

Ref: HCM Chapters 12 and 21

Exhibit 21-3 of the HCM presents a set of curves that indicate a per-lane capacity ranging from approximately 1900 to 2200 pc/h, for free-speeds of 45 to 60 mph. Based on observation, the multi-lane highways outside of urban areas within the EPZ service traffic with free-speeds in this range. The actual time-varying speeds computed by the simulation

model reflect the demand: capacity relationship and the impact of control at intersections. A conservative estimate of per-lane capacity of 1900 pc/h is adopted for this study for multi-lane highways outside of urban areas, as shown in Appendix K.

Chapter 12 presents the basic concepts underlying the procedures in Chapters 20 and 21.

4.3.3 Freeways

Ref: HCM Chapters 13, 22-25

Chapter 22 of the HCM describes a procedure for integrating the results obtained in Chapters 23, 24 and 25, which compute capacity and LOS for freeway components. The discussion also references Chapter 31, which presents a discussion on simulation models. The simulation model, PC-DYNEV, automatically performs this integration process.

Chapter 23 of the HCM presents procedures for estimating capacity and LOS for “Basic Freeway Segments". Exhibit 23-3 of the HCM2000 presents capacity vs. free speed estimates.

Free Speed:	55	60	65	70+
Per-Lane Capacity (pc/h):	2250	2300	2350	2400

The inputs to the simulation model are highway geometrics, free-speeds and capacity based on field observations. The simulation logic calculates actual time-varying speeds based on demand: capacity relationships.

Chapter 24 of the HCM presents procedures for estimating capacity, speed, density and LOS. The simulation model contains logic that relates speed to demand volume: capacity ratio. The value of capacity obtained from Exhibit 24-8 of the HCM depends on the "Type" and geometrics of the weaving segment and on the "Volume Ratio" (ratio of weaving volume to total volume).

Chapter 25 of the HCM presents procedures for estimating capacities of ramps and of "merge" areas. The capacity of a merge area "is determined primarily by the capacity of the downstream freeway segment". Values of this merge area capacity are presented in Exhibit 25-7 of the HCM, and depend on the number of freeway lanes and on the freeway free speed. The KLD simulation model logic simulates the merging operations of the ramp and freeway traffic. If congestion results from an excess of demand relative to capacity, then the model allocates service appropriately to the two entering traffic streams and produces LOS F conditions (The HCM does not address LOS F explicitly).

Chapter 13 presents basic concepts underlying the procedures in the later chapters.

4.3.4 Intersections

Ref: HCM Chapters 10, 16, 17

Procedures for estimating capacity and LOS for approaches to intersections are presented in Chapters 16 (signalized intersections) and 17 (un-signalized intersections). These are the two longest chapters in the HCM 2000, reflecting the complexity of these procedures. The simulation logic is likewise complex, but different; as stated on page 31-21 of the HCM2000:

> *"Assumptions and complex theories are used in the simulation model to represent the real-world dynamic traffic environment."*

Chapter 10 presents basic concepts underlying the procedures in the later chapters.

4.4 Simulation and Capacity Estimation

Chapter 31 of the HCM is entitled, "Simulation and other Models." The lead sentence on the subject of Traffic Simulation Models is:

> Traffic simulation models use numerical techniques on a digital computer to create a description of how traffic behaves over extended periods of time for a given transportation facility or system…by stepping through time and across space, tracking events as the system state unfolds. Traffic simulation models focus on the dynamic of traffic flow.

In general terms, this description applies to the PC-DYNEV model, which is further described in Appendix C. It is essential to recognize that simulation models do not replicate the methodology and procedures of the HCM – they *replace* these procedures by describing the complex interactions of traffic flow and computing Measures of Effectiveness (MOE) detailing the operational performance of traffic over time and by location.

All simulation models must be calibrated properly with field observations that quantify the performance parameters applicable to the analysis network. Two of the most important of these are: (1) Free flow speed (FFS); and (2) saturation headway, h_{sat}. The first of these is estimated by direct observation during the road survey; the second is estimated using the concepts of the HCM, as described earlier. These parameters are listed in Appendix K, for each network link.

The observations made during the road survey (see Section 1.3) were used to calibrate the model used for this study.

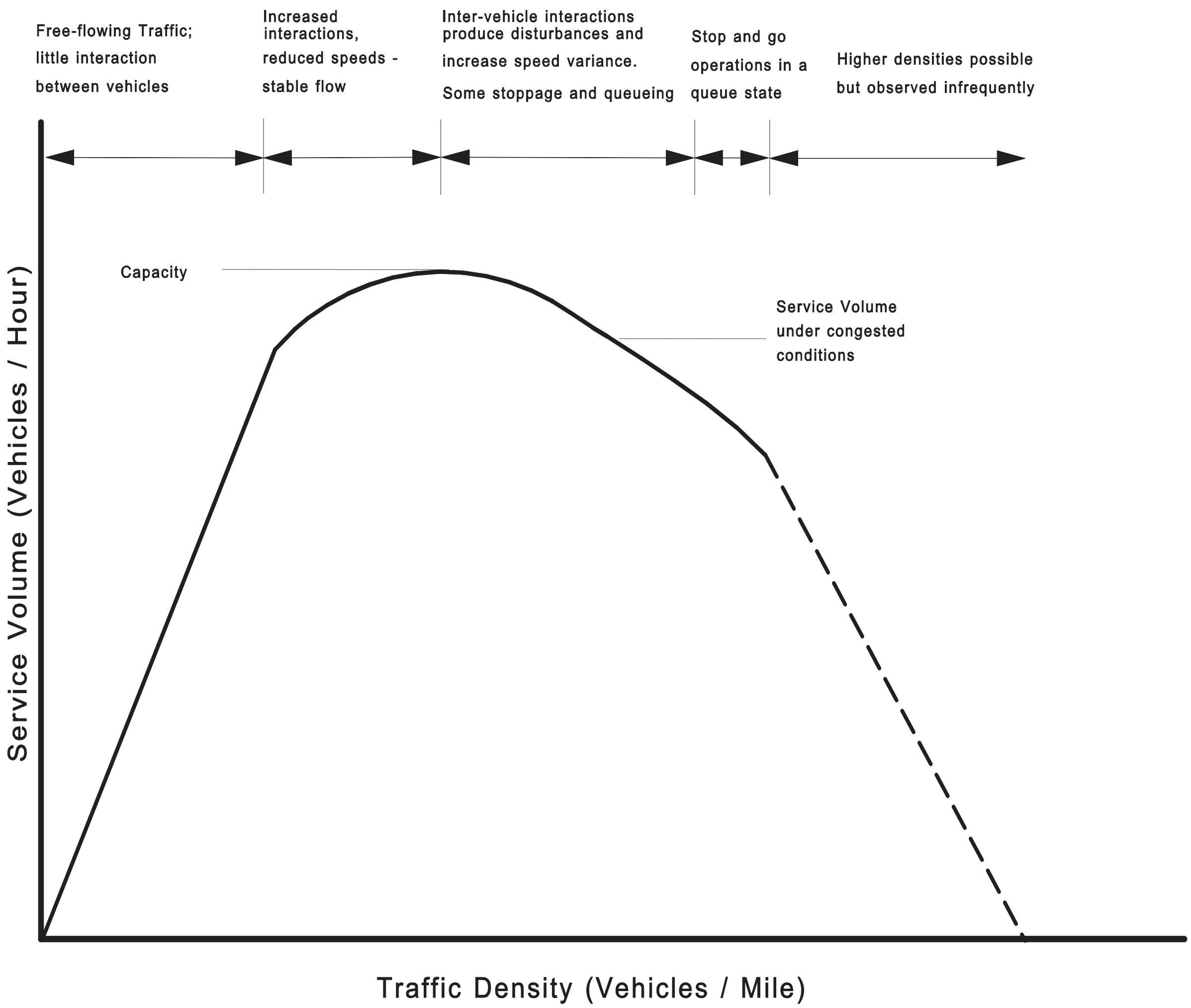


Figure 4-1. Fundamental Relationship between Volume and Density

5. ESTIMATION OF TRIP GENERATION TIME

Federal Government guidelines (see NUREG 0654, Appendix 4) specify that the planner estimate the distributions of elapsed times associated with mobilization activities undertaken by the public to prepare for the evacuation trip. The elapsed time associated with each activity is represented as a statistical distribution reflecting differences between members of the public. The quantification of these activity-based distributions relies largely on the results of the telephone survey. We define the sum of these distributions of elapsed times as the Trip Generation Time Distribution.

Background

In general, an accident at a nuclear power station is characterized by the following Emergency Action Classification Levels (see Appendix 1 of NUREG 0654 for details):

1. Unusual Event
2. Alert
3. Site Area Emergency
4. General Emergency

At each level, the Federal guidelines specify a set of Actions to be undertaken by the Licensee, and by State and Local offsite authorities. As a Planning Basis, we will adopt a conservative posture, in accordance with Federal Regulations, that a rapidly escalating accident will be considered in calculating the Trip Generation Time. We will assume:

a. The Advisory to Evacuate will be announced coincident with the emergency notification.
b. Mobilization of the general population will commence up to 10 minutes after the alert notification.
c. Evacuation Time Estimates (ETE) are measured relative to the Advisory to Evacuate.
d. Schools will be evacuated prior to the Advisory to Evacuate, if conditions permit.

We emphasize that the adoption of this planning basis is not a representation that these events will occur at the PSEG Site within the indicated time frame. Rather, these assumptions are necessary in order to:

- Establish a temporal framework for estimating the Trip Generation distribution in the format recommended in Appendix 4 of NUREG 0654.
- Identify temporal points of reference that uniquely define "Clear Time" and ETE.

It is more likely that a longer time will elapse between the various classes of an emergency at the PSEG Site.

For example, suppose one hour will elapse from the siren alert to the Advisory to Evacuate. In this case, it is reasonable to expect some degree of spontaneous evacuation by the public during this one-hour period. As a result, the population within the Emergency Planning Zone (EPZ) will be lower when the Advisory to Evacuate is announced, than at the time of the General Emergency. Thus, the time needed to evacuate the EPZ, after the Advisory to Evacuate will be somewhat less than the estimates presented in this report.

The notification process consists of two events:

- Transmitting information (e.g. using sirens, tone alerts, EAS broadcasts, loud speakers).
- Receiving and correctly interpreting the information that is transmitted.

The peak general population within the EPZ approximates 50,000 persons[1] who are deployed over an area of approximately 265 square miles and are engaged in a wide variety of activities. It must be anticipated that some time will elapse between the transmission and receipt of the information advising the public of an accident.

The amount of elapsed time will vary from one individual to the next depending on where that person is, what that person is doing, and related factors. Furthermore, some persons who will be directly involved with the evacuation process may be outside the EPZ at the time that the emergency is declared. These people may be commuters, shoppers and other travelers who reside within the EPZ and who will return to join the other household members upon receiving notification of an emergency.

As indicated in NUREG 0654, the estimated elapsed times for the receipt of notification can be expressed as a distribution reflecting the different notification times for different people within, and outside, the EPZ. By using time distributions, it is also possible to distinguish between different population groups and different day-of-week and time-of-day scenarios, so that accurate ETE may be obtained.

[1] According to Table 6-4, the peak vehicle population in the EPZ for non-special events occurs for Scenario 6. According to Table 6-3, there are 100% of the permanent resident population, 100% of the employees commuting into the EPZ and 5% of the transients visiting the EPZ present for this scenario. Applying these percentages to the values presented in Section 3 yields: 100% x 45,034 residents (Table 3-1) + 5% x 3,323 transients (Table 3-4) + 100% x 4,724 employees (Table 3-5) = 49,924 persons.

For example, people at home or at work within the EPZ will be notified by siren, and/or tone alert and/or radio. Those well outside the EPZ will be notified by telephone, radio, TV and word-of-mouth, with potentially longer time lags. Furthermore, the spatial distribution of the EPZ population will differ with time of day - families will be united in the evenings, but dispersed during the day. In this respect, weekends will differ from weekdays.

Generally, the information required can be obtained from a telephone survey of EPZ residents. Such a survey was conducted. Appendix F presents the raw survey results. It is important to note that the shape and duration of the evacuation trip mobilization distribution is important at sites where traffic congestion is not expected to cause the evacuation time estimate to extend in time well beyond the trip generation period. The remaining discussion will focus on the application of the trip generation data obtained from the telephone survey to the development of the PSEG Site ETE.

Fundamental Considerations

The environment leading up to the time that people begin their evacuation trips consists of a sequence of events and activities. Each event (other than the first) occurs at an instant in time and is the outcome of an activity.

Activities are undertaken over a period of time. Activities may be in "series" (i.e. to undertake an activity implies the completion of all preceding events) or may be in parallel (two or more activities may take place over the same period of time). Activities conducted in series are functionally dependent on the completion of prior activities; activities conducted in parallel are functionally independent of one-another. The relevant events associated with the public's preparation for evacuation are:

Event Number	Event Description
1	Notification
2	Aware of Situation
3	Depart Work
4	Arrive Home
5	Depart on Evacuation Trip

Associated with each sequence of events are one or more activities, as outlined below:

Table 5-1. Event Sequence for Evacuation Activities

Event Sequence	Activity	Distribution
$1 \rightarrow 2$	Receive Notification	1
$2 \rightarrow 3$	Prepare to Leave Work	2
$2,3 \rightarrow 4$	Travel Home	3
$2,4 \rightarrow 5$	Prepare to Leave to Evacuate	4
N/A	Snow Clearance	5

These relationships are shown graphically in Figure 5-1.

- An Event is a 'state' that exists at a point in time (e.g., depart work, arrive home)
- An Activity is a 'process' that takes place over some elapsed time (e.g., prepare to leave work, travel home)

As such, an Activity changes the 'state' of an individual (e.g. the activity, 'travel home' changes the state from 'depart work' to 'arrive home'). Therefore, an Activity can be described as an 'Event Sequence'; the elapsed times to perform an event sequence vary from one person to the next and are described as statistical distributions on the following pages.

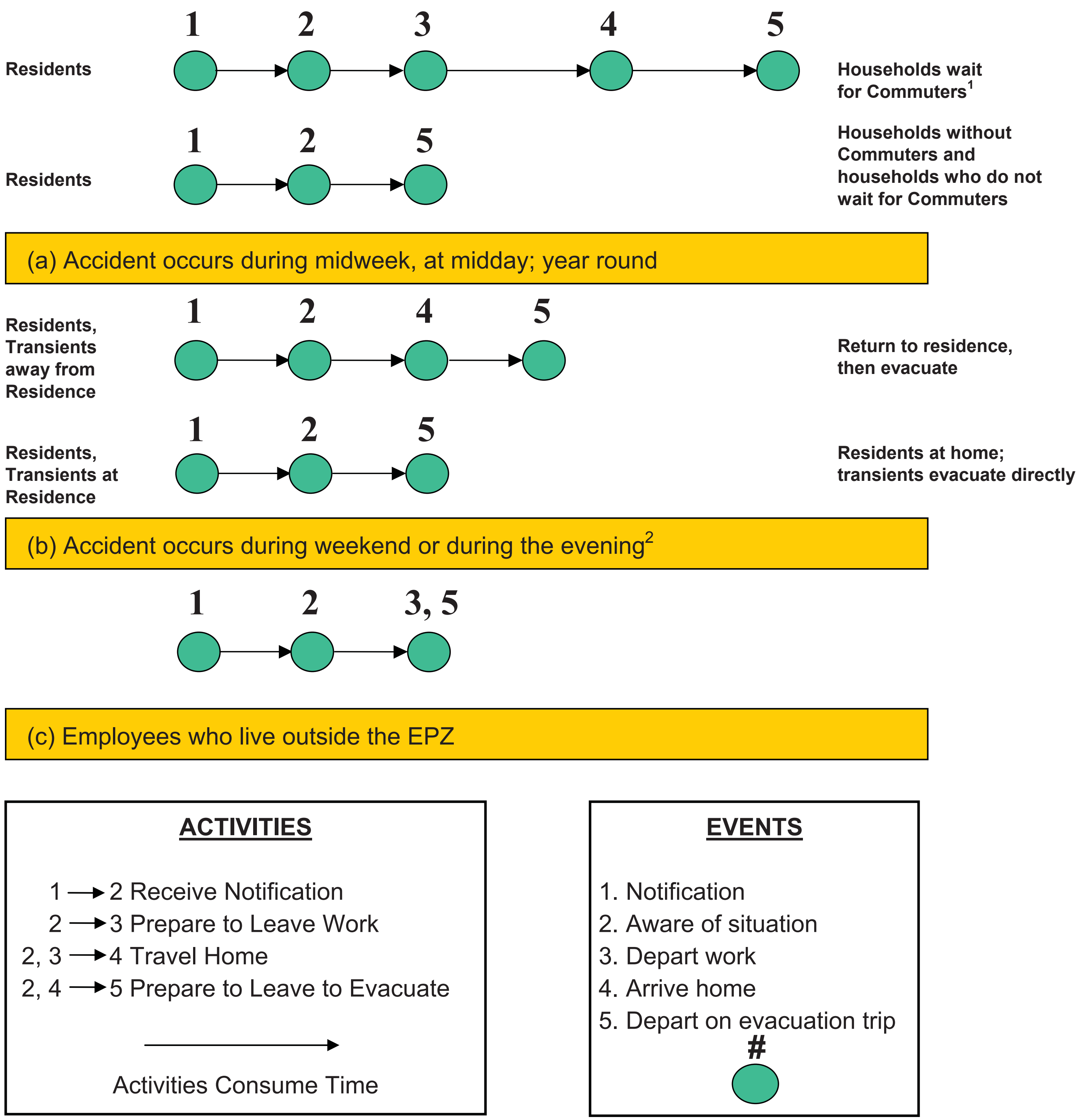
An employee who lives outside the EPZ will follow sequence (c) of Figure 5-1. A household within the EPZ that has one or more commuters at work, and will await their return before beginning the evacuation trip will follow the first sequence of Figure 5-1(a). A household within the EPZ that has no commuters at work, or that will not await the return of any commuters, will follow the second sequence of Figure 5-1(a), regardless of day of week or time of day.

Households with no commuters on weekends or in the evening/night-time, will follow the applicable sequence in Figure 5-1(b). Transients will always follow one of the sequences of Figure 5-1(b). Some transients away from their residence could elect to evacuate immediately without returning to the residence, as indicated in the second sequence.

It is seen from Figure 5-1, that the Trip Generation time (i.e. the total elapsed time from Event 1 to Event 5) depends on the scenario and will vary from one household to the next. Furthermore, Event 5 depends, in a complicated way, on the time distributions of all activities preceding that event. That is, to estimate the time distribution of Event 5, we must obtain estimates of the time distributions of all preceding events. For this study, we adopt the conservative posture that all activities will occur in sequence.

Estimated Time Distributions of Activities Preceding Event 5

The time distribution of an event is obtained by "summing" the time distributions of all prior contributing activities. (This "summing" process is quite different than an algebraic sum since we are operating on distributions – not scalar numbers).



[1] Applies for evening and weekends also if commuters are at work.
[2] Applies throughout the year for transients.

Figure 5-1. Events and Activities Preceding the Evacuation Trip

Time Distribution No. 1, Notification Process: Activity 1 → 2

It is assumed (based on the presence of sirens within the EPZ) that 85 percent of those within the EPZ will be aware of the accident within 30 minutes with the remainder notified within the following 20 minutes. The notification distribution is given below:

Table 5-2. Time Distribution for Notifying the Public

Elapsed Time (Minutes)	Percent of Population Notified
0	0.0
5	7.0
10	13.0
15	26.0
20	46.0
25	65.0
30	85.0
35	90.0
40	95.0
45	98.0
50	100.0

Distribution No. 2, Prepare to Leave Work: Activity 2 → 3

It is reasonable to expect that the vast majority of business enterprises within the EPZ will elect to shut down following notification and most employees would leave work quickly. Commuters, who work outside the EPZ could, in all probability, also leave quickly since facilities outside the EPZ would remain open and other personnel would remain. Personnel or farmers responsible for equipment would require additional time to secure their facility. The distribution of Activity 2 K 3 reflects data obtained by the telephone survey. This distribution is plotted in Figure 5-2 and listed below.

Table 5-3. Time Distribution for Employees to Prepare to Leave Work

Elapsed Time (Minutes)	Cumulative Percent Employees Leaving Work	Elapsed Time (Minutes)	Cumulative Percent Employees Leaving Work
0	0.0	55	85.8
5	29.5	60	91.5
10	42.2	65	93.6
15	51.4	70	95.7
20	57.5	75	97.8
25	60.7	80	98.4
30	72.1	85	98.9
35	76.4	90	99.5
40	79.3	95	99.6
45	83.8	100	99.8
50	84.5	105	100.0

NOTE: The survey data was normalized to distribute the "Don't know" response. That is, the sample was reduced in size to include only those returns which included responses to this question. The underlying assumption is that the distribution of this activity for the “Don’t know” responders, if the event takes place, would be the same as those responders who provided estimates.

Distribution No. 3, Travel Home: Activity 3 $\rightarrow$ 4

These data are provided directly by those households which responded to the telephone survey. This distribution is plotted in Figure 5-2 and listed below.

Table 5-4. Time Distribution for Commuters to Travel Home

Elapsed Time (Minutes)	Cumulative Percent Returning Home	Elapsed Time (Minutes)	Cumulative Percent Returning Home
0	0.0	45	90.2
5	11.8	50	91.8
10	24.9	55	92.0
15	35.2	60	96.6
20	46.8	65	97.6
25	53.5	70	98.5
30	70.6	75	99.5
35	76.9	80	100.0
40	84.4		

NOTE: The survey data was normalized to distribute the "Don't know" response

Distribution No. 4, Prepare to Leave Home: Activity 2, 4 $\rightarrow$ 5

These data are provided directly by those households which responded to the telephone survey. This distribution is plotted in Figure 5-2 and listed below.

Table 5-5. Time Distribution for Population to Prepare to Evacuate

Elapsed Time (Minutes)	Cumulative Percent Ready to Evacuate	Elapsed Time (Minutes)	Cumulative Percent Ready to Evacuate
0	0.0	85	92.9
5	10.1	90	93.4
10	20.2	95	93.5
15	30.3	100	93.5
20	42.0	105	93.6
25	53.7	110	94.7
30	65.4	115	95.8
35	68.0	120	96.9
40	70.6	125	97.8
45	73.2	130	98.7
50	76.8	135	99.6
55	80.5	140	99.6
60	84.1	145	99.6
65	86.7	150	99.6
70	89.3	155	99.7
75	92.0	160	99.9
80	92.4	165	100.0

NOTE: The survey data was normalized to distribute the "Don't know" response

Distribution No. 5, Snow Clearance Time Distribution

Inclement weather scenarios involving snowfall must address the time lags associated with snow clearance. It is assumed that snow equipment is mobilized and deployed during the snowfall to maintain passable roads. The general consensus is that the snow-plowing efforts are generally successful for all but the most extreme blizzards when the rate of snow accumulation exceeds that of snow clearance over a period of many hours.

Consequently, it is reasonable to assume that the highway system will remain passable – albeit at a lower capacity – under the vast majority of snow conditions. Nevertheless, for the vehicles to gain access to the highway system, it may be necessary for driveways and employee parking lots to be cleared to the extent needed to permit vehicles to gain access to the roadways. These clearance activities take time; this time must be incorporated into the trip generation time distributions. These data are provided by those households which responded to the telephone survey. This distribution is plotted in Figure 5-2 and listed below.

Table 5-6. Time Distribution for Population to Clear 6”-8” of Snow

Elapsed Time (Minutes)	Cumulative Pct. of Households Completing Activity	Elapsed Time (Minutes)	Cumulative Pct. of Households Completing Activity
0	0.0	85	92.3
5	11.6	90	93.2
10	23.2	95	93.2
15	34.7	100	93.3
20	44.9	105	93.4
25	55.0	110	94.2
30	65.2	115	95.0
35	68.3	120	95.9
40	71.5	125	97.1
45	74.7	130	98.3
50	77.5	135	99.5
55	80.4	140	99.5
60	83.2	145	99.6
65	85.7	150	99.7
70	88.2	155	99.8
75	90.7	160	100.0
80	91.5		

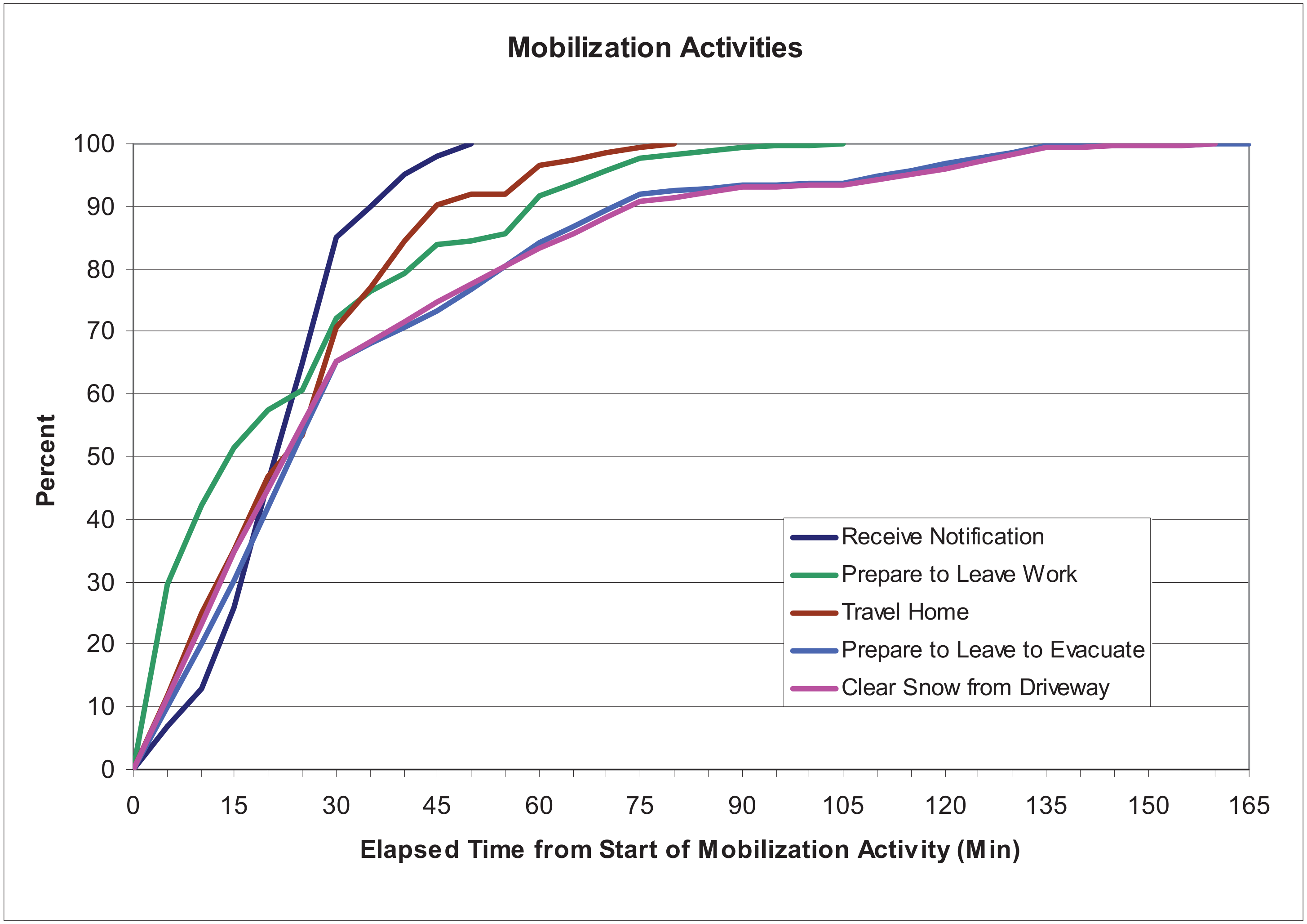


Figure 5-2. Evacuation Mobilization Activities

Calculation of Trip Generation Time Distribution

The time distributions for each of the mobilization activities presented herein must be combined to form the appropriate Trip Generation Distributions. We assume that the stated events take place in sequence such that all preceding events must be completed before the current event can occur. For example, if a household awaits the return of a commuter, the work-to-home trip (Activity 3 $\rightarrow$ 4) must precede Activity 4 $\rightarrow$ 5.

To calculate the time distribution of an event that is dependent on two sequential activities, it is necessary to “sum” the distributions associated with these prior activities. The distribution summing algorithm is applied repeatedly as shown to form the required distribution. As an outcome of this procedure, new time distributions are formed; we assign “letter” designations to these intermediate distributions to describe the procedure.

Table 5-7. Mapping Distributions to Events

Apply “Summing” Algorithm To:	Distribution Obtained	Event Defined
Distributions 1 and 2	Distribution A	Event 3
Distributions A and 3	Distribution B	Event 4
Distributions B and 4	Distribution C	Event 5
Distributions 1 and 4	Distribution D	Event 5
Distributions C and 5	Distribution E	Event 5
Distributions D and 5	Distribution F	Event 5

Table 5-8. Description of the Distributions

Distribution	Description
A	Time distribution of commuters departing place of work (Event 3). Also applies to employees who work within the EPZ who live outside, and to Transients within the EPZ.
B	Time distribution of commuters arriving home (Event 4).
C	Time distribution of residents with commuters leaving home to begin the evacuation trip (Event 5).
D	Time distribution of residents without commuters returning home to begin the evacuation trip (Event 5).
E	Time distribution of residents with commuters who return home, leaving home to begin the evacuation trip after snow clearance activities (Event 5).
F	Time distribution of residents with no commuters returning home, leaving to begin the evacuation trip after snow clearance activities (Event 5).

As shown in Figure 5-2 and in Appendix F, the mobilization activity distributions include outliers – generally, these represent anomalous responses to the survey question.

Following standard statistical practice, outliers were identified by (a) computing the estimated mean and standard deviation from the complete set of data, (b) computing value x_{LIMIT} as the mean plus 3.0 standard deviations, above which one expects 0.135% of the observations, (c) inspecting the gap between this limit value and the next-lowest observed value, (d) if that gap is sizable, classify the points above x_{LIMIT} as outliers and eliminate those points from the sample, (e) repeat the process from “a” to “d” until there are no outliers to consider.

The data sets and distributions are then used to construct distributions for the total mobilization times under different scenarios (e.g. commuter returning, no commuter returning, no snow or snow in each). In general, these are additive, using weighting based upon the probability distributions of each element; Figure 5-3 presents the combined trip generation distributions designated A, C, D, E and F. These distributions are presented on the same time scale. (The use of strictly additive activities is a conservative approach, because it makes all activities sequential – preparation for departure follows the return of the commuter; snow clearance follows the preparation for departure, and so forth. In practice, it is reasonable that some of these activities are done in parallel, at least to some extent – for instance, preparation to depart begins by a household member at home while the commuter is still on the road.)

Once the mobilization distributions are computed, they are not truncated, but rather used in their tabular/graphical form as direct inputs to later computations that lead to the ETE.

The PC-DYNEV simulation model is designed to accept varying rates of vehicle trip generation for each origin centroid, expressed in the form of histograms. These histograms, which represent Distributions A, C, D, E and F, properly displaced with respect to one another, are tabulated in Table 5-9 (Distribution B, Arrive Home, omitted for clarity).

The final time period (11) is 600 minutes long. This time period is added to allow the analysis network to clear, in the event congestion persists beyond the trip generation period. Note that there are no trips generated during this final time period.

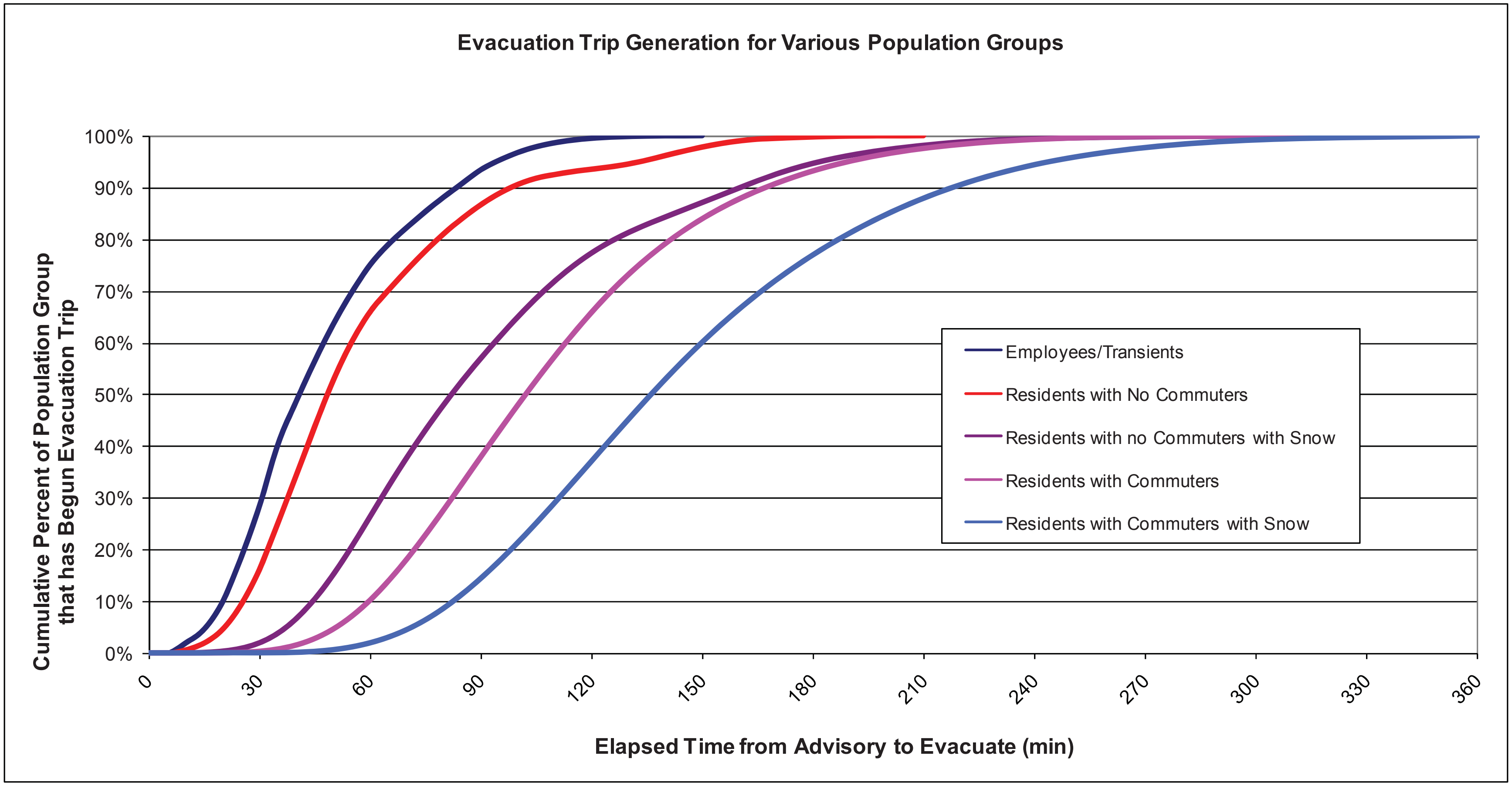


Figure 5-3. Comparison of Trip Generation Distributions

Table 5-9. Trip Generation Histograms for the EPZ Population

Time Period	Duration (Min)	Percent of Total Trips Generated Within Indicated Time Period					
		Employees (Distribution A)	Transients (Distribution B)	Residents with Commuters (Distribution C)	Residents Without Commuters (Distribution D)	Residents With Commuters Snow (Distribution E)	Residents Without Commuters Snow (Distribution F)
1	15	5	5	0	2	0	0
2	15	23	23	0	14	0	2
3	30	47	47	10	49	2	24
4	30	18	18	27	21	13	30
5	30	7	7	28	7	22	20
6	30	0	0	18	4	23	10
7	30	0	0	9	2	17	8
8	60	0	0	6	1	17	5
9	60	0	0	1	0	5	1
10	60	0	0	1	0	1	0
11	600	0	0	0	0	0	0

Notes:

- Shadow vehicles are loaded onto the analysis network (Figure 1-2) using Distributions D and E for good weather and snow, respectively.
- Special event (construction/outage) vehicles are loaded using Distribution A.
- School and transit buses are loaded at their mobilization time of 90 minutes.

6. DEMAND ESTIMATION FOR EVACUATION SCENARIOS

An evacuation "case" defines a combination of Evacuation Region and Evacuation Scenario. The definitions of "Region" and "Scenario" are as follows:

Region: A grouping of contiguous evacuation ERPAs, that forms either a "keyhole" sector-based area, or a circular area within the EPZ, that must be evacuated in response to a radiological emergency.

Scenario: A combination of circumstances, including time of day, day of week, season, and weather conditions. Scenarios define the number of people in each of the affected population groups and their respective mobilization time distributions.

A total of 17 Regions were defined which encompass all the groupings of ERPAs considered. These Regions are defined in Table 6-1. The ERPA configurations are identified in Figure 6-1. Each keyhole sector-based area consists of a central circle centered at the PSEG Site, and three adjoining sectors, each with a central angle of 22.5 degrees. The central sector coincides with the wind direction. These sectors extend to the EPZ boundary (Regions R04 through R13), or to 5 miles from the PSEG Site (Regions R14 through R17). Regions R01, R02 and R03 represent radial evacuations of 2, 5 and 10 miles, respectively.

A total of 15 Scenarios were evaluated for all Regions. Thus, there are a total of 15x17=255 evacuation cases. Table 6-2 is a description of all Scenarios.

Each combination of region and scenario implies a specific population to be evacuated. Table 6-3 presents the percentage of each population group assumed to evacuate for each scenario. Table 6-4 presents the vehicle counts for each scenario for an evacuation of Region R03 – the entire EPZ.

The vehicle estimates presented in Section 3 are peak values. These peak values are adjusted depending on the scenario and region being considered using scenario and region specific percentages; the scenario percentages are presented in Table 6-3, while the regional percentages are provided in Table H-1. The percentages presented in Table 6-3 were determined as follows:

The residents with commuters value during the week (when workforce is at its peak) is equal to the product of 60% (the number of households with at least one commuter) and 65% (the number of households with a commuter who would await the return of the commuter prior to evacuating). See assumption 3b in Section 2.3. It is assumed for weekend and evening scenarios that 10% of households with commuters will have a commuter at work during those times.

Employment is assumed to be at its peak during the winter, midweek, midday. Employment is reduced slightly (96%) for summer, midweek, midday scenarios. This is based on the assumption that 50% of the employees commuting into the EPZ will be on vacation for a week during the approximate 12 weeks of summer. It is further assumed that those taking vacation will be uniformly dispersed throughout the summer with approximately 4% of employees vacationing each week. Based on vehicle count data collected on the plant access road, the evening and weekend employment at the existing Salem/Hope Creek units is approximately 10% of the weekday employment. As shown in Table E-7, the existing PSEG units are the largest employer in the EPZ; therefore the value of 10% employment on weekends and evenings has been applied to the EPZ as a whole.

Transient activity is assumed to be at its peak during summer weekends and less (35%) during the week. As shown in Appendix E, few of the recreational areas in the EPZ have overnight accommodations; thus, transient activity is assumed to be low during evening hours – 5% for summer and 0% for winter. Transient activity on winter weekends is equal to 12% which is the ratio of hunters at wildlife management areas to the total transients in Table E-5.

As noted in the shadow footnote to Table 6-3, the shadow percentages are computed using a base of 30% (see assumption 5 in Section 2.2) voluntary evacuation multiplied by a scenario-specific proportion of employees to permanent residents in the shadow region. For example, using the values provided in Table 6-4 for Scenario 1, the shadow percentage is computed as follows:

$$30\% \times \left(1 + \frac{4{,}121}{8{,}113 + 12{,}688}\right) = 36\%$$

Three special events – construction of a new plant at the PSEG Site coincident with refueling at one of the existing units in Year 2019 with the existing access road and with the proposed causeway, and refueling only in Year 2019 – were considered as Scenarios 13, 14 and 15. Thus, the special event traffic is 100% evacuated for Scenarios 13, 14 and 15, and 0% for all other scenarios.

It is assumed that summer school enrollment is approximately 10% of enrollment during the regular school year for summer, midweek, midday scenarios. School is not in session during weekends and evening, thus no buses are needed under those circumstances. As discussed in Section 7, schools are assumed to be in session during the winter season, midweek, midday and 100% of buses will be needed under those circumstances. Transit buses are 100% evacuated for all scenarios as it is assumed that the transit-dependent population is present in the EPZ for all scenarios.

As discussed in Section 3, external traffic is assumed to be reduced by 40% during evening scenarios and is 100% for all other scenarios.

Table 6-1. Description of Evacuation Regions*

Region	Description	ERPA											
		New Jersey								Delaware			
		1	2	3	4	5	6	7	8	A	B	C	D
R01	2-Mile	x							x				x
R02	5-Mile	x							x	x			x
R03	Entire EPZ	x	x	x	x	x	x	x	x	x	x	x	x
5-Mile Ring and Downwind to EPZ Boundary													
Region	**Wind Direction Towards:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**A**	**B**	**C**	**D**
R04	NNW	x		x		x			x	x		x	x
R05	N	x		x	x	x			x	x		x	x
R06	NNE, NE	x	x	x	x	x			x	x			x
R07	ENE	x	x	x	x		x		x	x			x
R08	E, ESE	x	x				x	x	x	x			x
R09	SE	x					x	x	x	x			x
R10	SSE	x						x	x	x	x		x
R11	S, SSW, SW	x							x	x	x		x
R12	WSW, W, WNW	x							x	x	x	x	x
R13	NW	x							x	x		x	x
2-Mile Ring and Downwind to EPZ Boundary													
Region	**Wind Direction Towards:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**A**	**B**	**C**	**D**
R14	NNE, NE	x	x	x	x	x			x				x
R15	ENE	x	x	x	x		x		x				x
R16	E, ESE	x	x				x	x	x				x
R17	SE	x					x	x	x				x
N/A	NNW	Refer to Region R04											
	N	Refer to Region R05											
	SSE	Refer to Region R10											
	S, SSW, SW	Refer to Region R11											
	WSW, W, WNW	Refer to Region R12											
	NW	Refer to Region R13											
2-Mile Ring and Downwind to 5 Miles													
Region	**Wind Direction Towards:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**A**	**B**	**C**	**D**
N/A	NNE, NE, ENE, E, ESE, SE	Refer to Region R01											
N/A	N, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW	Refer to Region R02											
x = ERPA EVACUATES		ERPA SHELTERS IN PLACE											

*Adapted from Region definitions in County/State Radiological Emergency Plans

Figure 6-1. PSEG Site EPZ ERPAs

Table 6-2. Evacuation Scenario Definitions

Scenario	Season[1]	Day of Week	Time of Day	Weather	Special	Year
1	Summer	Midweek	Midday	Good	None	2010
2	Summer	Midweek	Midday	Rain	None	2010
3	Summer	Weekend	Midday	Good	None	2010
4	Summer	Weekend	Midday	Rain	None	2010
5	Summer	Midweek, Weekend	Evening	Good	None	2010
6	Winter	Midweek	Midday	Good	None	2010
7	Winter	Midweek	Midday	Rain	None	2010
8	Winter	Midweek	Midday	Snow	None	2010
9	Winter	Weekend	Midday	Good	None	2010
10	Winter	Weekend	Midday	Rain	None	2010
11	Winter	Weekend	Midday	Snow	None	2010
12	Winter	Midweek, Weekend	Evening	Good	None	2010
13	Winter	Midweek	Midday	Good	New Plant Construction + Refueling	2019
14	Winter	Midweek	Midday	Good	Scenario 13 with Proposed Causeway	2019
15	Winter	Midweek	Midday	Good	Refueling Only	2019

[1] Winter assumes that school is in session (also applies to spring and autumn). Summer assumes that school is not in session.

Table 6-3. Percent of Population Groups Evacuating for Various Scenarios

Scenario	Residents With Commuters in Household	Residents With No Commuters in Household	Employees	Transients	Shadow	Special Events	School Buses	Transit Buses	External Through Traffic
1	39%	61%	96%	35%	36%	0%	10%	100%	100%
2	39%	61%	96%	35%	36%	0%	10%	100%	100%
3	10%	90%	10%	100%	31%	0%	0%	100%	100%
4	10%	90%	10%	100%	31%	0%	0%	100%	100%
5	10%	90%	10%	5%	31%	0%	0%	100%	40%
6	39%	61%	100%	5%	36%	0%	100%	100%	100%
7	39%	61%	100%	5%	36%	0%	100%	100%	100%
8	39%	61%	100%	5%	36%	0%	100%	100%	100%
9	10%	90%	10%	12%	31%	0%	0%	100%	100%
10	10%	90%	10%	12%	31%	0%	0%	100%	100%
11	10%	90%	10%	12%	31%	0%	0%	100%	100%
12	10%	90%	10%	0%	31%	0%	0%	100%	40%
13	39%	61%	100%	5%	35%	100%	100%	100%	100%
14	39%	61%	100%	5%	35%	100%	100%	100%	100%
15	39%	61%	100%	5%	35%	100%	100%	100%	100%

Resident Households With Commuters .... Households of EPZ residents who await the return of commuters prior to beginning the evacuation trip.

Resident Households With No Commuters .... Households of EPZ residents who do not have commuters or will not await the return of commuters prior to beginning the evacuation trip.

Employees .... EPZ employees who live outside of the EPZ.

Transients .... People who are in the EPZ at the time of an accident for recreational or other (non-employment) purposes.

Shadow .... Residents and employees in the shadow region (outside of the EPZ) who will spontaneously decide to relocate during the evacuation. The basis for the values shown is a 30% relocation of shadow residents along with a proportional percentage of shadow employees. The percentage of shadow employees is computed using the scenario-specific ratio of EPZ employees to residents.

Special Events .... Additional vehicles at the PSEG Site for construction of the new plant and for refueling at one of the existing operational units.

School and Transit Buses .... Vehicle-equivalents present on the road during evacuation servicing schools and transit-dependent people (1 bus is equivalent to 2 passenger vehicles).

External Through Traffic .... Traffic on local highways and major arterial roads at the start of the evacuation. This traffic is stopped by access control approximately 90 minutes after the evacuation begins.

Table 6-4. Vehicle Estimates By Scenario*										
Scenario	Residents with Commuters	Residents without Commuters	Employees	Transients	Shadow	Special Events	School Buses	Transit Buses	External Traffic	Total Scenario Vehicles
1	8,113	12,688	4,121	533	26,761	-	61	68	13,587	65,932
2	8,113	12,688	4,121	533	26,761	-	61	68	13,587	65,932
3	811	19,990	429	1,523	22,797	-	-	68	13,587	59,205
4	811	19,990	429	1,523	22,797	-	-	68	13,587	59,205
5	811	19,990	429	76	22,797	-	-	68	5,435	49,606
6	8,113	12,688	4,293	76	26,946	-	606	68	13,587	66,377
7	8,113	12,688	4,293	76	26,946	-	606	68	13,587	66,377
8	8,113	12,688	4,293	76	26,946	-	606	68	13,587	66,377
9	811	19,990	429	183	22,797	-	-	68	13,587	57,865
10	811	19,990	429	183	22,797	-	-	68	13,587	57,865
11	811	19,990	429	183	22,797	-	-	68	13,587	57,865
12	811	19,990	429	-	22,797	-	-	68	5,435	49,530
13	10,354**	16,198**	4,206***	76	28,565**	2,161	606	68	13,587	75,821
14	10,354**	16,198**	4,206***	76	28,565**	2,161	606	68	13,587	75,821
15	10,354**	16,198**	4,206***	76	28,565**	0***	606	68	13,587	73,660

***The values presented are for an evacuation of the full EPZ (Region R03).**

****The peak construction year is currently estimated at 2019. The permanent resident population and shadow population have been extrapolated to 2019 using the estimated average yearly percentage growth rates presented in Section 3.**
*****As noted in Section 3.6, the outage vehicles have been included with the Salem/Hope Creek employees so as to use the traffic volumes measured as part of the Traffic Impact Analysis (TIA) study included in the Environmental Report.**

7. GENERAL POPULATION EVACUATION TIME ESTIMATES (ETE)

This section presents the current results of the computer analyses using the IDYNEV System described in Appendices B, C and D. These results cover 17 regions within the PSEG Site EPZ and the 15 Evacuation Scenarios discussed in Section 6.

The ETE for all Evacuation Cases are presented in Tables 7-1A through 7-1D. **These tables present the estimated times to clear the indicated population percentages from the Evacuation Regions for all Evacuation Scenarios.** Table 7-2 defines the Evacuation Regions considered. The tabulated values of ETE are obtained by interpolating the PC-DYNEV simulation model outputs which are generated at 10-minute intervals, then rounding these data to the nearest 5 minutes.

7.1 Voluntary Evacuation and Shadow Evacuation

We define "voluntary evacuees" as people who are within the EPZ in ERPAs for which an Advisory to Evacuate *has not* been issued, yet who nevertheless elect to evacuate. We define "shadow evacuation" as the movement of people from areas *outside* the EPZ for whom no protective action recommendation has been issued. Both voluntary and shadow evacuations are assumed to take place over the same time frame as the evacuation from within the impacted Evacuation Region.

The ETE for the PSEG Site addresses the issue of voluntary evacuees in the manner shown in Figure 7-1. Within the circle defined by the farthest radial distance of the Evacuation Region, 50 percent of those people located in ERPAs not advised to evacuate, are assumed to do so. Within the annular ring extending from the furthest distance of the Evacuation Region (if less than 10 miles), to the EPZ boundary, it is assumed that 35 percent of the people located there will elect to evacuate.

Figure 7-2 presents the area identified as the Shadow Evacuation Region. This region extends radially from the plant to cover a region between the EPZ boundary and approximately 15 miles. The population and number of evacuating vehicles in the Shadow Evacuation Region were estimated using the same methodology that was used for permanent residents within the EPZ (see page 3-2). It is estimated that 160,741 people reside in the Shadow Evacuation Region and that they will evacuate in 74,285 vehicles.

Traffic generated within this Shadow Evacuation Region, traveling away from the PSEG Site location, has a potential for impeding evacuating vehicles from within the Evacuation Region. We assume that the traffic volumes emitted within the Shadow Evacuation Region correspond to 30 percent of the residents there plus a proportionate number of employees in that region, as noted in the Shadow footnote to Table 6-3. **All ETE calculations include this shadow traffic movement.**

7.2 Patterns of Traffic Congestion During Evacuation

Figures 7-3 through 7-5 illustrate the patterns of traffic congestion that arise for the case when the entire EPZ (Region R03) is advised to evacuate during the winter, midweek, midday period under good weather conditions (Scenario 6).

Traffic congestion, as the term is used here, is defined as Level of Service (LOS) F. LOS F is defined as follows (2000 HCM):

> Level of Service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount that can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level of Service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow, which causes the queue to form, and Level of Service F is an appropriate designation for such points.

This definition is general and conceptual in nature, and applies primarily to uninterrupted flow. Levels of Service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

All highway "links" which experience LOS F are delineated in these Figures by a red line; all others are lightly indicated. Congestion develops rapidly around concentrations of population and traffic bottlenecks. Residents of Salem City, NJ are limited to two evacuation routes – State Route 45 and State Route 49. Many of the employees at the three operational units at the PSEG Site also evacuate through Salem City. Each of these routes are a single lane in each direction with several signalized intersections within the city, and do not provide sufficient capacity to service evacuees traveling through Salem. Thus, these routes are congested for several hours after the Advisory to Evacuate (ATE) as shown in Figures 7-3 through 7-5. Middletown, DE, while more populated than Salem City, has several evacuation routes available – US Route 301, Delaware Route 71, US Route 13, and Delaware Route 1. The additional evacuation route capacity in Middletown allows congestion to dissipate quicker than in Salem City as shown in Figure 7-5.

Figure 7-3 presents the congestion pattern one hour after the ATE. Route 49 westbound through Salem City is congested, especially at the intersections with Route 45 and with Front Street. Congestion is also experienced at the signalized intersection of Route 49 and Hook Rd (County Route 551) as many evacuees will make a right turn to access Hook Rd and bypass Pennsville. Many of the routes leading out of Middletown are congested at one hour after the ATE. Congestion develops westbound

on Route 299 at the signalized intersection with Route 301. Congestion also develops southbound on Route 71 at the signalized intersections with Route 299 in Middletown and with Main Street/Pine Tree Rd in Townsend as some Middletown evacuees are using Route 71 southbound to evacuate. Route 301 northbound is congested from Middletown to the signalized intersection with Route 896, where the road widens from a single lane in each direction to 2 lanes in each direction. After the road widens, there is sufficient available capacity and congestion dissipates. There is also congestion observed on Route 13 and Route 1 northbound and southbound in Delaware; however, the majority of this congestion is outside of the EPZ.

As shown in Figure 7-4, congestion patterns are similar at 2 hours after the ATE. Congestion persists within Salem City. Congestion is also observed eastbound along Route 45 approaching Woodstown; however, this congestion is outside the EPZ. Congestion along Route 299 in Middletown is beginning to clear. Congestion is still observed northbound on Route 301 and southbound on Route 71.

Figure 7-5 indicates that all of the congestion in the Delaware portion of the EPZ has cleared except for northbound Route 301 at the intersection with Route 896. This congestion clears at about 2 hours and 45 minutes after the ATE. Congestion also persists within Salem City; this congestion dissipates at 2 hours and 50 minutes after the ATE.

Most of the congestion in the EPZ has dissipated by 2 hours 30 minutes after the ATE, as seen in Figure 7-5. The absence of congestion on network links implies that traffic demand there has decreased below the roadway capacity for a period of time sufficient to dissipate any traffic queues. It does not imply that traffic has completely cleared from these roadway sections.

The congestion clears before the trip generation time of 6 hours (See Section 5); thus, the ETE for the 100th percentile evacuation is dictated by the trip generation time. **The 90th percentile ETE should be considered when making protective action decisions, in order to avoid the long tail of the 100th percentile ETE.** This observation is consistent with the findings of NUREG/CR-6953, Volume 2. The use of a public outreach (information) program to emphasize the need for evacuees to minimize the time needed to prepare to evacuate (secure the home, assemble needed clothes, medicines, etc.) should also be considered.

Table 7-3 provides a description of each congestion point identified in Figures 7-3 through 7-5, including the link (up node and down node combination) where congestion is observed. The average delay per vehicle at the identified congestion points during the designated times following the advisory to evacuate is also provided in Table 7-3. The delay is measured in minutes and is the delay observed over the previous simulation period of ten minutes. For example, congestion point #1 experiences 9.0 minutes of delay per vehicle at 1 hour after the ATE. This means that during the ten minutes of simulation from 50 minutes to 1 hour after the ATE, vehicles on link (901,148) experience 9.0 minutes of delay, on average.

7.3 Evacuation Rates

Evacuation is a continuous process, as implied by Figures 7-3 through 7-5. Another format for displaying the dynamics of evacuation is depicted in Figure 7-6. This plot indicates the rate at which traffic flows out of the indicated areas for the case of an evacuation of the full EPZ (Region R03) under the indicated conditions. Appendix J presents these plots for all Evacuation Scenarios for Region R03.

As indicated in Figure 7-6, there is typically a long "tail" to these distributions. Vehicles evacuate an area slowly at the beginning, as people respond to the Advisory to Evacuate at different rates. Then traffic demand builds rapidly (slopes of curves increase). When the system becomes congested, traffic exits the EPZ at rates somewhat below capacity until some evacuation routes have cleared. As more routes clear, the aggregate rate of egress slows since many vehicles have already left the EPZ. Towards the end of the process, relatively few evacuation routes service the remaining demand.

This decline in aggregate flow rate, towards the end of the process, is characterized by these curves flattening and gradually becoming horizontal. Ideally, it would be desirable to fully saturate all evacuation routes equally so that all will service traffic near capacity levels and all will clear at the same time. For this ideal situation, all curves would retain the same slope until the end – thus minimizing evacuation time. In reality, this ideal is generally unattainable reflecting the variation in population density and in highway capacity over the EPZ.

Comparison of Scenarios 13 and 14 in Tables 7-1B and 7-1C indicates that the proposed causeway reduces ETE at the 90th and 95th percentiles for the 2-mile and 5-mile Regions (Region R01 and R02). The proposed causeway provides additional capacity which enables these regions to evacuate more efficiently. Note, however, that the ETE for the full EPZ (Region R03) is unaffected. The aforementioned bottlenecks in Salem City dictate the ETE for Region R03 at the 90th and 95th percentiles. The proposed causeway moves traffic to Salem City more quickly; however, the bottlenecks within the city still exist and ETE are unchanged. Appendix N discusses the benefits of the proposed causeway in more detail.

Comparison of ETE for Regions R01, R02 and R03 present anomalies at the 50th, 90th and 95th percentiles wherein ETE for Regions R02 and R03 are less than those for Region R01, contrary to what one may expect. These anomalies are a result of the differing number of evacuating vehicles for each Region. As shown in Table 7-2, the 5-mile region includes ERPAs 1, 8, A and D, while the 2-mile region includes ERPAs 1, 8 and D. According to the output files for Scenario 6, there are 18,783 vehicles evacuating for Region R02 and 2,002 vehicles evacuating for Region R01. Suppose that 100 vehicles are delayed due to congestion along the access road within the 2-mile region. These 100 vehicles constitute 5% (100 ÷ 2,002) of the evacuating vehicles for Region R01, while they only constitute 0.5% (100 ÷ 18,783) of the evacuating vehicles for Region R02. Thus, these 100 vehicles could impact the 95th percentile ETE for Region

R01, whereas they would have no effect on Region R02. This anomaly explains why ETE for Region R02 and R03 are less than those for Region R01 for certain scenarios and percentiles. Note, however, that this anomaly does not exist at the 100th percentile.

7.4 Guidance on Using ETE Tables

Tables 7-1A through 7-1D present the ETE values for all 17 Evacuation Regions and all 15 Evacuation Scenarios. They are organized as follows:

Table	Contents
7-1A	ETE represents the elapsed time required for **50** percent of the population within a Region, to evacuate from that Region.
7-1B	ETE represents the elapsed time required for **90** percent of the population within a Region, to evacuate from that Region.
7-1C	ETE represents the elapsed time required for **95** percent of the population within a Region, to evacuate from that Region.
7-1D	ETE represents the elapsed time required for **100** percent of the population within a Region, to evacuate from that Region.

The user first determines the percentile of population for which the ETE is sought. The applicable value of ETE within the chosen Table may then be identified using the following procedure:

1. Identify the applicable **Scenario**:
   - Season
     - Summer
     - Winter (also Autumn and Spring)
   - Day of Week
     - Midweek
     - Weekend
   - Time of Day
     - Midday
     - Evening
   - Weather Condition
     - Good Weather
     - Rain
     - Snow
   - Special Event
     - New Plant Construction + Refueling

While these Scenarios are designed, in aggregate, to represent conditions throughout the year, some further clarification is warranted:

- The conditions of a summer evening (either midweek or weekend) and rain are not explicitly identified in Tables 7-1A through 7-1D. For these conditions, Scenario (4) applies.
- The conditions of a winter evening (either midweek or weekend) and rain are not explicitly identified in Tables 7-1A through 7-1D. For these conditions, Scenarios (7) and (10) for rain apply.
- The conditions of a winter evening (either midweek or weekend) and snow are not explicitly identified in Tables 7-1A through 7-1D. For these conditions, Scenarios (8) and (11) for snow apply.
- The seasons are defined as follows:
  - Summer assumes that public schools are *not* in session.
  - Winter, Spring and Autumn imply that public schools *are* in session.
- Time of Day: Midday implies the time over which most commuters are at work.

2. With the Scenario identified, now identify the **Evacuation Region**:
   - Determine the projected azimuth direction of the plume (coincident with the wind direction). This direction is expressed in terms of compass orientation: *towards* N, NNE, NE, …
   - Determine the distance that the Evacuation Region will extend from the PSEG Site. The applicable distances and their associated candidate Regions are given below:
     - 2 Miles (Region R01)
     - 5 Miles (Region R02)
     - to EPZ Boundary (Regions R03 through R17)
   - Enter Table 7-2 and identify the applicable group of candidate Regions based on the distance that the selected Region extends from the PSEG Site. Select the Evacuation Region identifier in that row from the first column of the Table.

3. Determine the **ETE for the Scenario** identified in Step 1 and the Region identified in Step 2, as follows:
   - The columns of Table 7-1 are labeled with the Scenario numbers. Identify the proper column in the selected Table using the Scenario number determined in Step 1.
   - Identify the row in this table that provides ETE values for the Region identified in Step 2.
   - The unique data cell defined by the column and row so determined contains the desired value of ETE expressed in Hours:Minutes.

Example

It is desired to identify the ETE for the following conditions:

- Sunday, August 10th at 4:00 AM.
- It is raining.
- Wind direction is *toward* the northeast (NE).
- Wind speed is such that the distance to be evacuated is judged to be a 5-mile radius and downwind to 10 miles (to EPZ boundary).
- The desired ETE is that value needed to evacuate 90 percent of the population from within the impacted Region.

Table 7-1B is applicable because the 90th-percentile population is desired. Proceed as follows:

1. Identify the Scenario as summer, weekend, evening and raining. Entering Table 7-1B, it is seen that there is no match for these descriptors. However, the clarification given above assigns this combination of circumstances to Scenario 4.

2. Enter Table 7-2 and locate the Region described as “5-Mile Ring and Downwind to EPZ boundary” for wind direction toward the NE and read REGION R06 in the first column of that row.

3. Enter Table 7-1B to locate the data cell containing the value of ETE for Scenario 4 and Region R06. This data cell is in column (4) and in the row for Region R06; it contains the ETE value of **1:50**.

Table 7-1A. Time to Clear the Indicated Area of *50* Percent of The Affected Population

	Summer		Summer		Summer		Winter			Winter			Winter		Winter		
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend			Midweek Weekend		Midweek		
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	(12)	Scenario:	(13)	(14)	(15)
	Midday		Midday		Evening		Midday			Midday			Evening		Midday		
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Region Wind Toward:	New Plant Construction + Refueling	Proposed Causeway	Refueling Only
Entire 2-Mile Region, 5-Mile Region, and EPZ																	
R01 2-mile ring	0:55	0:55	0:55	0:55	0:55	R01 2-mile ring	0:55	0:55	1:05	0:55	0:55	1:20	0:55	R01 2-mile ring	1:25	1:00	0:55
R02 5-mile ring	0:55	0:55	0:50	0:55	0:55	R02 5-mile ring	0:55	0:55	1:05	0:50	0:55	1:05	0:55	R02 5-mile ring	1:00	0:55	0:55
R03 Entire EPZ	1:10	1:15	1:05	1:10	1:05	R03 Entire EPZ	1:10	1:15	1:30	1:05	1:10	1:25	1:05	R03 Entire EPZ	1:20	1:20	1:20
5-Mile Ring and Downwind to EPZ Boundary																	
R04 NNW	1:05	1:10	1:00	1:05	1:00	R04 NNW	1:05	1:10	1:25	1:00	1:05	1:15	1:00	R04 NNW	1:15	1:15	1:10
R05 N	1:05	1:10	1:00	1:05	1:00	R05 N	1:05	1:10	1:20	1:00	1:05	1:15	1:00	R05 N	1:15	1:15	1:10
R06 NNE, NE	1:00	1:05	0:55	1:00	0:55	R06 NNE, NE	1:00	1:05	1:15	0:55	1:00	1:10	0:55	R06 NNE, NE	1:05	1:05	1:00
R07 ENE	1:00	1:05	0:55	1:00	0:55	R07 ENE	1:00	1:05	1:15	0:55	1:00	1:10	0:55	R07 ENE	1:05	1:05	1:00
R08 E, ESE	0:55	1:00	0:55	0:55	0:55	R08 E, ESE	0:55	1:00	1:10	0:55	0:55	1:05	0:55	R08 E, ESE	1:00	1:00	0:55
R09 SE	0:55	1:00	0:55	0:55	0:55	R09 SE	0:55	1:00	1:05	0:55	0:55	1:05	0:55	R09 SE	1:00	0:55	0:55
R10 SSE	1:00	1:05	1:00	1:00	1:00	R10 SSE	1:05	1:05	1:20	1:00	1:00	1:15	1:00	R10 SSE	1:10	1:05	1:05
R11 S, SSW, SW	1:00	1:05	1:00	1:00	1:00	R11 S, SSW, SW	1:05	1:05	1:20	1:00	1:00	1:15	1:00	R11 S, SSW, SW	1:10	1:05	1:05
R12 W, WSW, WNW	1:10	1:10	1:05	1:10	1:05	R12 W, WSW, WNW	1:10	1:15	1:25	1:05	1:10	1:25	1:05	R12 W, WSW, WNW	1:20	1:15	1:20
R13 NW	1:05	1:05	1:00	1:00	1:00	R13 NW	1:05	1:05	1:20	1:00	1:00	1:15	1:00	R13 NW	1:10	1:10	1:10
2-Mile Ring and Downwind to EPZ Boundary																	
R14 NNE, NE	1:10	1:15	1:00	1:05	1:05	R14 NNE, NE	1:10	1:15	1:30	1:00	1:05	1:25	1:05	R14 NNE, NE	1:25	1:20	1:10
R15 ENE	1:10	1:10	1:00	1:00	1:00	R15 ENE	1:10	1:15	1:25	1:00	1:00	1:20	1:00	R15 ENE	1:20	1:20	1:10
R16 E, ESE	1:00	1:05	0:55	0:55	0:55	R16 E, ESE	1:00	1:05	1:15	0:55	0:55	1:15	0:55	R16 E, ESE	1:15	1:05	1:00
R17 SE	1:00	1:00	0:55	0:55	0:55	R17 SE	1:00	1:00	1:10	0:55	0:55	1:25	0:55	R17 SE	1:25	1:00	1:00

Table 7-1B. Time to Clear the Indicated Area of *90* Percent of The Affected Population

Scenario:	(1)	(2)	(3)	(4)	(5)
	Summer		Summer		Summer
	Midweek		Weekend		Midweek Weekend
	Midday		Midday		Evening
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather
Entire 2-Mile Region, 5-Mile Region, and EPZ					
R01 2-mile ring	1:50	1:50	1:45	1:45	1:45
R02 5-mile ring	1:35	1:45	1:35	1:40	1:35
R03 Entire EPZ	2:15	2:25	2:00	2:10	2:00
5-Mile Ring and Downwind to EPZ Boundary					
R04 NNW	2:10	2:15	1:50	2:00	1:55
R05 N	2:10	2:15	1:50	2:00	1:55
R06 NNE, NE	2:00	2:05	1:40	1:50	1:45
R07 ENE	1:55	2:00	1:40	1:45	1:40
R08 E, ESE	1:40	1:50	1:35	1:40	1:40
R09 SE	1:40	1:45	1:35	1:40	1:35
R10 SSE	2:00	2:10	1:50	2:00	1:50
R11 S, SSW, SW	2:00	2:10	1:50	2:00	1:50
R12 W, WSW, WNW	2:10	2:20	2:00	2:10	2:00
R13 NW	2:00	2:05	1:50	1:55	1:50
2-Mile Ring and Downwind to EPZ Boundary					
R14 NNE, NE	2:25	2:35	1:55	2:05	2:00
R15 ENE	2:15	2:25	1:50	2:00	1:55
R16 E, ESE	2:00	2:00	1:40	1:40	1:50
R17 SE	2:00	2:00	1:50	1:50	1:55

Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Winter			Winter			Winter
	Midweek			Weekend			Midweek Weekend
	Midday			Midday			Evening
Region Wind Toward:	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather
Entire 2-Mile Region, 5-Mile Region, and EPZ							
R01 2-mile ring	1:50	1:50	2:05	1:45	1:45	2:40	1:45
R02 5-mile ring	1:35	1:45	2:10	1:35	1:40	2:00	1:35
R03 Entire EPZ	2:15	2:25	2:55	2:00	2:10	2:40	2:00
5-Mile Ring and Downwind to EPZ Boundary							
R04 NNW	2:10	2:15	2:50	1:50	1:55	2:30	1:55
R05 N	2:10	2:15	2:50	1:50	1:55	2:30	1:55
R06 NNE, NE	2:00	2:05	2:35	1:40	1:45	2:15	1:45
R07 ENE	1:55	2:00	2:30	1:35	1:45	2:15	1:40
R08 E, ESE	1:40	1:50	2:15	1:35	1:40	2:05	1:40
R09 SE	1:40	1:45	2:10	1:35	1:40	2:05	1:35
R10 SSE	2:00	2:10	2:45	1:50	2:00	2:30	1:50
R11 S, SSW, SW	2:00	2:10	2:45	1:50	2:00	2:30	1:50
R12 W, WSW, WNW	2:10	2:20	2:55	2:00	2:10	2:40	2:00
R13 NW	2:00	2:05	2:40	1:45	1:55	2:25	1:50
2-Mile Ring and Downwind to EPZ Boundary							
R14 NNE, NE	2:30	2:35	3:05	1:55	2:05	2:40	2:00
R15 ENE	2:20	2:25	2:55	1:50	1:55	2:40	1:55
R16 E, ESE	2:00	2:00	2:40	1:40	1:45	2:30	1:50
R17 SE	2:00	2:00	2:30	1:55	1:55	2:45	1:50

Scenario:	(13)	(14)	(15)
	Winter		
	Midweek		
	Midday		
Region Wind Toward:	New Plant Construction + Refueling	Proposed Causeway	Refueling Only
Entire 2-Mile Region, 5-Mile Region, and EPZ			
R01 2-mile ring	2:25	1:45	1:50
R02 5-mile ring	1:50	1:40	1:40
R03 Entire EPZ	2:45	2:45	2:40
5-Mile Ring and Downwind to EPZ Boundary			
R04 NNW	2:35	2:35	2:30
R05 N	2:35	2:35	2:30
R06 NNE, NE	2:15	2:15	2:00
R07 ENE	2:15	2:15	1:55
R08 E, ESE	1:55	1:45	1:45
R09 SE	1:50	1:40	1:40
R10 SSE	2:20	2:15	2:15
R11 S, SSW, SW	2:20	2:15	2:15
R12 W, WSW, WNW	2:40	2:40	2:40
R13 NW	2:30	2:30	2:30
2-Mile Ring and Downwind to EPZ Boundary			
R14 NNE, NE	2:45	2:45	2:25
R15 ENE	2:40	2:40	2:15
R16 E, ESE	2:25	1:55	2:05
R17 SE	2:25	1:50	2:00

Table 7-1C. Time to Clear the Indicated Area of _95_ Percent of The Affected Population

	Summer		Summer		Summer		Winter			Winter			Winter		Winter		
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend			Midweek Weekend		Midweek		
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	(12)	Scenario:	(13)	(14)	(15)
	Midday		Midday		Evening		Midday			Midday			Evening		Midday		
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Region Wind Toward:	New Plant Construction + Refueling	Proposed Causeway	Refueling Only
Entire 2-Mile Region, 5-Mile Region, and EPZ																	
R01 2-mile ring	2:05	2:05	2:05	2:05	2:05	R01 2-mile ring	2:05	2:05	2:40	2:05	2:05	2:55	2:05	R01 2-mile ring	2:35	1:55	2:05
R02 5-mile ring	1:50	2:00	1:40	1:50	1:50	R02 5-mile ring	1:50	2:00	2:30	1:40	1:50	2:20	1:50	R02 5-mile ring	2:15	1:50	1:55
R03 Entire EPZ	2:35	2:40	2:15	2:25	2:20	R03 Entire EPZ	2:35	2:45	3:25	2:15	2:25	3:00	2:20	R03 Entire EPZ	3:05	3:05	3:05
5-Mile Ring and Downwind to EPZ Boundary																	
R04 NNW	2:30	2:35	2:05	2:15	2:15	R04 NNW	2:30	2:35	3:20	2:05	2:10	2:55	2:15	R04 NNW	3:00	3:00	2:55
R05 N	2:30	2:35	2:05	2:10	2:15	R05 N	2:30	2:35	3:15	2:05	2:10	2:55	2:15	R05 N	3:00	3:00	2:55
R06 NNE, NE	2:25	2:30	1:55	2:05	2:05	R06 NNE, NE	2:25	2:30	3:05	1:50	2:00	2:40	2:05	R06 NNE, NE	2:45	2:45	2:25
R07 ENE	2:20	2:25	1:50	2:00	2:00	R07 ENE	2:20	2:25	3:00	1:50	2:00	2:35	2:00	R07 ENE	2:40	2:40	2:20
R08 E, ESE	2:00	2:05	1:45	1:55	1:55	R08 E, ESE	2:00	2:05	2:45	1:45	1:55	2:25	1:55	R08 E, ESE	2:20	2:05	2:05
R09 SE	1:55	2:00	1:45	1:55	1:50	R09 SE	1:55	2:00	2:35	1:45	1:55	2:25	1:50	R09 SE	2:15	1:55	2:00
R10 SSE	2:25	2:30	2:05	2:15	2:10	R10 SSE	2:25	2:30	3:10	2:05	2:15	2:50	2:10	R10 SSE	2:35	2:35	2:35
R11 S, SSW, SW	2:20	2:30	2:05	2:15	2:10	R11 S, SSW, SW	2:20	2:30	3:05	2:05	2:15	2:50	2:10	R11 S, SSW, SW	2:35	2:35	2:35
R12 W, WSW, WNW	2:30	2:35	2:15	2:25	2:20	R12 W, WSW, WNW	2:30	2:40	3:20	2:15	2:25	3:00	2:20	R12 W, WSW, WNW	3:05	3:05	3:05
R13 NW	2:25	2:25	2:05	2:10	2:10	R13 NW	2:25	2:25	3:10	2:00	2:10	2:50	2:10	R13 NW	2:55	2:55	2:55
2-Mile Ring and Downwind to EPZ Boundary																	
R14 NNE, NE	2:45	2:50	2:10	2:20	2:15	R14 NNE, NE	2:45	2:50	3:30	2:10	2:15	3:05	2:20	R14 NNE, NE	3:05	3:05	2:40
R15 ENE	2:30	2:40	2:10	2:15	2:15	R15 ENE	2:35	2:40	3:20	2:10	2:15	3:05	2:15	R15 ENE	2:55	2:55	2:30
R16 E, ESE	2:25	2:25	2:05	2:05	2:15	R16 E, ESE	2:25	2:25	3:10	2:05	2:05	3:00	2:15	R16 E, ESE	2:35	2:15	2:30
R17 SE	2:20	2:20	2:10	2:15	2:15	R17 SE	2:20	2:20	3:00	2:15	2:15	3:00	2:15	R17 SE	2:35	2:05	2:25

Table 7-1D. Time to Clear the Indicated Area of *100* Percent of The Affected Population

	Summer		Summer		Summer
	Midweek		Weekend		Midweek Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)
	Midday		Midday		Evening
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather
Entire 2-Mile Region, 5-Mile Region, and EPZ					
R01 2-mile ring	4:00	4:05	3:10	3:10	3:10
R02 5-mile ring	4:10	4:10	4:10	4:10	4:10
R03 Entire EPZ	6:10	6:10	6:00	6:00	6:00
5-Mile Ring and Downwind to EPZ Boundary					
R04 NNW	6:05	6:10	4:10	4:10	4:10
R05 N	6:05	6:05	4:10	4:10	4:10
R06 NNE, NE	6:00	6:00	4:10	4:10	4:10
R07 ENE	6:00	6:00	4:10	4:10	4:10
R08 E, ESE	4:10	4:10	4:10	4:10	4:10
R09 SE	4:10	4:10	4:10	4:10	4:10
R10 SSE	6:10	6:10	6:00	6:00	6:00
R11 S, SSW, SW	6:10	6:10	6:00	6:00	6:00
R12 W, WSW, WNW	6:10	6:10	6:00	6:00	6:00
R13 NW	6:00	6:05	4:10	4:10	4:10
2-Mile Ring and Downwind to EPZ Boundary					
R14 NNE, NE	6:00	6:00	4:10	4:10	4:10
R15 ENE	6:00	6:00	4:10	4:10	4:10
R16 E, ESE	4:10	4:10	4:10	4:10	4:10
R17 SE	4:10	4:10	3:10	3:10	3:10

	Winter			Winter			Winter
	Midweek			Weekend			Midweek Weekend
Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Midday			Midday			Evening
Region Wind Toward:	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather
Entire 2-Mile Region, 5-Mile Region, and EPZ							
R01 2-mile ring	4:00	4:05	5:10	3:10	3:10	4:10	3:10
R02 5-mile ring	4:10	4:10	5:10	4:10	4:10	5:10	4:10
R03 Entire EPZ	6:10	6:15	6:15	6:00	6:00	6:00	6:00
5-Mile Ring and Downwind to EPZ Boundary							
R04 NNW	6:05	6:10	6:10	4:10	4:20	5:10	4:10
R05 N	6:05	6:10	6:10	4:10	4:20	5:10	4:10
R06 NNE, NE	6:10	6:10	6:10	4:10	4:10	5:10	4:10
R07 ENE	6:00	6:10	6:10	4:10	4:10	5:10	4:10
R08 E, ESE	4:10	4:10	5:10	4:10	4:10	5:10	4:10
R09 SE	4:10	4:10	5:10	4:10	4:10	5:10	4:10
R10 SSE	6:10	6:10	6:10	6:00	6:00	6:00	6:00
R11 S, SSW, SW	6:10	6:10	6:10	6:00	6:00	6:00	6:00
R12 W, WSW, WNW	6:10	6:10	6:15	6:00	6:00	6:00	6:00
R13 NW	6:00	6:05	6:10	4:10	4:15	5:10	4:10
2-Mile Ring and Downwind to EPZ Boundary							
R14 NNE, NE	6:10	6:10	6:10	4:10	4:10	5:10	4:10
R15 ENE	6:00	6:10	6:10	4:10	4:10	5:10	4:10
R16 E, ESE	4:10	4:10	5:10	4:10	4:10	5:00	4:10
R17 SE	4:10	4:10	5:10	3:10	3:10	4:10	3:10

	Winter		
	Midweek		
Scenario:	(13)	(14)	(15)
	Midday		
Region Wind Toward:	New Plant Construction + Refueling	Proposed Causeway	Refueling Only
Entire 2-Mile Region, 5-Mile Region, and EPZ			
R01 2-mile ring	4:00	4:00	4:00
R02 5-mile ring	4:10	4:10	4:10
R03 Entire EPZ	6:10	6:10	6:10
5-Mile Ring and Downwind to EPZ Boundary			
R04 NNW	6:10	6:10	6:10
R05 N	6:10	6:10	6:10
R06 NNE, NE	6:10	6:10	6:00
R07 ENE	6:00	6:00	6:00
R08 E, ESE	4:10	4:10	4:10
R09 SE	4:10	4:10	4:10
R10 SSE	6:10	6:10	6:10
R11 S, SSW, SW	6:10	6:10	6:10
R12 W, WSW, WNW	6:10	6:10	6:10
R13 NW	6:10	6:10	6:10
2-Mile Ring and Downwind to EPZ Boundary			
R14 NNE, NE	6:10	6:10	6:00
R15 ENE	6:00	6:00	6:00
R16 E, ESE	4:10	4:10	4:10
R17 SE	4:10	4:10	4:10

Table 7-2. Description of Evacuation Regions*

Region	Description	ERPA											
		New Jersey								Delaware			
		1	2	3	4	5	6	7	8	A	B	C	D
R01	2-Mile	x							x				x
R02	5-Mile	x							x	x			x
R03	Entire EPZ	x	x	x	x	x	x	x	x	x	x	x	x
5-Mile Ring and Downwind to EPZ Boundary													
Region	**Wind Direction Towards:**	1	2	3	4	5	6	7	8	A	B	C	D
R04	NNW	x		x		x			x	x		x	x
R05	N	x		x	x	x			x	x		x	x
R06	NNE, NE	x	x	x	x	x			x	x			x
R07	ENE	x	x	x	x		x		x	x			x
R08	E, ESE	x	x				x	x	x	x			x
R09	SE	x					x	x	x	x			x
R10	SSE	x						x	x	x	x		x
R11	S, SSW, SW	x							x	x	x		x
R12	WSW, W, WNW	x							x	x	x	x	x
R13	NW	x							x	x		x	x
2-Mile Ring and Downwind to EPZ Boundary													
Region	**Wind Direction Towards:**	1	2	3	4	5	6	7	8	A	B	C	D
R14	NNE, NE	x	x	x	x	x			x				x
R15	ENE	x	x	x	x		x		x				x
R16	E, ESE	x	x				x	x	x				x
R17	SE	x					x	x	x				x
N/A	NNW	Refer to Region R04											
N/A	N	Refer to Region R05											
N/A	SSE	Refer to Region R10											
N/A	S, SSW, SW	Refer to Region R11											
N/A	WSW, W, WNW	Refer to Region R12											
N/A	NW	Refer to Region R13											
2-Mile Ring and Downwind to 5 Miles													
Region	**Wind Direction Towards:**	1	2	3	4	5	6	7	8	A	B	C	D
N/A	NNE, NE, ENE, E, ESE, SE	Refer to Region R01											
N/A	N, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW	Refer to Region R02											
x = ERPA EVACUATES		ERPA SHELTERS IN PLACE											

***Adapted from Region definitions in County/State Radiological Emergency Plans**

Table 7-3. Average Delay for Selected Roadways in the PSEG Site Analysis Network						
	Link			Average Delay per Vehicle (min/veh) at Indicated Time after the Advisory to Evacuate		
CP #	From Node	To Node	Roadway	1 Hour	2 Hours	2 Hours 30 Minutes
1	901	148	Route 299 Westbound approach to US 301	9.0	9.4	0.0
2	275	273	Route 49 Westbound approach to Route 45	1.2	0.6	0.4
3	350	276	Yorke St Eastbound approach to Route 49	10.0	4.5	0.0
4	866	141	Route 301 Northbound at Route 896	2.8	9.3	9.2
5	678	679	Route 71 Southbound at Main St/Pine Tree Rd	3.6	3.6	0.2
6	836	350	Salem-Hancocks Bridge Rd/Yorke St at Grieves Pkwy	9.6	4.8	0.0
7	833	272	Route 49 Westbound approach to Front St	0.0	0.0	0.0
8	446	272	Front St Eastbound approach to Route 49	2.4	2.4	2.2
9	266	265	Route 49 Westbound approach to Hook Rd	3.5	9.0	9.0
10	667	668	Route 71 Southbound to Route 299	3.5	0.0	0.0
11	410	411	W Main St Eastbound approach to Telegraph Rd (Alloway)	0.3	0.0	0.0
12	312	313	Route 45 Eastbound approach to Route 40 (Woodstown)	3.7	7.7	4.7

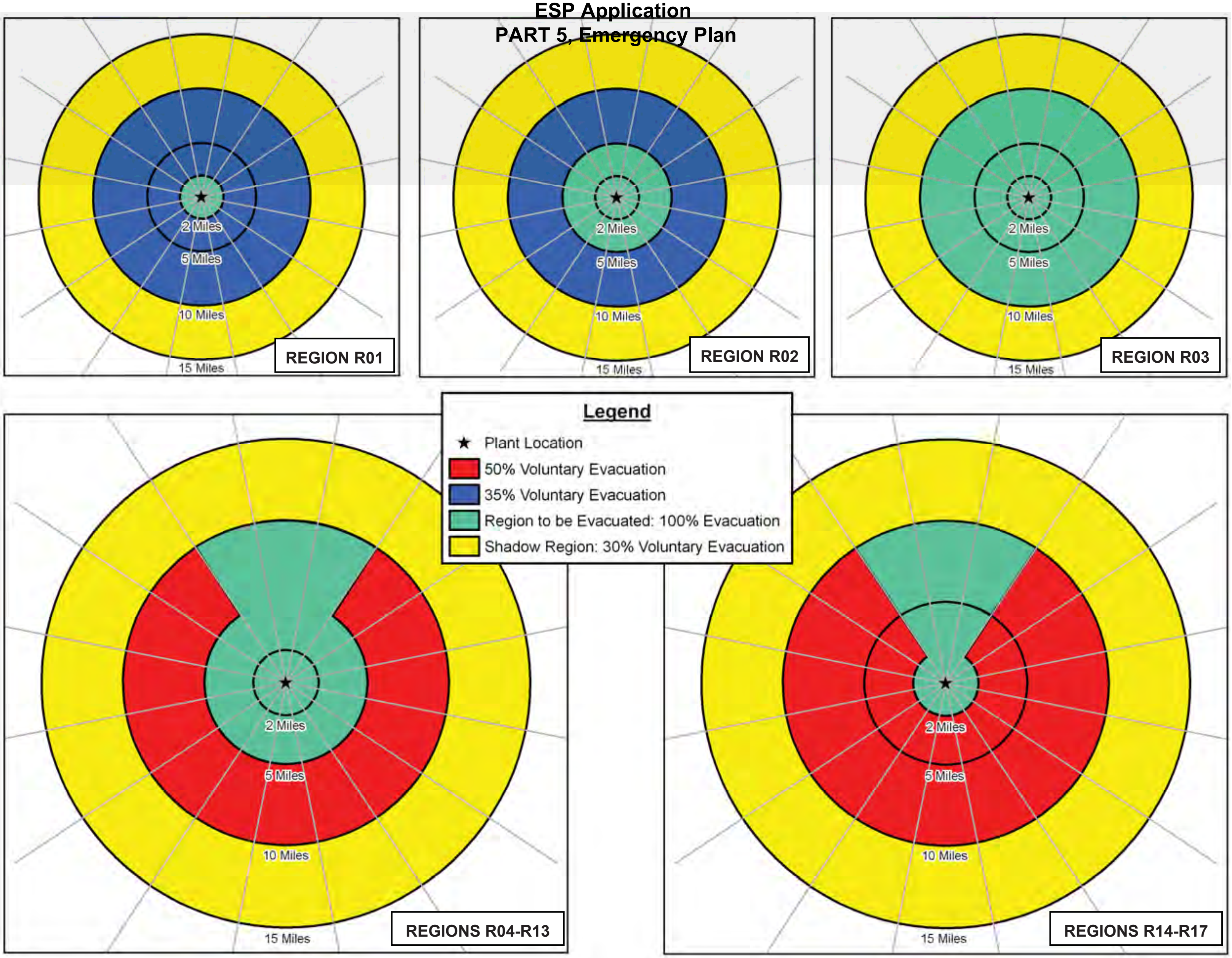


Figure 7-1. Voluntary Evacuation Methodology

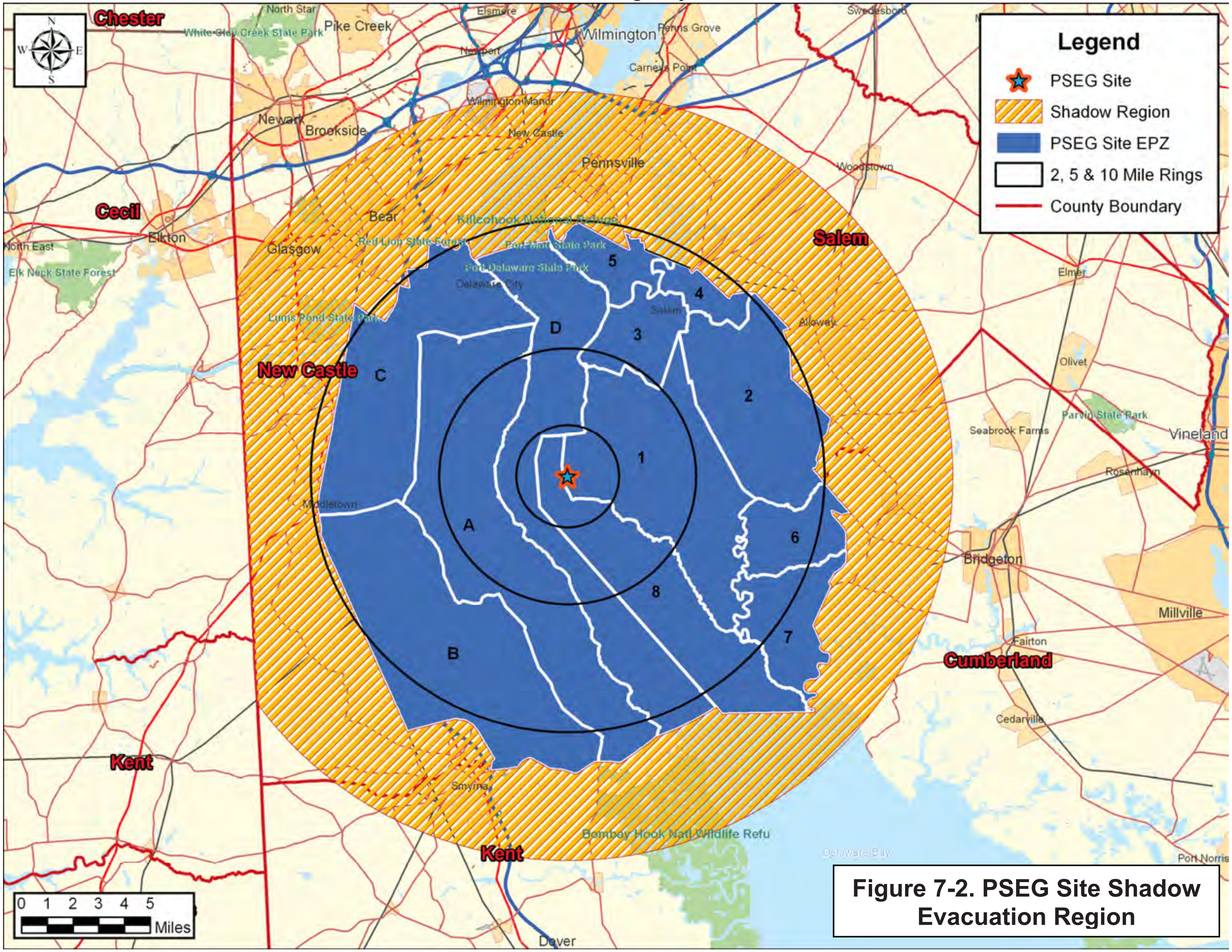


Figure 7-2. PSEG Site Shadow Evacuation Region

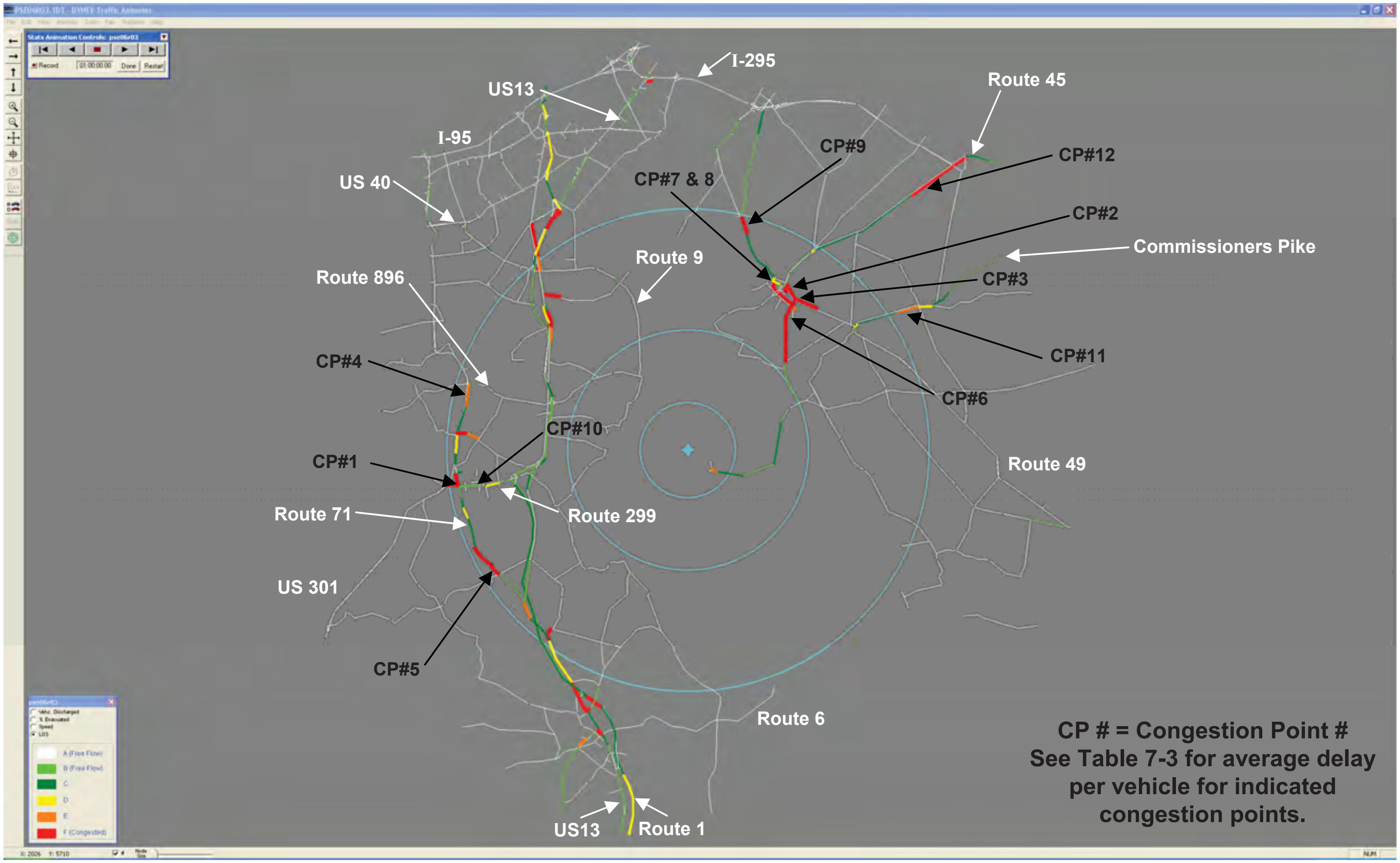


Figure 7-3. Areas of Traffic Congestion _1 Hour_ after the Advisory to Evacuate (Scenario 6, Region R03)

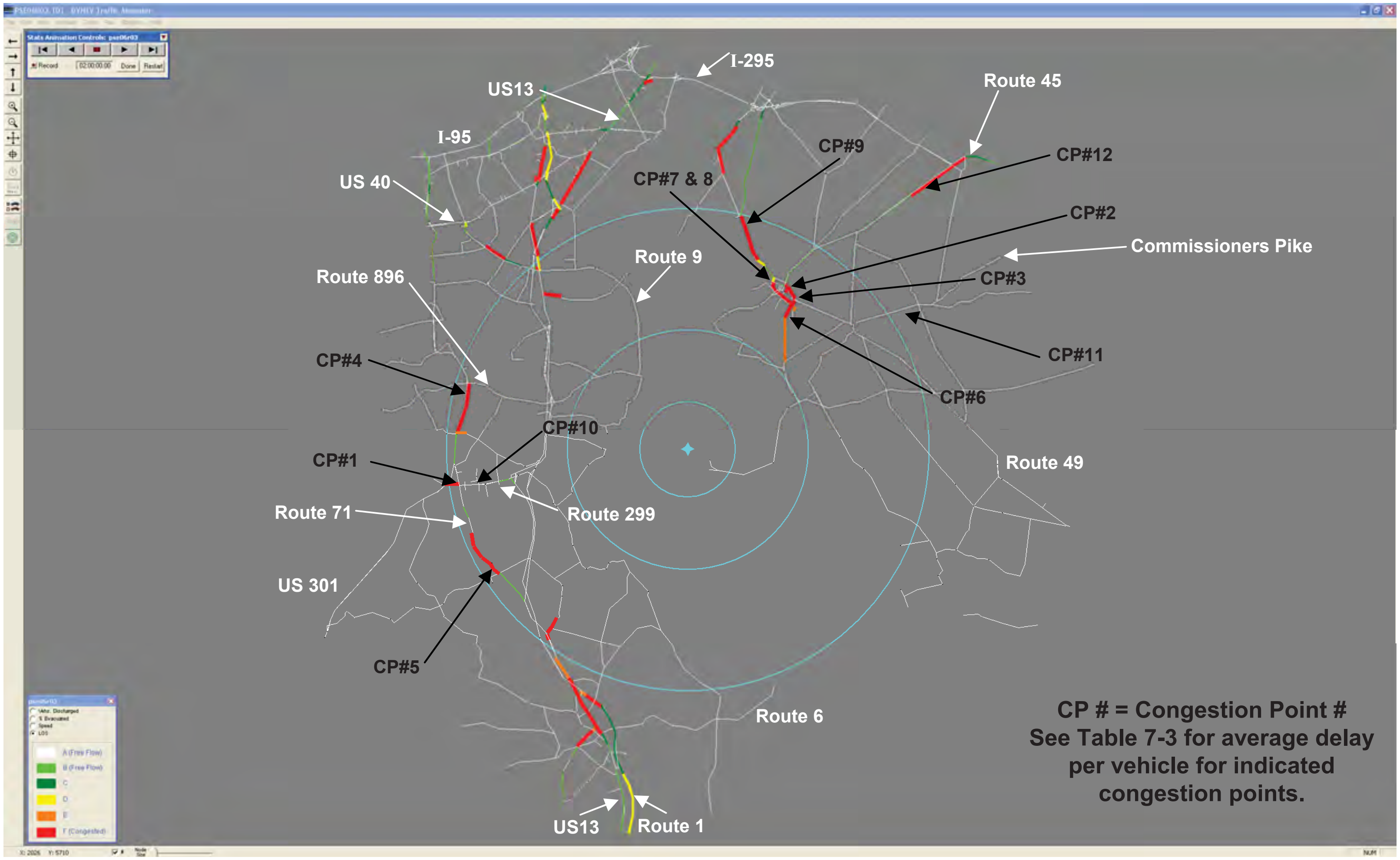


Figure 7-4. Areas of Traffic Congestion *2 Hours* after the Advisory to Evacuate (Scenario 6, Region R03)

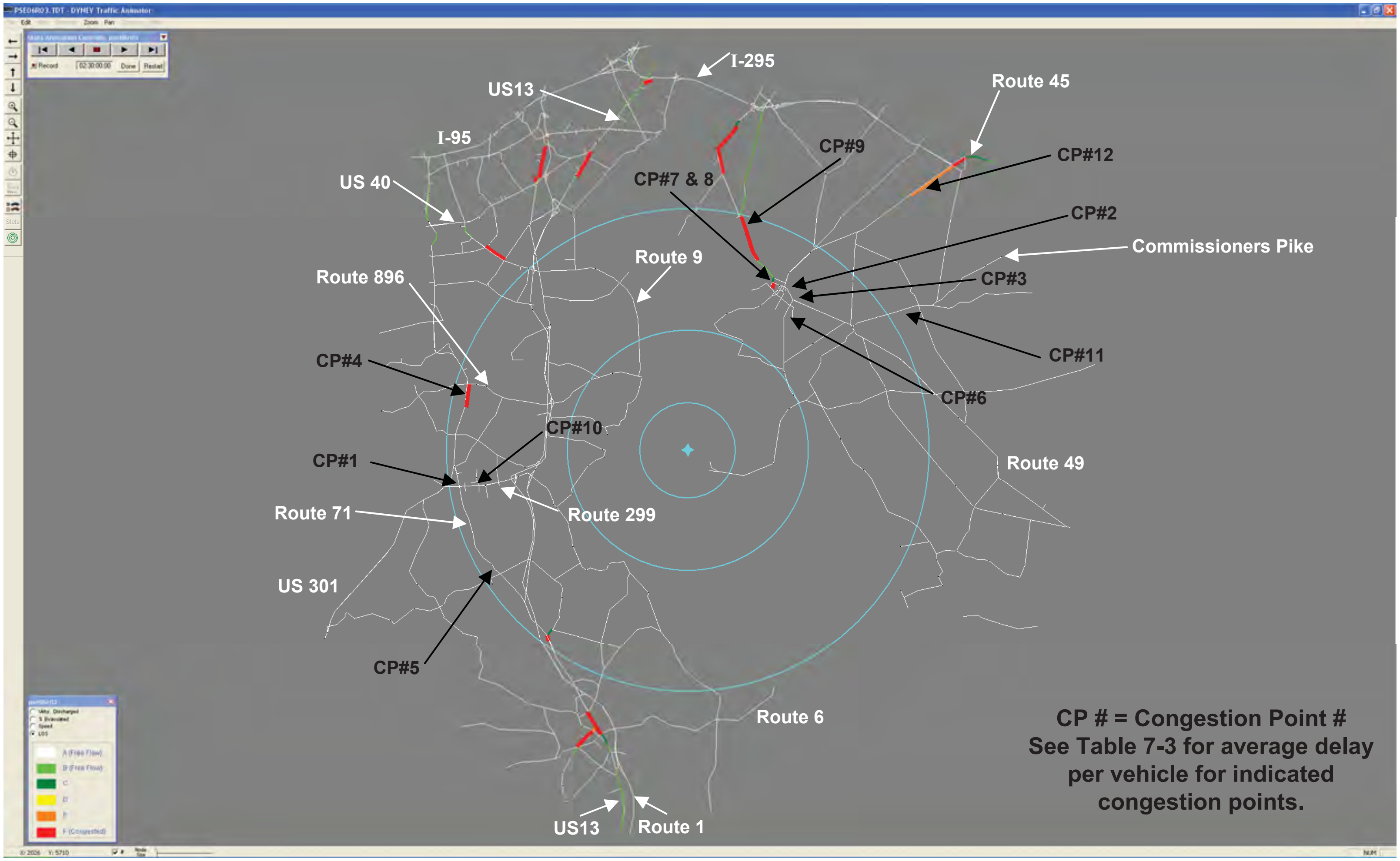


Figure 7-5. Areas of Traffic Congestion *2 Hours and 30 Minutes* after the Advisory to Evacuate (Scenario 6, Region R03)

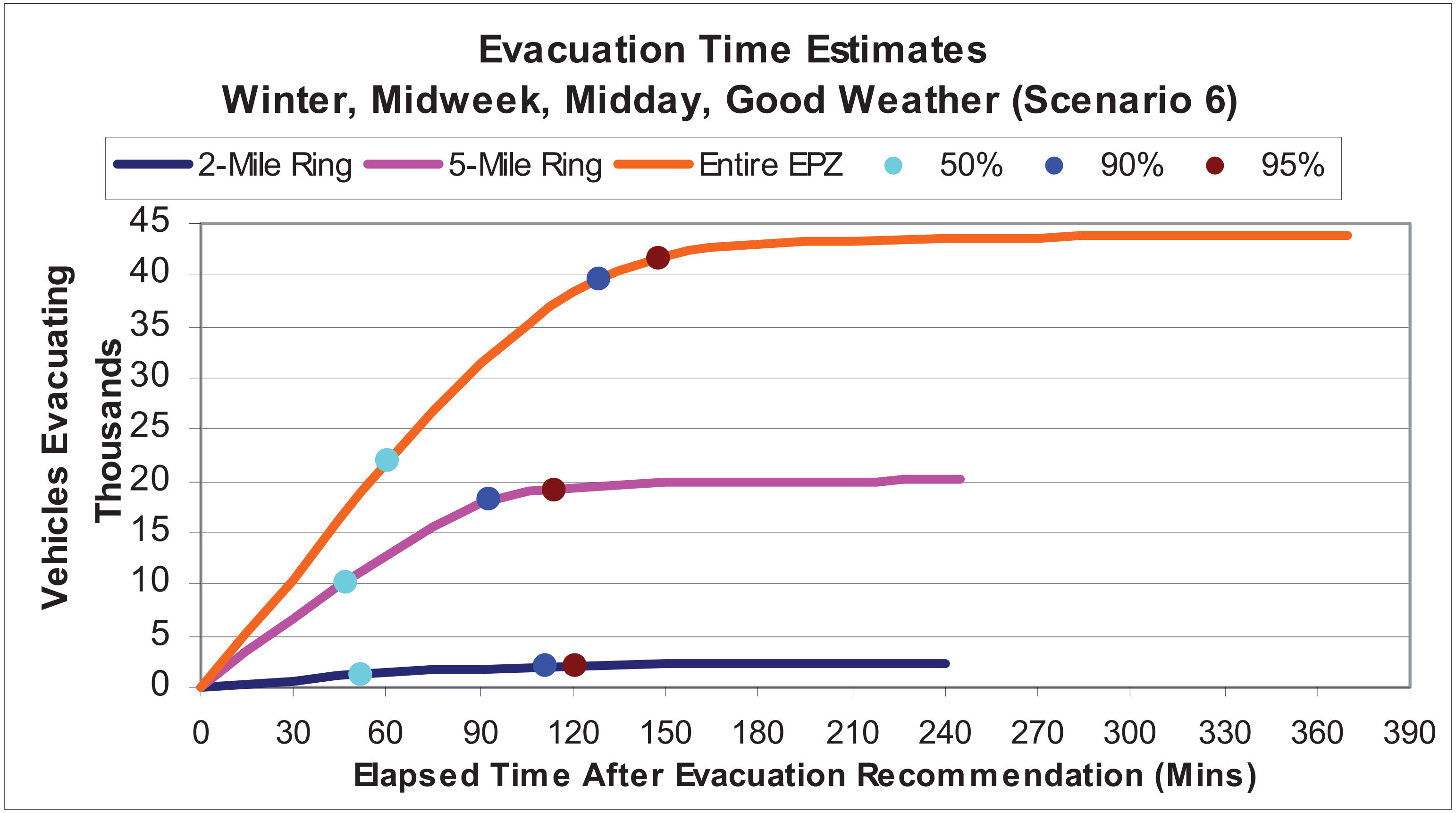


Figure 7-6. Evacuation Time Estimates for the PSEG Site Winter, Midweek, Midday, Good Weather, Evacuation of Region R03 (Entire EPZ)

8. TRANSIT-DEPENDENT AND SPECIAL FACILITY EVACUATION TIME ESTIMATES

This section details the analyses applied and the results obtained in the form of evacuation time estimates for transit vehicles (buses). The demand for transit service reflects the needs of two population groups: (1) residents with no vehicles available; and (2) residents of special facilities such as schools and health-support facilities.

These transit vehicles merge into and become a part of the general evacuation traffic environment that is comprised mostly of "passenger cars" (pc's). The presence of each transit vehicle in the evacuating traffic stream is represented within the modeling paradigm described in Appendix D as equivalent to two pc's. This equivalence factor represents the longer size and more sluggish operating characteristics of a transit vehicle, relative to those of a pc.

Transit vehicles must be mobilized in preparation for their respective evacuation missions. Specifically:

- Bus drivers must be alerted
- They must travel to the bus depot
- They must be briefed there and assigned to a route or facility

These activities consume time. Based on experience at other plants, it is estimated that bus mobilization time will average approximately 90 minutes extending from the Advisory to Evacuate to the time when buses arrive at the facility to be evacuated.

During this mobilization period, other mobilization activities are taking place. One of these is the action taken by parents, neighbors, relatives and friends to pick up children from school prior to the arrival of buses, so that they may join their families. Virtually all studies of evacuations have concluded that this "bonding" process of uniting family units is universally prevalent during emergencies and should be anticipated in the planning process. The current emergency plan information disseminated to residents of the Salem & Hope Creek Nuclear Generating Stations EPZ indicates that parents should not pick up children at school, rather, they should pick up children at the host school. Picking up children at school could add to traffic congestion at the schools, delaying the departure of the buses evacuating schoolchildren, which may have to return to the EPZ and evacuate the transit-dependent population. We provide estimates of buses under the assumption that no children will be picked up, to present an upper bound estimate. It is assumed that children at day-care centers are picked up by parents or guardians and that the time to perform this activity is captured in the trip generation times discussed in Section 5.

The procedure is:

- Estimate demand for transit service
- Estimate time to perform all transit functions
- Estimate route travel times to the EPZ boundary and to the school reception centers

8.1 Transit-Dependent People - Demand Estimate

The telephone survey (see Appendix F) results were used to estimate the portion of the population requiring transit service:

- Those persons in households that do not have a vehicle available.
- Those persons in households that do have vehicle(s) that would not be available at the time the evacuation is advised.

In the latter group, the vehicle(s) may be used by a commuter(s) who does not return (or is not expected to return) home to evacuate the household.

Table 8-1 presents estimates of transit-dependent people. Note:

- Estimates of persons requiring transit vehicles include schoolchildren. For those evacuation scenarios where children are at school when an evacuation is ordered, separate transportation is provided for the schoolchildren. The actual need for transit vehicles by residents is thereby less than the given estimates. However, we will not reduce our estimates of transit vehicles since it would add to the complexity of the implementation procedures.
- It is reasonable and appropriate to consider that many transit-dependent persons will evacuate by ride-sharing with neighbors, friends or family. For example, nearly 80 percent of those who evacuated from Mississauga, Ontario who did not use their own cars, shared a ride with neighbors or friends. Other documents report that approximately 70 percent of transit-dependent persons were evacuated via ride-sharing[1]. **We will adopt a conservative estimate that 50 percent of transit-dependent persons will ride-share.**

The estimated number of bus trips needed to service transit-dependent persons is based on an estimate of average bus occupancy of 30 persons at the conclusion of the bus run. Transit vehicle seating capacities typically equal or exceed 60 children (roughly equivalent to 40 adults). If transit vehicle evacuees are two-thirds adults and one-third children, then the number of “adult seats” taken by 30 persons is 20 + (2/3

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[1] Jones, J., et. al. Review of NUREG-0654, Supplement 3, “Criteria for Protective Action Recommendations for Severe Accidents” - Focus Groups and Telephone Survey, NUREG/CR-6953, Vol. 2, Sandia National Laboratories, Page 45.

x10) = 27. On this basis, the average load factor anticipated is (27/40) x 100 = 68 percent. Thus, if the actual demand for service exceeds the estimates of Table 8-1 by 50 percent, the demand for service can still be accommodated by the available bus seating capacity.

$$\left(20+\left(\frac{2}{3}\times 10\right)\right)\div 40\times 1.5=1.00$$

Table 8-1 indicates that transportation must be provided for 1,029 people. Therefore, a total of 34 bus runs are required to transport this population to reception centers.

To illustrate this estimation procedure, we calculate the number of persons, P, requiring public transit or ride-share, and the number of buses, B, required for the PSEG Site EPZ:

$$P=15{,}423\times(0.035\times 1.38+0.216\times(1.93-1)\times 0.65\times 0.40+0.455\times(3.07-2)\times(0.65\times 0.40)^2)=15{,}423\times 0.134=2{,}058$$

$$B=(0.5\times P)\div 30=34$$

These calculations are explained as follows:

- All members (1.38 avg.) of households (HH) with no vehicles (3.5%) will evacuate by public transit or ride-share. The term 15,423 (number of households) x 0.035 x 1.38, accounts for these people.
- The members of HH with 1 vehicle away (21.6%), who are at home, equal (1.93-1). The number of HH where the commuter will not return home is equal to (15,423 x 0.216 x 0.65 x 0.40), as 65% of EPZ households have a commuter, 40% of which would not return home in the event of an emergency. The number of persons who will evacuate by public transit or ride-share is equal to the product of these two terms.
- The members of HH with 2 vehicles that are away (45.5%), who are at home, equal (3.07 – 2). The number of HH where neither commuter will return home is equal to 15,423 x 0.455 x $(0.65 \times 0.40)^2$. The number of persons who will evacuate by public transit or ride-share is equal to the product of these two terms (the last term is squared to represent the probability that *neither* commuter will return).
- Households with 3 or more vehicles are assumed to have no need for transit vehicles.
- The total number of persons requiring public transit is the sum of such people in HH with no vehicles, or with 1 or 2 vehicles that are away from home.

The estimate of transit-dependent population in Table 8-1 far exceeds the number of registered transit-dependent persons in the EPZ as provided in the State Radiological

Emergency Plans. This is consistent with the findings of NUREG/CR-6953, Volume 2[2], in that a large majority of the transit-dependent population within the EPZs of U.S. nuclear plants do not register with their local emergency response agency.

8.2 School Population – Transit Demand

Table 8-2 presents the school population and transportation requirements for the direct evacuation of all schools within the EPZ for the 2008-2009 school year. The column in Table 8-2 entitled "Bus Runs Required" specifies the number of buses required for each school under the following set of assumptions and estimates:

- No students will be picked up by their parents prior to the arrival of the buses.
- Bus capacity, expressed in students per bus, is set to 70 for primary schools and 46 for middle and high schools.
- Those staff members who do not accompany the students will evacuate in their private vehicles.
- No allowance is made for student absenteeism typically 3 percent daily.

Consideration should be given that the counties in the EPZ introduce procedures whereby the schools are contacted prior to the dispatch of buses from the depot (approximately one hour after the Advisory to Evacuate), to ascertain the current estimate of students to be evacuated. In this way, the number of buses dispatched to the schools will reflect the actual number needed. Those buses originally allocated to evacuate schoolchildren that are not needed due to children being picked up by their parents, can be gainfully assigned to service other facilities or those persons who do not have access to private vehicles or to ride-sharing.

Table 8-3 presents a list of the school reception centers for each school in the EPZ. Students will be transported to these centers where they will be subsequently retrieved by their respective families.

8.3 Special Facility Demand

Table 8-4 presents the census of special facilities in the EPZ. Approximately 392 people have been identified as living in, or being treated in, these facilities. This census also indicates the number of wheelchair-bound people and the number of bed-ridden people at each facility. The transportation requirements for this group are also presented. The number of ambulance runs is determined by assuming that 2 patients can be accommodated per ambulance trip; the number of wheelchair van runs assumes 4

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[2] Jones, J., et. al. Review of NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents" - Focus Groups and Telephone Survey, NUREG/CR-6953, Vol. 2, Sandia National Laboratories, Pages viii, ix and 33.

wheelchairs per trip; the number of wheelchair bus runs assumes 15 wheelchairs per trip and the number of bus runs estimated assumes 30 ambulatory patients per trip.

8.4 Evacuation Time Estimates for Transit-Dependent People

EPZ bus resources are assigned to evacuating schoolchildren as the first priority in the event of an emergency. In the event that the allocation of buses dispatched from the depots to the various facilities and to the bus routes is somewhat “inefficient”, or if there is a shortfall of available drivers, then there may be a need for some buses to return to the EPZ from the reception center after completing their first evacuation trip, to complete a “second wave” of providing transport service to evacuees. For this reason, the ETE for the transit-dependent population will be calculated for both a one wave transit evacuation and for two waves. Of course, if the impacted Evacuation Region is other than R03 (the entire EPZ), then there will likely be ample transit resources relative to demand in the impacted Region and this discussion of a second wave would likely not apply.

When school bus needs are satisfied, subsequent assignments of buses to service the transit-dependent should be sensitive to their mobilization time. Clearly, the buses should be dispatched after people have completed their mobilization activities and are in a position to board the buses when they arrive at the pick-up points.

Evacuation Time Estimates for Transit Trips were developed using both good weather and adverse weather conditions. Figure 8-1 presents the chronology of events relevant to transit operations. The elapsed time for each activity will now be discussed with reference to Figure 8-1.

Activity: Mobilize Drivers (A→B→C)

Mobilization is the elapsed time from the Advisory to Evacuate until the time the buses arrive at the facility to be evacuated. It is assumed that for a rapidly escalating radiological emergency with no observable indication before the fact, drivers would likely require 90 minutes to be contacted, to travel to the depot, be briefed, and to travel to the transit-dependent facilities. Mobilization time is slightly longer – 100 minutes – when raining.

Activity: Board Passengers (C→D)

Based on discussions with offsite agencies, a loading time of 15 minutes (20 minutes for rain) for school buses is used.

For multiple stops along a pick-up route (transit-dependent bus routes) we must allow for the additional delay associated with stopping and starting at each pick-up point. The time, t, required for a bus to decelerate at a rate, “a”, expressed in ft/sec/sec, from a speed, “v”, expressed in ft/sec, to a stop, is $t = v/a$. Assuming the same acceleration

rate and final speed following the stop yields a total time, T, to service boarding passengers:

$$T = t + B + t = B + 2t = B + \frac{2v}{a},$$

Where B = Dwell time to service passengers. The total distance, “s” in feet, travelled during the deceleration and acceleration activities is: s = v^2/a. If the bus had not stopped to service passengers, but had continued to travel at speed, v, then its travel time over the distance, s, would be: s/v, or (v^2/a)/v = v/a. Then the total delay (i.e. pickup time, P) to service passengers is:

$$P = T - \frac{v}{a} = B + \frac{v}{a}$$

Assigning reasonable estimates:

- B = 50 seconds: a generous value for a single passenger, carrying personal items, to board per stop
- v = 25 mph = 37 ft/sec
- a = 4 ft/sec/sec, a moderate average rate

Then, P ≈ 1 minute per stop. Allowing 30 minutes pick-up time per bus run implies 30 stops per run, for good weather. It is assumed that bus acceleration and speed will be less in rain; loading time is 40 minutes per bus in rain.

Activity: Travel to EPZ Boundary (D→E)

School Evacuation

Information provided in the state radiological emergency plans and discussions with state emergency management officials indicate the following bus resources, by school/school district:

- Elsinboro Elementary School: 3 Buses
- Salem City Schools: 25 Buses
- Quinton Twp. Schools: 6 Buses
- Lower Alloways Creek School: 6 Buses
- Appoquinimink Schools: 109 Buses

- Colonial School District: 130 Buses

Comparison of the available bus resources with the number of buses needed in Table 8-2 indicates that Appoquinimink School District and Salem City Schools do not have sufficient bus resources to evacuate school children in a single wave. However, it is assumed that these school districts will be assisted through Memoranda of Understanding and Mutual Aid Agreements, as outlined in Attachment 3 to the State of New Jersey Radiological Emergency Response Plan.

The buses servicing the schools are ready to begin their evacuation trips at 105 minutes after the advisory to evacuate – 90 minutes mobilization time plus 15 minutes loading time. The UNITES software discussed in Section 1.3 was used to define bus routes along the most likely path from a school being evacuated to the EPZ boundary, traveling toward the appropriate reception center. This is done in UNITES by interactively selecting the series of nodes from the school to the EPZ boundary. The bus route is given an identification number and is written to the I-DYNEV input stream. UNITES computes the route length and DYNEV outputs the average speed for each 10 minute interval for each bus route input. The bus routes input are documented in Table 8-5 (refer to the maps of the link-node analysis network in Appendix K for node locations). Data from 100 to 110 minutes after the advisory to evacuate were used. The average speed along the path using the data generated by DNYEV was computed as follows:

$$Average\ Speed\left(\frac{mi.}{hr.}\right)=\left(\frac{\sum_{i=1}^{n} length\ of\ link\ i\ (mi)}{\sum_{i=1}^{n} Delay\ on\ link\ i\ (\text{min.})+\dfrac{length\ of\ link\ i\ (mi.)}{free\ flow\ speed\ on\ link\ i\left(\dfrac{mi.}{hr.}\right)}\times\dfrac{60\ \text{min.}}{1\ hr.}}\right)\times\frac{60\ \text{min.}}{1\ hr.}$$

The average speed computed (using this methodology) for the buses servicing each of the schools in the EPZ is shown in Tables 8-6A and B, and in Tables 8-8A and B for the transit vehicles evacuating transit-dependent persons, which are discussed later. The travel time to the EPZ boundary was computed for each bus using the computed average speed and the distance to the EPZ boundary along the most likely route out of the EPZ. The travel time from the EPZ boundary to the Reception Center was computed assuming an average speed of 45 mph and 40 mph for good weather and rain respectively. Speeds were reduced in Tables 8-6 and 8-8 to 45 mph (40 mph for rain) for those calculated bus speeds which exceed 45 mph, as it is unlikely that school buses would be traveling at speeds greater than that.

Tables 8-6A (good weather) and 8-6B (rain) present the following evacuation time estimates (rounded up to the nearest 5 minutes) for schools in the EPZ: (1) The elapsed time from the Advisory to Evacuate until the bus exits the EPZ; and (2) The elapsed time until the bus reaches the School Reception Center. The evacuation time out of the EPZ can be computed as the sum of travel times associated with Activities A→B→C,

C→D, and D→E (For example: 90 min. + 15 + 31 = 2:20 for Salem High School, with good weather, rounded up to the nearest 5 minutes). The evacuation time to the School Reception Center is determined by adding the time associated with Activity E→F (discussed below), to this EPZ evacuation time.

Evacuation of Transit-Dependent Population

The buses dispatched from the depots to service the transit-dependent evacuees will be scheduled so that they arrive at their respective routes after their passengers have completed their mobilization. As shown in Figure 5-3 (Residents without Commuters), 90 percent of the evacuees will complete their mobilization when the buses will begin their routes, approximately 105 minutes after the Advisory to Evacuate. Headways of 5 minutes are used for those routes which require multiple buses; buses begin traversing some of these routes at 90 minutes to service those people who may mobilize more quickly.

Those buses servicing the transit-dependent evacuees will first travel along their pick-up routes, then proceed out of the EPZ. Buses will travel along the major routes in the EPZ as described in Table 8-7 and shown graphically in Appendix M. These routes were taken from the state radiological emergency plans. There are 9 bus routes in New Jersey, and 6 bus routes in Delaware.

As previously discussed, a pickup time of 30 minutes is estimated for 30 individual stops to pick up passengers, with an average of one minute of delay associated with each stop.

The travel distance along the respective pick-up routes within the EPZ is estimated using the UNITES software. Bus travel times within the EPZ are computed using average speeds computed by DYNEV, using the aforementioned methodology that was used for school evacuation.

Tables 8-8A and 8-8B present the transit-dependent population evacuation time estimates for each bus route calculated using the above procedures for good weather and rain, respectively. For example, the ETE for New Jersey Bus Route Number 3A is computed as 105 + 53 + 30 = 3:10 for good weather (rounded to nearest 5 minutes). Here, 53 minutes is the time to travel 13 miles at 14.72 mph, the average speed output by the model for this route at 105 minutes. The ETE for a second wave (discussed below) is presented in the event there is a shortfall of available buses or bus drivers.

Activity: Travel to School Reception Centers (E→F)

The distances from the EPZ boundary to the school reception centers are measured using Geographical Information Systems (GIS) software along the most likely route from

the EPZ to the reception center. The reception centers are identified in Table 8-3. For a one-wave evacuation, this travel time outside the EPZ does not contribute to the ETE. For a two-wave evacuation, the ETE for buses must be considered separately, since it could exceed the ETE for the general public. Assumed bus speeds of 45 mph and 40 mph for good weather and rain, respectively, will be applied for this activity.

Activity: Passengers Leave Bus (F→G)

A bus can empty within 5 minutes. The driver takes a 10 minute break.

Activity: Bus Returns to Route for Second Wave Evacuation (G→C)

The buses assigned to return to the EPZ to perform a "second wave" evacuation of transit-dependent evacuees will be those that evacuated the schoolchildren. These buses are assigned since they will be the first buses to complete their evacuation service and are therefore the first to be available for the second wave. The schoolchildren depart the bus, and the bus then returns to the EPZ, travels to its route and proceeds to pick up transit-dependent evacuees along the route. The travel time back to the EPZ is calculated using distances estimated from GIS and the assumed bus travel speeds.

The second-wave ETE for the Delaware Red Line Bus Route is computed as follows for good weather:

- Bus arrives at reception center at 2:30 in good weather (average of column "Return to EPZ" for New Castle County in Table 8-6A).
- Bus discharges passengers (5 minutes) and driver takes a 10-minute rest: 15 minutes.
- Bus returns to EPZ: 22 minutes (average of column "Travel Time EPZ Bdry to RC (min)" for New Castle County in Table 8-6A).
- Bus completes pick-ups along route and departs EPZ: 30 minutes + 42 minutes (26 miles @ 37.14 mph) = 72 minutes.
- Bus exits EPZ at time 2:30 + 0:15 + 0:22 + 1:12 = 4:20 (rounded to nearest 5 minutes) after the Advisory to Evacuate.

The ETE for the completion of the second wave for all transit-dependent bus routes are provided in Tables 8-8A and 8-8B. These tables should be considered when making Protective Action Decisions since the ETE for transit-dependent people exceed the ETE for the general population at the 90th percentile.

Evacuation of Ambulatory Persons from Special Facilities

The bus operations for this group are similar to those for school evacuation except:

- Buses are assigned on the basis of 30 patients to allow for staff to accompany the patients.
- The passenger loading time will be longer at approximately one minute per patient to account for the time to move patients from inside the facility to the vehicles.

As is done for the schools, it is estimated that mobilization time averages 90 minutes. In the event there is a shortfall of transit vehicles for a “single-wave” evacuation, then buses used to evacuate schools will have to return to evacuate the special facilities. The school ETE to the Reception Centers is 2:25 (145 minutes) on average, and about 25 minutes of additional inbound travel time to the special facility from the reception center would be required. It follows, therefore, that about 80 minutes (145 + 25 – 90) would have to be added to the calculated ETE for special facilities, in the event they are evacuated as a “second wave”.

Based on the locations of the medical facilities in Figure E-2, it is estimated that buses will have to travel 3 miles, on average, to leave the EPZ. The average speed output by the model at 90 minutes for Region 3, Scenario 6 is 34.48 mph; thus, travel time out of the EPZ is approximately 5 minutes.

The ETE for buses evacuating ambulatory patients at medical facilities is the sum of the mobilization time, total passenger loading time, and travel time out of the EPZ. For example, the calculation of ETE for the Midtown Rest Haven with 19 ambulatory residents is:

ETE: 90 + 19 x 1 + 5 = 114 min. or 1:55 rounded up.

Table 8-4 indicates that 15 bus runs, 7 wheelchair bus runs and 6 wheelchair van runs are needed for the entire EPZ. Loading times are estimated at 2 minutes per wheelchair bound person as staff will have to assist them in boarding the bus. For example, the ETE for the wheelchair bound at Broadmeadow Healthcare is:

ETE: 90 + 60 x 2 + 5 = 3:35 (rounded up to the nearest 5 minutes).

8.5 Special Needs Population

Based on data provided by the state emergency management agencies, there are an estimated 16 homebound special needs people within the Delaware portion of the EPZ and 34 people within the New Jersey portion of the EPZ who require special transportation to evacuate. All 16 people registered in Delaware require a wheelchair van to be evacuated. In the New Jersey portion of the EPZ, there are 2 people that require an ambulance, 11 that require a wheelchair van and 21 that require a bus to evacuate.

ETE for Homebound Special Needs Persons

Wheel-Chair Vans

Section 8.3 identifies a wheelchair van capacity of 4 wheelchairs per trip. As discussed above, there are 27 homebound special needs persons within the EPZ requiring wheelchair van transportation; therefore 7 wheelchair vans are needed. Assuming one special needs person per household, each wheelchair van will service about 4 households. It is conservatively assumed that the households are spaced 5 miles apart and that van speeds approximate 20 mph between households.

a. Assumed mobilization time for wheelchair van resources to arrive at first household: 1:30

b. Loading time at first household: 15 minutes

c. Travel to next household: 3 @ 15 minutes (5 miles @ 20 mph) = 45 minutes

d. Loading time: 3 @ 15 minutes = 45 minutes

e. Travel time to EPZ boundary at 3:15: 5 miles @ 20 mph = 15 minutes

ETE: 1:30 + 15 + 45 + 45 + 15 = 3:30

Buses

Assuming no more than one special needs person per household implies that 21 households (HH) need to be serviced. While only 1 bus is needed from a capacity perspective, if 4 buses are deployed to service these special needs HH, then each would require about 5 stops. The following outlines the ETE calculations:

1. Assume 4 buses are deployed, each with about 5 stops, to service a total of 21 HH.

2. The ETE is calculated as follows:

    a. Buses arrive at the first pickup location: 90 minutes

    b. Load HH members at first pickup: 5 minutes

    c. Travel to subsequent pickup locations: 4 @ 6 minutes = 24 minutes

    d. Load HH members at subsequent pickup locations: 4 @ 5 minutes = 20 minutes

    e. Travel to EPZ boundary (assume 8 miles): 24 minutes.

ETE: 90 + 5 + 24 + 20 + 24 = 2:45

Rain ETE: 100 + 5 + 28 + 20 + 26 = 3:00

The estimated travel time between pickups is based on a distance of 2 miles @ 20 mph = 6 minutes. If planned properly, the pickup locations for each bus run should be clustered within the same general area. The estimated travel time to the EPZ boundary is based on a distance of 8 miles @ 20 mph = 24 minutes. It is assumed that mobilization time to first pickup is 10 minutes longer in rain = 100 minutes. Travel time to the EPZ boundary in rain from the last pickup requires 23 minutes (8 miles @ 18 mph - Travel speeds are 10% less in rain) and that travel time between pickups is 7 minutes (2 miles @ 18 mph). All ETE are rounded to nearest 5 minutes.

Assuming all HH members (avg. HH size equals 2.92 persons) travel with the disabled person yields 5 x 2.92 = 15 persons per bus. From the perspective of bus capacity, fewer buses could be deployed. For example, 2 buses, each servicing about 10 HH could accommodate 2.92 x 10 = 30 people, but the additional 5 stops would add 5 x (6 + 5) = 55 minutes to the ETE. The ETE would equal 3:40 with good weather and 3:55 for rain using 2 buses.

Ambulances

It is estimated that 1 ambulance run will be needed to evacuate the 2 homebound bed-ridden persons within Salem County.

As shown in Table B-6 in Attachment 22, Element B of the State of New Jersey Radiological Emergency Response Plan, there are sufficient ambulance resources in the EPZ to evacuate the institutionalized and homebound bed-ridden populations in a single wave.

Mobilization time and loading time are assumed to be 30 minutes each per ambulance. Each ambulance servicing the homebound bed-ridden population will make 2 stops with an estimated distance of 5 miles between stops and an estimated distance of 5 miles to the EPZ boundary after the final stop. It is conservatively assumed that ambulances will travel at 30 mph within the EPZ. Mobilization time is 5 minutes longer and travel speed is 10% less in rain – 27 mph. All ETE are rounded to nearest 5 minutes.

The ETE are computed as follows:

a. Ambulance arrives at first household: 30 minutes

b. Loading time at first household: 30 minutes

c. Ambulance travels to second household: 5 miles @ 30 mph = 10 minutes

d. Loading time at second household: 30 minutes

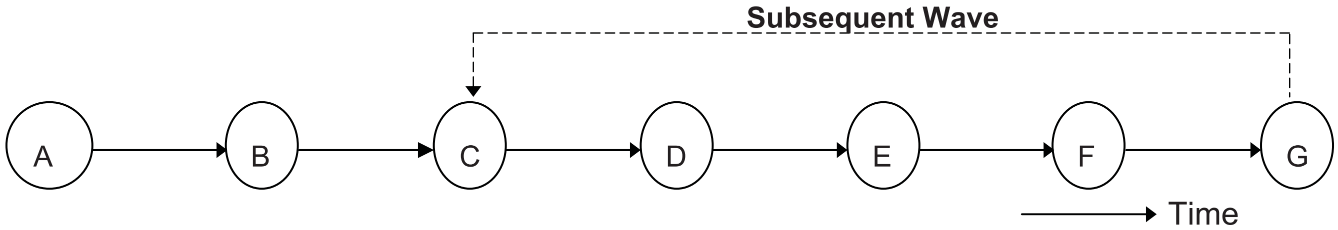
e. Travel time to EPZ boundary: 5 miles @ 30 mph = 10 minutes

ETE: 30 + 30 + 10 + 30 + 10 = 1:50

Rain ETE: 35 + 30 + 11 + 30 + 11 = 2:00

8.6 Correctional Facilities

As detailed in Table E-4, there are two correctional facilities within the EPZ – the Central Violation of Patrol Probation Center and the James T. Vaughn Correctional Center. The total inmate population at these facilities is 2,750 persons. Both of these facilities are located in close proximity to the EPZ boundary and are beyond 10 miles from the PSEG Site, as shown in Figure E-2. As stated in Standard Operating Procedure (SOP) 1000-D of the Delaware Radiological Emergency Plan, these facilities will shelter-in-place in the event of an incident at the PSEG Site. This plan was reiterated in discussions with the Delaware Emergency Management Agency. As such, evacuation time estimates need not be considered for the correctional facilities within the EPZ.



Event

A	Advisory to Evacuate
B	Bus Dispatched from Depot
C	Bus Arrives at Facility/Pick-up Route
D	Bus Departs for Reception Center
E	Bus Exits Region
F	Bus Arrives at School Reception Center
G	Bus Available for “Second Wave” Evacuation Service

Activity

A→B	Driver Mobilization
B→C	Travel to Facility or to Pick-up Route
C→D	Passengers Board the Bus
D→E	Bus Travels Towards Region Boundary
E→F	Bus Travels Towards School Reception Center Outside the EPZ
F→G	Passengers Leave Bus; Driver Takes a Break

Figure 8-1. Chronology of Transit Evacuation Operations

Table 8-1. Transit-Dependent Population Estimates

Facility Name	2010 EPZ Population	Survey Average Household Size With Indicated No. of Vehicles			Estimated Number of Households	Survey Percent Households With			Survey Percent Households With Commuters	Survey Percent Households With Non-Returning Commuters	Total People Requiring Transport	Estimated Ridesharing Percentage	People Requiring Public Transit	Percent of Population Requiring Public Transit
		0	1	2		0 Vehicle	1 Vehicle	2 Vehicle						
PSEG Site	45,034	1.38	1.93	3.07	15,423	3.5%	21.6%	45.5%	65%	40%	2,058	50%	1,029	2.3%

Table 8-2. School Population Demand Estimates							
ERPA	Distance (miles)	Direc-tion	School Name	Municipality	Enroll-ment	Staff	Bus Runs Required
Salem County, NJ Schools							
1	7.0	E	Lower Alloways Creek Elementary School	Salem	222	78	4
2	8.4	NE	Quinton Elementary School	Quinton	358	61	6
3	5.4	NNE	Elsinboro Township Elementary School	Salem	108	17	2
3	7.4	NNE	John Fenwick Elementary School	Salem	300	80	5
3	6.8	NNE	Salem High School	Salem	600	110	14
3	7.6	NNE	Salem Middle School	Salem	580	110	13
4	9.0	NNE	The ARC of Salem County	Salem	147	28	4
				Salem County Totals:	**2,315**	**484**	**48**
Cumberland County, NJ Schools							
6	10.6	E	Stow Creek Township Elementary School	Bridgeton	135	20	2
6	10.2	E	Woodland Country Day School	Bridgeton	159	38	3
7	11.6	ESE	Morris Goodwin Elementary School	Greenwich	77	12	2
				Cumberland County Totals:	**371**	**70**	**7**
New Castle County, DE Schools							
A	5.8	NW	Van Hook Walsh School Inc.	Middletown	4	3	1
B	9.6	WSW	Everett Meredith Middle School	Middletown	1,250	95	28
B	9.6	WSW	Groves Adult High Shool	Middletown	160	20	4
B	8.3	W	Middletown High School	Middletown	1,707	145	38
B	9.3	W	Silver Lake Elementary School	Middletown	670	60	10
B	8.5	WSW	St. Andrew's School	Middletown	270	125	6
B	8.9	WSW	St. Anne's Episcopal School	Middletown	325	55	8
B	9.6	WSW	Townsend Elementary School	Townsend	315	55	5
C	9.4	NW	AdvoServ School	Bear	123	140	3
C	8.1	WNW	Alfred Waters Middle School	Middletown	777	60	17
C	7.9	W	Brick Mill Elementary School	Middletown	770	80	11
C	8.0	WNW	Cedar Lane Elementary School	Middletown	670	70	10
C	7.8	NW	Gunning Bedford Middle School	New Castle	950	85	21
C	10.0	NW	Kathleen H. Wilbur Elementary School (formerly Wrangle Hill Elementary School)	Bear	1,150	100	17
C	9.1	W	Louis L. Redding Middle School	Middletown	800	70	18
C	7.7	NW	Southern Elementary School	New Castle	1,065	100	16
C	7.7	WNW	St. George's Technical High School	Middletown	1,035	135	23
C	8.0	WNW	Cedar Lane Early Childhood Center	Middletown	331	30	5
B	9.6	WSW	Appoquinimink Early Childhood Center	Middletown	260	40	4
B	9.5	SW	Townsend Early Childhood Center	Townsend	202	26	3
				New Castle County Totals:	**12,834**	**1,494**	**248**
				EPZ Totals:	**15,520**	**2,048**	**303**

Table 8-3. School Reception Centers	
School	**Reception Center**
Elsinboro Township Elementary School	**Mary Shoemaker School**
Lower Alloways Creek Township Elementary School	**Schalick High School**
Quinton Township Elementary School	
John Fenwick School	**Penns Grove Middle School**
Salem City High School	**Penns Grove High School**
Salem City Middle School	
Morris Goodwin School	**Cumberland County Regional High School**
Stow Creek Township School	
Woodland Country Day School	
AdvoServ School	**Brandywine High School**
St. Georges Technical High School	
Gunning Bedford Middle School	**Mount Pleasant High School**
Kathleen H. Wilbur Elementary School (formerly Wrangle Hill Elementary School)	
Southern Elementary School	
Van Hook Walsh School	**Ben Rohe Residence**
Cedar Lane Elementary School	**Dover High School**
Silver Lake Elementary School	
Townsend Elementary School	
Alfred Waters Middle School	
Groves Adult High School	
Brick Mill Elementary School	
Cedar Lane Early Childhood Center	
Townsend Early Childhood Center	
Middletown High School	**Caesar Rodney High School**
Everett Meredith Middle School	
Appoquinimink Early Childhood Center	
Redding Middle School	
St. Andrew's School	

Table 8-4. Special Facility Transit Demand											
ERPA	**Facility Name**	**Municipality**	**Cap-acity**	**Current Census**	**Ambu-latory**	**Wheel-chair Bound**	**Bed-ridden**	**Wheel-chair Bus Runs**	**Wheel-chair Van Runs**	**Bus Runs**
SALEM COUNTY, NJ										
3	Homecare & Hospicecare of South Jersey	Salem	52	52	42	10	0	0	3	2
2	Lower Alloways Creek Twp: Leisure Arms Complex Kitchen	Salem	36	30	29	1	0	0	1	1
5	Lindsay House	Pennsville	16	16	13	3	0	0	1	1
3	Midtown Rest Haven	Salem	23	19	19	0	0	0	0	1
		Salem County Totals:	*127*	*117*	*103*	*14*	*0*	*0*	*5*	*5*
NEW CASTLE COUNTY, DE										
C	Gateway Foundation (Cottage 2)	Delaware City	72	72	72	0	0	0	0	3
C	Silver Lake Day Treatment Center	Middletown	26	26	26	0	0	0	0	1
N/A	People's Place Residential Group Home**	Townsend	8	8	8	0	0	0	0	1
B	Broadmeadow Healthcare	Middletown	117	77	17	60	0	4	0	1
B	Blackbird Landing Group Home	Townsend	8	8	8	0	0	0	0	1
C	Cornerstone Residential	Delaware City	15	15	15	0	0	0	0	1
C	Middletown Residential Treatment Center	Middletown	10	10	10	0	0	0	0	1
C	Governor Bacon Health Center	Delaware City	80	59	12	47	0	3	1	1
		New Castle County Totals:	*336*	*275*	*168*	*107*	*0*	*7*	*1*	*10*
		Total:	**463**	**392**	**271**	**121**	**0**	**7**	**6**	**15**

**The exact location of this facility is not known.

Table 8-5: Bus Route Descriptions		
Bus Route Number	**Description**	**Nodes Traversed from Route Start to EPZ Boundary**
1	Delaware - Blue Route	576, 575, 574, 573, 572, 571, 570, 569, 562, 561, 560, 559, 558, 557, 556, 722, 723, 724, 725, 789, 726, 727, 790
2	Delaware - Green Route	854, 867, 667, 668, 681, 682, 683, 684, 856, 45, 44, 855, 804, 42, 803, 41, 787, 39, 37, 861, 33, 728, 32, 30
3	Delaware - Red Route	673, 674, 675, 676, 677, 678, 679, 861, 33, 728, 32, 30
4	Delaware - Pink Route	546, 545, 544, 543, 542, 731, 732, 730, 733, 734, 735, 739, 740, 21, 911, 23, 738, 26, 29, 30
5	Delaware - Purple Route	51, 52, 873, 511, 863, 862, 64, 65, 66, 67, 69, 771, 70
6	Delaware - Brown Route	593, 594, 596, 597, 598, 599, 600, 601, 602, 70
7	NJ - Route 1	485, 484, 483, 482, 481, 480, 479, 837, 836, 350, 276, 275, 273, 274, 304, 819
8	NJ - Route 2A	391, 392, 393, 394, 335, 395, 396, 397, 398, 286
9	NJ - Route 2B	359, 838, 839, 840, 841, 842, 843, 844, 280, 279, 278, 820, 276, 275, 273, 274, 304, 819
10	NJ - Route 3A	475, 476, 478, 479, 837, 836, 350, 276, 275, 273, 274, 304, 819
11	NJ - Route 3B	350, 831, 443, 442, 446, 272, 833, 445, 273, 274, 271, 270, 269, 270, 269, 268, 266, 265
12	NJ - Route 4	274, 304, 819, 305, 307, 310
13	NJ - Route 5	454, 455, 456, 457, 459, 460
14	NJ - Route 6	367, 368, 369, 370, 371, 372, 373, 374, 375
15	NJ - Route 7	825, 375, 377, 378, 379, 381, 382, 383
16	Elsinboro Township Elementary School	741, 438, 437, 439, 440, 441, 443, 444, 830, 273, 274, 304, 819
17	Quinton Township Elementary School	281, 282, 283, 284, 285, 286
18	Lower Alloways Creek Elementary School	391, 392, 393, 394, 335, 395, 396, 397, 398, 286
19	John Fenwick Elementary School	831, 834, 275, 273, 445, 833, 272, 271, 270, 269, 268, 266, 265
20	Salem Middle School	444, 445, 833, 272, 271, 270, 269, 268, 266, 265
21	Salem High School	473, 831, 834, 275, 273, 445, 833, 272, 271, 270, 269, 268, 266, 265
22	The ARC of Salem County	304, 819
23	Morris Goodwin School	823, 822, 821, 377, 378
24	Stow Creek Township	340, 341, 342
25	Woodland Country Day School	339, 340, 341, 342
26	Southern Elementary School, Gunning Bedford Elementary School	663, 664, 648, 771,70, 72, 74, 807
27	Cedar Lane Elementary School, Alfred Waters Middle School, Cedar Lane Early Childhood Center	56, 55, 48, 801, 47, 46, 785, 40, 786, 38, 36, 35, 28, 27, 857
28	Silver Lake Elementary School	903, 681, 682, 683, 684, 856, 45, 46, 785, 40, 786, 38, 36, 35, 28, 27, 857
29	Townsend Elementary School, Townsend Early Childhood Center	709, 679, 680, 861, 33, 728, 32, 30, 29, 26, 23, 24
30	Redding Middle School	681, 682, 683, 684, 856, 45, 46, 785, 40, 786, 38, 36, 35, 28, 27, 857
31	Middletown High School	683, 684, 856, 45, 46, 785, 40, 786, 38, 36, 35, 28, 27, 857
32	AdvoServ	67, 69, 771, 70, 75, 940
33	St. Andrew's School, St. Anne's Episcopal School	673, 674, 675, 676, 677, 678, 679, 680, 861, 33, 728, 32, 30, 29, 26, 23
34	Everett Meredith Middle School, Groves Adult High School, Appoquinimink Early Childhood Center	668, 681, 682, 683, 684, 856, 45, 46, 785, 40, 786, 38, 36, 35, 28, 27, 857
35	Van Hook Walsh School	876, 875, 874, 873, 511, 863, 59, 62, 800, 68, 73, 74
37	Kathleen H. Wilbur Elementary School	603, 806, 71, 72, 74, 807
38	Brick Mill Elementary School	812, 684, 856, 45, 46, 785, 40, 786, 38, 36, 35, 28, 27, 857
39	St. George's Technical High School	277, 809, 142, 241, 244, 267, 302, 303, 309, 64, 65, 66, 67, 69, 771, 70, 75, 940

Table 8-6A. School Evacuation Time Estimates - Good Weather

School	Driver Mobilization Time(min)	Loading Time (min)	Dist. to EPZ Boundary (mi.)	Average Speed (mph)	Adjusted Speed (mph)	Travel Time to EPZ Bdry (min)	ETE (hr:min)	Dist. EPZ Bndry to R.C. (mi.)	Travel Time EPZ Bdry to RC (min)	ETE to R.C. (hr:min)
Salem County, NJ Schools										
Lower Alloways Creek Elementary School	90	15	4.61	48.89	45.00	7	**1:55**	10	14	**2:10**
Quinton Elementary School	90	15	4.16	55.23	45.00	6	**1:55**	10	14	**2:05**
Elsinboro Township Elementary School	90	15	5.35	37.95	37.95	9	**1:55**	8	11	**2:05**
John Fenwick Elementary School	90	15	4.28	8.57	8.57	30	**2:15**	10	14	**2:30**
Salem High School	90	15	4.78	9.30	9.30	31	**2:20**	10	14	**2:30**
Salem Middle School	90	15	3.80	12.33	12.33	19	**2:05**	10	14	**2:20**
The ARC of Salem County	90	15	1.22	49.77	45.00	2	**1:50**	10	14	**2:05**
Cumberland County, NJ Schools										
Stow Creek Township Elementary School	90	15	1.86	60.00	45.00	3	**1:50**	8	11	**2:00**
Woodland Country Day School	90	15	2.28	59.06	45.00	4	**1:50**	8	11	**2:00**
Morris Goodwin Elementary School	90	15	1.47	38.80	38.80	3	**1:50**	8	11	**2:00**
New Castle County, DE Schools										
Van Hook Walsh School Inc.	90	15	5.64	61.37	45.00	8	**1:55**	16	22	**2:15**
Everett Meredith Middle School	90	15	11.98	40.23	40.23	18	**2:05**	20	27	**2:30**
Groves Adult High Shool	90	15	11.98	40.23	40.23	18	**2:05**	13	18	**2:25**
Middletown High School	90	15	10.91	42.06	42.06	16	**2:05**	20	27	**2:30**
Silver Lake Elementary School	90	15	11.95	40.29	40.29	18	**2:05**	13	18	**2:25**
St. Andrew's School	90	15	8.90	16.18	16.18	34	**2:20**	20	27	**2:50**
St. Anne's Episcopal School	90	15	8.90	16.18	16.18	34	**2:20**	16	22	**2:45**
Townsend Elementary School	90	15	6.73	21.73	21.73	19	**2:05**	13	18	**2:25**
AdvoServ School	90	15	3.58	15.90	15.90	14	**2:00**	16	22	**2:25**
Alfred Waters Middle School	90	15	13.53	47.73	45.00	19	**2:05**	13	18	**2:25**
Brick Mill Elementary School	90	15	10.89	42.07	42.07	16	**2:05**	13	18	**2:20**
Cedar Lane Elementary School	90	15	13.53	47.73	45.00	19	**2:05**	13	18	**2:25**
Gunning Bedford Middle School	90	15	3.94	13.98	13.98	17	**2:05**	16	22	**2:25**
Kathleen H. Wilbur Elementary School	90	15	1.29	52.23	45.00	2	**1:50**	16	22	**2:10**
Louis L. Redding Middle School	90	15	11.76	40.68	40.68	18	**2:05**	20	27	**2:30**
Southern Elementary School	90	15	3.94	13.98	13.98	17	**2:05**	16	22	**2:25**
St. George's Technical High School	90	15	6.20	16.16	16.16	24	**2:10**	16	22	**2:35**
Appoquinimink Early Childhood Center	90	15	11.98	40.23	40.23	18	**2:05**	20	27	**2:30**
Cedar Lane Early Childhood Center	90	15	13.53	47.73	45.00	19	**2:05**	13	18	**2:25**
Townsend Early Childhood Center	90	15	6.73	21.73	21.73	19	**2:05**	13	18	**2:25**
						Maximum for EPZ:	**2:20**		**Maximum:**	**2:50**
						Average for EPZ:	**2:05**		**Average:**	**2:25**

Table 8-6B. School Evacuation Time Estimates - Rain										
School	**Driver Mobilization Time(min)**	**Loading Time (min)**	**Dist. to EPZ Boundary (mi.)**	**Average Speed (mph)**	**Adjusted Speed (mph)**	**Travel Time to EPZ Bdry (min)**	**ETE (hr:min)**	**Dist. EPZ Bndry to R.C. (mi.)**	**Travel Time EPZ Bdry to RC (min)**	**ETE to R.C. (hr:min)**
Salem County, NJ Schools										
Lower Alloways Creek Elementary School	100	20	4.61	44.18	40.00	7	**2:10**	10	15	**2:25**
Quinton Elementary School	100	20	4.16	49.77	40.00	7	**2:10**	10	15	**2:25**
Elsinboro Township Elementary School	100	20	5.35	34.61	34.61	10	**2:10**	8	12	**2:25**
John Fenwick Elementary School	100	20	4.28	8.42	8.42	31	**2:35**	10	15	**2:50**
Salem High School	100	20	4.78	9.13	9.13	32	**2:35**	10	15	**2:50**
Salem Middle School	100	20	3.80	12.11	12.11	19	**2:20**	10	15	**2:35**
The ARC of Salem County	100	20	1.22	45.00	40.00	2	**2:05**	10	15	**2:20**
Cumberland County, NJ Schools										
Stow Creek Township Elementary School	100	20	1.86	53.86	40.00	3	**2:05**	8	12	**2:15**
Woodland Country Day School	100	20	2.28	53.06	40.00	4	**2:05**	8	12	**2:20**
Morris Goodwin Elementary School	100	20	1.47	35.05	35.05	3	**2:05**	8	12	**2:15**
New Castle County, DE Schools										
Van Hook Walsh School Inc.	100	20	5.64	45.63	40.00	9	**2:10**	16	24	**2:35**
Everett Meredith Middle School	100	20	11.98	30.93	30.93	24	**2:25**	20	30	**2:55**
Groves Adult High Shool	100	20	11.98	30.93	30.93	24	**2:25**	13	20	**2:45**
Middletown High School	100	20	10.91	31.59	31.59	21	**2:25**	20	30	**2:55**
Silver Lake Elementary School	100	20	11.95	30.95	30.95	24	**2:25**	13	20	**2:45**
St. Andrew's School	100	20	8.90	14.06	14.06	38	**2:40**	20	30	**3:10**
St. Anne's Episcopal School	100	20	8.90	14.06	14.06	38	**2:40**	16	24	**3:05**
Townsend Elementary School	100	20	6.73	23.14	23.14	18	**2:20**	13	20	**2:40**
AdvoServ School	100	20	3.58	17.08	17.08	13	**2:15**	16	24	**2:40**
Alfred Waters Middle School	100	20	13.53	36.40	36.40	23	**2:25**	13	20	**2:45**
Brick Mill Elementary School	100	20	10.89	31.58	31.58	21	**2:25**	13	20	**2:45**
Cedar Lane Elementary School	100	20	13.53	36.40	36.40	23	**2:25**	13	20	**2:45**
Gunning Bedford Middle School	100	20	3.94	9.71	9.71	25	**2:25**	16	24	**2:50**
Kathleen H. Wilbur Elementary School	100	20	1.29	22.04	22.04	4	**2:05**	16	24	**2:30**
Louis L. Redding Middle School	100	20	11.76	31.12	31.12	23	**2:25**	20	30	**2:55**
Southern Elementary School	100	20	3.94	9.71	9.71	25	**2:25**	16	24	**2:50**
St. George's Technical High School	100	20	6.20	12.15	12.15	31	**2:35**	16	24	**2:55**
Appoquinimink Early Childhood Center	100	20	11.98	30.93	30.93	24	**2:25**	20	30	**2:55**
Cedar Lane Early Childhood Center	100	20	13.53	36.40	36.40	23	**2:25**	13	20	**2:45**
Townsend Early Childhood Center	100	20	6.73	23.14	23.14	18	**2:20**	13	20	**2:40**
						Maximum for EPZ:	**2:40**		**Maximum:**	**3:10**
						Average for EPZ:	**2:20**		**Average:**	**2:40**

Table 8-7. Summary of Transit-Dependent Bus Routes for the PSEG Site			
Route	Number of Buses	Route Description	Length (mi.)
1	1	New Jersey – Services ERPA 1	18
2A	1	New Jersey – Services the Southern half of ERPA 2	20
2B	1	New Jersey – Services the Northern half of ERPA 2	23
3A	1	New Jersey – Services the Southern half of ERPA 3	13
3B	1	New Jersey – Services the Northern half of ERPA 3, encompassing Salem	4
4	1	New Jersey - Services ERPA 4	10
5	1	New Jersey - Services ERPA 5	8
6	1	New Jersey - Services ERPA 6	18
7	1	New Jersey - Services ERPA 7	16
Blue	2	Delaware – Services Route 9 in New Castle County in the northern portion of the EPZ	21
Green	10	Delaware – Services mainly Routes 299 and 71 in Middletown	24
Red	5	Delaware – Services mainly Route 71 and Caldwell Corner Road in Townsend	26
Pink	2	Delaware – Services Route 9 and the outskirts of Smyrna in the southern portion of the EPZ	30
Purple	2	Delaware – Services mainly Lorewood Grove Rd and Cox Neck Road	25
Brown	4	Delaware – Services Delaware City, Route 9 north of the C&D Canal, and Route 896 south of the C&D Canal.	33

Table 8-8A. Transit-Dependent Evacuation Time Estimates - Good Weather

Route Number	Bus Number	Single Wave						Second Wave							
		Mobilization (min)	Route Distance (mi.)	Average Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE	ETE to Rec. Ctr (min)	Unload (min)	Driver Rest (min)	Return time to EPZ (min)	Average Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE
1	1	105	18	17.70	61	30	3:20	130	5	10	13	38.57	28	30	3:40
2A	1	105	20	36.36	33	30	2:50	130	5	10	13	36.36	33	30	3:45
2B	1	105	23	32.09	43	30	3:00	130	5	10	13	37.30	37	30	3:45
3A	1	105	13	14.72	53	30	3:10	130	5	10	13	39.00	20	30	3:30
3B	1	105	4	8.67	37	30	2:55	130	5	10	13	12.63	19	30	3:30
4	1	105	10	37.50	16	30	2:35	130	5	10	13	37.50	16	30	3:25
5	1	105	8	34.29	14	30	2:30	130	5	10	13	34.29	14	30	3:25
6	1	105	18	37.24	29	30	2:45	130	5	10	13	37.24	29	30	3:40
7	1	105	16	36.92	26	30	2:45	130	5	10	13	36.92	26	30	3:35
Blue	1	105	21	20.00	63	30	3:20	150	5	10	22	38.18	33	30	4:10
	2	110	21	20.00	63	30	3:25	155	5	10	22	38.18	33	30	4:15
Green	1	90	24	32.00	45	30	2:45	150	5	10	22	38.92	37	30	4:15
	2	95	24	33.49	43	30	2:50	155	5	10	22	38.92	37	30	4:20
	3	100	24	33.49	43	30	2:55	160	5	10	22	38.92	37	30	4:25
	4	105	24	36.92	39	30	2:55	165	5	10	22	38.92	37	30	4:30
	5	110	24	36.92	39	30	3:00	170	5	10	22	38.92	37	30	4:35
	6	115	24	38.92	37	30	3:05	175	5	10	22	38.92	37	30	4:40
	7	120	24	38.92	37	30	3:10	180	5	10	22	38.92	37	30	4:45
	8	125	24	38.92	37	30	3:15	185	5	10	22	38.92	37	30	4:50
	9	130	24	38.92	37	30	3:20	190	5	10	22	38.92	37	30	4:55
	10	135	24	38.92	37	30	3:25	195	5	10	22	38.92	37	30	5:00
Red	1	90	26	28.36	55	30	2:55	150	5	10	22	37.14	42	30	4:20
	2	95	26	28.89	54	30	3:00	155	5	10	22	37.14	42	30	4:25
	3	100	26	28.89	54	30	3:05	160	5	10	22	37.14	42	30	4:30
	4	105	26	28.89	54	30	3:10	165	5	10	22	37.14	42	30	4:35
	5	110	26	28.89	54	30	3:15	170	5	10	22	37.14	42	30	4:40
Pink	1	105	30	38.30	47	30	3:05	150	5	10	22	38.30	47	30	4:25
	2	110	30	38.30	47	30	3:10	155	5	10	22	38.30	47	30	4:30
Purple	1	105	25	35.71	42	30	3:00	150	5	10	22	36.59	41	30	4:20
	2	110	25	35.71	42	30	3:05	155	5	10	22	36.59	41	30	4:25
Brown	1	90	33	36.67	54	30	2:55	150	5	10	22	36.67	54	30	4:35
	2	95	33	36.67	54	30	3:00	155	5	10	22	36.67	54	30	4:40
	3	100	33	36.67	54	30	3:05	160	5	10	22	36.67	54	30	4:45
	4	105	33	36.67	54	30	3:10	165	5	10	22	36.67	54	30	4:50
Maximum ETE for Single Wave:							**3:25**	**Maximum ETE for Second Wave:**							**5:00**
Average ETE for Single Wave:							**3:00**	**Average ETE for Second Wave:**							**4:20**

Table 8-8B. Transit-Dependent Evacuation Time Estimates - Rain

Route Number	Bus Number	Single Wave: Mobilization (min)	Route Distance (mi.)	Average Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE	Second Wave: ETE to Rec. Ctr (min)	Unload (min)	Driver Rest (min)	Return time to EPZ (min)	Average Speed (mph)	Route Travel Time (min)	Pickup Time (min)	ETE
1	1	115	18	15.88	68	40	3:45	150	5	10	14	33.75	32	40	4:15
2A	1	115	20	31.58	38	40	3:15	150	5	10	14	31.58	38	40	4:20
2B	1	115	23	23.79	58	40	3:35	150	5	10	14	32.86	42	40	4:25
3A	1	115	13	13.45	58	40	3:35	150	5	10	14	33.91	23	40	4:05
3B	1	115	4	5.85	41	40	3:20	150	5	10	14	15.00	16	40	3:55
4	1	115	10	33.33	18	40	2:55	150	5	10	14	33.33	18	40	4:00
5	1	115	8	30.00	16	40	2:55	150	5	10	14	30.00	16	40	3:55
6	1	115	18	31.76	34	40	3:10	150	5	10	14	31.76	34	40	4:15
7	1	115	16	32.00	30	40	3:05	150	5	10	14	32.00	30	40	4:10
Blue	1	115	21	18.81	67	40	3:45	170	5	10	24	33.16	38	40	4:50
	2	120	21	18.81	67	40	3:50	175	5	10	24	33.16	38	40	4:55
Green	1	100	24	29.39	49	40	3:10	170	5	10	24	34.29	42	40	4:55
	2	105	24	29.39	49	40	3:15	175	5	10	24	34.29	42	40	5:00
	3	110	24	29.39	49	40	3:20	180	5	10	24	34.29	42	40	5:05
	4	115	24	28.80	50	40	3:25	185	5	10	24	34.29	42	40	5:10
	5	120	24	28.80	50	40	3:30	190	5	10	24	34.29	42	40	5:15
	6	125	24	30.64	47	40	3:35	195	5	10	24	34.29	42	40	5:20
	7	130	24	30.64	47	40	3:40	200	5	10	24	34.29	42	40	5:25
	8	135	24	34.29	42	40	3:40	205	5	10	24	34.29	42	40	5:30
	9	140	24	34.29	42	40	3:45	210	5	10	24	34.29	42	40	5:35
	10	145	24	34.29	42	40	3:50	215	5	10	24	34.29	42	40	5:40
Red	1	100	26	24.00	65	40	3:25	170	5	10	24	31.84	49	40	5:00
	2	105	26	23.64	66	40	3:35	175	5	10	24	31.84	49	40	5:05
	3	110	26	23.64	66	40	3:40	180	5	10	24	31.84	49	40	5:10
	4	115	26	23.64	66	40	3:45	185	5	10	24	31.84	49	40	5:15
	5	120	26	23.64	66	40	3:50	190	5	10	24	31.84	49	40	5:20
Pink	1	115	30	30.51	59	40	3:35	170	5	10	24	33.33	54	40	5:05
	2	120	30	30.51	59	40	3:40	175	5	10	24	33.33	54	40	5:10
Purple	1	115	25	30.00	50	40	3:25	170	5	10	24	31.91	47	40	5:00
	2	120	25	30.00	50	40	3:30	175	5	10	24	31.91	47	40	5:05
Brown	1	100	33	31.43	63	40	3:25	170	5	10	24	31.43	63	40	5:15
	2	105	33	31.43	63	40	3:30	175	5	10	24	31.43	63	40	5:20
	3	110	33	31.43	63	40	3:35	180	5	10	24	31.43	63	40	5:25
	4	115	33	31.43	63	40	3:40	185	5	10	24	31.43	63	40	5:30
						Maximum ETE for Single Wave:	**3:50**							**Maximum ETE for Second Wave:**	**5:40**
						Average ETE for Single Wave:	**3:30**							**Average ETE for Second Wave:**	**4:55**

9. TRAFFIC MANAGEMENT STRATEGY

This section presents the suggested traffic control and management strategy that is designed to expedite the movement of evacuating traffic. The resources required to implement this strategy include:

- Personnel with the capabilities of performing the planned control functions of traffic guides (preferably, not necessarily, law enforcement officers).
- Traffic Control Devices to assist these personnel in the performance of their tasks. These devices should comply with the guidance of the Manual of Uniform Traffic Control Devices (MUTCD) published by the Federal Highway Administration (FHWA) of the U.S.D.O.T. All state and most county transportation agencies have access to the MUTCD (also available online). Applicable devices include, with reference to the MUTCD:
    - Traffic Barriers: Chapter 6F, section 6F.61, 62 and Figure 6F-4.
    - Traffic Cones: Chapter 3F and section 6F.56.
    - Signs: Chapter 2I
- A plan that defines all necessary details and is documented in a format that is readily understood by those assigned to perform traffic control.

The functions to be performed in the field are:

1. Facilitate evacuating traffic movements that serve to expedite travel out of the EPZ along routes that the analysis has found to be most effective.
2. Discourage traffic movements that permit evacuating vehicles to travel in a direction which takes them significantly closer to the power station, or which interferes with the efficient flow of other evacuees.

We employ the terms "facilitate" and "discourage" rather than "enforce" and "prohibit" to indicate the need for flexibility in performing the traffic control function. There are always legitimate reasons for a driver to prefer a direction other than that indicated. For example:

- A driver may be traveling home from work or from another location, to join other family members preliminary to evacuating.
- An evacuating driver may be taking a detour from the evacuation route in order to pick up a relative, or other evacuees.
- The driver may be an emergency worker en route to perform an important activity.

The implementation of a plan must also be flexible enough for the application of sound judgment by the traffic guide.

The traffic management strategy is the outcome of the following process:

1. A field survey of these critical locations.
   The schematics describing traffic control, which are presented in Appendix G, are based on data collected during field surveys, upon large-scale maps, and on overhead photos.
2. Computer analysis of the evacuation traffic flow environment.
   This analysis identifies the best routing and those locations that experience pronounced congestion.
3. Consultation with emergency management and enforcement personnel.
   Trained personnel who are experienced in controlling traffic and are aware of the likely evacuation traffic patterns have reviewed these control tactics.
4. Prioritization of TCPs.
   Application of traffic control at some TCPs will have a more pronounced influence on expediting traffic movements than at other TCPs. For example, TCPs controlling traffic originating from areas in close proximity to the power plant could have a more beneficial effect on minimizing potential exposure to radioactivity than those TCPs located far from the power plant. Thus, during the mobilization of personnel to respond to the emergency situation, those TCPs which are assigned a higher priority should be manned earlier. These priorities have been reviewed by state/county emergency management representatives and by law enforcement personnel.

The control tactic at each TCP is presented in each schematic that appears in Appendix G. The traffic management plan has been reviewed by the state and county emergency planners with local and state police. Specifically the number and locations of the suggested TCP and ACP have been reviewed in detail, and the indicated resource requirements have been reconciled with current assets.

The use of Intelligent Transportation Systems (ITS) technologies can reduce manpower and equipment needs, while still facilitating the evacuation process. Dynamic Message Signs (DMS) can be placed within the EPZ to provide information to travelers regarding traffic conditions, route selection, and reception center information. DMS can also be placed outside of the EPZ to warn motorists to avoid using routes that may conflict with the flow of evacuees away from the power plant. Highway Advisory Radio (HAR) can be used to broadcast information to evacuees en route through their vehicle stereo systems. Automated Traveler Information Systems (ATIS) can also be used to provide evacuees with information. Internet websites can provide traffic and evacuation route information before the evacuee begins his trip, while on board navigation systems (GPS units), cell phones, and pagers can be used to provide information en route. These are only several examples of how ITS technologies can benefit the evacuation process. Consideration should be given that ITS technologies be used to facilitate the evacuation process, and any additional signage placed should consider evacuation needs.

Chapter 2I of the MUTCD presents guidance on Emergency Management signing. Specifically, the Evacuation Route sign, EM-1 on page 2I-3, with the word “Hurricane” removed, could be installed selectively within the EPZ, if considered advisable by local and state authorities. Similar comments apply to sign EM-3 which identifies TCP locations.

As discussed in Section 2.3, these TCP are not credited in calculating the ETE results. Access control points (ACP) are deployed near the periphery of the EPZ to divert “through” trips. The ETE calculations reflect the assumptions that all “external-external” trips are interdicted after 90 minutes have elapsed after the advisory to evacuate (ATE).

All transit trips and other responders entering the EPZ to support the evacuation are assumed to be unhindered by personnel manning TCP.

Study Assumptions 5 and 6 in Section 2.3 discuss ACP and TCP staffing schedules and operations.

10. EVACUATION ROUTES

Evacuation routes are comprised of two distinct components:

- Routing from an ERPA being evacuated to the boundary of the Evacuation Region and thence out of the Emergency Planning Zone (EPZ).
- Routing of evacuees from the EPZ boundary to reception centers.

Evacuees should be routed within the EPZ in such a way as to *minimize their exposure to risk*. This primary requirement is met by routing traffic to move away from the location of the PSEG Site, to the extent practicable, and by delineating evacuation routes that expedite the movement of evacuating vehicles. This latter objective is addressed by developing evacuation routes to achieve a balancing of traffic demand relative to the available highway capacity to the extent possible, subject to satisfying the primary requirement noted above. This is achieved by carefully specifying candidate destinations for all origin centroids where evacuation trips are generated, and applying the TRAD model effectively. See Appendices A-D for further discussion.

The routing of evacuees from the EPZ boundary to reception centers should be responsive to several considerations:

- Minimize the amount of travel outside the EPZ, from the points where these routes cross the EPZ boundary, to the reception centers.
- Relate the anticipated volume of traffic destined to the reception center, to the capacity of the reception center facility.

Figure 10-1 presents a map showing the general population reception centers. The major evacuation routes for the four quadrants of the EPZ are presented in Figures 10-2 through 10-5.

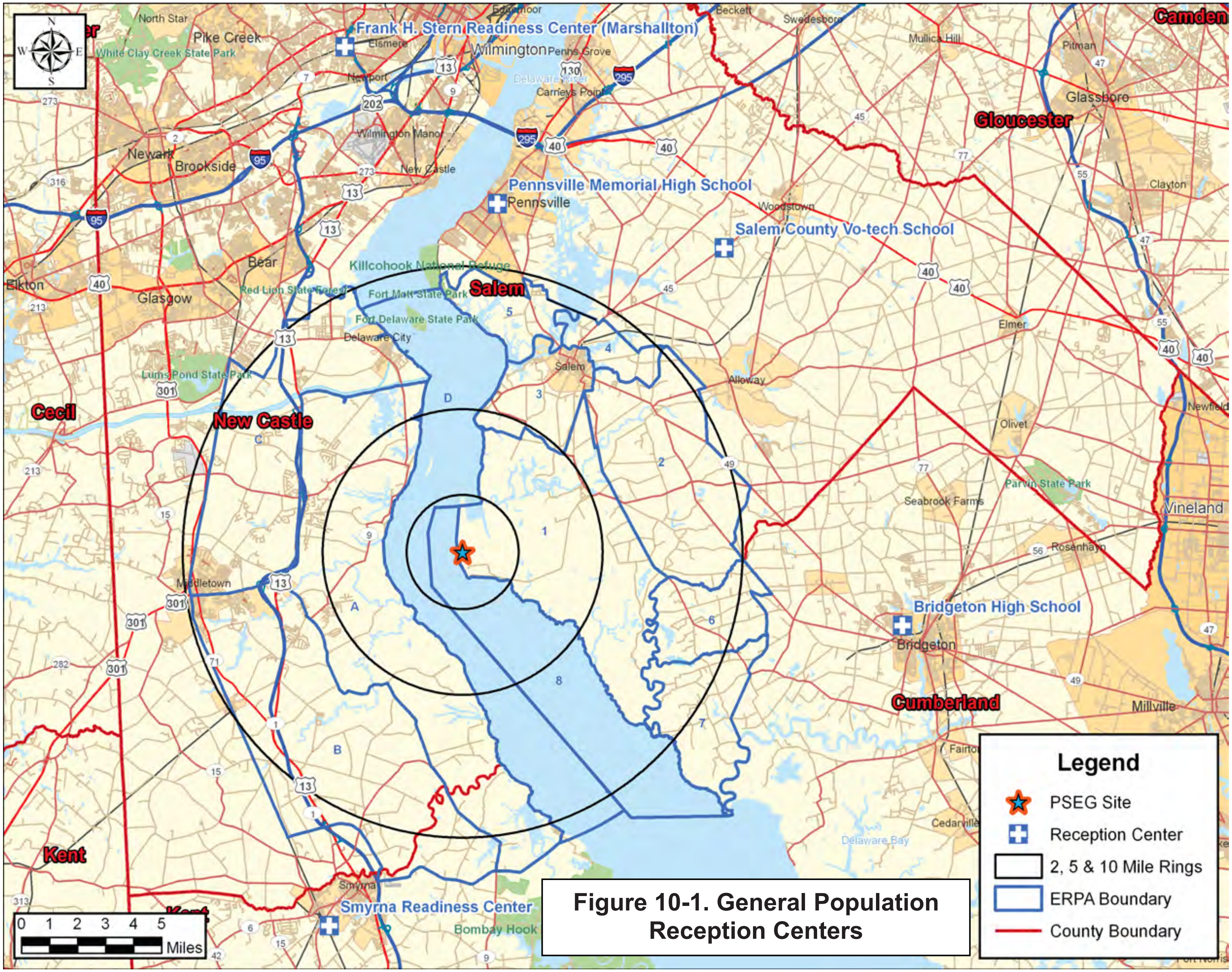


Figure 10-1. General Population Reception Centers

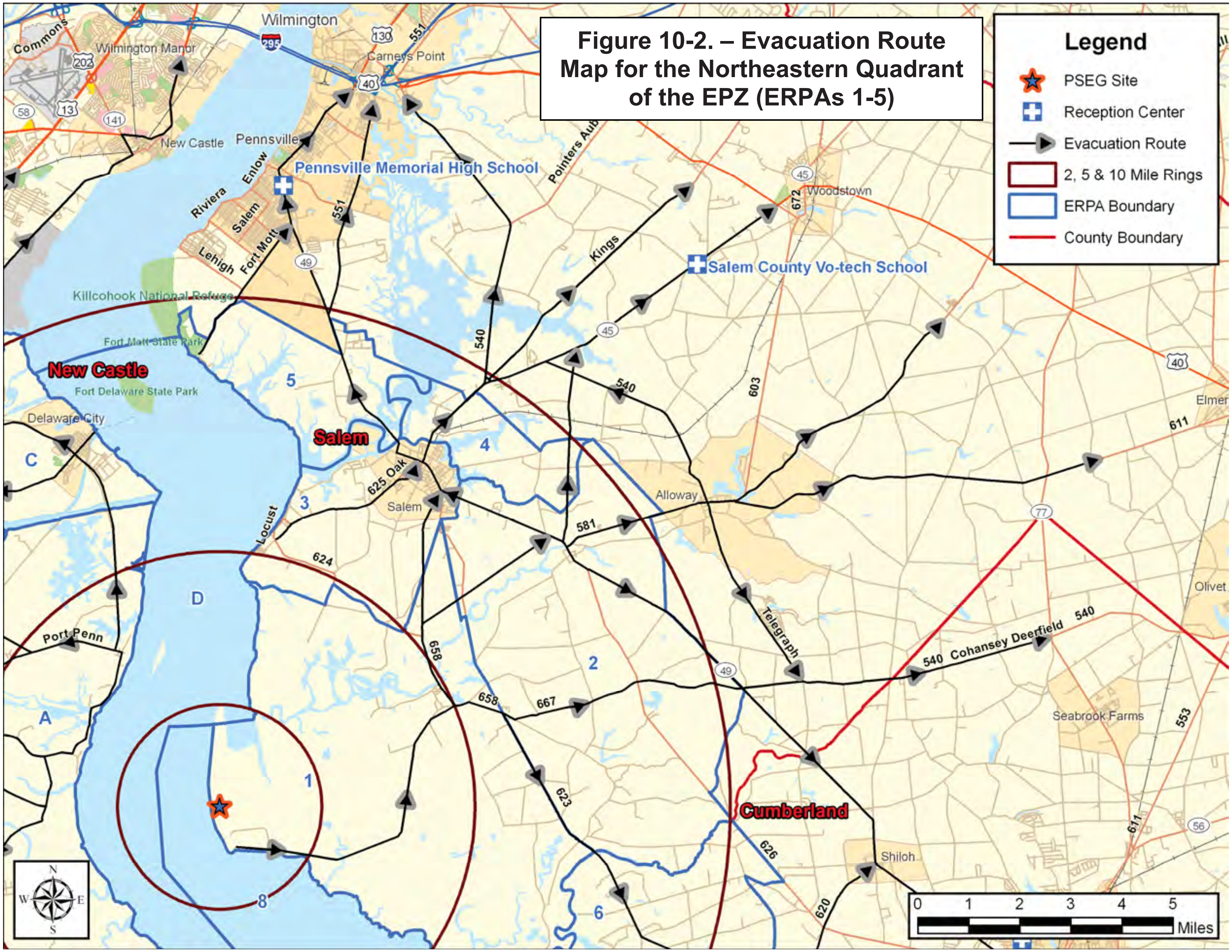


Figure 10-2. – Evacuation Route Map for the Northeastern Quadrant of the EPZ (ERPAs 1-5)

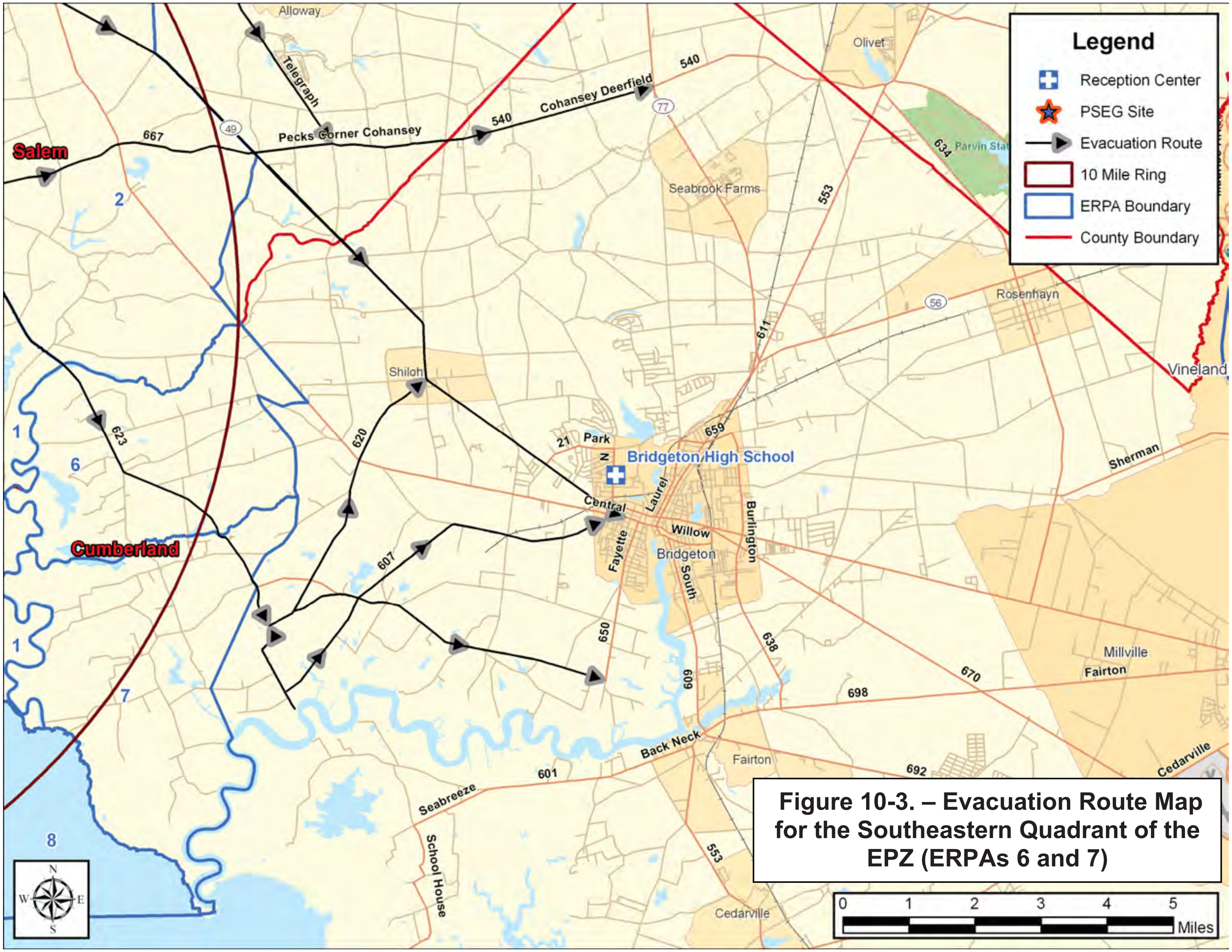


Figure 10-3. – Evacuation Route Map for the Southeastern Quadrant of the EPZ (ERPAs 6 and 7)


Figure 10-4. – Evacuation Route Map for the Northwestern Quadrant of the EPZ (ERPA C)
Legend
PSEG Site
Reception Center
Evacuation Route
10 Mile Ring
ERPA Boundary
County Boundary
Frank H. Stern Readiness Center (Marshallton)
Pennsville Memorial High School
New Castle
Salem
Newark
Brookside
Bear
Glasgow
Elkton
Elsmere
Newport
Wilmington Manor
Pennsville
Delaware City
Chesapeake City
Killcohook National Refuge
Fort Mott State Park
Fort Delaware State Park
Lums Pond State Park
A
C
D
3
4
5
0 1 2 3 4 5 Miles

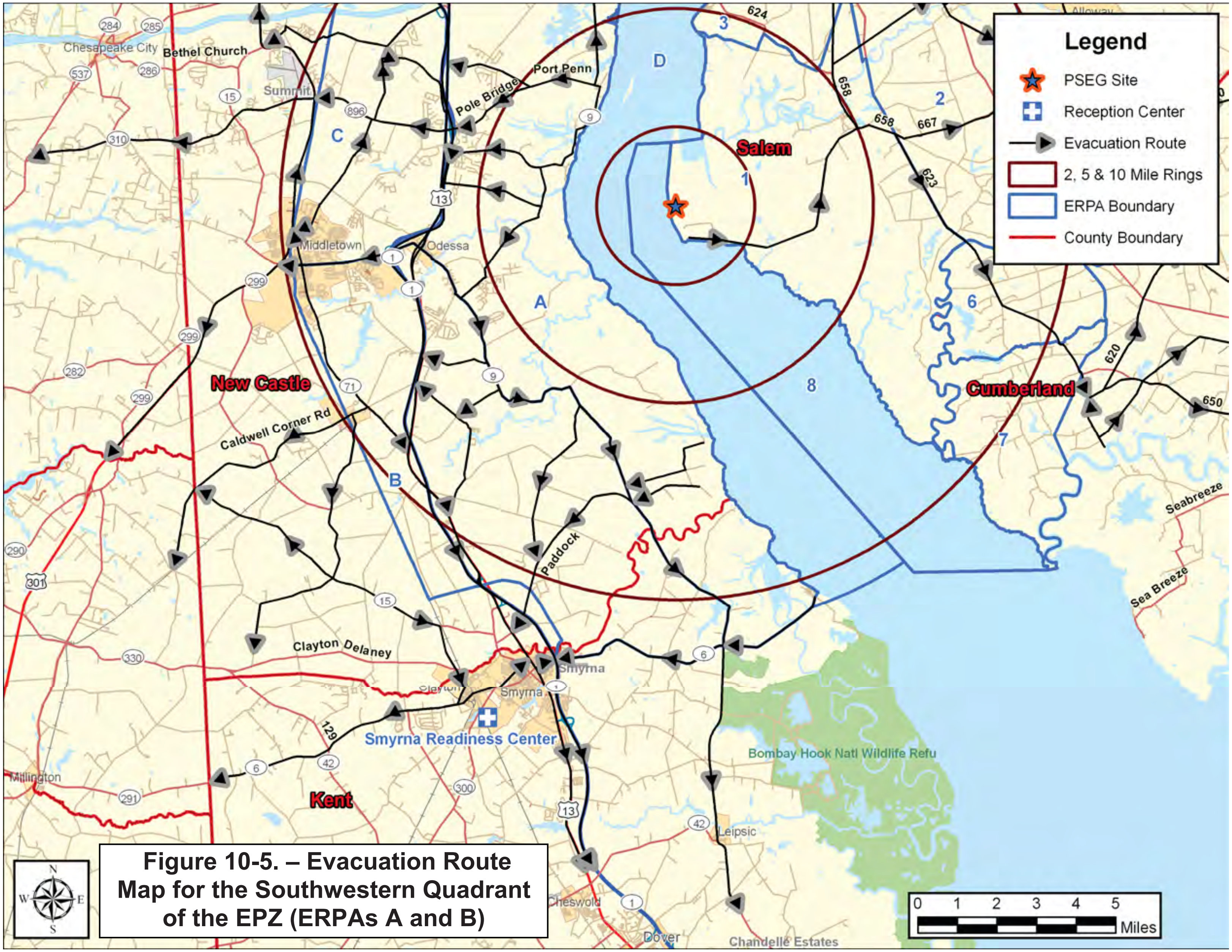


Figure 10-5. – Evacuation Route Map for the Southwestern Quadrant of the EPZ (ERPAs A and B)

11. SURVEILLANCE OF EVACUATION OPERATIONS

There is a need for surveillance of traffic operations during the evacuation. There is also a need to clear any blockage of roadways arising from accidents or vehicle disablement. Surveillance can take several forms.

1. Traffic control personnel, located at Traffic Control and Access Control points, provide fixed-point surveillance.
2. Ground patrols may be undertaken along well-defined paths to ensure coverage of those highways that serve as major evacuation routes.
3. Aerial surveillance of evacuation operations may also be conducted using helicopter or fixed-wing aircraft.
4. Cellular phone calls (if cellular coverage exists) from motorists may also provide direct field reports of road blockages.

These concurrent surveillance procedures are designed to provide coverage of the entire EPZ as well as the area around its periphery. It is the responsibility of the Counties to support an emergency response system that can receive messages from the field and be in a position to respond to any reported problems in a timely manner. This coverage should quickly identify, and expedite the response to any blockage caused by a disabled vehicle.

Tow Vehicles

In a low-speed traffic environment, any vehicle disablement is likely to arise due to a low-speed collision, mechanical failure or the exhaustion of its fuel supply. In any case, the disabled vehicle can be pushed onto the shoulder, thereby restoring traffic flow. Past experience in other emergencies indicates that evacuees who are leaving an area often perform activities such as pushing a disabled vehicle to the side of the road without prompting.

While the need for tow vehicles is expected to be low under the circumstances described above, it is still prudent to be prepared for such a need. Consideration should be given that tow trucks with a supply of gasoline be deployed at strategic locations within, or just outside, the EPZ. These locations should be selected so that:

- They permit access to key, heavily loaded, evacuation routes.
- Responding tow trucks would most likely travel counter-flow relative to evacuating traffic.

Consideration should also be given that the state emergency management agencies encourage gas stations to remain open during the evacuation.

12. CONFIRMATION TIME

It is necessary to confirm that the evacuation process is effective in the sense that the public is complying with the Advisory to Evacuate. Consideration should be given that the counties and states in the EPZ develop procedures for confirmation of the evacuation. Should procedures not already exist, we suggest an alternative or complementary approach.

The procedure we suggest employs a stratified random sample and a telephone survey. The size of the sample is dependent on the expected number of households that do not comply with the Advisory to Evacuate. We believe it is reasonable to assume, for the purpose of estimating sample size that at least 80 percent of the population within the EPZ will comply with the Advisory to Evacuate. On this basis, an analysis could be undertaken (see Table 12-1) to yield an estimated sample size of approximately 300.

The confirmation process should start at about 3 hours after the Advisory to Evacuate, which is when 90 percent of evacuees have completed their mobilization activities (see Table 5-9). At this time, virtually all evacuees will have departed on their respective trips and the local telephone system will be largely free of traffic.

As indicated in Table 12-1, approximately 7½ person hours are needed to complete the telephone survey. If six people are assigned to this task, each dialing a different set of telephone exchanges (e.g., each person can be assigned a different set of ERPAs), then the confirmation process will extend over a time frame of about 75 minutes. Thus, the confirmation should be completed well before the evacuated area is cleared. Of course, fewer people would be needed for this survey if the Evacuation Region were only a portion of the EPZ. Use of modern automated computer controlled dialing equipment can significantly reduce the manpower requirements and the time required to undertake this type of confirmation survey.

If this method is indeed used by the EPZ counties, consideration should be given that a list of telephone numbers within the EPZ be kept in the Emergency Operations Center (EOC) at all times. Such a list could be purchased from vendors and should be periodically updated. As indicated above, the confirmation process should not begin until 3 hours after the Advisory to Evacuate, to ensure that households have had enough time to mobilize. This 3-hour timeframe will enable telephone operators to arrive at their workplace, obtain a call list and prepare to make the necessary phone calls.

Should the number of telephone responses (i.e., people still at home) exceed 20 percent, then the telephone survey should be repeated after an hour's interval until the confirmation process is completed.

TABLE 12-1
ESTIMATED NUMBER OF TELEPHONE CALLS REQUIRED FOR CONFIRMATION OF EVACUATION

Problem Definition

Estimate number of phone calls, n, needed to ascertain the proportion, F of households that have not evacuated.

Reference: Burstein, H., Attribute Sampling, McGraw Hill, 1971

Given:

No. of households plus other facilities, N, within the EPZ (est.) = 15,500
Est. proportion, F, of households that will not evacuate = 0.20
Allowable error margin, e: 0.05
Confidence level, α: 0.95 (implies A = 1.96)

Applying Table 10 of cited reference,

$$p = F + e = 0.25;\ q = 1 - p = 0.75$$

$$n = \frac{A^2 pq + e}{e^2} = 308$$

Finite population correction:

$$n_F = \frac{nN}{n + N - 1} = 302$$

Thus, some 300 telephone calls will confirm that approximately 20 percent of the population has not evacuated. If only 10 percent of the population does not comply with the Advisory to Evacuate, then the required sample size, n_F = 213.

Est. Person Hours to complete 300 telephone calls

Assume: Time to dial using touch-tone (random selection of listed numbers): 30 seconds
Time for 6 rings (no answer): 36 seconds
Time for 4 rings plus short conversation: 60 sec.
Interval between calls: 20 sec.

Person Hours: 300[30+0.8(36)+0.2(60)+20]/3600 = 7.6

13. OBSERVATIONS

The following considerations are offered:

1. The traffic management plan has been reviewed by state and county emergency planners with local and state police (See Section 9 and Appendix G). Specifically…
   - The number and locations of suggested Traffic Control Points (TCP) and Access Control Points (ACP) have been reviewed in detail.
   - The indicated resource requirements (personnel, cones, barriers, etc.) have been reconciled with current assets.
2. Intelligent Transportation Systems (ITS) such as Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), Automated Traveler Information Systems (ATIS), etc. should be used to facilitate the evacuation process (See Section 9). The placement of additional signage should consider evacuation needs.
3. Counties/states should implement procedures whereby schools are contacted prior to dispatch of buses from the depots to get an accurate count of students needing transportation and the number of buses required (See Section 8).
4. Average school ETE (Tables 8-6A and 8-6B) do not exceed the ETE for the general population at the 90th percentile for an evacuation of the entire EPZ (Region R03). The ETE for transit-dependent people (Tables 8-8A and 8-8B) do exceed the ETE for the general population at the 90th percentile. Thus, Tables 8-8A and 8-8B should be considered when making Protective Action Decisions.
5. Counties/states should establish strategic locations to position tow trucks provided with gasoline containers in the event of a disabled vehicle during the evacuation process (see Section 11) and should encourage gas stations to remain open during the evacuation.
6. Counties/states should establish a system to confirm that the Advisory to Evacuate is being adhered to (see the approach suggested by KLD in Section 12).
   - Should the approach offered by KLD in Section 12 be used, consideration should be given to keep a list of telephone numbers within the EPZ in the Emergency Operations Center (EOC) at all times.
7. Examination of the general population ETE in Section 7 and in Appendix J shows that the ETE for 100 percent of the population is generally 3 to 3½ hours longer than for 90 percent of the population. Specifically, the additional time needed for the last 10 percent of the population to evacuate can be as much as double the time needed to evacuate 90 percent of the population. This non-linearity reflects the fact that these relatively few stragglers require significantly more time to mobilize (i.e. prepare for the evacuation trip) than their neighbors. This leads to two considerations:
   - The public outreach (information) program should emphasize the need for evacuees to minimize the time needed to prepare to evacuate (secure the home, assemble needed clothes, medicines, etc.).

- The decision makers should reference Table 7-1B or Table J-1B which list the time needed to evacuate 90 percent of the population, when preparing recommended protective actions.

APPENDIX A

Glossary of Traffic Engineering Terms

APPENDIX A: GLOSSARY OF TRAFFIC ENGINEERING TERMS

Term	Definition
Link	A network link represents a specific, one-directional section of roadway. A link has both physical (length, number of lanes, topology, etc.) and operational (turn movement percentages, service rate, free-flow speed) characteristics.
Measures of Effectiveness	Statistics describing traffic operations on a roadway network.
Node	A network node generally represents an intersection of network links. A node has control characteristics, i.e., the allocation of service time to each approach link.
Origin	A location attached to a network link, within the EPZ or shadow region, where trips are generated at a specified rate in vehicles per hour (vph). These trips enter the roadway system to travel to their respective destinations.
Network	A graphical representation of the geometric topology of a physical roadway system, which is comprised of directional links and nodes.
Prevailing Roadway and Traffic Conditions	Relates to the physical features of the roadway, the nature (e.g., composition) of traffic on the roadway and the ambient conditions (weather, visibility, pavement conditions, etc.).
Service Rate	Maximum rate at which vehicles, executing a specific turn maneuver, can be discharged from a section of roadway at the prevailing conditions, expressed in vehicles per second (vps) or vehicles per hour (vph).
Service Volume	Maximum number of vehicles which can pass over a section of roadway in one direction during a specified time period with operating conditions at a specified Level of Service (The Service Volume at the upper bound of Level of Service, E, equals Capacity). Service Volume is usually expressed as vehicles per hour (vph).
Signal Cycle Length	The total elapsed time to display all signal indications, in sequence. The cycle length is expressed in seconds.
Signal Interval	A single combination of signal indications. The interval duration is expressed in seconds. A signal phase is comprised of a sequence of signal intervals.
Signal Phase	A set of signal indications (and intervals) which services a particular combination of traffic movements on selected approaches to the intersection. The phase duration is expressed in seconds.

Term	Definition
Traffic (Trip) Assignment	A process of assigning traffic to paths of travel in such a way as to satisfy all trip objectives (i.e., the desire of each vehicle to travel from a specified origin in the network to a specified destination) and to optimize some stated objective or combination of objectives. In general, the objective is stated in terms of minimizing a generalized "cost". For example, "cost" may be expressed in terms of travel time.
Traffic Density	The number of vehicles that occupy one lane of a roadway section of specified length at a point in time, expressed as vehicles per mile (vpm).
Traffic (Trip) Distribution	A process for determining the destinations of all traffic generated at the origins. The result often takes the form of a Trip Table, which is a matrix of origin-destination traffic volumes.
Traffic Simulation	A computer model designed to replicate the real-world operation of vehicles on a roadway network, so as to provide statistics describing traffic performance. These statistics are called Measures of Effectiveness.
Traffic Volume	The number of vehicles that pass over a section of roadway in one direction, expressed in vehicles per hour (vph). Where applicable, traffic volume may be stratified by turn movement.
Travel Mode	Distinguishes between private auto, bus, rail, pedestrian and air travel modes.
Trip Table or Origin-Destination Matrix	A rectangular matrix or table, whose entries contain the number of trips generated at each specified origin, during a specified time period, that are attracted to (and travel toward) each of its specified destinations. These values are expressed in vehicles per hour (vph) or in vehicles.
Turning Capacity	The capacity associated with that component of the traffic stream which executes a specified turn maneuver from an approach at an intersection.

APPENDIX B

Traffic Assignment Model

APPENDIX B: TRAFFIC ASSIGNMENT MODEL

This section describes the integrated trip assignment and distribution model named TRAD that is expressly designed for use in analyzing evacuation scenarios. This model employs equilibrium traffic assignment principles and is one of the models of the IDYNEV System.

To apply TRAD, the analyst must specify the highway network, link capacity information, the volume of traffic generated at all origin centroids, a set of accessible candidate destination nodes on the periphery of the EPZ for each origin, and the capacity (i.e., "attraction") of each destination node. TRAD calculates the optimal trip distribution and the optimal trip assignment (i.e., routing) of the traffic generated at each origin node, traveling to the associated set of candidate destination nodes, so as to minimize evacuee travel times.

Overview of Integrated Distribution and Assignment Model

The underlying premise is that the selection of destinations and routes is intrinsically coupled in an evacuation scenario. That is, people in vehicles seek to travel out of an area of potential risk as rapidly as possible by selecting the "best" route. The model is designed to identify these "best" routes in a manner that distributes vehicles from origins to destinations and routes them over the highway network, in a consistent and optimal manner.

The approach we adopt is to extend the basic equilibrium assignment methodology to embrace the distribution process, as well. That is, the selection of destination nodes by travelers from each origin node, and the selection of the connecting paths of travel, are both determined by the integrated model. This determination is subject to specified capacity constraints, so as to satisfy the stated objective function. This objective function is the statement of the User Optimization Principle by Wardrop[1].

To accomplish this integration, we leave the equilibrium assignment model intact, changing only the form of the objective function. It will also be necessary to create a "fictional" augmentation of the highway network. This augmentation will consist of Pseudo-Links and Pseudo-Nodes, so configured as to embed an equilibrium Distribution Model within the fabric of the Assignment Model.

[1] Wardrop, J.G., 1952. Some Theoretical Aspects of Road Traffic Research, *Proceedings, Institute of Civil Engineers*, Part II, Vol. 1, pp. 325-378.

Specification of TRAD Model Inputs

The user must specify, for each origin node, the average hourly traffic volume generated, as well as a set of candidate accessible destinations. A destination is "accessible" to traffic originating at an origin node if there is at least one path connecting the origin to the destination node. There must be at least one destination node specified for each origin centroid. The number of trips generated at the origin node, which are distributed to each specified, accessible destination node within this set, is determined by the model in a way as to satisfy the network-wide objective function (Wardrop's Principle).

The user must also specify the total number of trips which can be accommodated by each destination node. This value reflects the capacities of the road(s) immediately servicing the destination node. We call this number of trips, the "attraction" of the destination node, consistent with conventional practice. Clearly, we require that the total number of trips traveling to a destination, j, from all origin nodes, i, cannot exceed the attraction of destination node, j. By summing over all destination nodes, this constraint also states that the total trips generated at all origin nodes must not exceed the total capacity to accommodate these trips at all of the specified destinations.

In summary, the user must specify the total trips generated at each of the origin nodes, the maximum number of trips that can be accommodated by each of the specified destination nodes and the highway network attributes which include the traffic control tactics. The TRAD model includes a function which expresses travel time on each network link in terms of traffic volume and link capacity. This function drives the underlying trip distribution and trip assignment decision-making process. Thus, the TRAD model satisfies the objectives of evacuees to select destination nodes and travel paths to minimize evacuation travel time. As such, this integrated model is classified as a behavioral model.

At the outset, it may appear that we have an intractable problem:

- If TRAD retains the basic assignment algorithm, it must be provided a Trip Table as input.
- On the other hand, if the distribution model is embedded within the assignment model, rather than preceding it, a Trip Table is not available as input.

The resolution of this problem is as follows:

1. We construct an "augmentation" network that allows the user to specify only the volume for each origin node. The allocation of trips from the origin node to each candidate destination node is not specified and will be determined internally by the model.
2. We construct pseudo-links which enforce the specified values of attraction, A_j, for all destination nodes, j, by suitably calibrating the relationship of the travel time vs. volume and capacity.

This augmented network is comprised of three subnetworks:

1. The highway subnetwork, which consists of "Class I" Links and Nodes.
2. A subnetwork of "Class II" Pseudo-Links which acts as an interface between the highway subnetwork and the network augmentation.
3. The subnetwork of "Class III" Pseudo-Links and Nodes which comprises the network augmentation described above.

The need for these Class II links will become clear later. The classifications are described below:

Class I Links and Nodes

These links and nodes represent the physical highway network: sections of highway and intersections. Trips generated at each Origin [Centroid] Node are assigned to a specified Class I link via a "connector" link. These connector links are transparent to the user and offer no impedance to the traveler; they represent the aggregation of local streets which service the centroidal generated trips and feed them onto the highway network. The real-world destination nodes are part of this network. The immediate approaches to these destination nodes are Class I links.

Class II Links

These pseudo-links are constructed so as to connect each specified destination node with its Class III Pseudo-Node (P-N) counterpart on a one-to-one basis. The capacities of these Class II links are set equal to the capacities at their respective destination nodes.

Class III Links and Nodes

Class III links and nodes form the augmentation to the basic network. These Pseudo-Links provide paths from the Class II links servicing traffic traveling from the specified [real] destination nodes, to the Super-Nodes which represent the user-specified set of destination nodes associated with each origin node.
Each Class of links provides a different function:

- Class I links represent the physical highway network. As such, each link has a finite capacity, a finite length and an estimated travel time for free-flowing vehicles. The nodes generally represent intersections, interchanges and, possibly, changes in link geometry. The topology of the Class I network represents that of the physical highway system.
- The Class II links represent the interface between the real highway subnetwork and the augmentation subnetwork. These pseudo-links are needed to represent the specified "attractions" of each destination node, i.e.,

the maximum number of vehicles that can be accommodated by each destination node. Instead of explicitly assigning a capacity limitation to the destination nodes, we assign this capacity limitation of the Class II Pseudo-Links. This approach is much more suitable, computationally.

- The topology of the network augmentation (i.e., Class III Links and Nodes) is designed so that all traffic from an origin node can only travel to the single "Super-Node" by flowing through its set of real destination nodes, thence along the links of the augmented network.

The Class II Pseudo-Links and the network augmentation of Class III Pseudo-Nodes and Links represent logical constructs of fictitious links created internally by the model that allows the user to specify the identity of all destination nodes in each origin-based set, without specifying the distribution of traffic volumes from the origin to each destination node in that set.

Calculation of Capacities and Impedances

Each class of links exhibits different properties. Specifically, the relationship between travel impedance (which is expressed in terms of travel time) and both volume and capacity will differ:

- For Class I links, the capacity represents the physical limitation of the highway sections. Travel impedance is functionally expressed by relating travel time with respect to the traffic volume-link capacity relationship.
- For Class II links, link capacity represents the maximum number of vehicles that can be accommodated at the [real] destination nodes that form the upstream nodes of each Class II link. Since Class II links are Pseudo-Links, there should be virtually no difference in impedance to traffic along Class II links when the assigned traffic volume on these links is below their respective capacities. That is, the assignment of traffic should not be influenced by differences in travel impedance on those Class II links where the assigned volumes do not exceed their respective capacities.
- For Class III links, both capacity and impedance have no meaning. Since the Class II links limit the number of vehicles entering the Class III subnetwork at all entry points (i.e., at the Class II Pseudo-Nodes) and since all these links are Pseudo-Links, it follows that the Class III network is, by definition, an uncapacitated network.

Specification of the Objective Function

It is computationally convenient to be able to specify a single impedance (or "cost") function relating the travel time on a link, to its capacity and assigned traffic volume, for all classes of links. To achieve this, we will adopt the following form based on the original "BPR Formula[2]":

$$T = T_o\{\alpha[1 + a_1(\frac{v}{c})^{b_1}] + \beta[1 + a_2(\frac{v}{c})^{b_2}]\} + I$$

Where, as for the present traffic assignment model in TRAD,

T	=	Link travel time, sec.
T_o	=	Unimpeded link travel time, sec.
V	=	Traffic volume on the link, veh/hr
C	=	Link capacity, veh/hr
a_i,b_i	=	Calibration parameters
α, ß	=	Coefficients defined below
I	=	Impedance term, expressed in seconds, which could represent turning penalties or any other factor which is justified in the user's opinion

The assignment of coefficients varies according to the Class in which a link belongs:

Class	α	ß	T_o
I	1	0	L/U_f
II	0	1	W
III	0	0	1

Here, L is a highway link length and U_f is the free-flow speed of traffic on a highway link. The values of a_1 and b_1, which are applicable only for Class I links, are based on experimental data:

$a_1 = 0.8$ $b_1 = 5.0$

The values of a_2 and b_2, which are applicable for each Class II link, are based upon the absolute requirement that the upstream destination node can service no more traffic than the user-specified value of the maximum "attraction". In addition, these parameters must be chosen so that these Pseudo-Links all offer the same impedance to traffic when their assigned volumes are less than their respective specified maximum attractions.

The weighting factor, W, is computed internally by the software.

[2] Bureau of Public Roads (1964). Traffic Assignment Manual. U.S. Dept. of Commerce, Urban Planning Division, Washington D.C.

Of course, it is still possible for the assignment algorithm within TRAD to distribute more traffic to a destination node than that node can accommodate. For emergency planning purposes, this is a desirable model feature. Such a result will be flagged by the model to alert the user to the fact that some factor is strongly motivating travelers to move to that destination node, despite its capacity limitations. This factor can take many forms: inadequate highway capacity to other destinations, improper specification of candidate destinations for some of the origins, or some other design inadequacy. The planner can respond by modifying the control tactics, changing the origin-destination distribution pattern, providing more capacity at the overloaded destinations, etc.

APPENDIX C

Traffic Simulation Model: PC-DYNEV

APPENDIX C: TRAFFIC SIMULATION MODEL: PC-DYNEV

A model, named PC-DYNEV, is an adaptation of the TRAFLO Level II simulation model, developed by KLD for the Federal Highway Administration (FHWA). Extensions in scope were introduced to expand the model's domain of application to include all types of highway facilities, to represent the evacuation traffic environment and to increase its computational efficiency. This model produces the extensive set of output Measures of Effectiveness (MOE) shown in Table C-1.

The traffic stream is described internally in the form of statistical flow profiles. These profiles, expressed internally as statistical histograms, describe the platoon structure of the traffic stream on each network link. The simulation logic identifies five types of histograms:

- The ENTRY histogram which describes the platoon flow at the upstream end of the subject link. This histogram is simply an aggregation of the appropriate OUTPUT turn-movement-specific histograms of all feeder links.
- The INPUT histograms which describe the platoon flow pattern arriving at the stop line. These are obtained by first disaggregating the ENTRY histogram into turn-movement-specific component ENTRY histograms. Each such component is modified to account for the platoon dispersion which results as traffic traverses the link. The resulting INPUT histograms reflect the specified turn percentages for the subject link.
- The SERVICE histogram which describes the service rates for each turn movement. These service rates reflect the type of control device servicing traffic on this approach; if it is a signal, then this histogram reflects the specified movement-specific signal phasing. A separate model estimates service rates for each turn movement, given that the control is GO.

These data are provided for each network link and are also aggregated over the entire network.

- The QUEUE histograms that describe the time-varying ebb and growth of the queue formation at the stop line. These histograms are derived from the interaction of the respective IN histograms with the SERVICE histograms.
- The OUT histograms that describe the pattern of traffic discharging from the subject link. Each of the IN histograms is transformed into an OUT histogram by the control applied to the subject link. Each of these OUT histograms is added into the (aggregate) ENTRY histogram of its receiving link. This approach provides the model with the ability to identify the characteristics of each turn-movement-specific component of the traffic stream. Each component is serviced at a different saturation flow rate as is the case in the real world. The logic recognizes when one component of the traffic flow encounters saturation conditions even if the others do not.

Algorithms provide estimates of delay and stops reflecting the interaction of the IN histograms with the SERVICE histograms. The logic also provides for properly treating spillback conditions reflecting queues extending from its host link, into its upstream feeder links.

A valuable feature is the ability to internally generate functions that relate mean speed to density on each link, given user-specified estimates of free-flow speed and saturation service rates for each link. Such relationships are essential in order to simulate traffic operations on freeways and rural roads, where signal control does not exist or where its effect is not the dominant factor in impeding traffic flow.

All traffic simulation models are data-intensive. Table C-2 outlines the input data elements. This input describes:

- Topology of the roadway system
- Geometrics of each roadway component
- Channelization of traffic on each roadway component
- Motorist behavior that, in aggregate, determines the operational performance of vehicles in the system
- Specification of the traffic control devices and their operational characteristics
- Traffic volumes entering and leaving the roadway system
- Traffic composition.

To provide an efficient framework for defining these specifications, the physical environment is represented as a network. The unidirectional links of the network generally represent roadway components: either urban streets or freeway segments. The nodes of the network generally represent urban intersections or points along the freeway where a geometric property changes (e.g. a lane drop, change in grade or ramp).

Figure C-1 is an example of a small network representation. The freeway is defined by the sequence of links, (20,21), (21,22), and (22,23). Links (8001, 19) and (3, 8011) are Entry and Exit links, respectively. An arterial extends from node 3 to node 19 and is partially subsumed within a grid network. Note that links (21,22) and (17,19) are grade-separated.

Table C-1. Measures of Effectiveness Output by PC-DYNEV	
Measure	**Units**
Travel	Vehicle-Miles and Vehicle-Trips
Moving Time	Vehicle-Minutes
Delay Time	Vehicle-Minutes
Total Travel Time	Vehicle-Minutes
Efficiency: Moving Time/Total Travel Time	Percent
Mean Travel Time per Vehicle	Seconds
Mean Delay per Vehicle	Seconds
Mean Delay per Vehicle-Mile	Seconds/Mile
Mean Speed	Miles/Hour
Mean Occupancy	Vehicles
Mean Saturation	Percent
Vehicle Stops	Percent

Table C-2. Input Requirements for the PC-DYNEV Model

GEOMETRICS

- Links defined by upstream downstream node numbers
- Links lengths
- Number of lanes (up to 6)
- Turn pockets
- Grade
- Network topology defined in terms of target nodes for each receiving link

TRAFFIC VOLUMES

- On all entry links and sink/source nodes stratified by vehicle type: auto, car pool, bus, truck
- Link-specific turn movements

TRAFFIC CONTROL SPECIFICATIONS

- Traffic signals: link-specific, turn movement specific
- Signal control treated as fixed time
- Stop and Yield signs
- Right-turn-on-red (RTOR)
- Route diversion specifications
- Turn restrictions
- Lane control (e.g. lane closure, movement-specific)

DRIVER'S AND OPERATIONAL CHARACTERISTICS

- Drivers (vehicle-specific) response mechanisms: free-flow speed, aggressiveness, discharge headway
- Link-specific mean speed for free-flowing (unimpeded) traffic
- Vehicle-type operational characteristics: acceleration, deceleration
- Such factors as bus route designation, bus station location, dwell time, headway, etc.

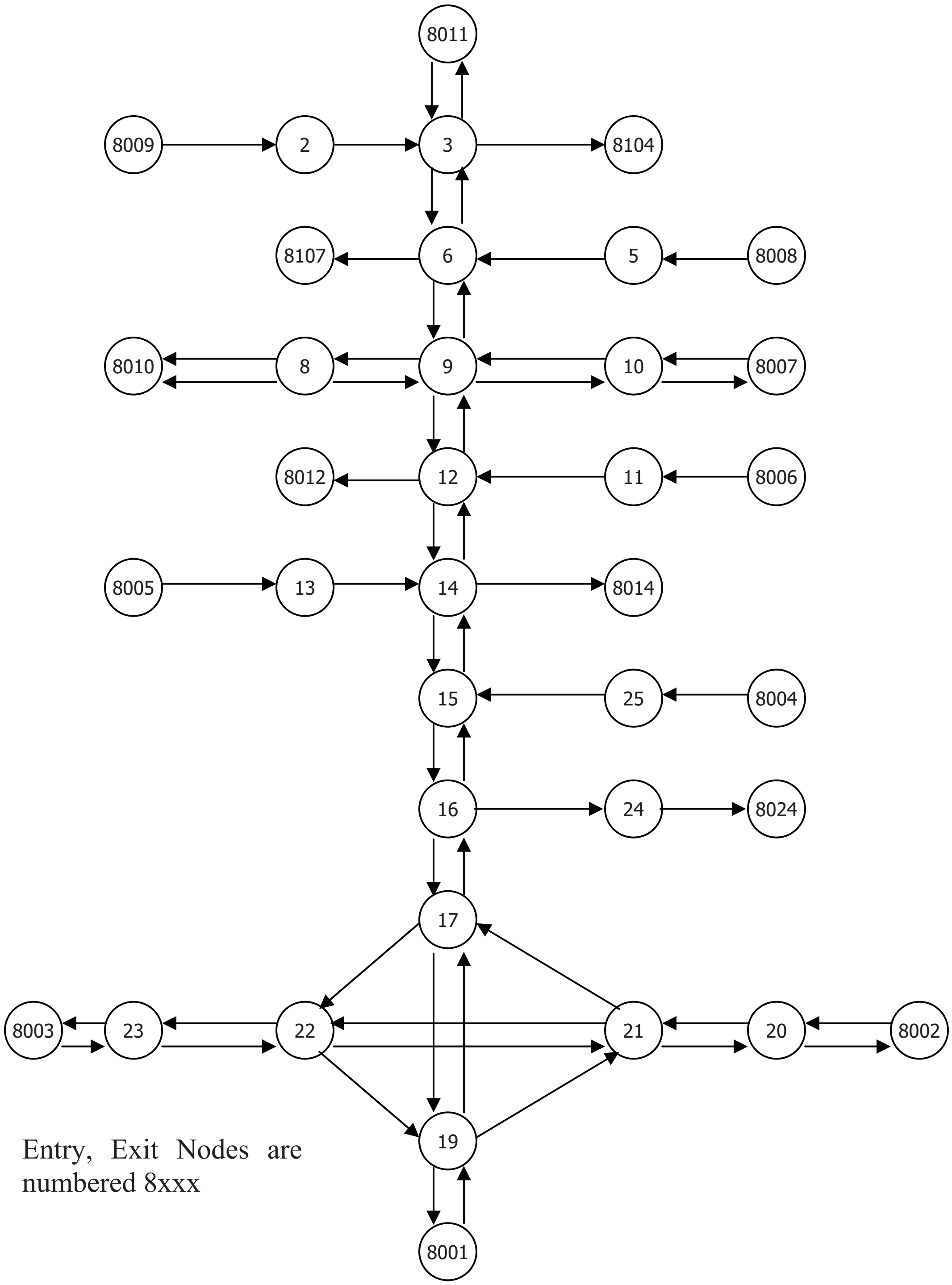


Figure C-1: Representative Analysis Network

APPENDIX D

Detailed Description of Study Procedure

APPENDIX D: DETAILED DESCRIPTION OF STUDY PROCEDURE

This appendix describes the activities that were performed to compute accurate Evacuation Time Estimates (ETE). The individual steps of this effort are represented as a flow diagram in Figure D-1. Each numbered step in the description that follows corresponds to the numbered element in this flow diagram.

Step 1.
The first activity is to obtain data defining the spatial distribution and demographic characteristics of the population within the Emergency Planning Zone (EPZ). These data were obtained from U.S. Census files and from the telephone survey results. Employee data were estimated by referencing state Journey-to-Work data provided by the U.S. Census, from phone calls to major employers and from assumptions based on parking lot capacities observed from overhead imagery. Transient data were obtained from local sources of information and State Emergency Management Agencies.

Step 2.
The next activity is to examine large-scale maps of the EPZ in both hard-copy form and using Geographical Information System (GIS) software. These maps were used to identify the analysis highway network and the access roads from each residential development to the adjoining elements of this network. This information is used to plan a field survey of the highway system and later, to assign generated evacuation trips to the correct links of the network.

Step 3.
The next step is to conduct a physical survey of the roadway system. The purpose of this survey is to determine the geometric properties of the highway elements, the channelization of lanes on each section of roadway, whether there are any turn restrictions or special treatment of traffic at intersections, the type and functioning of traffic control devices and to make the necessary observations needed to estimate realistic values of roadway capacity.

Step 4.
With this information, develop the evacuation network representation of the physical roadway system.

Step 5.
With the network drawn, proceed to estimate the capacities of each link and to locate the origin centroids where trips would be generated during the evacuation process.

Step 6.

With this information at hand, the data are entered into the computer to create the input stream for the TRaffic Assignment and Distribution (TRAD) model. This model is designed to be compatible with the PC-DYNEV traffic simulation model used later in the project; the input stream required for one model is entirely compatible with the input stream required by the other. Using a software system developed by KLD named UNITES, the data entry activity is performed interactively directly on the computer.

Step 7.

The TRAD model contains software that performs diagnostic testing of the input stream. These assist the user in identifying and correcting errors in the input stream.

Step 8.

After creating the input stream, execute the TRAD model to compute evacuating traffic routing patterns consistent with the guidelines of NUREG 0654, Appendix 4. The TRAD model also provides estimates of traffic loading on each highway link as well as rough estimates of operational performance.

Step 9.

Critically examine the statistics produced by the TRAD model. This is a labor-intensive activity, requiring the direct participation of skilled engineers who possess the necessary practical experience to interpret the results and to determine the causes of any problems reflected in the results.

Essentially, the approach is to identify those "hot spots" in the network that represent locations where congested conditions are pronounced and to identify the cause of this congestion. This cause can take many forms, either as excess demand due to improper routing, as a shortfall of capacity, or as a quantitative error in the way the physical system was represented in the input stream. This examination leads to one of two conclusions:

- The results are as satisfactory as could be expected at this stage of the analysis process; or
- The input stream must be modified accordingly.

This decision requires, of course, the application of the user's judgment based upon the results obtained in previous applications of the TRAD model and a comparison of the results of this last case with the previous ones. If the results are satisfactory in the opinion of the user, then the process continues with Step 12. Otherwise, proceed to Step 10.

Step 10.

There are many "treatments" available to the user in resolving such problems. These treatments range from decisions to reroute the traffic by imposing turn restrictions where they can produce significant improvements in capacity, changing the control treatment at critical intersections so as to provide improved service for one or more movements, or in

prescribing specific treatments for channelizing the flow so as to expedite the movement of traffic along major roadway systems or changing the trip table. Such "treatments" take the form of modifications to the original input stream.

Step 11.
As noted above, the changes to the input stream must be implemented to reflect the modifications undertaken in Step 10. At the completion of this activity, the process returns to Step 8 where the TRAD model is again executed.

Step 12.
The output of the TRAD model includes the computed turn movements for each link. These data are required – and – accessed by the PC-DYNEV simulation model. This step completes the specification of the PC-DYNEV input stream.

Step 13.
After the PC-DYNEV input stream has been debugged, the simulation model is executed to provide detailed estimates, expressed as statistical Measures of Effectiveness (MOE), which describe the detailed performance of traffic operations on each link of the network.

Step 14.
In this step, the detailed output of the simulation model is examined to identify whether problems exist on the network. The results of the simulation model are extremely detailed and far more accurately describe traffic operations than those provided by the TRAD model. Thus, it is possible to identify the cause of any problems by carefully studying the output.

Again, one can implement corrective treatments designed to expedite the flow of traffic on the network in the event that the results are considered to be less efficient than is possible to achieve. If input changes are needed, the analysis process proceeds to Step 15. On the other hand, if the results are satisfactory, then one can decide whether to return to Step 8 to again execute the TRAD model and repeat the whole process, or to accept the simulation results. If there were no changes indicated by the activities of Step 14, because the results were satisfactory, we can then proceed to document them in Step 17. Otherwise, return to Step 8 to determine the effects of the changes implemented in Step 14 on the optimal routing patterns over the network. This determination can be ascertained by executing the TRAD model.

Step 15.
This activity implements the changes in control treatments or in the assignment of destinations associated with one or more origins in order to improve the representation of traffic flow over the network. These treatments can also include the consideration of adding roadway segments to the existing analysis network to improve the representation of the physical system.

Step 16.
Once the treatments have been identified, it is necessary to modify the simulation model input stream accordingly. At the completion of this effort, the procedure returns to Step 13 to execute the simulation model again.

Step 17.
The simulation results are analyzed, tabulated and graphed. The results are then documented, as required.

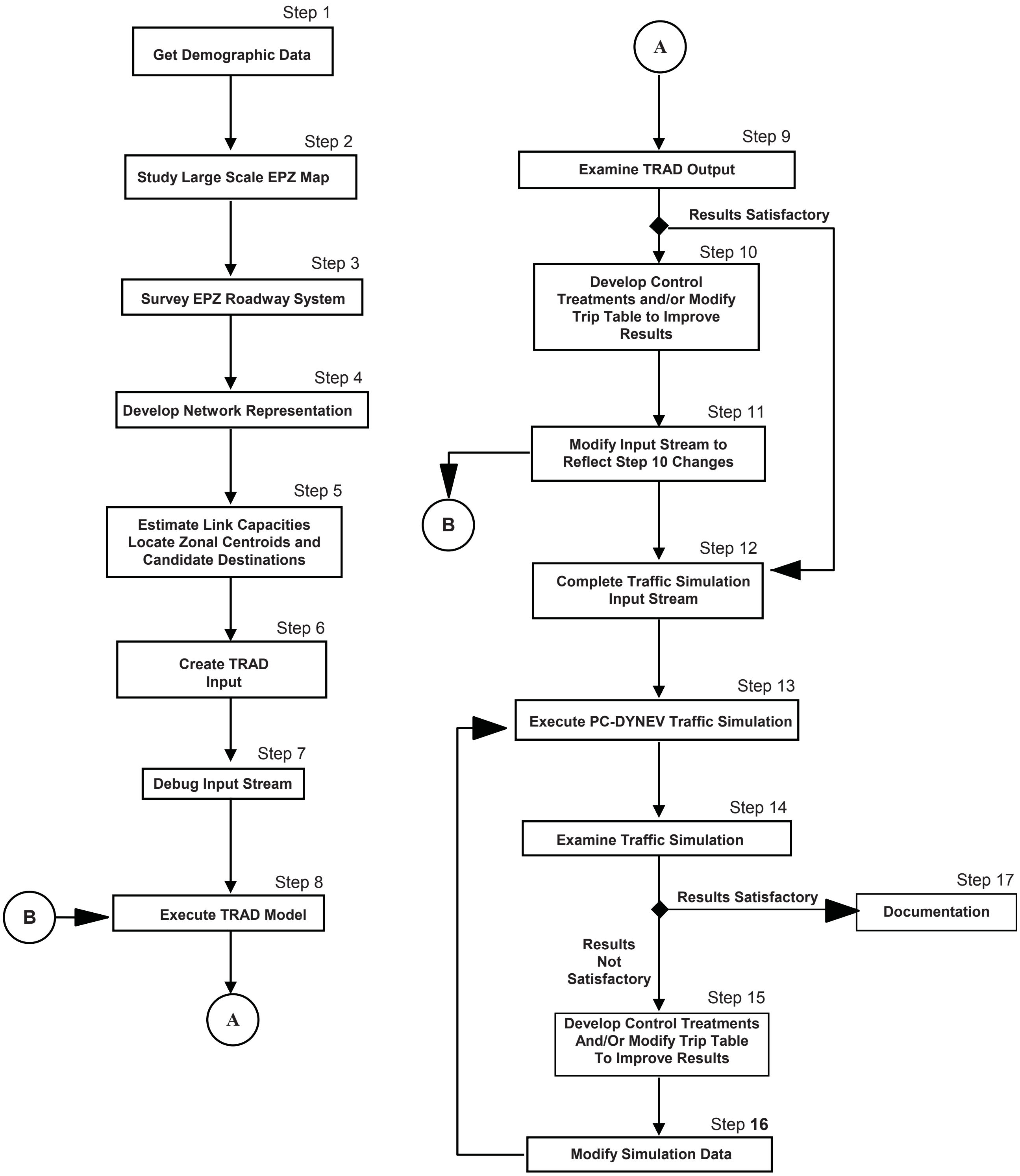


Figure D-1. Flow Diagram of Activities

APPENDIX E

Special Facility Data

APPENDIX E: SPECIAL FACILITY DATA

The following tables list population information, as of May 2009, for special facilities that are located within the PSEG Site EPZ. Special facilities are defined as schools, day care centers, hospitals and other medical care facilities and correctional facilities. Transient population data is included in the tables for recreational areas and lodging facilities. Each table is grouped by county and state. The location of the facility is defined by its straight-line distance (miles) and direction (magnetic bearing) from the center point of the PSEG Site.

Two schools, Stow Creek Elementary School and Morris Goodwin Elementary School, are both located just outside of the EPZ. Based on discussions with the New Jersey State Police Office of Emergency Management, these schools will be evacuated due to their close proximity to the EPZ boundary. These schools have been included within the ERPA closest to their location.

Table E-1. Schools within the PSEG Site EPZ								
ERPA	Distance (miles)	Dire-ction	School Name	Street Address	Municipality	Phone	Enroll-ment	Staff
SALEM COUNTY, NJ								
1	7.0	E	Lower Alloways Creek Elementary School	967 Main Street	Salem	(856) 935-2707	222	78
2	8.4	NE	Quinton Elementary School	8 Robinson Street	Quinton	(856) 935-2379	358	61
3	5.4	NNE	Elsinboro Township Elementary School	631 Salem - Ft Elfsborg Rd	Salem	(856) 935-3817	108	17
3	7.4	NNE	John Fenwick Elementary School	183 Smith Street	Salem	(856) 935-4100	300	80
3	6.8	NNE	Salem High School	219 Walnut St	Salem	(856) 935-3900	600	110
3	7.6	NNE	Salem Middle School	51 New Market St	Salem	(856) 935-2700	580	110
4	9.0	NNE	The ARC of Salem County	150 SR 45	Salem	(856) 935-3600	147	28
						Salem County Total:	**2,315**	**484**
CUMBERLAND COUNTY, NJ								
6	10.6	E	Stow Creek Township Elementary School	11 Gum Tree Corner Rd	Bridgeton	(856) 455-1717	135	20
6	10.2	E	Woodland Country Day School	1216 Roadstown Rd	Bridgeton	(856) 453-8499	159	38
7	11.6	ESE	Morris Goodwin Elementary School	839 Ye Greate St	Greenwich	(856) 451-5513	77	12
						Cumberland County Total:	**371**	**70**
NEW CASTLE COUNTY, DE								
A	5.8	NW	Van Hook Walsh School Inc.	554 Port Penn Rd	Middletown	(302) 834-4404	4	3
B	9.6	WSW	Appoquinimink Early Childhood Center	502 S Broad St	Middletown	(302) 376-4400	260	40
B	9.6	WSW	Everett Meredith Middle School	504 S Broad St	Middletown	(302) 378-5001	1,250	95
B	9.6	WSW	Groves Adult High Shool	504 S Broad St	Middletown	(302) 378-5037	160	20
B	8.3	W	Middletown High School	120 Silver Lake Rd	Middletown	(302) 376-4145	1,707	145
B	9.3	W	Silver Lake Elementary School	200 E Cochran St	Middletown	(302) 378-5023	670	60
B	8.5	WSW	St. Andrew's School	350 Noxontown Rd	Middletown	(302) 285-4213	270	125
B	8.9	WSW	St. Anne's Episcopal School	211 Silver Lake Rd	Middletown	(302) 378-3179	325	55
B	9.5	SW	Townsend Early Childhood Center	10 Brook Ramble Ln	Townsend	(302) 378-9960	202	26
B	9.6	WSW	Townsend Elementary School	126 Main St	Townsend	(302) 378-5020	315	55
C	9.4	NW	AdvoServ School	4185 Cukirkwood - St George's Rd	Bear	(302) 834-7018	123	140
C	8.1	WNW	Alfred Waters Middle School	1235 Cedar Lane Rd	Middletown	(302) 376-4128	777	60
C	7.9	W	Brick Mill Elementary School	378 Brick Mill Rd	Middletown	(302) 378-5288	770	80
C	8.0	WNW	Cedar Lane Early Childhood Center	1221 Cedar Lane Rd	Middletown	(302) 449-5873	331	30
C	8.0	WNW	Cedar Lane Elementary School	1259 Cedar Lane Rd	Middletown	(302) 378-5045	670	70
C	7.8	NW	Gunning Bedford Middle School	801 Cox Neck Rd	New Castle	(302) 832-6280	950	85
C	10.0	NW	Kathleen H. Wilbur Elementary School (formerly Wrangle Hill Elementary School)	4050 Wrangle Hill Rd	Bear	(302) 832-6330	1,150	100
C	9.1	W	Louis L. Redding Middle School	201 New St	Middletown	(302) 378-5030	800	70
C	7.7	NW	Southern Elementary School	795 Cox Neck Rd	New Castle	(302) 832-6300	1,065	100
C	7.7	WNW	St. George's Technical High School	555 Hyetts Corner Rd	Middletown	(302) 638-3772	1,035	135
						New Castle County Total:	**12,834**	**1,494**
						EPZ Total:	**15,520**	**2,048**

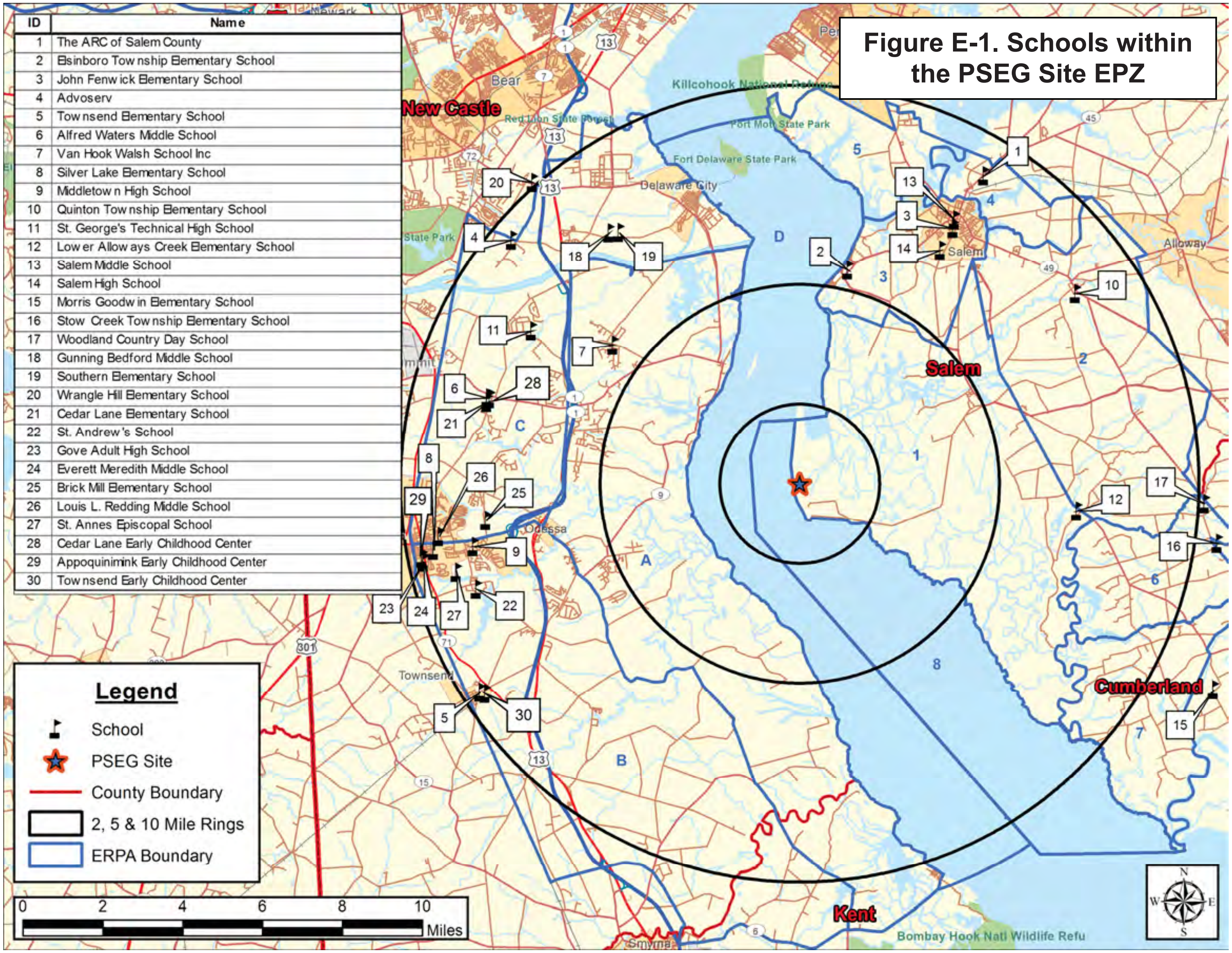


Figure E-1. Schools within the PSEG Site EPZ

Table E-2. Day Care Facilities within the PSEG Site EPZ								
ERPA	**Distance (miles)**	**Direction**	**Name**	**Street Address**	**Municipality**	**Phone**	**Enrollment**	**Employees**
Salem County, NJ								
1	4.8	ENE	Sugar & Spice Pre School Day Care Center	82 Main St	Hancocks Bridge	(856) 935-7259	25	3
3	7.4	NNE	Children's Space Child Care*	118 Walnut St	Salem	(856) 935-2788	100	14
3	7.7	NNE	Community Center*	Westside Ct	Salem	N/A	20	3
3	7.7	NE	Community Center*	Anderson Dr	Salem	N/A	20	3
3	7.6	NE	Noah's Ark	424 E. Broadway	Salem	N/A	14	4
3	7.8	NNE	Salvation Army Services Center	115 W Broadway, #5	Salem	(856) 936-0305	20	3
3	7.8	NNE	St. John's Pentecostal Out Reach Day Care Center	22 New Market St	Salem	(856) 935-1445	10	5
						Salem County Total:	**209**	**35**
New Castle County, DE								
B	9.6	W	ABC1 Child Care Learning	14 West Main St	Middletown	(302) 449-2413	70	20
B	9.4	W	Bethesda Child Development Center	116 E Main St	Middletown	(302) 378-8435	210	32
C	8.0	WNW	Bright Beginnings Pre School	1125 Jamison Corner Rd	Middletown	(302) 376-8001	47	6
C	6.5	W	Green Acres Pre School	23 N 6th St	Odessa	(302) 378-9250	174	16
						New Castle County Total:	**501**	**74**
						EPZ Total:	**710**	**109**

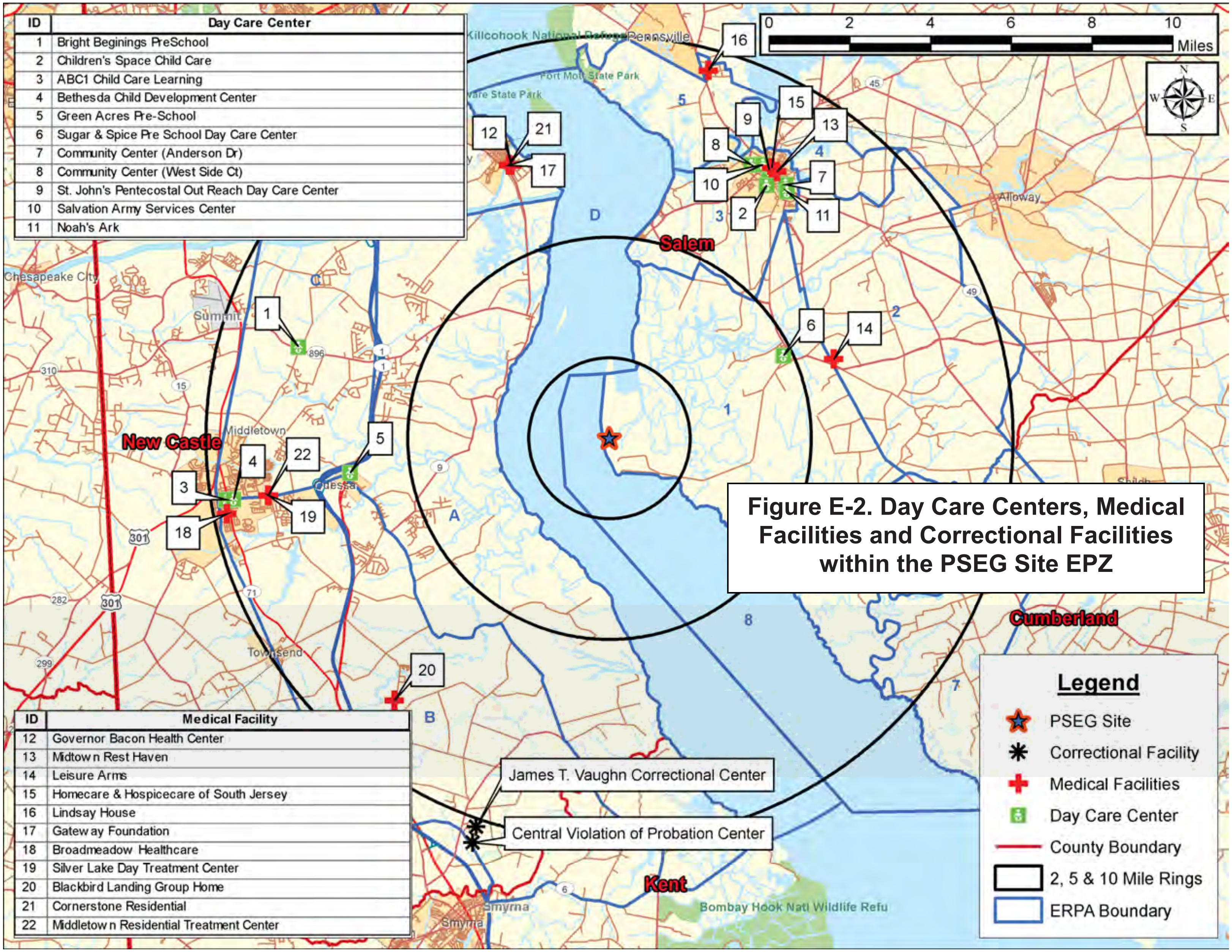
*Employment data not provided. Average enrollment/employee for facilities that did provide data was used.

N/A – not available

Table E-3. Medical Facilities and Assisted Living Facilties within the PSEG Site EPZ												
ERPA	Distance (miles)	Dir-ection	Name	Street Address	Municipality	Phone	Capacity	Current Census	Wheel-chair Patients	Bed-ridden Patients	Ambul-atory Patients	Employees
SALEM COUNTY, NJ												
2	5.9	ENE	Lower Alloways Creek Twp: Leisure Arms Complex Kitchen	622 New Bridge Rd	Salem	(856) 935-8122	36	30	1	0	29	3
3	7.8	NNE	Homecare & Hospicecare of South Jersey	Broadway & Walnut	Salem	(888) 628-7900	52	52	10	0	42	35
3	7.8	NNE	Midtown Rest Haven	258 E Broadway	Salem	(856) 935-4567	23	19	0	0	19	5
5	9.5	NNE	Lindsay House	39 Supawna Rd	Pennsville	(856) 339-0100	16	16	3	0	13	5
						Salem County Total:	**127**	**117**	**14**	**0**	**103**	**48**
NEW CASTLE COUNTY, DE												
B	8.4	SW	Blackbird Landing Group Home	994 Blackbird Landing Rd	Townsend		8	8	0	0	8	6
B	9.7	WSW	Broadmeadow Healthcare	500 S Broad St	Middletown	(302) 449-3400	117	77	60	0	17	91
C	7.2	NNW	Cornerstone Residential	171 New Castle Ave	Delaware City	(302) 836-8260	15	15	0	0	15	6
C	7.2	NNW	Gateway Foundation (Cottage 2)	171 New Castle Ave	Delaware City	(302) 836-2000	72	72	0	0	72	25
C	7.2	NNW	Governor Bacon Health Center	P.O. Box 559	Delaware City	(302) 836-2550	80	59	47	0	12	115
C	8.6	W	Middletown Residential Treatment Center	495 E Main St	Middletown	(302) 378-5224	10	10	0	0	10	20
C	8.6	W	Silver Lake Day Treatment Center	493 E Main St	Middletown	(302) 378-5238	26	26	0	0	26	8
N/A	N/A	N/A	People's Place Residential Group Home**	N/A	Townsend	(302) 422-8033	8	8	0	0	8	8
						New Castle County Total:	**336**	**275**	**107**	**0**	**168**	**279**
						EPZ Total:	**463**	**392**	**121**	**0**	**271**	**327**

**Address not available.

Table E-4. Correctional Facilities within the PSEG Site EPZ							
ERPA	Distance (miles)	Dir-ection	Name	Street Address	Municipality	Phone	Cap-acity
New Castle, DE							
B	10.6	SSW	Central Violation of Probation Center	875 Smyrna Landing Rd	Smyrna	(302) 659-6100	250
B	10.2	SSW	James T. Vaughn Correctional Center (formerly Delaware Correctional Center)	1181 Paddock Rd	Smyrna	(302) 653-9261	2,500
						EPZ Total:	2,750



ID	Day Care Center
1	Bright Beginings PreSchool
2	Children's Space Child Care
3	ABC1 Child Care Learning
4	Bethesda Child Development Center
5	Green Acres Pre-School
6	Sugar & Spice Pre School Day Care Center
7	Community Center (Anderson Dr)
8	Community Center (West Side Ct)
9	St. John's Pentecostal Out Reach Day Care Center
10	Salvation Army Services Center
11	Noah's Ark

ID	Medical Facility
12	Governor Bacon Health Center
13	Midtown Rest Haven
14	Leisure Arms
15	Homecare & Hospicecare of South Jersey
16	Lindsay House
17	Gateway Foundation
18	Broadmeadow Healthcare
19	Silver Lake Day Treatment Center
20	Blackbird Landing Group Home
21	Cornerstone Residential
22	Middletown Residential Treatment Center

Figure E-2. Day Care Centers, Medical Facilities and Correctional Facilities within the PSEG Site EPZ

Table E-5: Recreational Areas within the PSEG Site EPZ								
ERPA	Distance (miles)	Dir-ection	Facility Name	Street Address	Municipality	Phone	Per-sons	Total Vehicles
SALEM COUNTY, NJ								
1	4.4	NE	Abbots Farm	Abbots Farm Rd	N/A	N/A	10	3
1	4.9	ENE	Hancock House	3 Front St	Hancocks Bridge	N/A	20	7
1	7.1	ESE	Mad Horse Creek Wildlife Management Area	Stowneck Rd	Lower Alloways Creek	(609) 984-0547	25	9
2	7.8	E	Meadow View Acres Campground	69 Buckhorn Rd	Salem	(856) 935-4710	40	14
2	7.4	ENE	Wild Oaks Country Club	75 Wild Oaks Dr	Salem	(856) 935-0705	300	150
3	7.5	NNE	Barber's Basin Inc	108 Tilbury Rd	Salem	(865) 935-1261	50	17
3	7.3	NNE	Salem Public Ramp (PSEG)	Frienship Dr	Salem	N/A	60	41
5	9.0	N	Fort Mott State Park	454 Fort Mott Rd	Pennsville	(856) 935-3218	300	103
5	8.0	NNE	Penn-Salem Marina	Rte 49	Salem	(856) 935-2628	10	3
5	8.2	NNE	Salem Boat Club	SR 45	Salem	N/A	30	10
5	9.5	N	Supawna Meadows NWR	CR 632		N/A	15	5
						Salem County Total:	**860**	**362**
CUMBERLAND COUNTY, NJ								
6	7.3	ESE	Stow Creek State Park	Stow Creek Rd	Stow Creek Landing	(856) 785-0455	10	6
7	11.9	ESE	Greenwich Boat Works	1 Pier Rd	Greenwich	(856) 451-7777	60	21
7	11.8	SE	Hancock Harbor Marina	30 Hancock Harbor Rd	Greenwich	(856) 455-2610	60	21
						Cumberland County Total:	**130**	**48**
NEW CASTLE COUNTY, DE								
A	9.9	S	Aquatic Resources Education Center	4876 Hay Point Landing Rd	Smyrna	(302) 653-2882	110	22
A	3.1	NW	Augustine Beach Boat Ramp	N/A	Port Penn	N/A	88	60
A	3.6	NNW	Augustine Wildlife Area	503 N. Congress St	Port Penn	(302) 834-8433	50	17
A	6.0	S	Cedar Swamp: Collins Beach	Collins Beach Rd	Smyrna	N/A	350	240
A	4.1	SW	Cedar Swamp: The Rock Tract	Steve's Landing Rd	Middletown	N/A	58	30
A	3.7	NW	Port Penn Interpretive Center	1 W Market St	Port Penn	(302) 836-2533	25	9
A	5.8	WNW	Vandergrift Golf Club	631 Bayview Rd	Middletown	(302) 378-3665	100	50
B	9.2	W	Silver Lake Park	N/A	Middletown	(302) 378-4975	300	103
C	6.7	NW	Chesapeake & Delaware Canal	N/A	N/A	(410) 885-5622	200	100
C	7.4	NNW	Delaware City Marina	302 Canal St	Delaware City	(302) 834-4172	20	10
C	7.9	NNW	Fort Delaware State Park	45 Clinton St	Delaware City	(302) 834-7941	200	68
C	7.2	NNW	Fort DuPont State Park	P.O. Box 170	Delaware City	(302) 834-7941	292	150
C	9.1	W	Frog Hollow Golf Club	1 Wittington Way	Middletown	(302) 376-6500	100	40
C	6.6	NNW	Grass Dale Center	108 Old Reedy Pt. Bridge Rd	Delaware City	(302) 834-7941	6	6
						New Castle County Total:	**1,899**	**905**
KENT COUNTY, DE								
A	10.8	SSE	Smyrna River Boat Ramp	N/A	Woodland Beach	N/A	117	60
A	10.3	S	Woodland Beach Wildlife Refuge	Florio Rd	Smyrna	N/A	50	17
A	10.4	SSE	Woodland Beach	N/A	Woodland Beach	N/A	146	75
						Kent County Total:	**313**	**152**
						EPZ Total:	**3,202**	**1,467**

Table E-6. Lodging Facilities within the PSEG Site EPZ								
ERPA	Distance (miles)	Dir-ection	Facility Name	Street Address	Municipality	Phone	Per-sons	Veh-icles
SALEM COUNTY, NJ								
3	7.8	NNE	Salem Motor Lodge	235 E Broadway	Salem	(856) 935-1212	41	21
						Salem County Total:	**41**	**21**
NEW CASTLE COUNTY, DE								
A	9.9	S	Mallard Lodge	5128 Hay Pt. Landing Rd	Smyrna	(302) 653-2882	34	12
B	6.9	WSW	Pleasant Hill Motel	3155 DuPont Pkwy	Townsend	(302) 378-2468	30	15
C	6.2	WNW	Parkway Motel	2397 Dupont Pkwy	Middletown	(302) 378-2228	16	8
						New Castle County Total:	**80**	**35**
						EPZ Total:	**121**	**56**

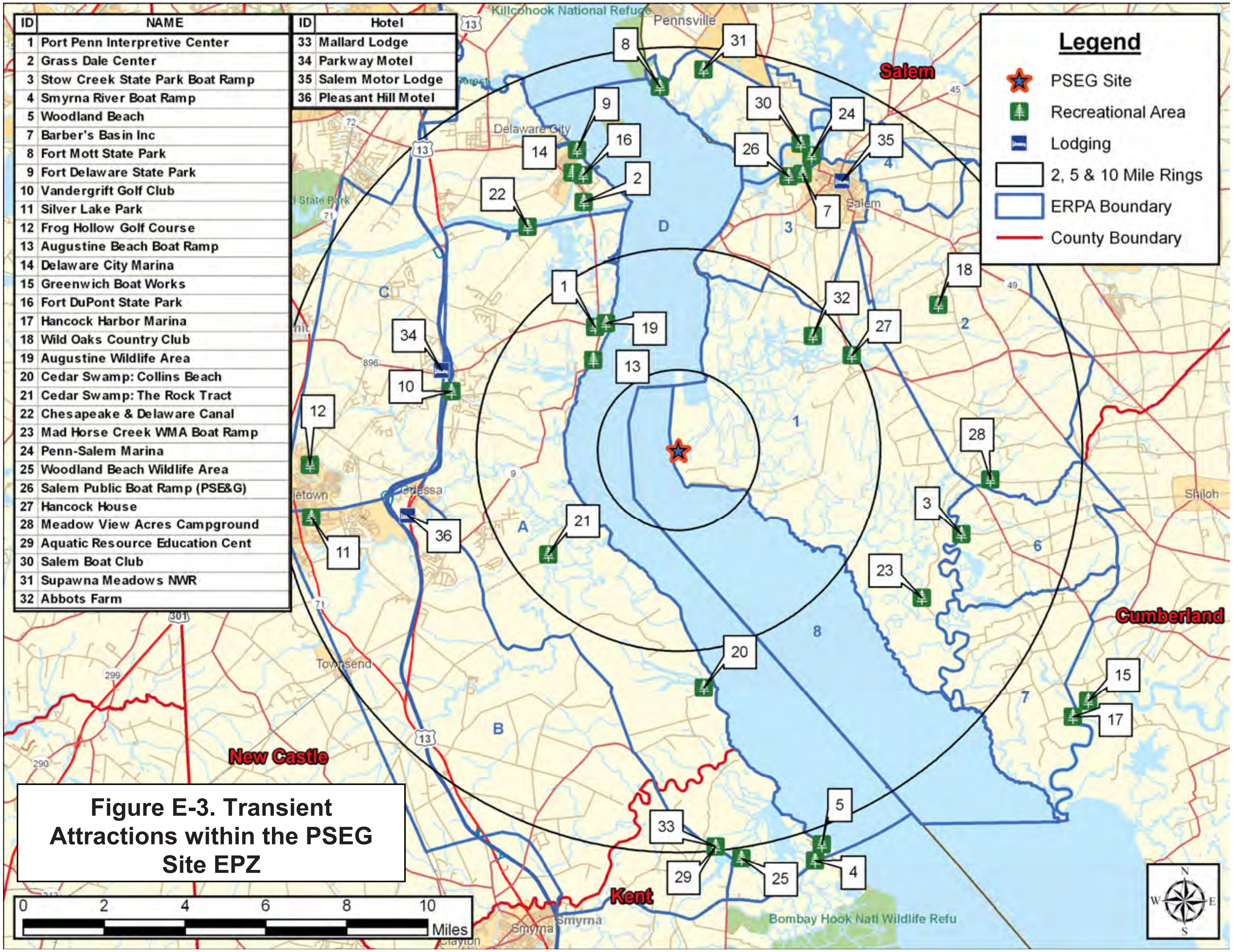


Figure E-3. Transient Attractions within the PSEG Site EPZ

Table E-7. Major Employers within the PSEG Site EPZ									
ERPA	Distance (miles)	Dir-ection	Facility Name	Street Address	Municipality	Phone	Employees (Max Shift)	% Non-EPZ	Employees (Non EPZ)
SALEM COUNTY, NJ									
1	7.0	E	Lower Alloways Creek Elementary School	967 Main Street	Salem	(856) 935-2707	78	67.33%	53
1	-	-	PSEG Nuclear LLC	-	Lower Alloways Creek	N/A	1,704	100.00%	1,704
2	8.4	NE	Quinton Elementary School	8 Robinson Street	Quinton	(856) 935-2379	61	71.61%	44
3	8.0	NNE	Anchor Hocking Glass	83 Griffith St	Salem	(856) 835-4000	130	67.33%	88
3	7.6	NNE	Cooper Interconnect	23 S Front St	Salem	(856) 935-7560	114	37.00%	42
3	7.4	NNE	John Fenwick Elementary School	183 Smith Street	Salem	(856) 935-4100	80	67.33%	54
3	7.9	NNE	Office of Salem County	92 Market St	Salem	(856) 935-9036	491	67.33%	331
3	6.9	NNE	PSEG - Nuclear Development	244 Chestnut St	Salem	N/A	39	100.00%	39
3	6.8	NNE	Salem High School	219 Walnut St	Salem	(856) 935-3900	110	67.33%	74
3	7.6	NNE	Salem Middle School	51 New Market St	Salem	(856) 935-2700	110	67.33%	74
4	8.7	NNE	Mannington Mills, Inc.	75 Mannington Mills Rd	Mannington	(856) 935-3000	550	75.67%	416
4	8.3	NNE	National Freight Inc	5 Route 45	Mannington	(856) 339-9257	100	75.67%	76
4	9.1	NNE	Salem County Mannington Center	165 SR 45	Mannington	N/A	50	75.67%	38
						Salem County Total:	3,617		3,033
NEW CASTLE COUNTY, DE									
B	9.7	WSW	Broadmeadow Healthcare	500 S Broad St	Middletown	(302) 449-3400	91	75.00%	68
B	9.6	WSW	Everett Meredith Middle School	504 S Broad St	Middletown	(302) 378-5001	95	75.00%	71
B	8.3	W	Middletown High School	120 Silver Lake Rd	Middletown	(302) 376-4145	145	75.00%	109
B	9.3	W	Silver Lake Elementary School	200 E Cochran St	Middletown	(302) 378-5023	60	75.00%	45
B	8.5	WSW	St. Andrew's School	350 Noxontown Rd	Middletown	(302) 285-4213	125	75.00%	94
B	8.9	WSW	St. Anne's Episcopal School	211 Silver Lake Rd	Middletown	(302) 378-3179	55	75.00%	41
B	9.6	WSW	Townsend Elementary School	126 Main St	Townsend	(302) 378-5020	55	75.00%	41
C	9.4	NW	AdvoServ School	4185 Cukirkwood - St George's Rd	Bear	(302) 834-7018	140	75.00%	105
C	8.1	WNW	Alfred Waters Middle School	1235 Cedar Lane Rd	Middletown	(302) 376-4128	60	75.00%	45
C	7.9	W	Brick Mill Elementary School	378 Brick Mill Rd	Middletown	(302) 378-5288	80	75.00%	60
C	8.0	WNW	Cedar Lane Elementary School	1259 Cedar Lane Rd	Middletown	(302) 378-5045	70	75.00%	53
C	9.6	NW	Formosa Plastics Company	780 School House Rd	Delaware City	(302) 836-2200	56	10.00%	6
C	7.2	NNW	Governor Bacon Health Center	P.O. Box 559	Delaware City	(302) 836-2550	115	75.00%	86
C	7.8	NW	Gunning Bedford Middle School	801 Cox Neck Rd	New Castle	(302) 832-6280	85	75.00%	64
C	9.7	W	Johnson Controls Inc. Battery Division	700 N Broad St	Middletown	(302) 378-9885	113	75.00%	85
C	10.0	NW	Kathleen H. Wilbur Elementary School (formerly Wrangle Hill Elementary School)	4050 Wrangle Hill Rd	Bear	(302) 832-6330	100	75.00%	75
C	9.1	W	Louis L. Redding Middle School	201 New St	Middletown	(302) 378-5030	70	75.00%	53
C	9.7	W	Quaker City Motor Parts/NAPA Distribution Center	678 N Broad St	Middletown	(302) 378-9583	86	75.00%	65
C	7.7	NW	Southern Elementary School	795 Cox Neck Rd	New Castle	(302) 832-6300	100	75.00%	75
C	8.9	NNW	Valero - Delaware City Refinery	4442 Wrangle Rd	Delaware City	(302) 834-2314	600	75.00%	450
						New Castle County Total:	2,301		1,691
						EPZ Total:	5,918		4,724

Figure E-4. Major Employers within the PSEG Site EPZ

APPENDIX F

Telephone Survey

APPENDIX F: TELEPHONE SURVEY

1. INTRODUCTION

The development of evacuation time estimates for the Emergency Planning Zone (EPZ) of the PSEG Site requires the identification of travel patterns, car ownership and household size of the population within the EPZ. Demographic information is obtained from Census data. The use of this data has several limitations when applied to emergency planning. First, the census data do not encompass the range of information needed to identify the time required for preliminary activities that must be undertaken prior to evacuating the area. Secondly, census data do not contain attitudinal responses needed from the population of the EPZ and consequently may not accurately represent the anticipated behavioral characteristics of the evacuating populace.

These concerns are addressed by conducting a telephone survey. The survey is designed to elicit information from the public concerning family demographics and estimates of response times to well defined events. The design of the survey includes a limited number of questions of the form “What would you do if …?” and other questions regarding activities with which the respondent is familiar (“How long does it take you to …?”)

2. SURVEY INSTRUMENT AND SAMPLING PLAN

Attachment A presents the final survey instrument. A draft of the instrument was submitted for comment. Comments were received and the survey instrument was modified accordingly, prior to conducting the survey.

Following the completion of the instrument, a sampling plan was developed. A sample size of approximately 600 **completed** survey forms yields results with an acceptable sampling error. The sample must be drawn from the EPZ population. Consequently, a list of EPZ zip codes was developed. This list is shown in Table F-1. Along with each zip code, an estimate of the population and number of households in each area was determined by overlaying Census data and the EPZ boundary using Geographical Information Systems (GIS) software. The proportional number of desired completed survey interviews for each area was identified, as shown in Table F-1.

The completed survey adhered to the sampling plan.

Table F-1. PSEG Site Telephone Survey Sampling Plan

Zip Code	Population within EPZ (2000)	Households	Required Sample
19709	14,451	4,967	238
19734	3,282	1,208	58
19977	2,890	481	23
19720	2,283	818	39
19701	602	169	8
08070	361	136	7
08079	11,046	4,450	214
08323	235	81	4
08302	491	193	9
Totals:	**35,641**	**12,502**	**600**
		Average Household Size:	**2.85**
		Total Sample Required:	**600**

3. SURVEY RESULTS

The results of the survey fall into two categories. First, the household demographics of the area can be identified. Demographic information includes such factors as household size, automobile ownership, and automobile availability. The distributions of the time to perform certain pre-evacuation activities are the second category of survey results. These data are processed to develop the trip generation distributions used in the evacuation modeling effort.

A review of the survey instrument reveals that several questions have a “don’t know” (DK) entry for a response. It is accepted practice in conducting surveys of this type to accept the answers of a respondent who offers a DK response for a few questions or who refuses to answer a few questions. To address the issue of occasional DK/refused responses from a large sample, the practice is to assume that the distribution of these responses is the same as the underlying distribution of the positive responses. In effect, the DK/refused responses are ignored and the distributions are based upon the positive data that is acquired.

Household Demographic Results

Household Size

Figure F-1 presents the distribution of household size within the EPZ. The average household contains 2.92 people. The estimated household size (2.85 persons) used to determine the survey sample (Table F-1) was drawn from Census data. The close agreement between the average household size obtained from the survey and from the Census is an indication of the reliability of the survey.

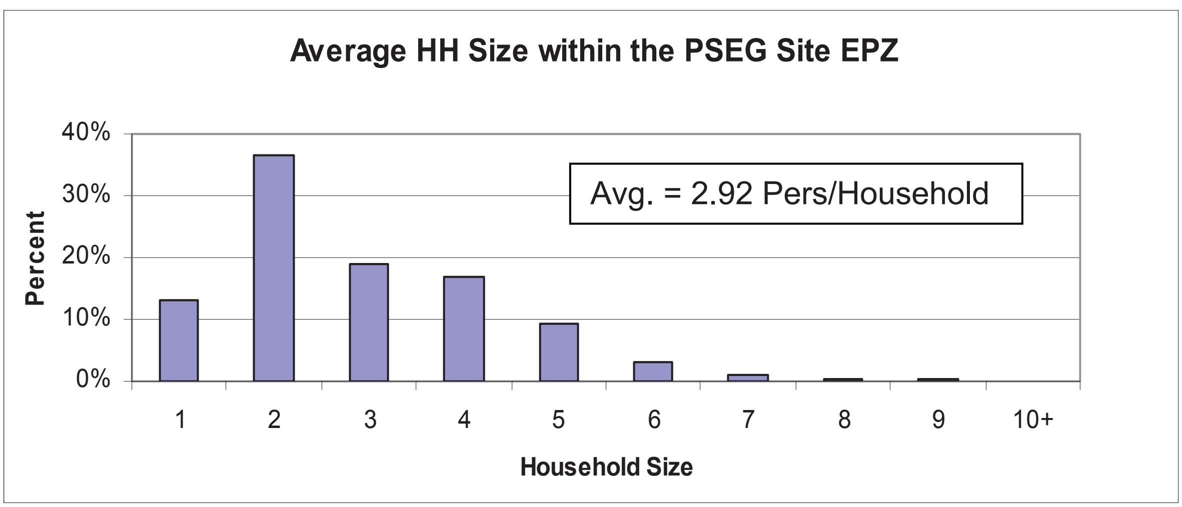


Figure F-1. Household Size in the EPZ

Automobile Ownership

The average number of automobiles per household in the EPZ is 2.14. It should be noted that approximately 3.5 percent of households do not have access to an automobile. The distribution of automobile ownership is presented in Figure F-2. Figures F-3 and F-4 present the automobile availability by household size. Note that the majority of households without access to a car are single person households. As expected, nearly all households of 2 or more people have access to at least one vehicle.

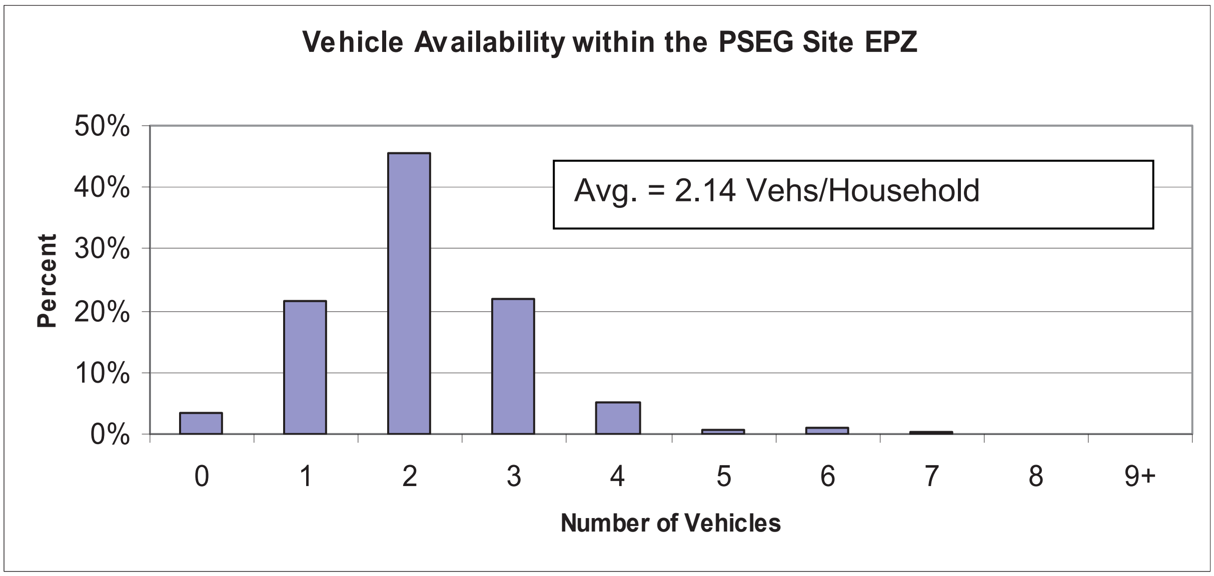


Figure F-2. Household Vehicle Availability

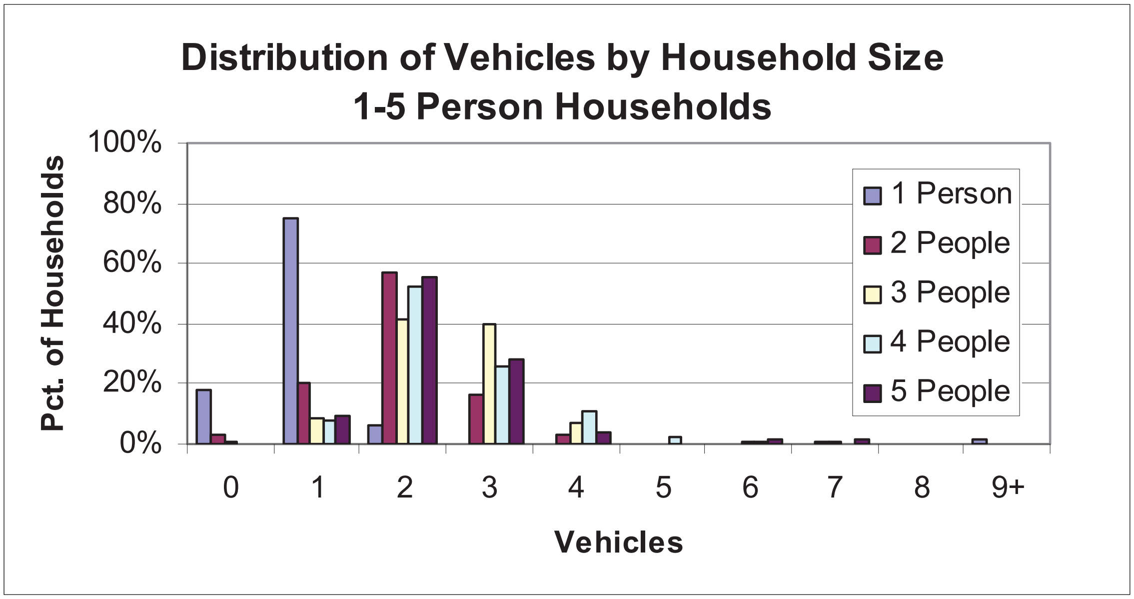


Figure F-3. Vehicle Availability – 1 to 5 Person Households

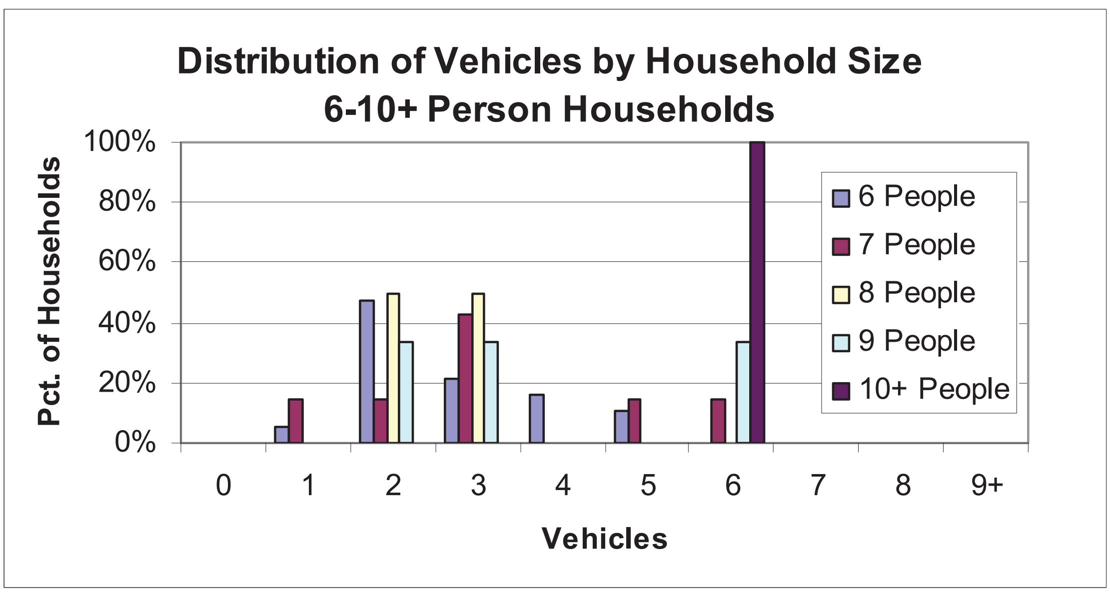


Figure F-4. Vehicle Availability – 6 to 10+ Person Households

Schoolchildren

The average number of schoolchildren per household identified by the survey is 0.75. Figure F-5 presents the distribution of schoolchildren.

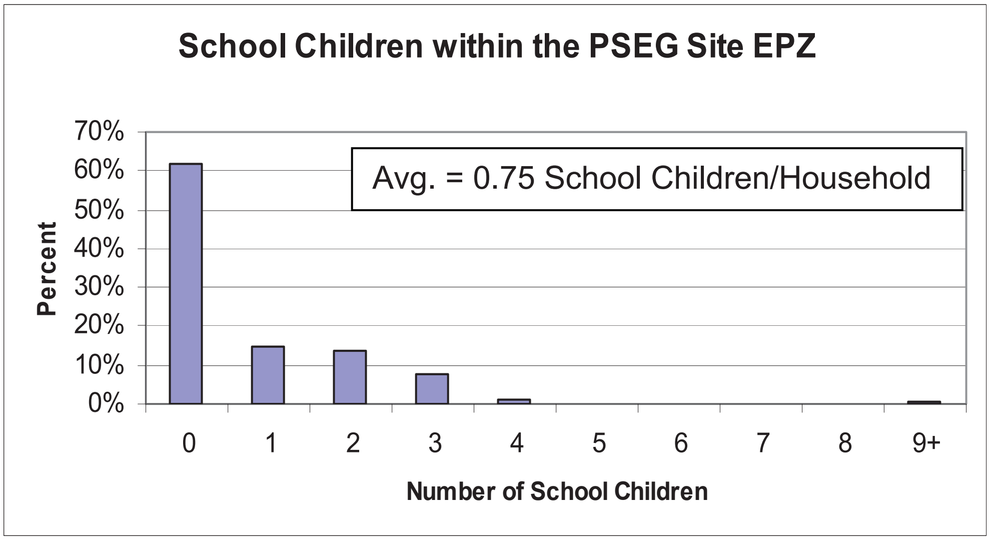


Figure F-5. Schoolchildren in Households

Commuters

Figure F-6 presents the distribution of the number of commuters in each household. The data shows an average of 1.17 commuters in each household in the EPZ.

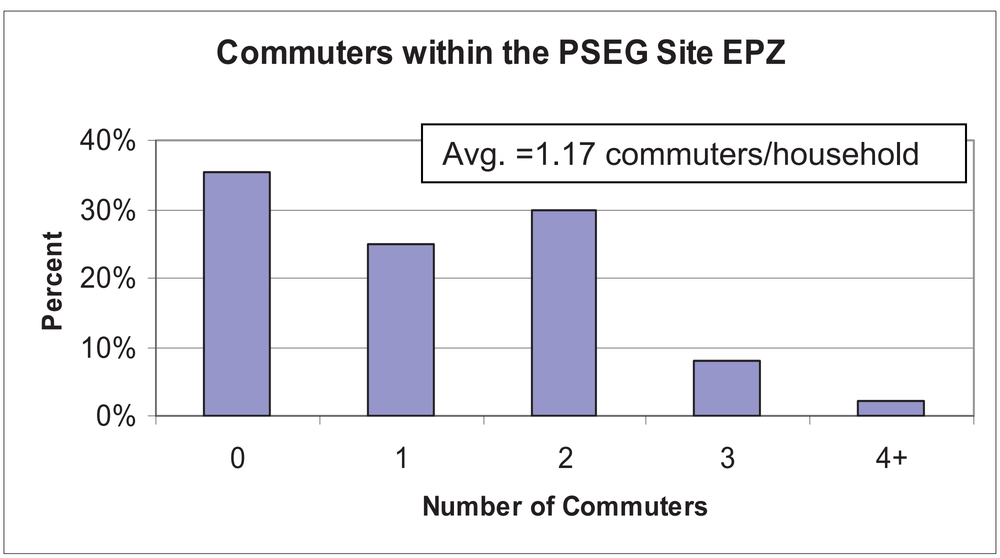


Figure F-6. Commuters in Households in the EPZ

Commuter Travel Modes

Figure F-7 presents the mode of travel that commuters use on a daily basis. The vast majority of commuters use their private automobiles to travel to work.

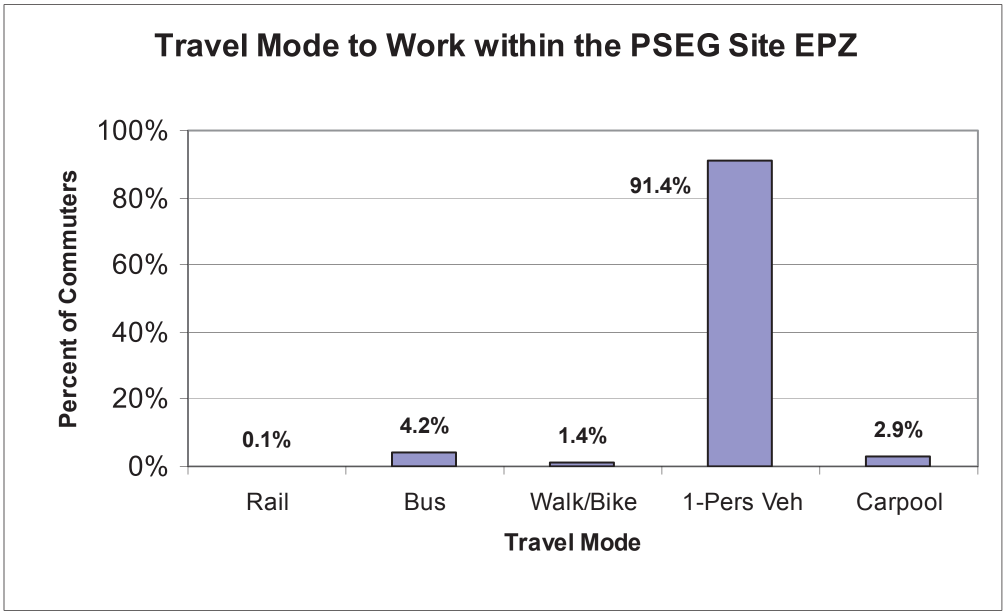


Figure F-7. Modes of Travel in the EPZ

Evacuation Response

Several questions were asked which are used to gauge the population's response to an emergency. The first of these asked "How many of the vehicles that are usually available to the household would your family use during an evacuation?" The response is shown in Figure F-8. On average, 1.35 vehicles per household would be used for evacuation purposes.

The second evacuation response question asked was "When the commuters are away from home, is there a vehicle at home that is available for evacuation during an emergency?" Of the survey participants who responded, 60 percent said that there was another vehicle available to evacuate, while 40 percent answered that there would be no vehicle available for evacuation.

The third evacuation response question was "Would your family await the return of other family members prior to evacuating the area?" Of the survey participants who responded, 60 percent said they would await the return of other family members before evacuating and 40 percent indicated that they would not await the return of other family members.

The fourth evacuation response question was "Would you take household pets with you if you were asked to evacuate the area?" As shown in Figure F-9, 62 percent of respondents said they would take their pets; 8 percent would not. The remaining 30 percent either did not have a pet, or did not give a definitive answer.

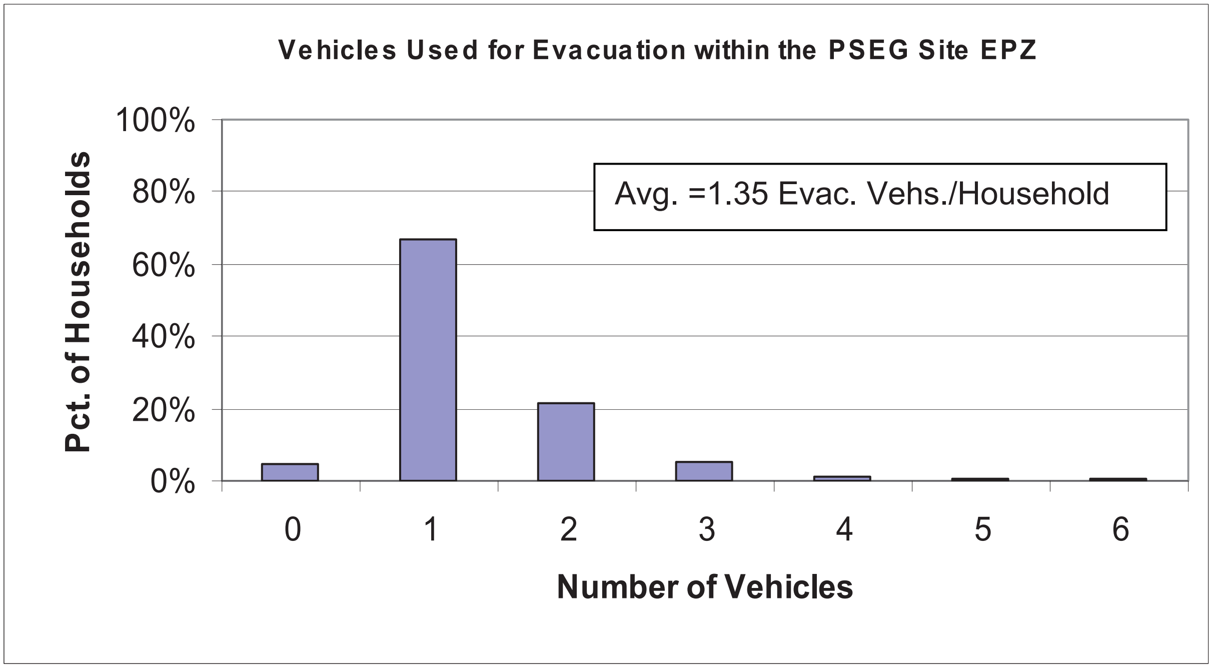


Figure F-8. Number of Vehicles Used for Evacuation

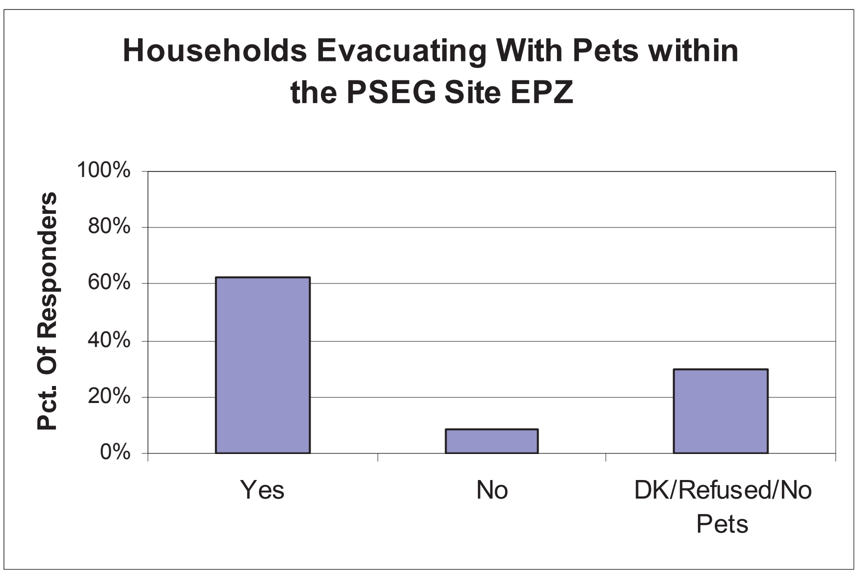


Figure F-9. Households Evacuating with Pets

Time Distribution Results

The survey asked several questions about the amount of time it takes to perform certain pre-evacuation activities. These activities involve actions taken by residents during the course of their day-to-day lives. Thus, the answers fall within the realm of the responder's experience.

How long does it take the commuter to complete preparation for leaving work?

Figure F-10 presents the cumulative distribution; in all cases, the activity is completed by about 120 minutes. Fifty percent can leave within 15 minutes.

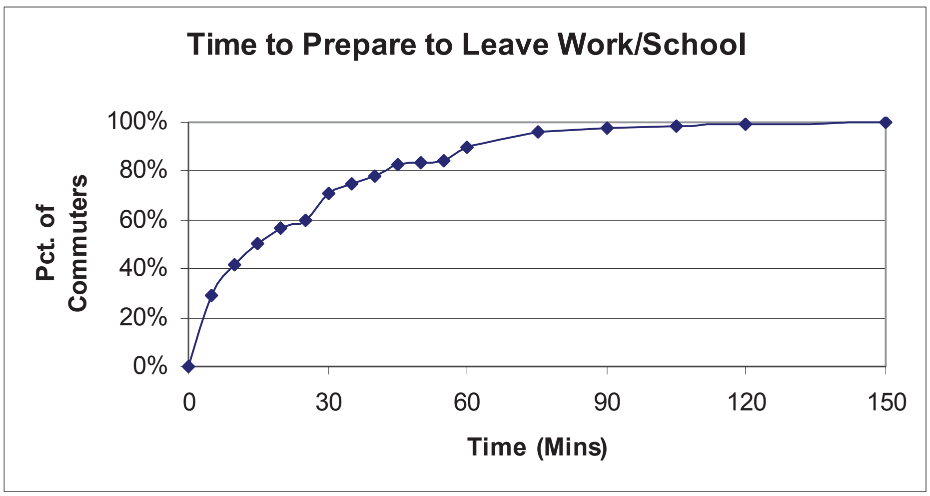


Figure F-10. Time Required to Prepare to Leave Work/School

How long would it take the commuter to travel home?

Figure F-11 presents the work to home travel time for the EPZ. About 70 percent of commuters can arrive home within about 30 minutes of leaving work; nearly all within 90 minutes.

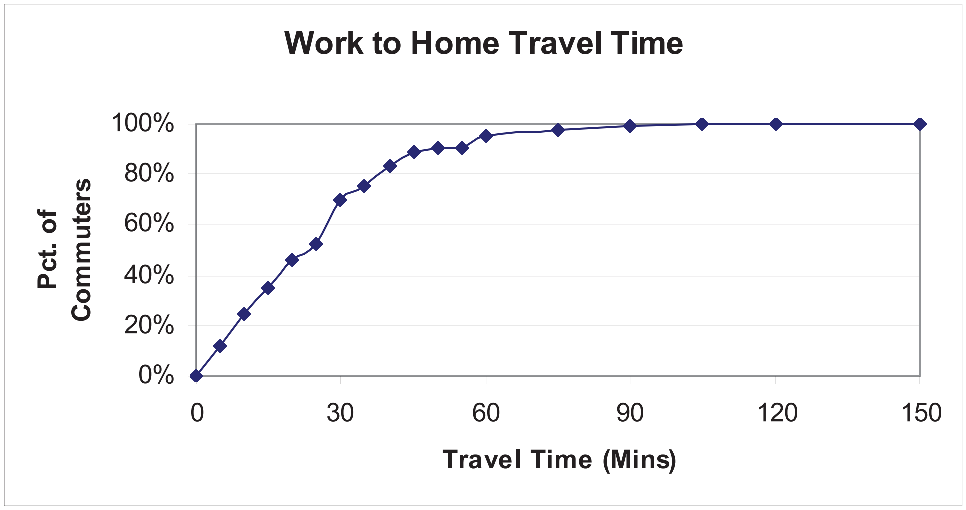


Figure F-11. Work to Home Travel Time

How long would it take the family to pack clothing, secure the house, and load the car?

Figure F-12 presents the time required to prepare for leaving on an evacuation trip. In many ways this activity mimics a family's preparation for a short holiday or weekend away from home. Hence, the responses represent the experience of the responder in performing similar activities.

The distribution shown in Figure F-12 has a long "tail." Over 90 percent of households can be ready to leave home within an hour and a half; the remaining households require up to an additional four and a half hours.

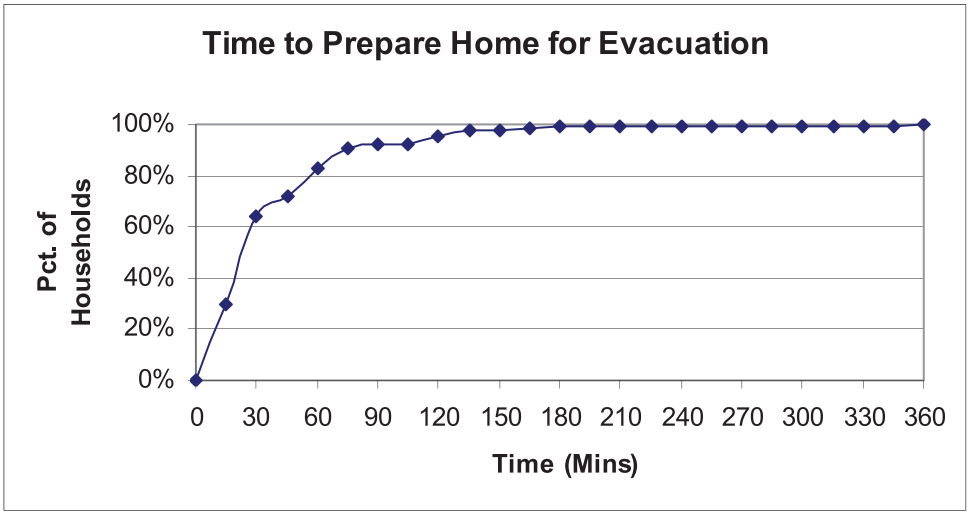


Figure F-12. Time to Prepare Home for Evacuation

How long would it take you to clear 6 to 8 inches of snow from your driveway?

During adverse, snowy weather conditions an additional activity must be performed before residents can depart on the evacuation trip. Although snow scenarios assume that the roads and highways have been plowed and are passable (albeit at lower speeds and capacities), it would be necessary to clear a private driveway prior to leaving the home so that the vehicle can access the street. Figure F-13 presents the time distribution for removing 6 to 8 inches of snow from a driveway. The time distribution for clearing the driveway has a long tail; about 90 percent of driveways are passable within one hour. However, the last driveway is cleared three and a half hours after the start of this activity.

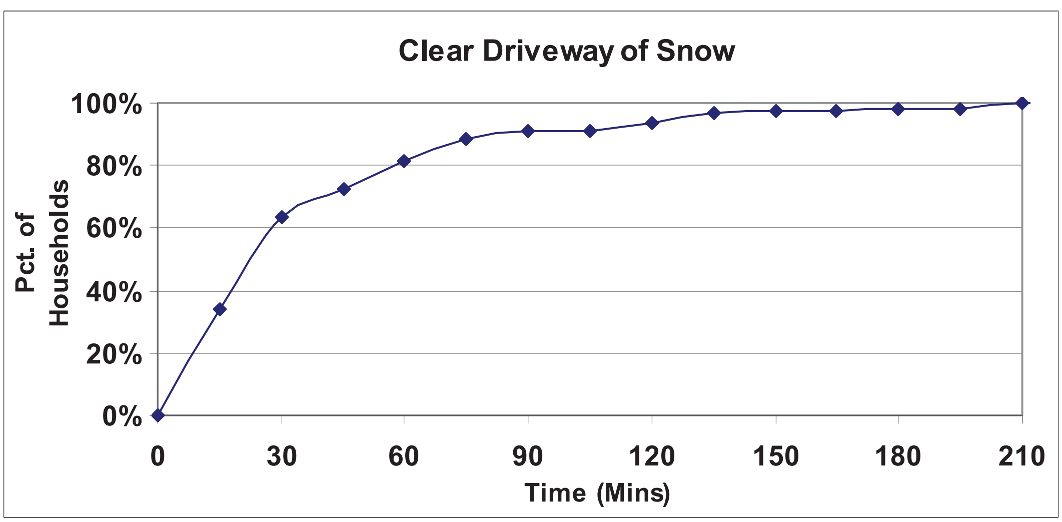


Figure F-13. Time to Clear Driveway of 6"-8" of Snow

4. CONCLUSIONS

The telephone survey provides valuable, relevant data associated with the PSEG Site that have been used to quantify "mobilization time" which can influence evacuation time estimates.

ATTACHMENT A

Telephone Survey Instrument

Survey Instrument

Hello, my name is _______________ and I'm working on a survey being made for [insert marketing firm name] designed to identify local travel patterns in your area. The information obtained will be used in a traffic engineering study and will be shared with County Officials for their consideration in enhancing county emergency response plans for all hazards. Your participation in this survey will greatly enhance the county's emergency preparedness program.

COL.1 Unused
COL.2 Unused
COL.3 Unused

COL.4 Unused
COL.5 Unused

Sex **COL. 8**
1 Male
2 Female

INTERVIEWER: ASK TO SPEAK TO THE HEAD OF HOUSEHOLD OR THE SPOUSE OF THE HEAD OF HOUSEHOLD. (Terminate call if not a residence)

DO NOT ASK:

1A. Record area code. To Be Determined

COL. 9-11

1B. Record exchange number. To Be Determined

COL. 12-14

2. What is your home Zip Code **Col. 15-19**

3. In total, how many cars, or other vehicles are usually available to the household? (DO NOT READ ANSWERS.)

COL.20
1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE
6 SIX
7 SEVEN
8 EIGHT
9 NINE OR MORE
0 ZERO (NONE)
X REFUSED

4. How many people usually live in this household? (DO NOT READ ANSWERS.)

COL.21	**COL.22**
1 ONE	0 TEN
2 TWO	1 ELEVEN
3 THREE	2 TWELVE
4 FOUR	3 THIRTEEN
5 FIVE	4 FOURTEEN
6 SIX	5 FIFTEEN
7 SEVEN	6 SIXTEEN
8 EIGHT	7 SEVENTEEN
9 NINE	8 EIGHTEEN
	9 NINETEEN OR MORE
	X REFUSED

5. How many children living in this household go to local public, private, or parochial schools? (DO NOT READ ANSWERS.)

COL.23
0 ZERO
1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE
6 SIX
7 SEVEN
8 EIGHT
9 NINE OR MORE
X REFUSED

---

6. How many people in the household commute to a job, or to college, at least 4 times a week?

COL.24		SKIP TO
0	ZERO	Q. 12
1	ONE	Q. 7
2	TWO	Q. 7
3	THREE	Q. 7
4	FOUR OR MORE	Q. 7
5	DON'T KNOW/REFUSED	Q. 12

INTERVIEWER: For each person identified in Question 6, ask Questions 7, 8, 9, and 10.

7. Thinking about commuter #1, how does that person usually travel to work or college? (REPEAT QUESTION FOR EACH COMMUTER.)

	Commuter #1 **COL.25**	Commuter #2 **COL.26**	Commuter #3 **COL.27**	Commuter #4 **COL.28**
Rail	1	1	1	1
Bus	2	2	2	2
Walk/Bicycle	3	3	3	3
Driver Car/Van	4	4	4	4
Park & Ride (Car/Rail, Xpress_bus)	5	5	5	5
Driver Carpool-2 or more people	6	6	6	6
Passenger Carpool-2 or more people	7	7	7	7
Taxi	8	8	8	8
Refused	9	9	9	9

---

8. What is the name of the city, town or community in which Commuter #1 works or attends school? (REPEAT QUESTION FOR EACH COMMUTER.) (FILL IN ANSWER.)

COMMUTER #1			COMMUTER #2			COMMUTER #3			COMMUTER #4		
________ City/Town		_____ State	________ City/Town		_____ State	________ City/Town		_____ State	________ City/Town		_____ State
COL.29	**COL.30**	**COL.31**	**COL.32**	**COL.33**	**COL.34**	**COL.35**	**COL.36**	**COL.37**	**COL.38**	**COL.39**	**COL.40**
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9

9. How long, on average, would it take Commuter #1 to travel home from work or college? (REPEAT QUESTION FOR EACH COMMUTER.) (DO NOT READ ANSWERS.)

COMMUTER #1

COL.41
1 5 MINUTES OR LESS
2 6-10 MINUTES
3 11-15 MINUTES
4 16-20 MINUTES
5 21-25 MINUTES
6 26-30 MINUTES
7 31-35 MINUTES
8 36-40 MINUTES
9 41-45 MINUTES

COL.42
1 46-50 MINUTES
2 51-55 MINUTES
3 56 - 1 HOUR
4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 OVER 2 HOURS (SPECIFY _____)
9
0
X DON'T KNOW/REFUSED

COMMUTER #2

COL.43
1 5 MINUTES OR LESS
2 6-10 MINUTES
3 11-15 MINUTES
4 16-20 MINUTES
5 21-25 MINUTES
6 26-30 MINUTES
7 31-35 MINUTES
8 36-40 MINUTES
9 41-45 MINUTES

COL.44
1 46-50 MINUTES
2 51-55 MINUTES
3 56 - 1 HOUR
4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 OVER 2 HOURS (SPECIFY _____)
9
0
X DON'T KNOW/REFUSED

COMMUTER #3

COL.45
1 5 MINUTES OR LESS
2 6-10 MINUTES
3 11-15 MINUTES
4 16-20 MINUTES
5 21-25 MINUTES
6 26-30 MINUTES
7 31-35 MINUTES
8 36-40 MINUTES
9 41-45 MINUTES

COL.46
1 46-50 MINUTES
2 51-55 MINUTES
3 56 - 1 HOUR
4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES –
5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 OVER 2 HOURS (SPECIFY _____)
9
0
X DON'T KNOW/REFUSED

COMMUTER #4

COL.47
1 5 MINUTES OR LESS
2 6-10 MINUTES
3 11-15 MINUTES
4 16-20 MINUTES
5 21-25 MINUTES
6 26-30 MINUTES
7 31-35 MINUTES
8 36-40 MINUTES
9 41-45 MINUTES

COL.48
1 46-50 MINUTES
2 51-55 MINUTES
3 56 - 1 HOUR
4 OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5 BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6 BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7 BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8 OVER 2 HOURS (SPECIFY _____)
9
0
X DON'T KNOW/REFUSED

10. Approximately how long does it take Commuter #1 to complete preparation for leaving work or college prior to starting the trip home? (REPEAT QUESTION FOR EACH COMMUTER.)
(DO NOT READ ANSWERS.)

COMMUTER #1

COL. 49		**COL. 50**	
1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 - 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9	
		0	
		X	DON'T KNOW/REFUSED

COMMUTER #2

COL.51		**COL. 52**	
1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 - 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9	
		0	
		X	DON'T KNOW/REFUSED

COMMUTER #3

COL. 53		**COL. 54**	
1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 - 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9	
		0	
		X	DON'T KNOW/REFUSED

COMMUTER #4

COL. 55		**COL. 56**	
1	5 MINUTES OR LESS	1	46-50 MINUTES
2	6-10 MINUTES	2	51-55 MINUTES
3	11-15 MINUTES	3	56 - 1 HOUR
4	16-20 MINUTES	4	OVER 1 HOUR, BUT LESS THAN 1 HOUR 15 MINUTES
5	21-25 MINUTES	5	BETWEEN 1 HOUR 16 MINUTES AND 1 HOUR 30 MINUTES
6	26-30 MINUTES	6	BETWEEN 1 HOUR 31 MINUTES AND 1 HOUR 45 MINUTES
7	31-35 MINUTES	7	BETWEEN 1 HOUR 46 MINUTES AND 2 HOURS
8	36-40 MINUTES	8	OVER 2 HOURS (SPECIFY _____)
9	41-45 MINUTES	9	
		0	
		X	DON'T KNOW/REFUSED

---

11. When the commuters are away from home, is there a vehicle at home that is available for evacuation during any emergency?

Col. 57	
1	Yes
2	No
3	Don’t Know/Refused

---

12. Would you await the return of family members prior to evacuating the area?

Col. 58	
1	Yes
2	No
3	Don’t Know/Refused

13. How many of the vehicles that are usually available to the household would your family use during an evacuation? (DO NOT READ ANSWERS.)

COL.59
1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE
6 SIX
7 SEVEN
8 EIGHT
9 NINE OR MORE
0 ZERO (NONE)
X REFUSED

---

14. How long would it take the family to pack clothing, secure the house, load the car, and complete preparations prior to evacuating the area? (DO NOT READ ANSWERS.)

COL.60
1 LESS THAN 15 MINUTES
2 15-30 MINUTES
3 31-45 MINUTES
4 46 MINUTES - 1 HOUR
5 1 HOUR TO 1 HOUR 15 MINUTES
6 1 HOUR 16 MINUTES TO 1 HOUR 30 MINUTES
7 1 HOUR 31 MINUTES TO 1 HOUR 45 MINUTES
8 1 HOUR 46 MINUTES TO 2 HOURS
9 2 HOURS TO 2 HOURS 15 MINUTES
0 2 HOURS 16 MINUTES TO 2 HOURS 30 MINUTES
X 2 HOURS 31 MINUTES TO 2 HOURS 45 MINUTES
Y 2 HOURS 46 MINUTES TO 3 HOURS

COL.61
1 3 HOURS TO 3 HOURS 15 MINUTES
2 3 HOURS 16 MINUTES TO 3 HOURS 30 MINUTES
3 3 HOURS 31 MINUTES TO 3 HOURS 45 MINUTES
4 3 HOURS 46 MINUTES TO 4 HOURS
5 4 HOURS TO 4 HOURS 15 MINUTES
6 4 HOURS 16 MINUTES TO 4 HOURS 30 MINUTES
7 4 HOURS 31 MINUTES TO 4 HOURS 45 MINUTES
8 4 HOURS 46 MINUTES TO 5 HOURS
9 5 HOURS TO 5 HOURS 15 MINUTES
0 5 HOURS 16 MINUTES TO 5 HOURS 30 MINUTES
X 5 HOURS 31 MINUTES TO 5 HOURS 45 MINUTES
Y 5 HOURS 46 MINUTES TO 6 HOURS

COL.62
1 DON'T KNOW

---

15. How long, on average, would it take you to clear 6-8" of snow to move the car from the driveway or curb to begin the evacuation trip? Assume the roads are passable. (DO NOT READ RESPONSES.)

COL.63
1 LESS THAN 15 MINUTES
2 15-30 MINUTES
3 31-45 MINUTES
4 46 MINUTES - 1 HOUR
5 1 HOUR TO 1 HOUR 15 MINUTES
6 1 HOUR 16 MINUTES TO 1 HOUR 30 MINUTES
7 1 HOUR 31 MINUTES TO 1 HOUR 45 MINUTES
8 1 HOUR 46 MINUTES TO 2 HOURS
9 2 HOURS TO 2 HOURS 15 MINUTES
0 2 HOURS 16 MINUTES TO 2 HOURS 30 MINUTES
X 2 HOURS 31 MINUTES TO 2 HOURS 45 MINUTES
Y 2 HOURS 46 MINUTES TO 3 HOURS

COL.64
1 MORE THAN 3 HOURS
2 DON'T KNOW

16. Would you take household pets with you if you were asked to evacuate the area?

Col. 65
1 Yes
2 No
3 Don't Know/Refused

Thank you very much. ___________________________

(TELEPHONE NUMBER CALLED)

IF REQUESTED:
For Additional information, contact your State Emergency Management Agency

County	EMO Phone
New Jersey	1-800-792-8314
Delaware	1-877-729-3362

APPENDIX G

Traffic Management Plan

APPENDIX G: TRAFFIC MANAGEMENT PLAN

As discussed in Section 7.2, the most critical intersections in the EPZ are listed in Table G-1 below, and are geographically displayed in Figures G-1 and G-2.

Table G-1. Critical Intersections in the PSEG Site EPZ

Critical Intersection ID	Description
1	NJ Route 49 and NJ Route 45
2	NJ Route 49 and Front Street
3	NJ Route 49 and Hook Rd (CR 551)
4	NJ Route 49 and Yorke St
5	Salem-Hancocks Bridge Rd/Yorke St and Grieves Parkway
6	DE Route 299 and US Route 301
7	DE Route 299 and DE Route 71
8	US Route 301 and DE Route 896
9	DE Route 71 and Main St/Pine Tree Rd

These critical intersections are suggested as traffic control points (TCP) during evacuation, which would be controlled by a police officer who would guide evacuees in the proper direction and facilitate the flow of traffic through the intersection. While there are many intersections that could potentially be TCPs, manpower and equipment are typically not sufficient to carry out all functions during an evacuation. Therefore, the investment of manpower and equipment at these critical intersections would be most beneficial to the evacuation process. Table G-2 summarizes the manpower and equipment needed to perform the traffic control duties at these suggested TCP. Figure G-3 through G-11 provide detailed schematics of the suggested actions to be taken at the TCP.

With reference to the discussion of Section 2.3, these TCP serve many useful functions, but are not considered in specifying the inputs to the I-DYNEV system used to calculate ETE. Consequently, the results presented in Section 7 and in Appendix J do not credit the presence of these TCP.

It is assumed that access control points (ACP) will be established within 90 minutes of the advisory to evacuate to discourage through travelers from using US Route 13 and DE Route 1 in Delaware and NJ Route 49 in New Jersey to traverse the EPZ. Figure G-12 maps the suggested ACP needed to divert traffic from entering the EPZ along the aforementioned routes. Table G-3 summarizes the manpower and equipment needed to implement access control, while Figures G-13 through G-18 provide detailed schematics of the suggested actions to be taken at the ACP.

The States of New Jersey and Delaware have existing traffic management plans to be used in the event of an evacuation of the EPZ due to an incident at one of the three operational

units at the PSEG Site. It is likely that these plans would be used in support of the new plant as well, when active.

Detailed information about the existing TCP and ACP can be found in the Delaware State Plan, SOP700, “Traffic and Access Control”, and in Appendix 5 of Attachment 22 to the State of New Jersey Salem/Hope Creek Nuclear Generating Stations Radiological Emergency Response Plan. Table G-4 compares the suggested TCP and ACP with the existing TCP and ACP. Those TCP and ACP which are not currently identified in the state plans should be considered in future revisions to the state plans. The traffic management plan detailed in this appendix has been reviewed by state and county emergency planners with local and state police.

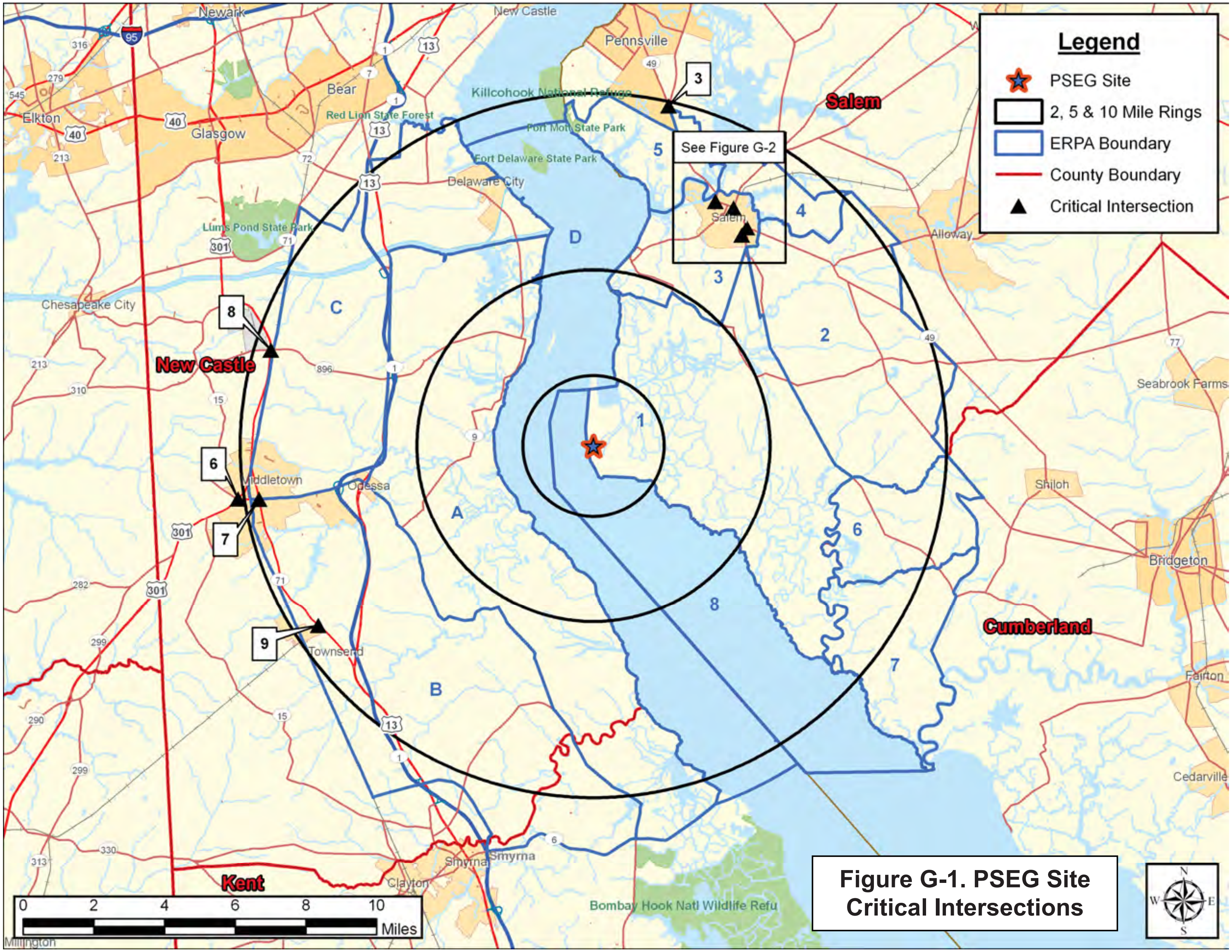


Figure G-1. PSEG Site Critical Intersections

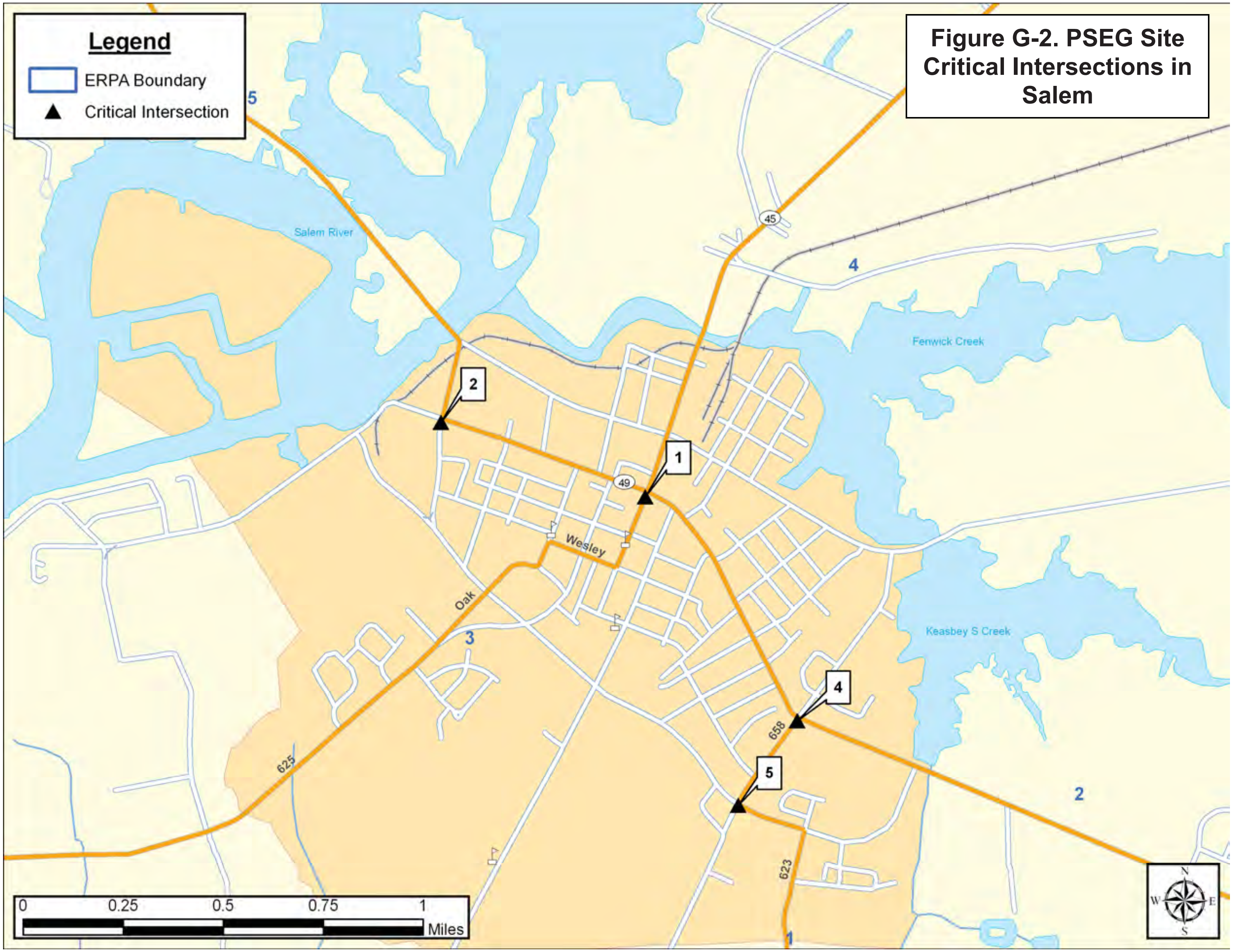

Legend
ERPA Boundary
Critical Intersection
Figure G-2. PSEG Site Critical Intersections in Salem
Salem River
Fenwick Creek
Keasbey S Creek
Wesley
Oak
45
49
658
625
623
1
2
3
4
5
0
0.25
0.5
0.75
1
Miles

Table G-2. Summary of Suggested Traffic Control Points					
ID	**Municipality**	**Intersection Location**	**Priority**	**# of Guides**	**# of Cones**
SALEM COUNTY, NJ					
1	Salem City	NJ Route 49 & NJ Route 45	1	1	3
2	Salem City	NJ Route 49 & Front St	1	1	6
3	Pennsville	NJ Route 49 & S. Hook Rd (CR 551)	1	2	3
4	Salem City	NJ Route 49 & Keasbey/Yorke St	2	1	6
5	Salem City	Salem-Hancocks Bridge Rd/Yorke St & Grieves Pkwy	1	1	3
Total Equipment/Manpower for Salem County:				**6**	**21**
NEW CASTLE COUNTY, DE					
6	Middletown	DE Route 299 & US 301	1	2	3
7	Middletown	DE Route 299 & DE Route 71	1	2	3
8	Summit Bridge	US 301 & DE Route 896	1	2	12
9	Townsend	DE Route 71 & Main St/Pine Tree Rd	2	2	9
Total Equipment/Manpower for New Castle County:				**8**	**27**
TOTAL EQUIPMENT/MANPOWER FOR ENTIRE EPZ:				**14**	**48**

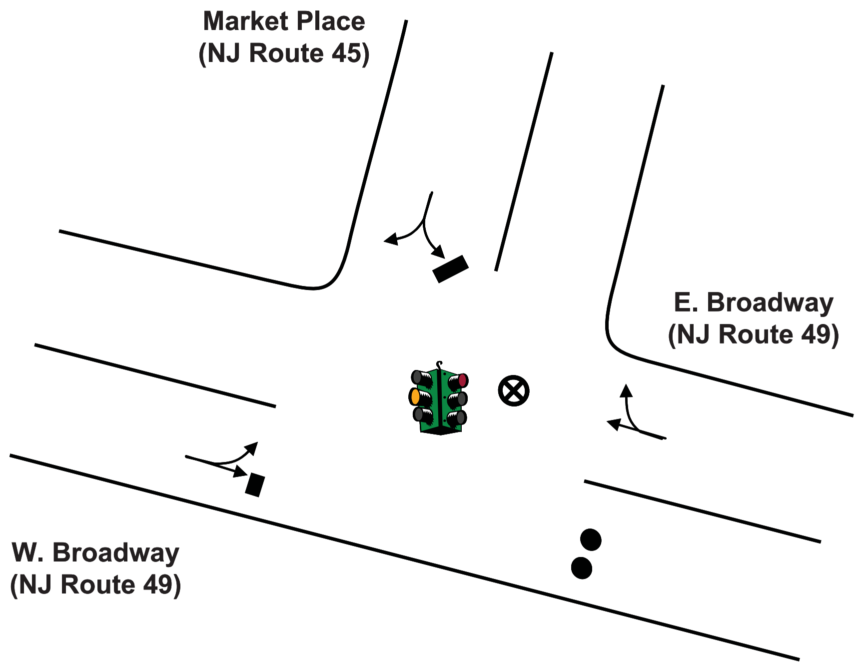
TCP

MUNICIPALITY: Salem City

LOCATION: NJ Route 49 & NJ Route 45

ID: 1

ERPA: 3



N

Traffic Guide should position himself safely

Key

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Discourage eastbound traffic on New Jersey Route 49

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)

3 Traffic Cones

LOCATION PRIORITY

1

Figure G-3. Schematic of TCP 1

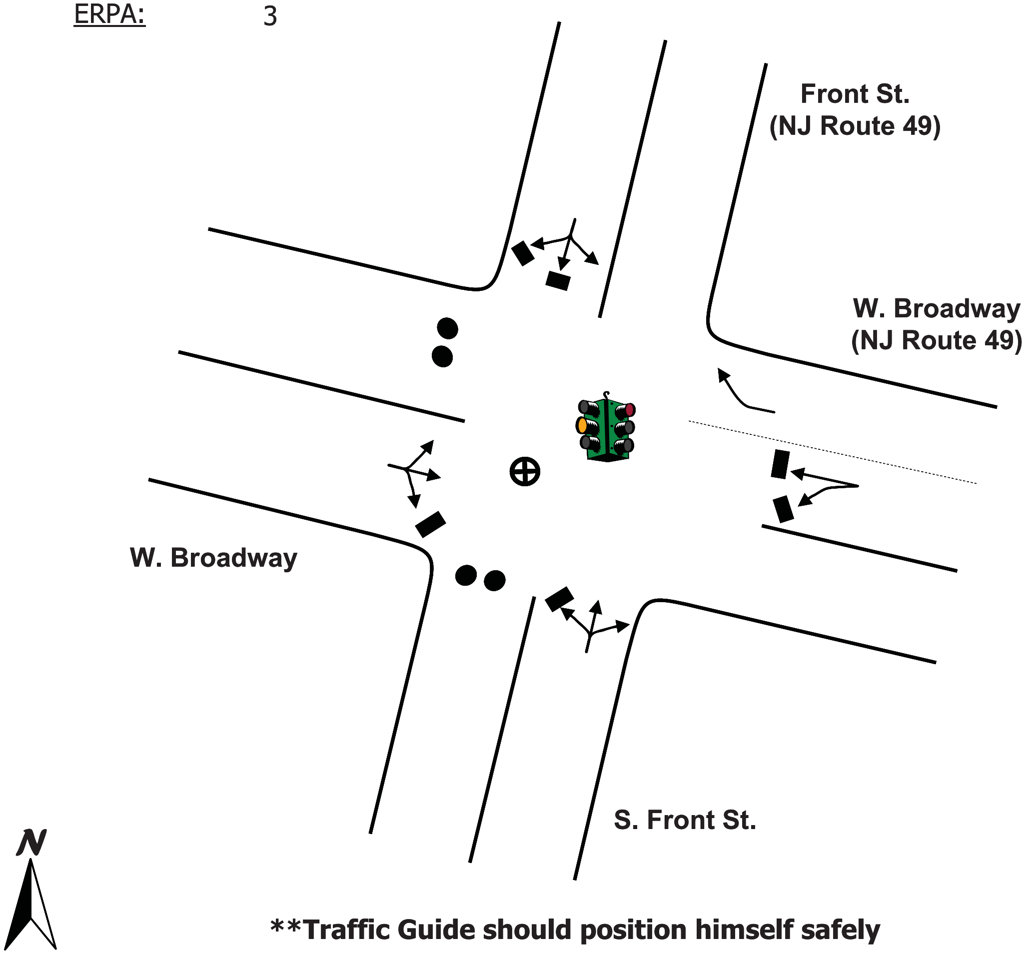
TCP

MUNICIPALITY: Salem City

LOCATION: NJ Route 49 & Front St

ID: 2

ERPA: 3



Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage westbound traffic on W. Broadway
2. Discourage southbound traffic on S. Front Street

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

1

Figure G-4. Schematic of TCP 2

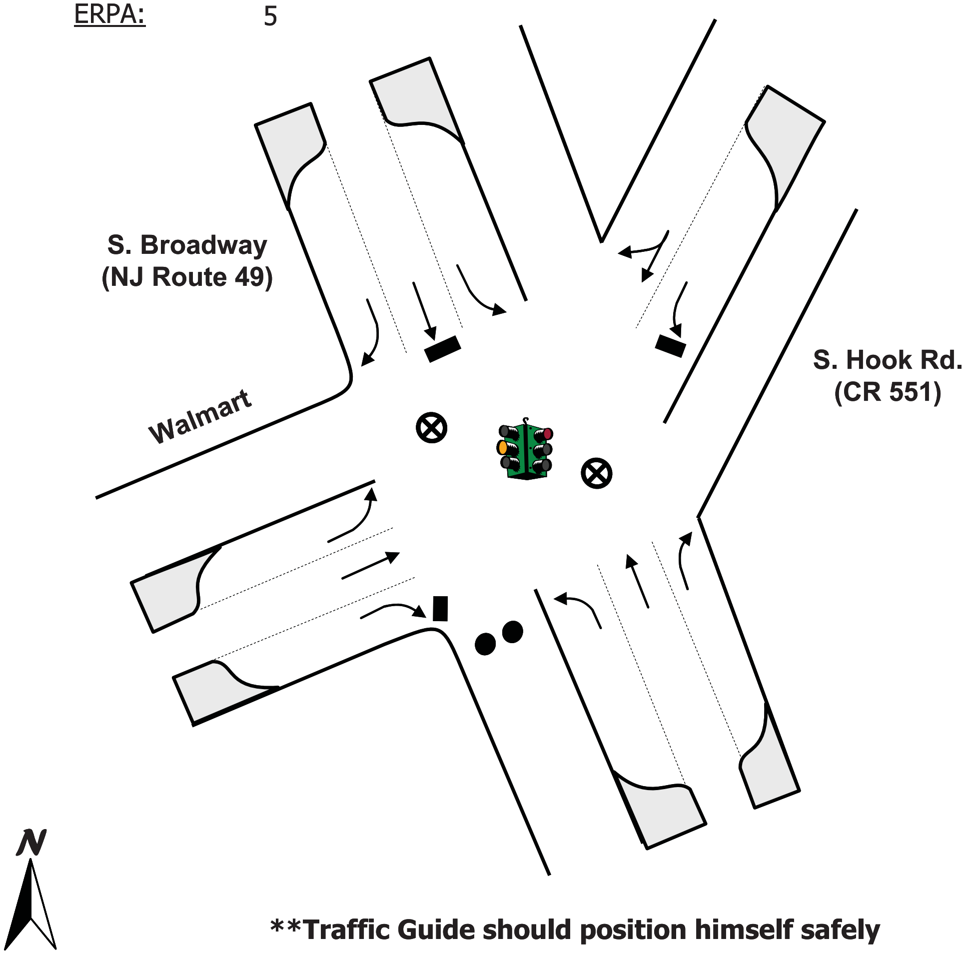
TCP

MUNICIPALITY: Pennsville

LOCATION: NJ Route 49 & S. Hook Rd (CR 551)

ID: 3

ERPA: 5



****Traffic Guide should position himself safely**

Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage eastbound traffic on New Jersey Route 49

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
3 Traffic Cones

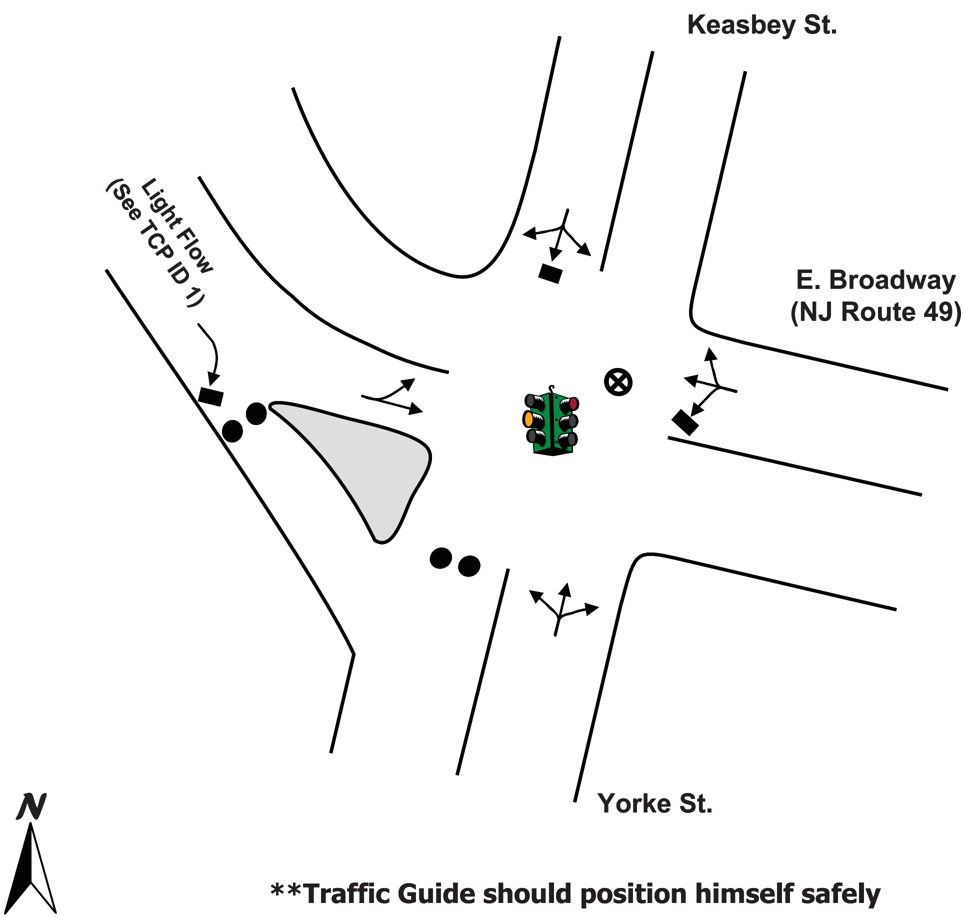
LOCATION PRIORITY

1

Figure G-5. Schematic of TCP 3

TCP

MUNICIPALITY: Salem City
LOCATION: NJ Route 49 & Keasbey/Yorke St
ID: 4
ERPA: 3



Traffic Guide should position himself safely

Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage southbound traffic on Yorke Street

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
6 Traffic Cones

LOCATION PRIORITY

2

Figure G-6. Schematic of TCP 4

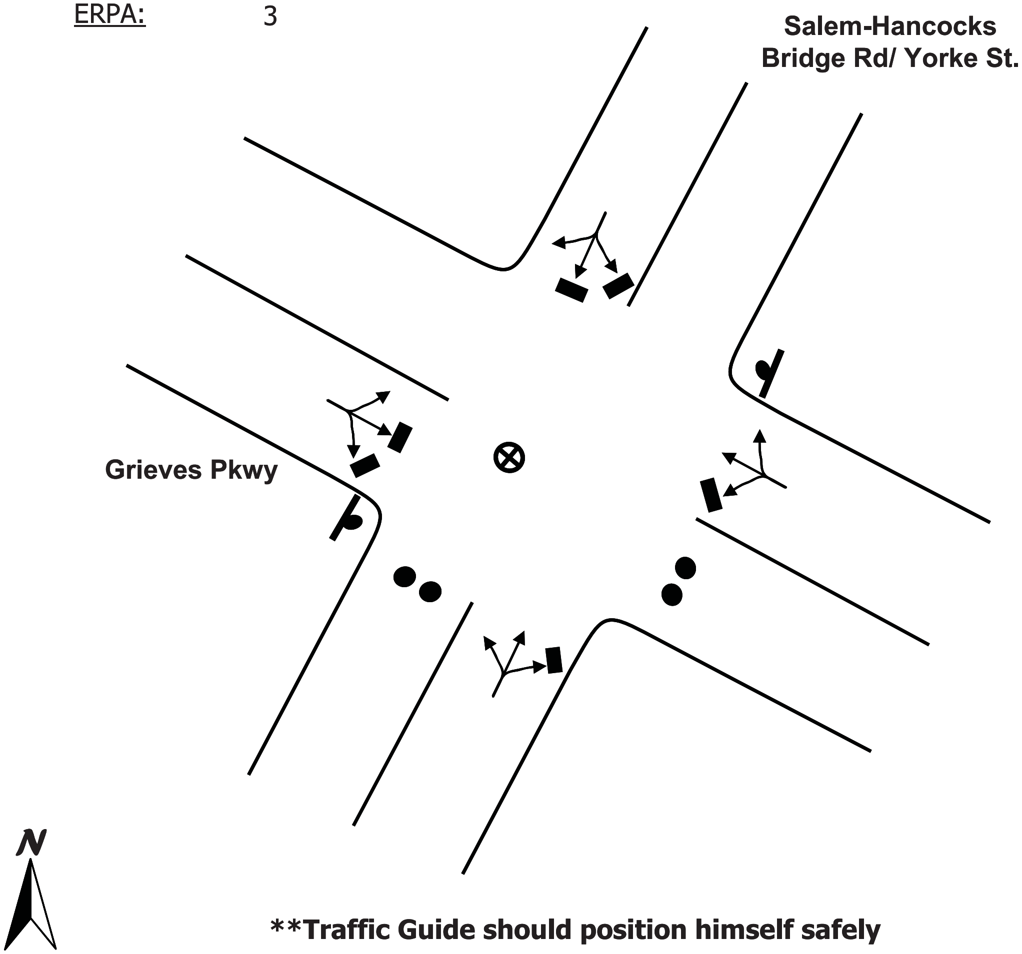
TCP

MUNICIPALITY: Salem City

LOCATION: Salem-Hancocks Bridge Rd/Yorke St & Grieves Pkwy

ID: 5

ERPA: 3



****Traffic Guide should position himself safely**

Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage southbound traffic on Yorke St.
2. Discourage eastbound traffic on Grieves Pkwy

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

1

Figure G-7. Schematic of TCP 5

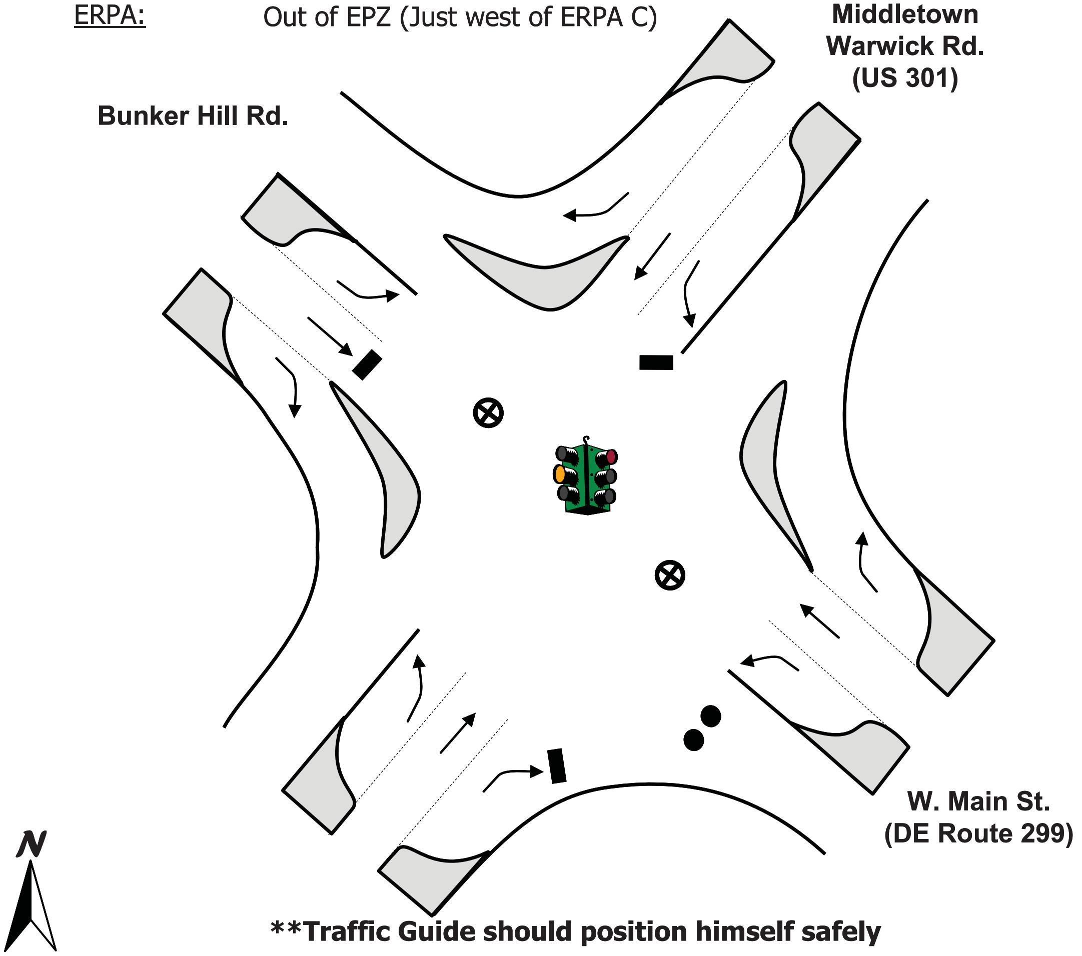
TCP

MUNICIPALITY: Middletown

LOCATION: DE Route 299 & US 301

ID: 6

ERPA: Out of EPZ (Just west of ERPA C)



**Traffic Guide should position himself safely

Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage eastbound traffic on DE Route 299

MANPOWER/EQUIPMENT ESTIMATE

2	Traffic Guide(s)
3	Traffic Cones

LOCATION PRIORITY

1

Figure G-8. Schematic of TCP 6

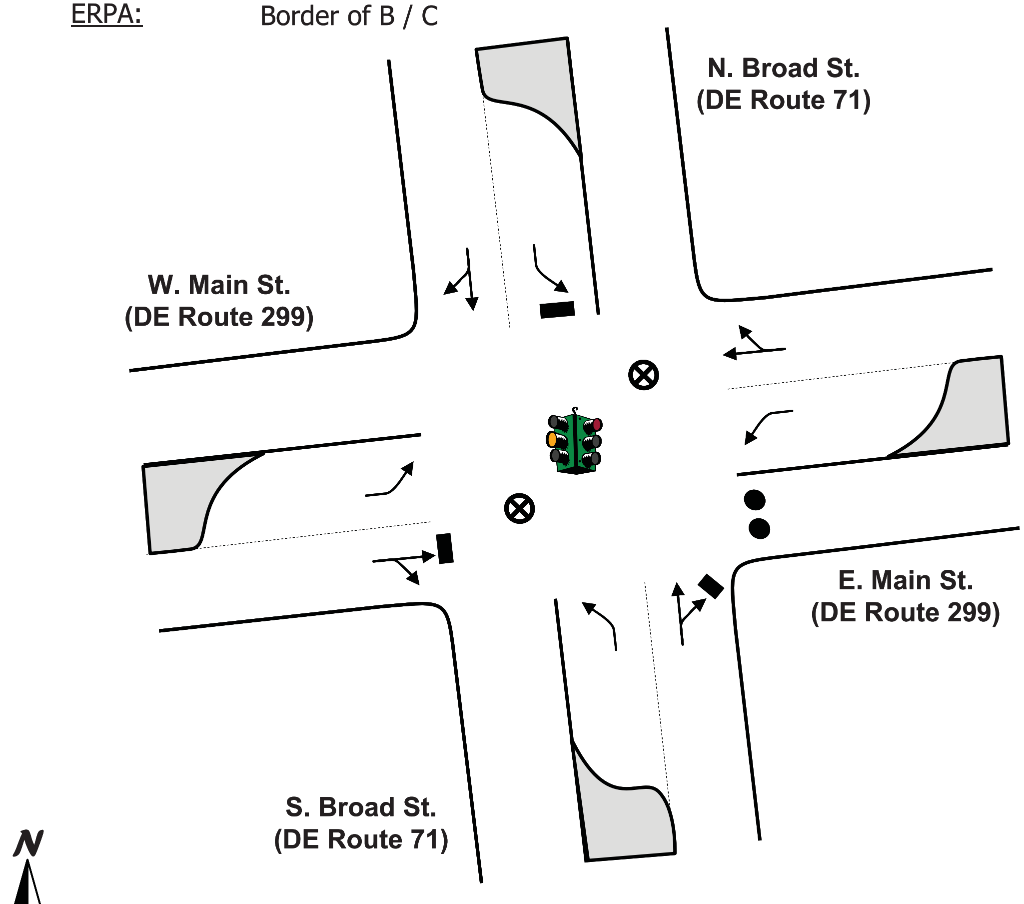
TCP

MUNICIPALITY: Middletown

LOCATION: DE Route 299 & DE Route 71

ID: 7

ERPA: Border of B / C



****Traffic Guide should position himself safely**

Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage eastbound traffic on Delaware Route 299

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
3 Traffic Cones

LOCATION PRIORITY

1

Figure G-9. Schematic of TCP 7

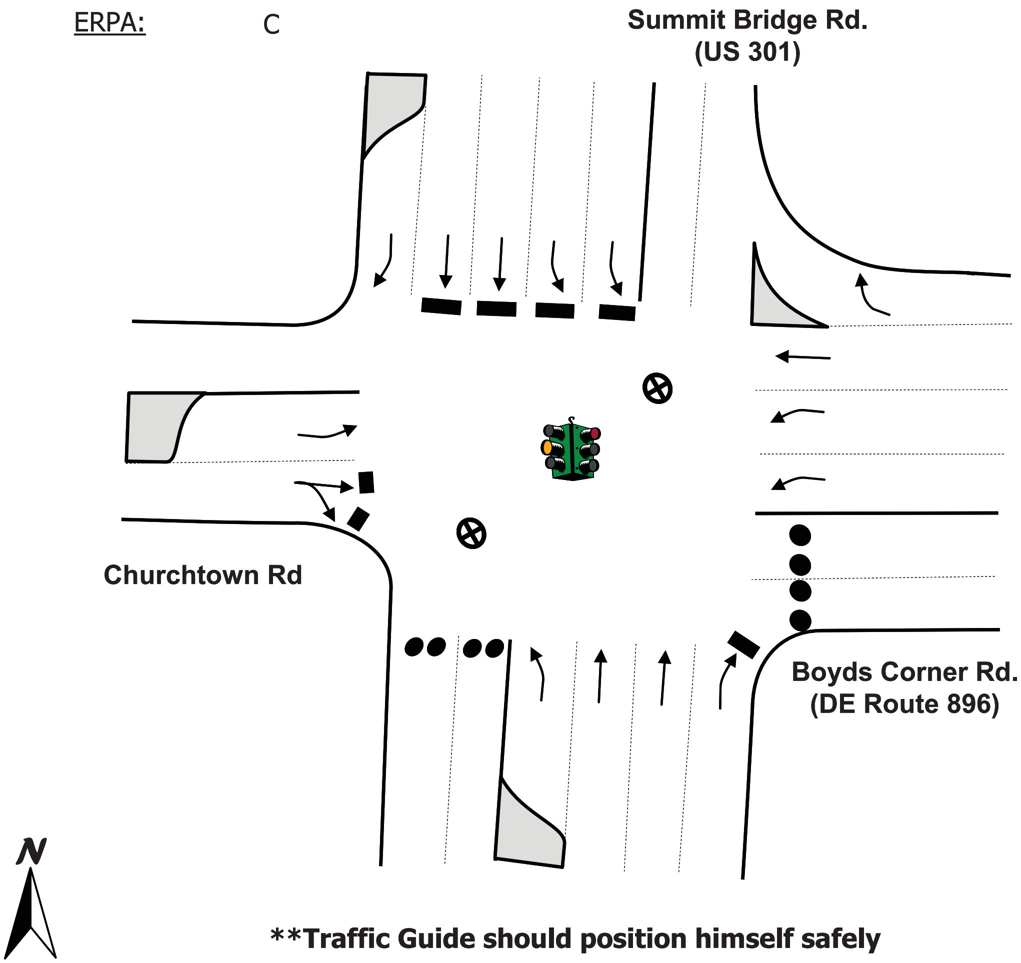
TCP

MUNICIPALITY: Summit Bridge

LOCATION: US 301 & DE Route 896

ID: 8

ERPA: C



**Traffic Guide should position himself safely

Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
  - 2 ft
  - 3 ft
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage eastbound traffic on Delaware Route 896
2. Discourage southbound traffic on US 301

MANPOWER/EQUIPMENT ESTIMATE

2	Traffic Guide(s)
12	Traffic Cones

LOCATION PRIORITY

1

Figure G-10. Schematic of TCP 8

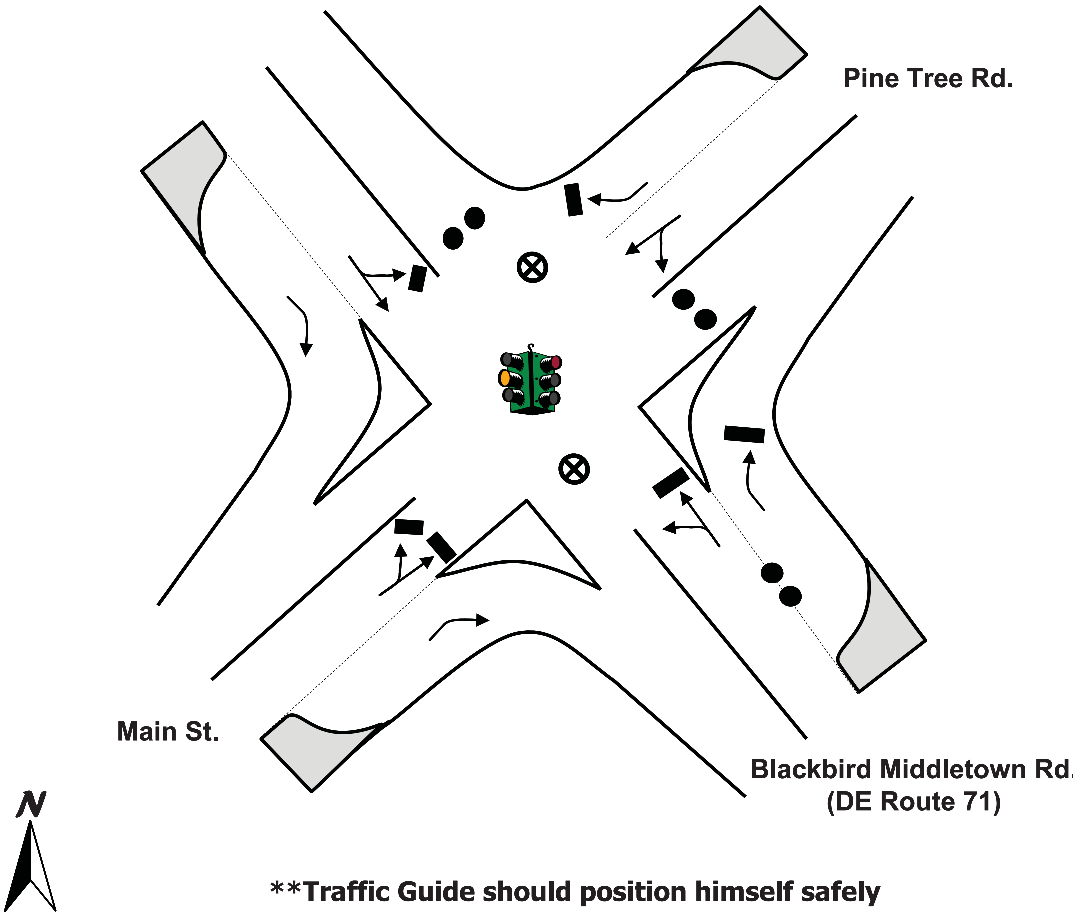
TCP

MUNICIPALITY: Townsend

LOCATION: DE Route 71 & Main St/Pine Tree Rd

ID: 9

ERPA: B



****Traffic Guide should position himself safely**

Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE
  - 2 ft
  - 3 ft
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Discourage eastbound traffic on Pine Tree Road
2. Discourage northbound traffic on DE Route 71

MANPOWER/EQUIPMENT ESTIMATE

2 Traffic Guide(s)
9 Traffic Cones

LOCATION PRIORITY

2

Figure G-11. Schematic of TCP 9

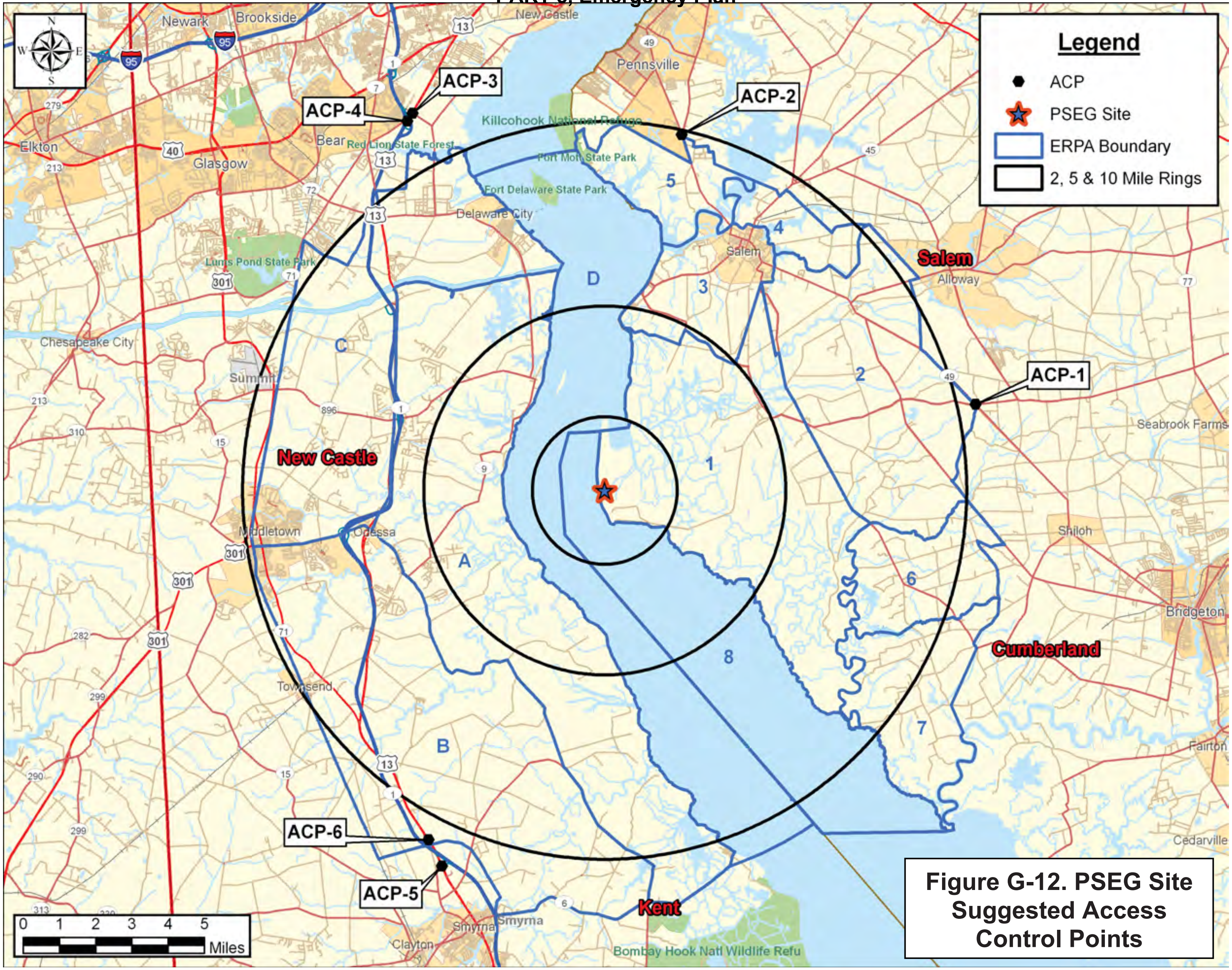


Figure G-12. PSEG Site Suggested Access Control Points

Table G-3. Summary of Suggested Access Control Points					
ID	**Municipality**	**Intersection Location**	**Priority**	**# of Guides**	**# of Barricades**
SALEM COUNTY, NJ					
ACP-1	Pecks Corner	NJ Route 49 & Harmersville Pecks Corner Rd/Cohansey Rd	1	1	4
ACP-2	Pennsville	NJ Route 49 & S. Hook Rd (CR 551)	1	1	2
		Total Equipment/Manpower for Salem County:		**2**	**6**
NEW CASTLE COUNTY, DE					
ACP-3	Bear	Bear Rd/Hamburg Rd & US 13	1	3	8
ACP-4	Bear	US 13 & DE Route 1 & DE Route 71	1	3	16
ACP-5	Smyrna	US 13 & DE Route 486 & DE Route 1	1	3	6
ACP-6	Smyrna	US 13 & DE Route 1	1	3	12
		Total Equipment/Manpower for New Castle County:		**12**	**42**
		TOTAL EQUIPMENT/MANPOWER FOR ENTIRE EPZ:		**14**	**48**

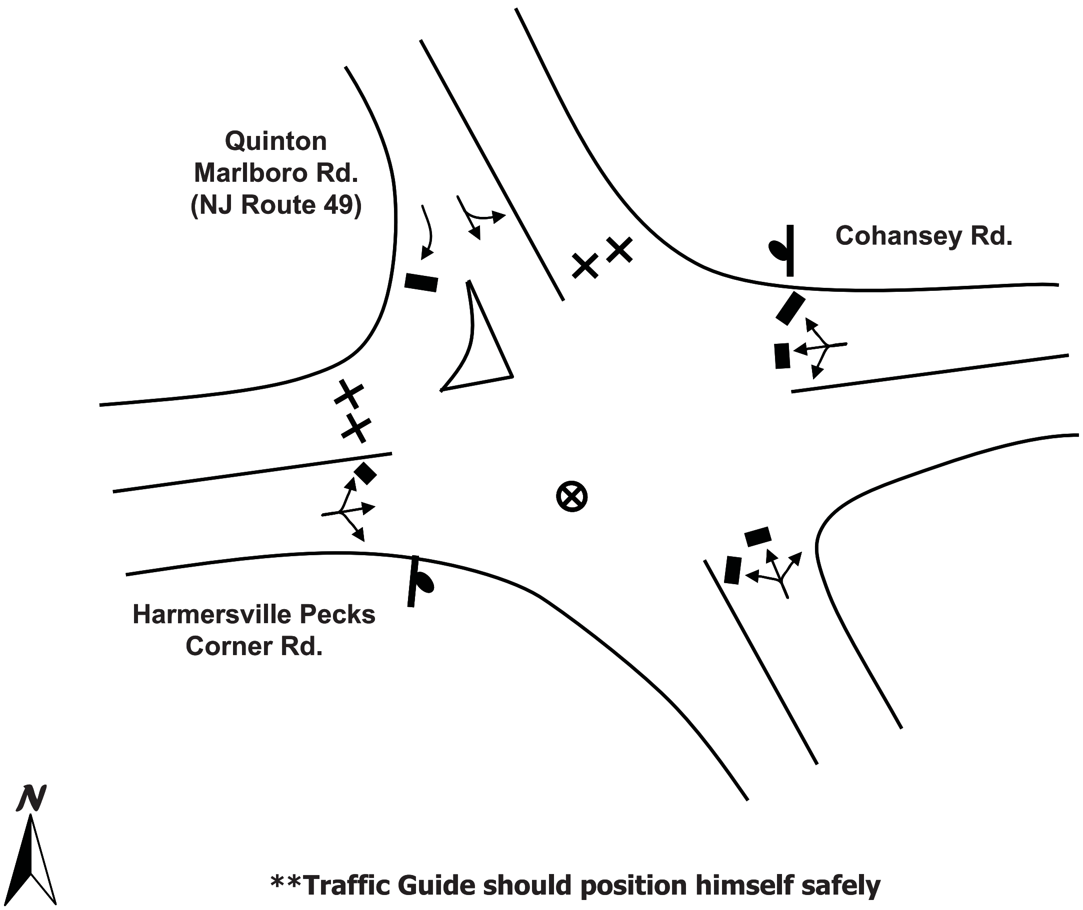
ACP

TOWN: Pecks Corner

LOCATION: NJ Route 49 & Harmersville Pecks Corner Rd. / Cohansey Rd.

ACP ID: ACP-1

ERPA: 2



Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft × 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Interdict and divert westbound traffic on New Jersey Route 49
2. Interdict and divert westbound traffic on Harmersville Pecks Corner Road

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)
4 Traffic Barricades

LOCATION PRIORITY

1

Figure G-13. Schematic of ACP 1

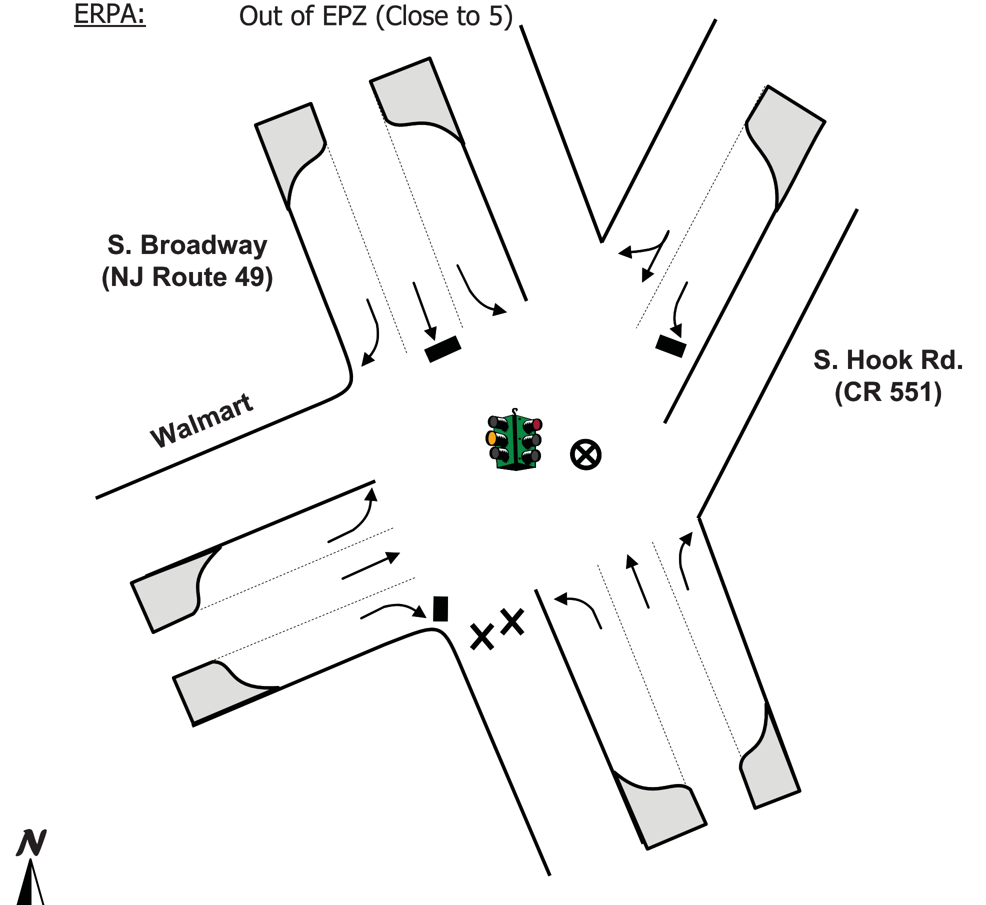
ACP

TOWN: Pennsville

LOCATION: NJ Route 49 & S. Hook Rd (CR 551)

ACP ID: ACP-2

ERPA: Out of EPZ (Close to 5)



Traffic Guide should position himself safely

Key

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft

ACTIONS TO BE TAKEN

1. Interdict and divert southbound traffic on New Jersey Route 49

MANPOWER/EQUIPMENT ESTIMATE

1 Traffic Guide(s)

2 Traffic Barricades

LOCATION PRIORITY

1

Figure G-14. Schematic of ACP 2

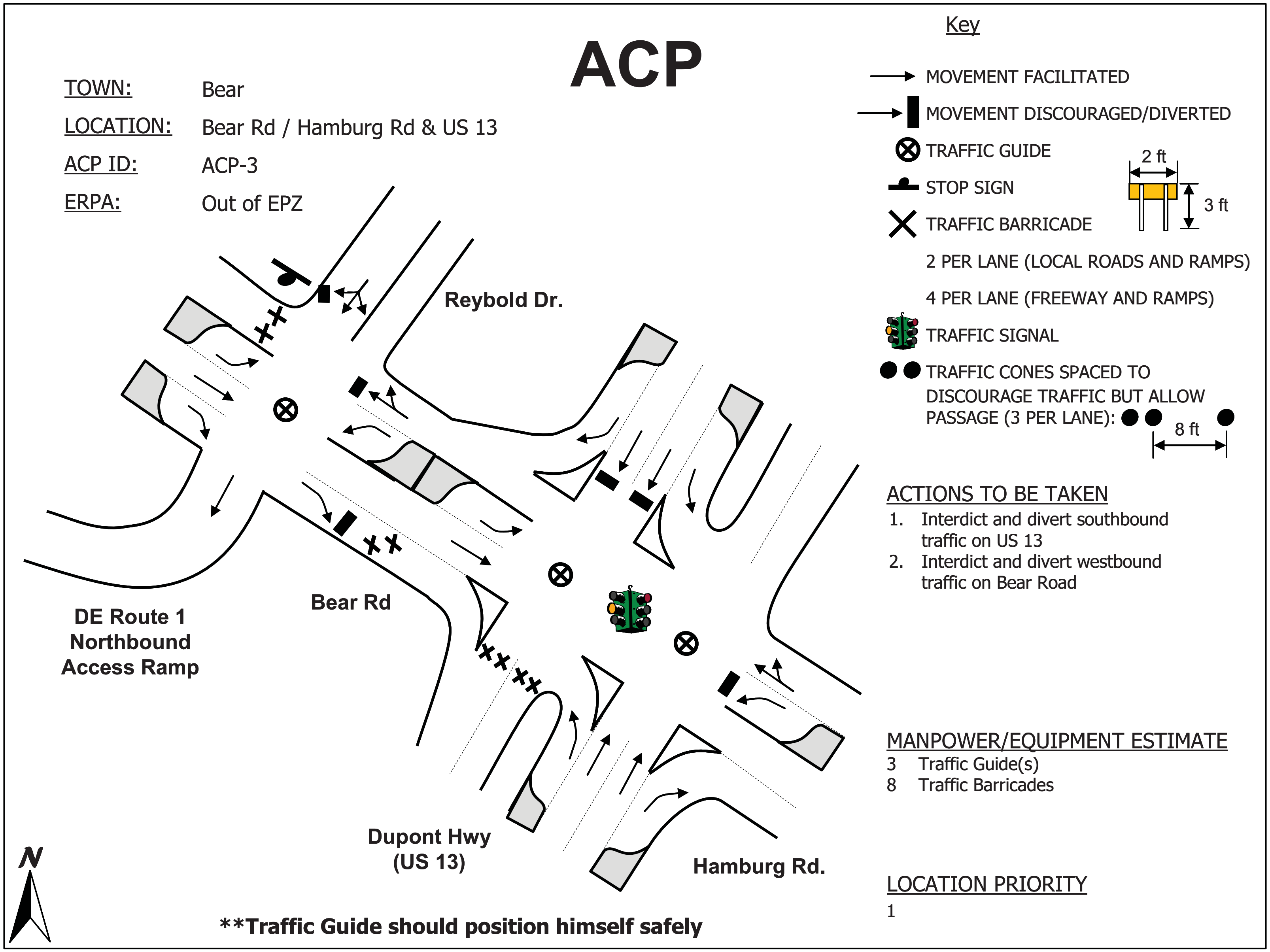


Figure G-15. Schematic of ACP 3

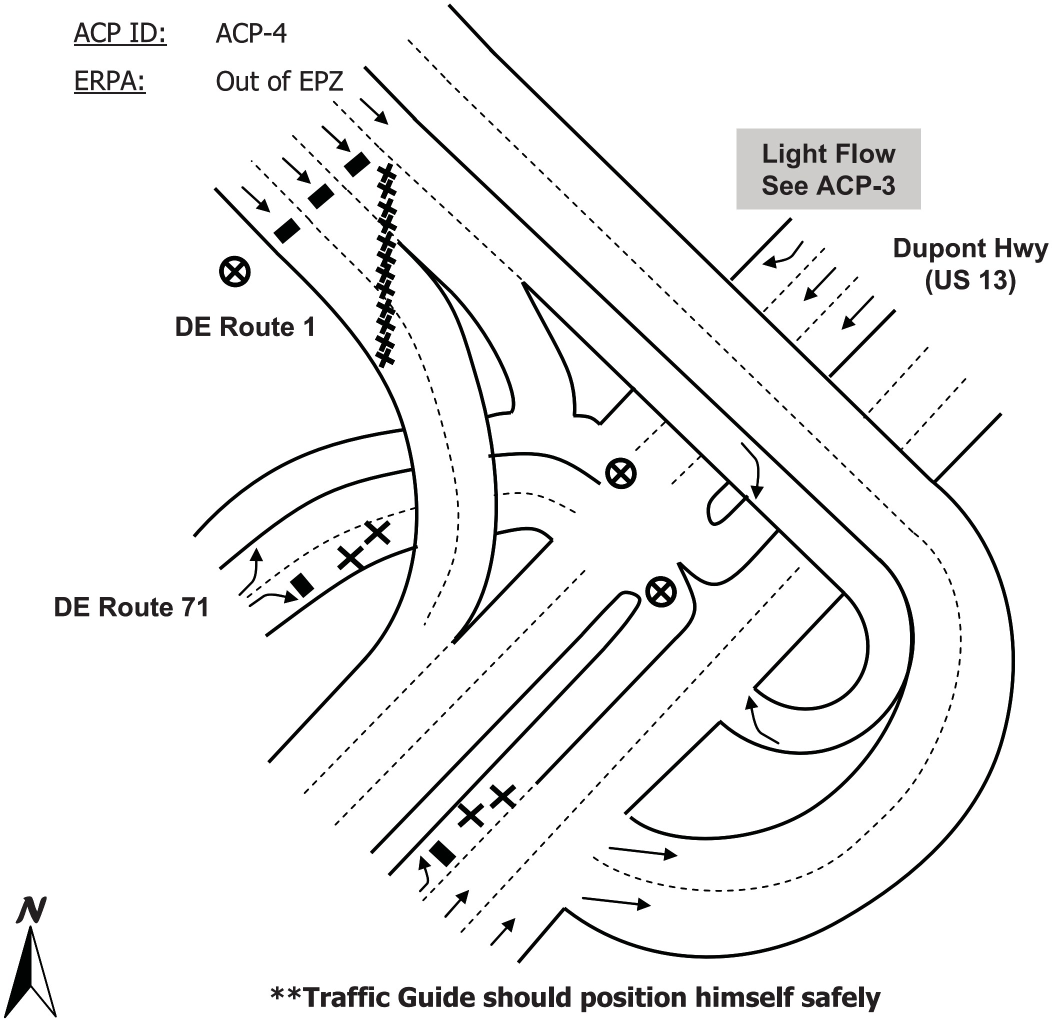
ACP

TOWN: Bear

LOCATION: US 13 & DE Route 1 & DE Route 71

ACP ID: ACP-4

ERPA: Out of EPZ



Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
  - 2 ft
  - 3 ft
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Interdict and divert southbound traffic on US Hwy 13
2. Interdict and divert westbound traffic on Delaware Route 71

MANPOWER/EQUIPMENT ESTIMATE

3 Traffic Guide(s)
16 Traffic Barricades

LOCATION PRIORITY

1

Figure G-16. Schematic of ACP 4

ACP

TOWN: Smyrna

LOCATION: US 13 & DE Route 486 & DE Route 1

ACP ID: ACP-5

ERPA: B

Key

MOVEMENT FACILITATED

MOVEMENT DISCOURAGED/DIVERTED

TRAFFIC GUIDE

STOP SIGN

TRAFFIC BARRICADE

2 ft

3 ft

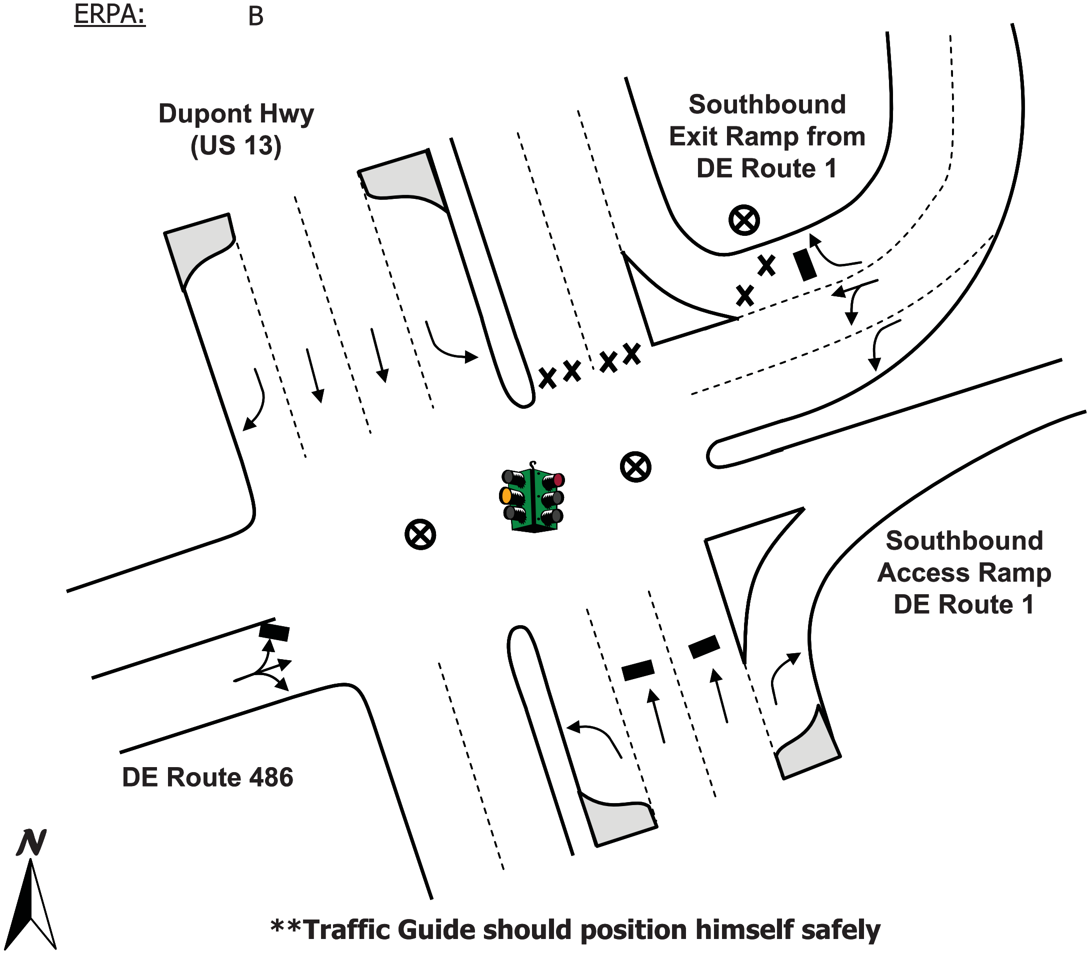
2 PER LANE (LOCAL ROADS AND RAMPS)

4 PER LANE (FREEWAY AND RAMPS)

TRAFFIC SIGNAL

TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE):

8 ft



ACTIONS TO BE TAKEN

1. Interdict and divert northbound traffic on US Hwy 13
2. Facilitate southbound traffic on Delaware Route 1

MANPOWER/EQUIPMENT ESTIMATE

3 Traffic Guide(s)
6 Traffic Barricades

LOCATION PRIORITY

1

Figure G-17. Schematic of ACP 5

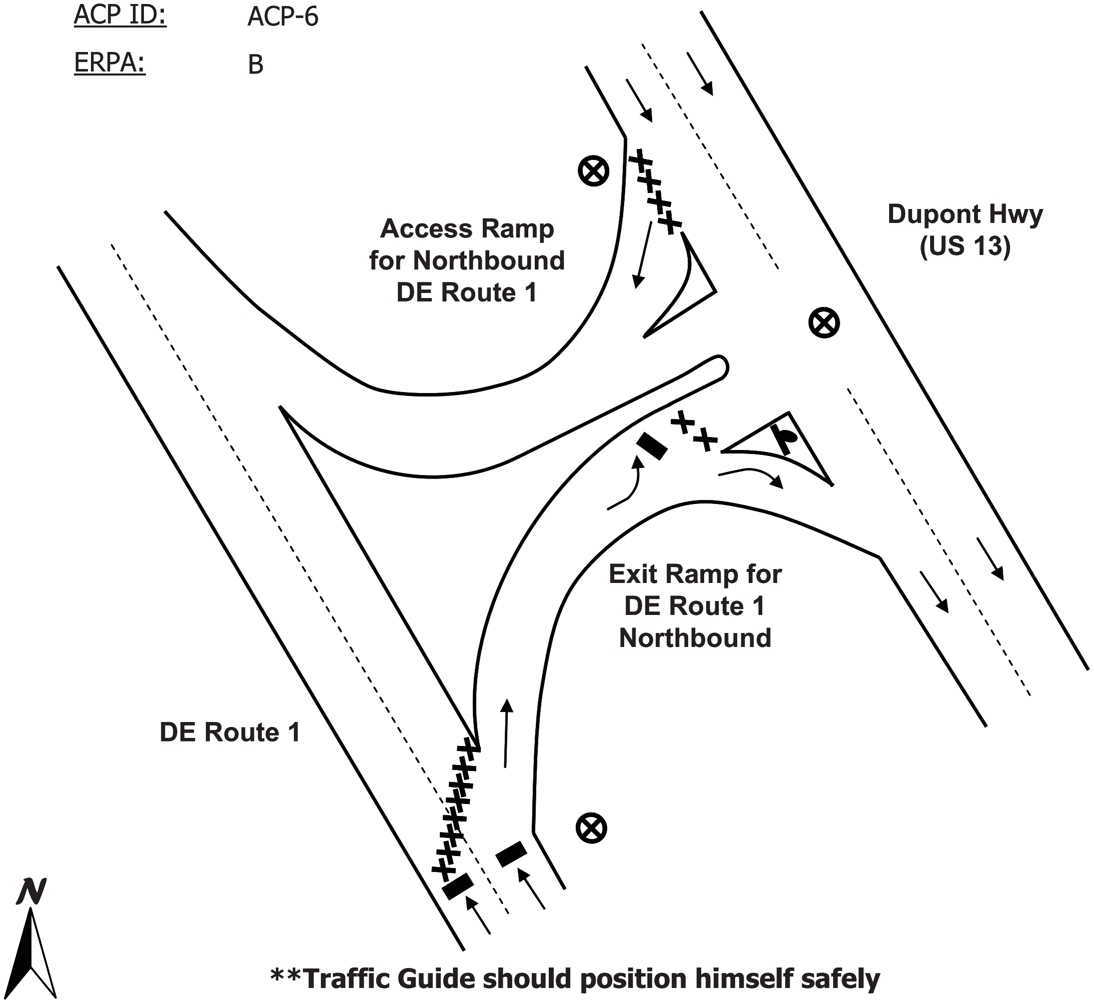
ACP

TOWN: Smyrna

LOCATION: US 13 & DE Route 1

ACP ID: ACP-6

ERPA: B



****Traffic Guide should position himself safely**

Key

- MOVEMENT FACILITATED
- MOVEMENT DISCOURAGED/DIVERTED
- TRAFFIC GUIDE
- STOP SIGN
- TRAFFIC BARRICADE (2 ft, 3 ft)
  - 2 PER LANE (LOCAL ROADS AND RAMPS)
  - 4 PER LANE (FREEWAY AND RAMPS)
- TRAFFIC SIGNAL
- TRAFFIC CONES SPACED TO DISCOURAGE TRAFFIC BUT ALLOW PASSAGE (3 PER LANE): 8 ft

ACTIONS TO BE TAKEN

1. Interdict and divert northbound traffic on Delaware Route 1
2. Facilitate southbound traffic on US Hwy 13

MANPOWER/EQUIPMENT ESTIMATE

3 Traffic Guide(s)
12 Traffic Barricades

LOCATION PRIORITY

1

Figure G-18. Schematic of ACP 6

Table G-4. Comparison of Suggested TCP/ACP with Existing State Plans	
TCP ID	**State Plan ID**
1	Post #1
2	Not Identified
3	1B
4	Not Identified
5	Post #18
6	B-13
7	T-12
8	B-10
9	T-10
ACP ID	**State Plan ID**
1	9B
2	1B
3	Not Identified
4	B-3
5	Not Identified
6	Not Identified

APPENDIX H

Evacuation Regions

APPENDIX H: EVACUATION REGIONS

This appendix presents the assumed voluntary evacuation percentages for each Evacuation Region (Table H-1) and maps of all Evacuation Regions. The percentages presented in Table H-1 are based on the methodology discussed in assumption 5 of Section 2.2 and shown in Figure 2-1.

Table H-1. Percent of ERPA Population Evacuating for Each Region

	Region																
	2-Mile Ring, 5-Mile Ring, Entire EPZ			5-Mile Radius and Downwind to EPZ Boundary										2-Mile Radius and Downwind to EPZ Boundary			
ERPA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	35%	35%	100%	50%	50%	100%	100%	100%	50%	50%	50%	50%	50%	100%	100%	100%	50%
3	35%	35%	100%	100%	100%	100%	100%	50%	50%	50%	50%	50%	50%	100%	100%	50%	50%
4	35%	35%	100%	50%	100%	100%	100%	50%	50%	50%	50%	50%	50%	100%	100%	50%	50%
5	35%	35%	100%	100%	100%	100%	50%	50%	50%	50%	50%	50%	50%	100%	50%	50%	50%
6	35%	35%	100%	50%	50%	50%	100%	100%	100%	50%	50%	50%	50%	50%	100%	100%	100%
7	35%	35%	100%	50%	50%	50%	50%	100%	100%	100%	50%	50%	50%	50%	50%	100%	100%
8	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
A	35%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	50%	50%	50%
B	35%	35%	100%	50%	50%	50%	50%	50%	50%	100%	100%	100%	50%	50%	50%	50%	50%
C	35%	35%	100%	100%	100%	50%	50%	50%	50%	50%	50%	100%	100%	50%	50%	50%	50%
D	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

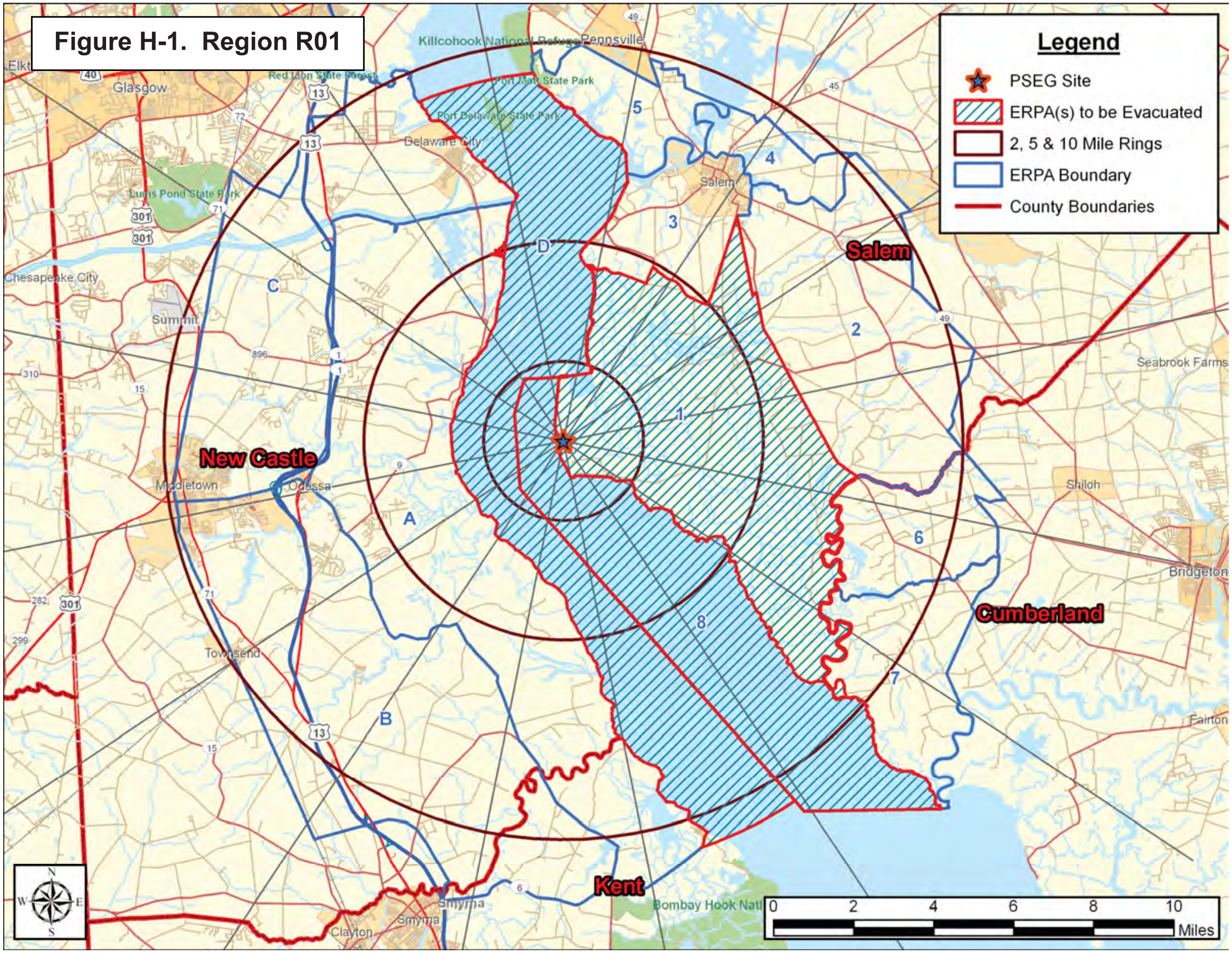


Figure H-1. Region R01
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
Salem
New Castle
Cumberland
Kent
Killcohook National Refuge
Pennsville
Port Mott State Park
Port Delaware State Park
Delaware City
Red Lion State Forest
Glasgow
Lums Pond State Park
Chesapeake City
Summit
Middletown
Odessa
Townsend
Smyrna
Clayton
Bombay Hook Natl
Seabrook Farms
Shiloh
Bridgeton
Fairton
A
B
C
D
1
2
3
4
5
6
7
8
0
2
4
6
8
10
Miles

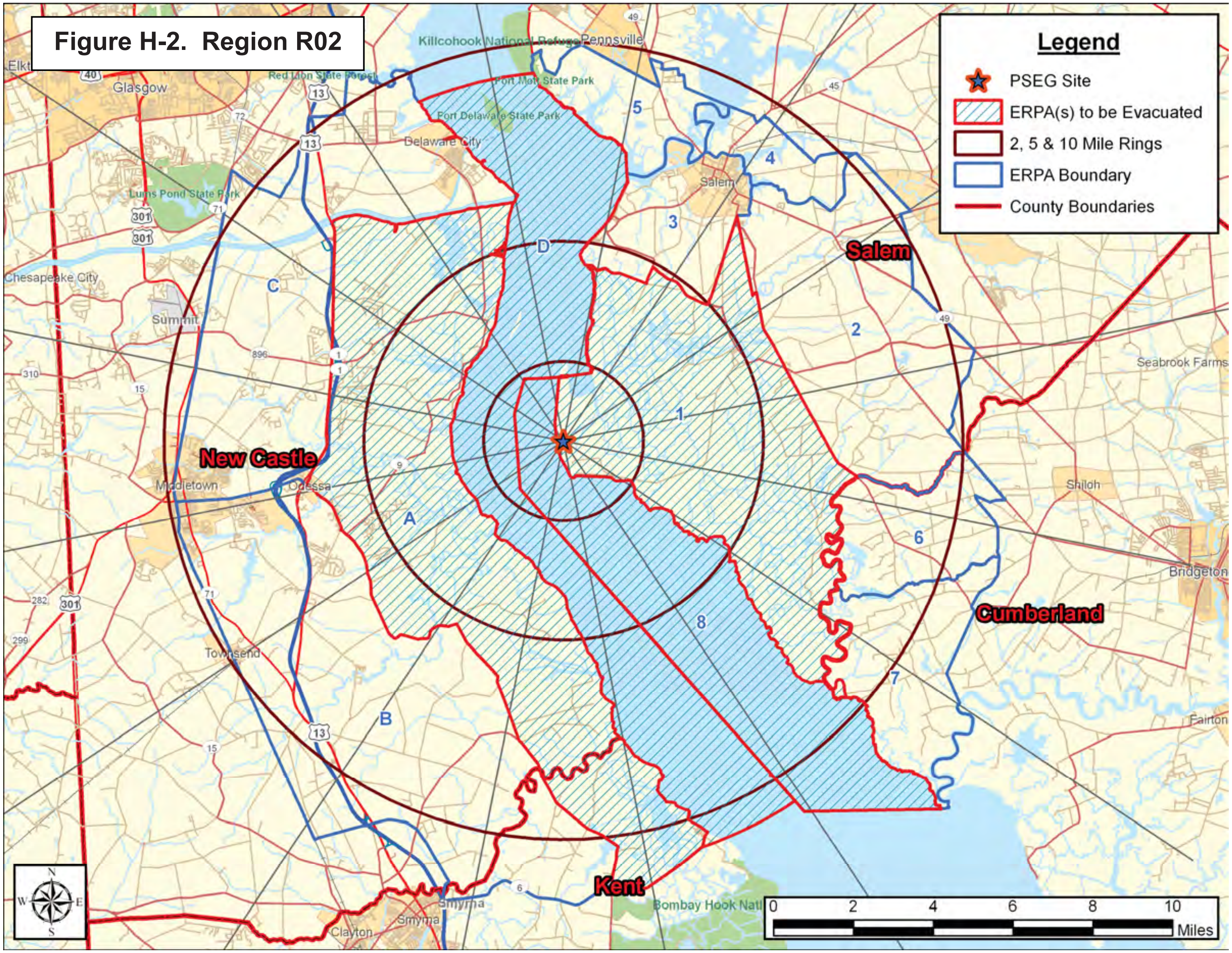


Figure H-2. Region R02
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
New Castle
Salem
Cumberland
Kent
Glasgow
Delaware City
Pennsville
Salem
Middletown
Odessa
Townsend
Smyrna
Clayton
Shiloh
Bridgeton
Seabrook Farms
Fairton
Chesapeake City
Summit
Killcohook National Refuge
Fort Mott State Park
Port Delaware State Park
Lums Pond State Park
Red Lion State Forest
Bombay Hook Natl
A
B
C
D
1
2
3
4
5
6
7
8
0
2
4
6
8
10
Miles

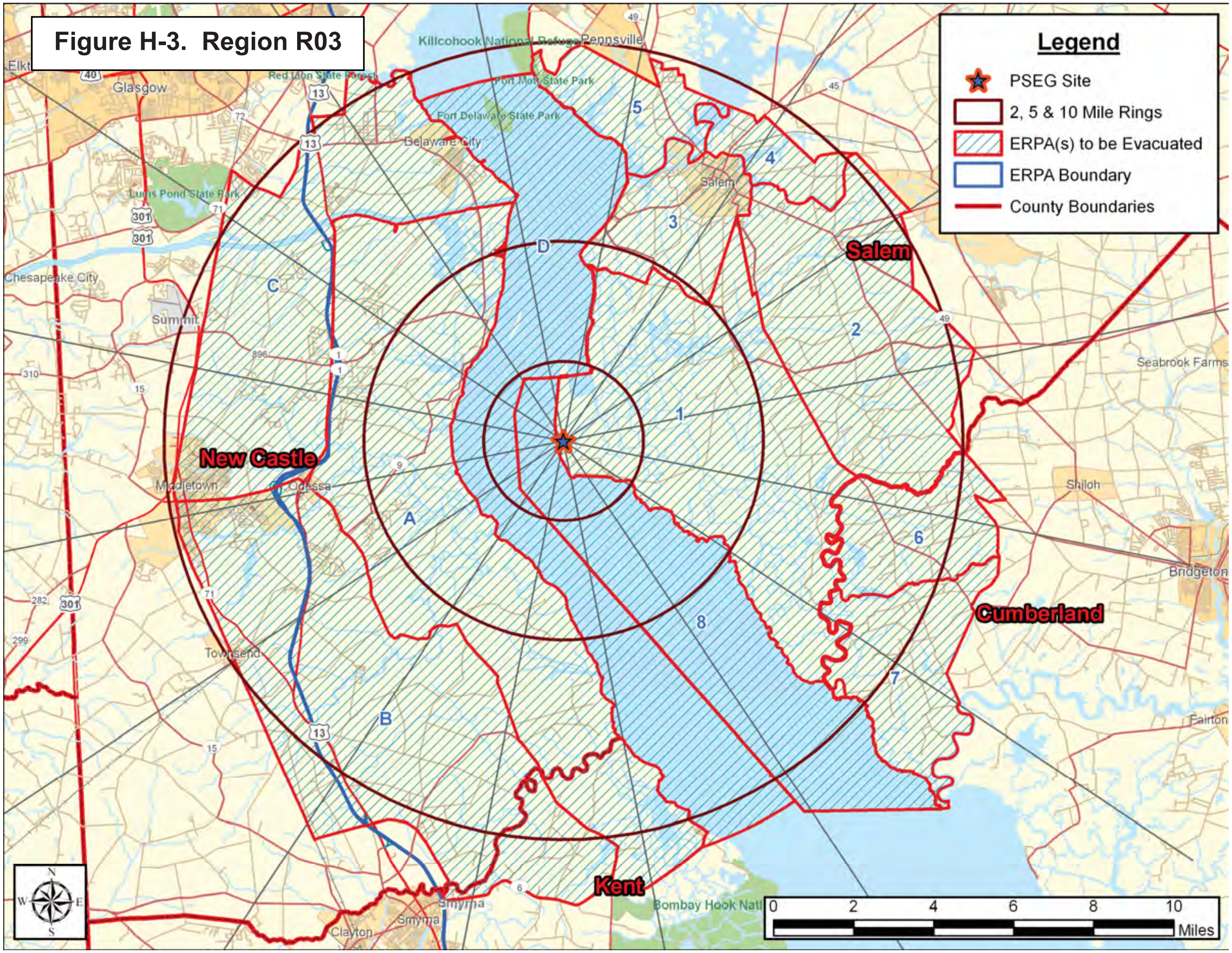


Figure H-3. Region R03
Legend
PSEG Site
2, 5 & 10 Mile Rings
ERPA(s) to be Evacuated
ERPA Boundary
County Boundaries
New Castle
Salem
Cumberland
Kent
Killcohook National Refuge
Pennsville
Glasgow
Red Lion State Forest
Fort Mott State Park
Port Delaware State Park
Delaware City
Lums Pond State Park
Salem
Chesapeake City
Summit
Seabrook Farms
Middletown
Odessa
Shiloh
Bridgeton
Townsend
Fairton
Smyrna
Clayton
Bombay Hook Natl
A
B
C
D
1
2
3
4
5
6
7
8
0
2
4
6
8
10
Miles

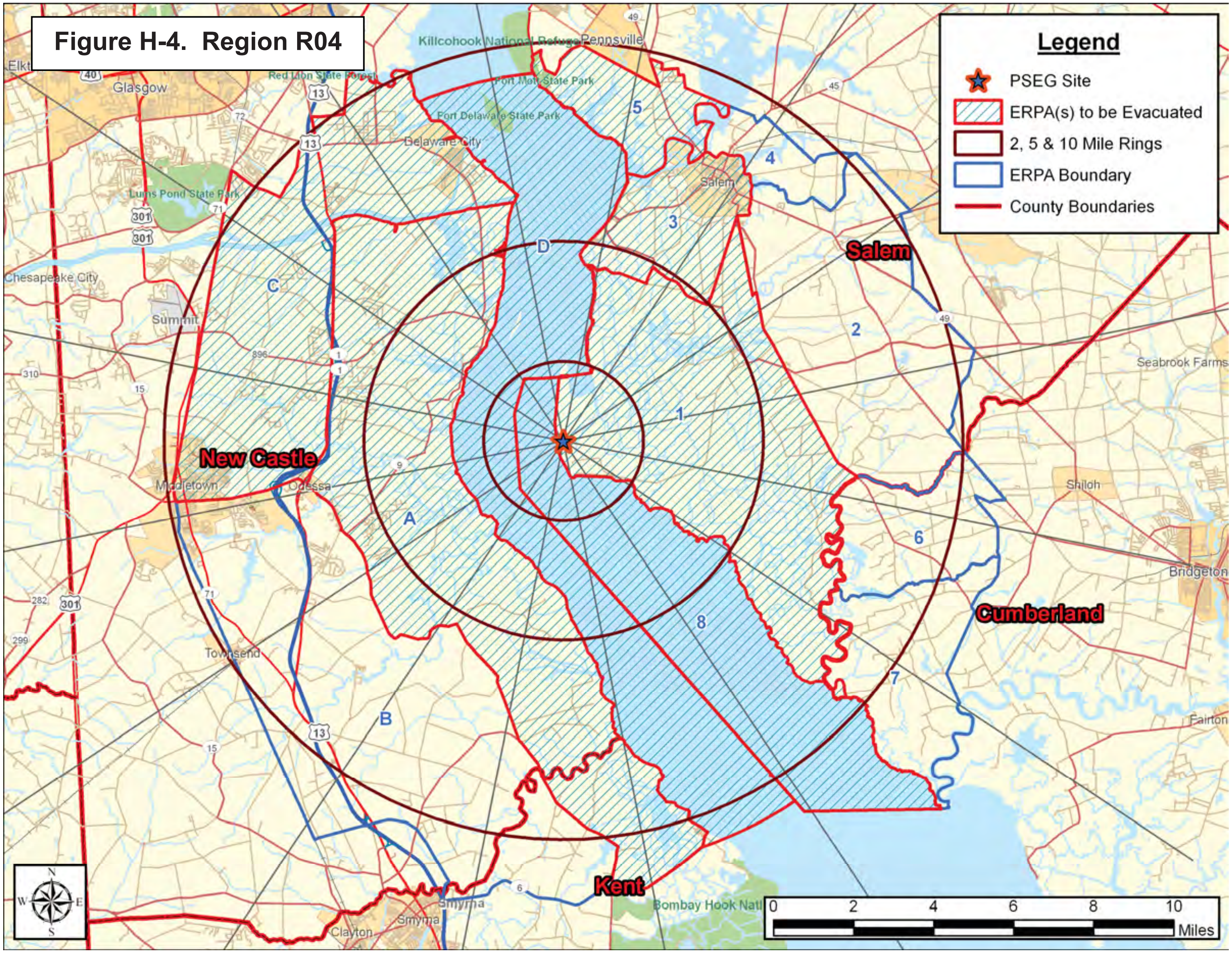


Figure H-4. Region R04
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
New Castle
Salem
Cumberland
Kent
Glasgow
Delaware City
Salem
Pennsville
Chesapeake City
Summit
Middletown
Odessa
Townsend
Smyrna
Clayton
Shiloh
Bridgeton
Seabrook Farms
Fairton
A
B
C
D
1
2
3
4
5
6
7
8
Miles

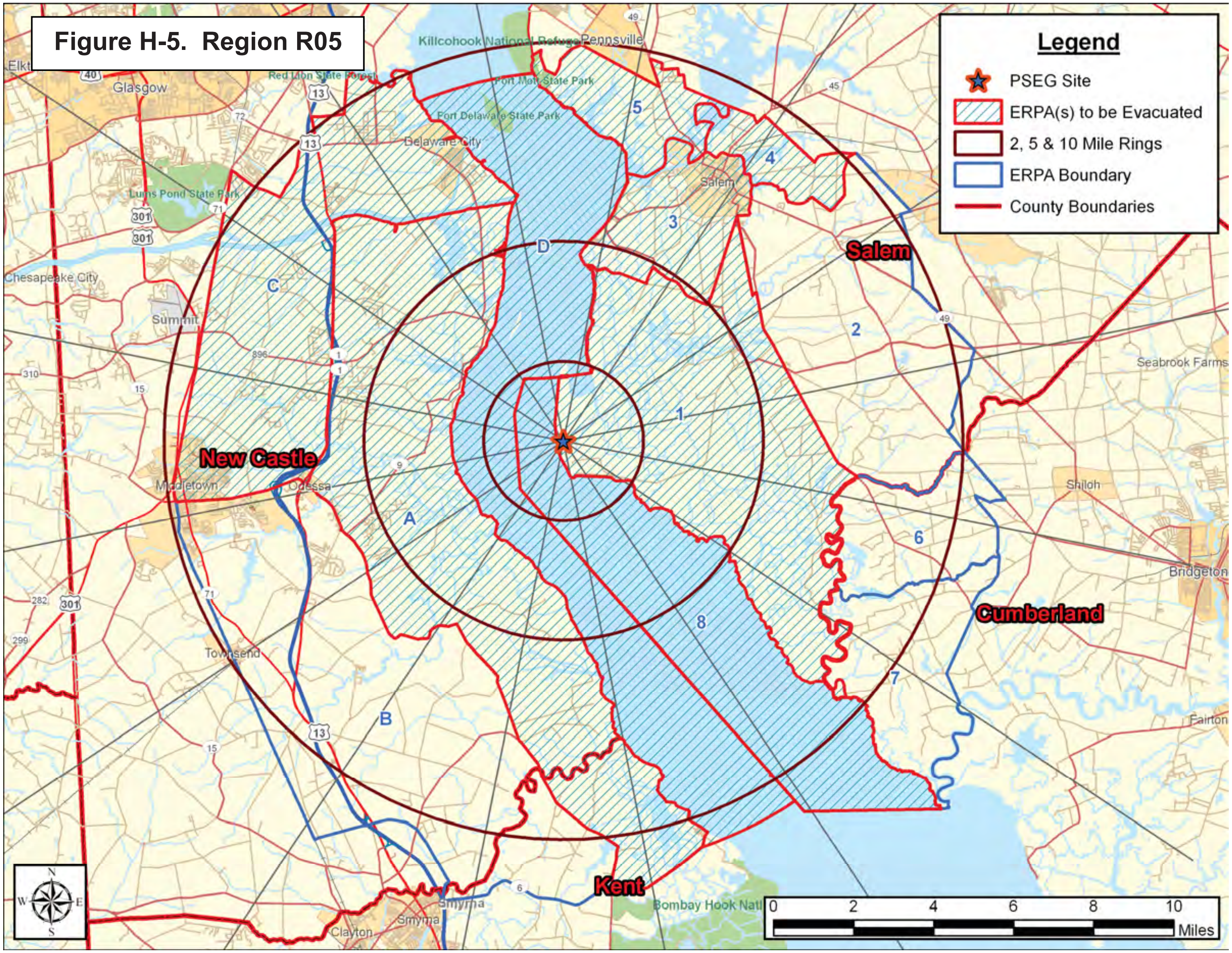


Figure H-5. Region R05
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
New Castle
Salem
Cumberland
Kent
Miles

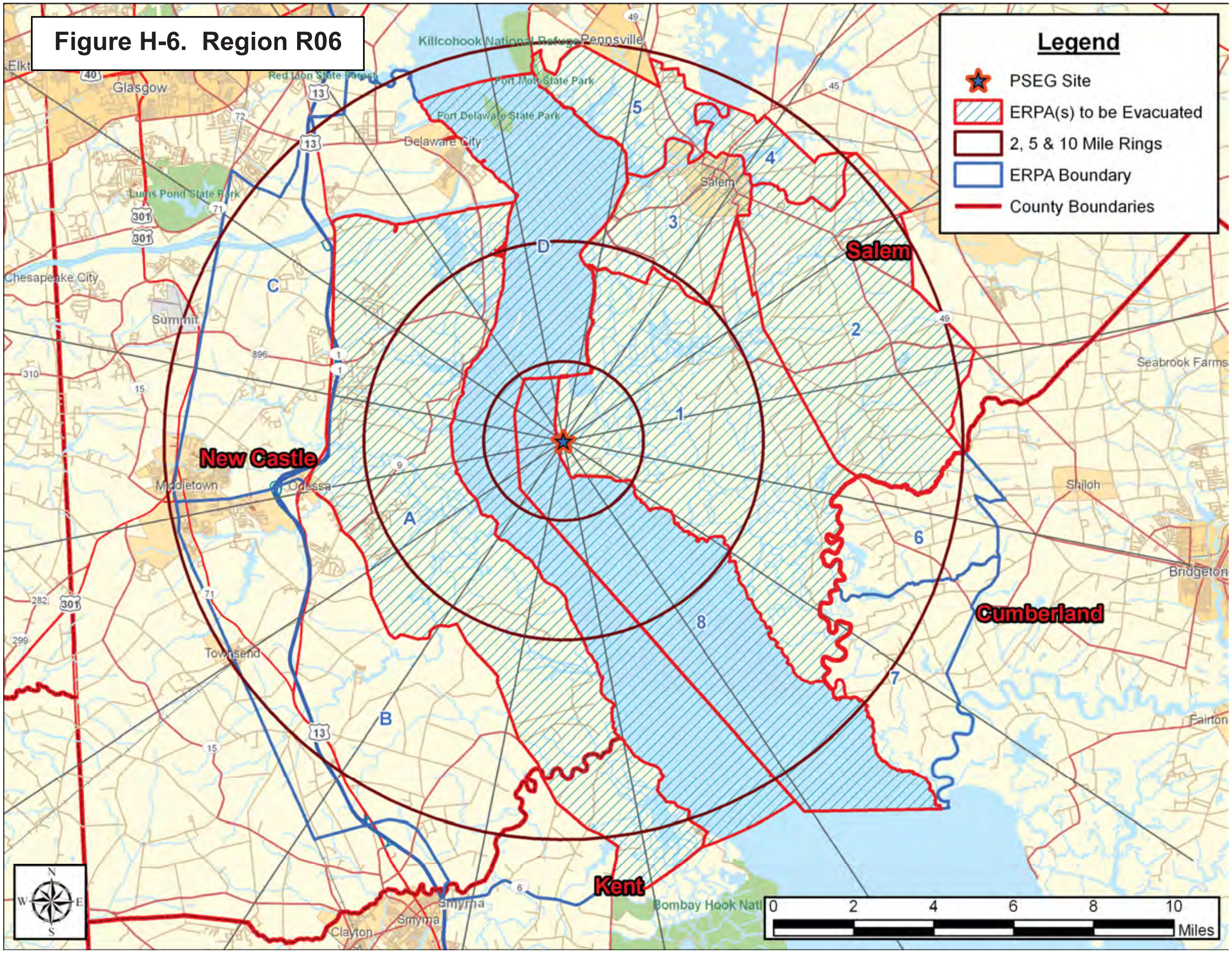


Figure H-6. Region R06
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
Salem
New Castle
Cumberland
Kent
Glasgow
Delaware City
Lums Pond State Park
Chesapeake City
Summit
Middletown
Odessa
Townsend
Smyrna
Clayton
Killcohook National Refuge
Pennsville
Fort Mott State Park
Port Delaware State Park
Red Lion State Forest
Seabrook Farms
Shiloh
Bridgeton
Fairton
Bombay Hook Natl
0 2 4 6 8 10
Miles

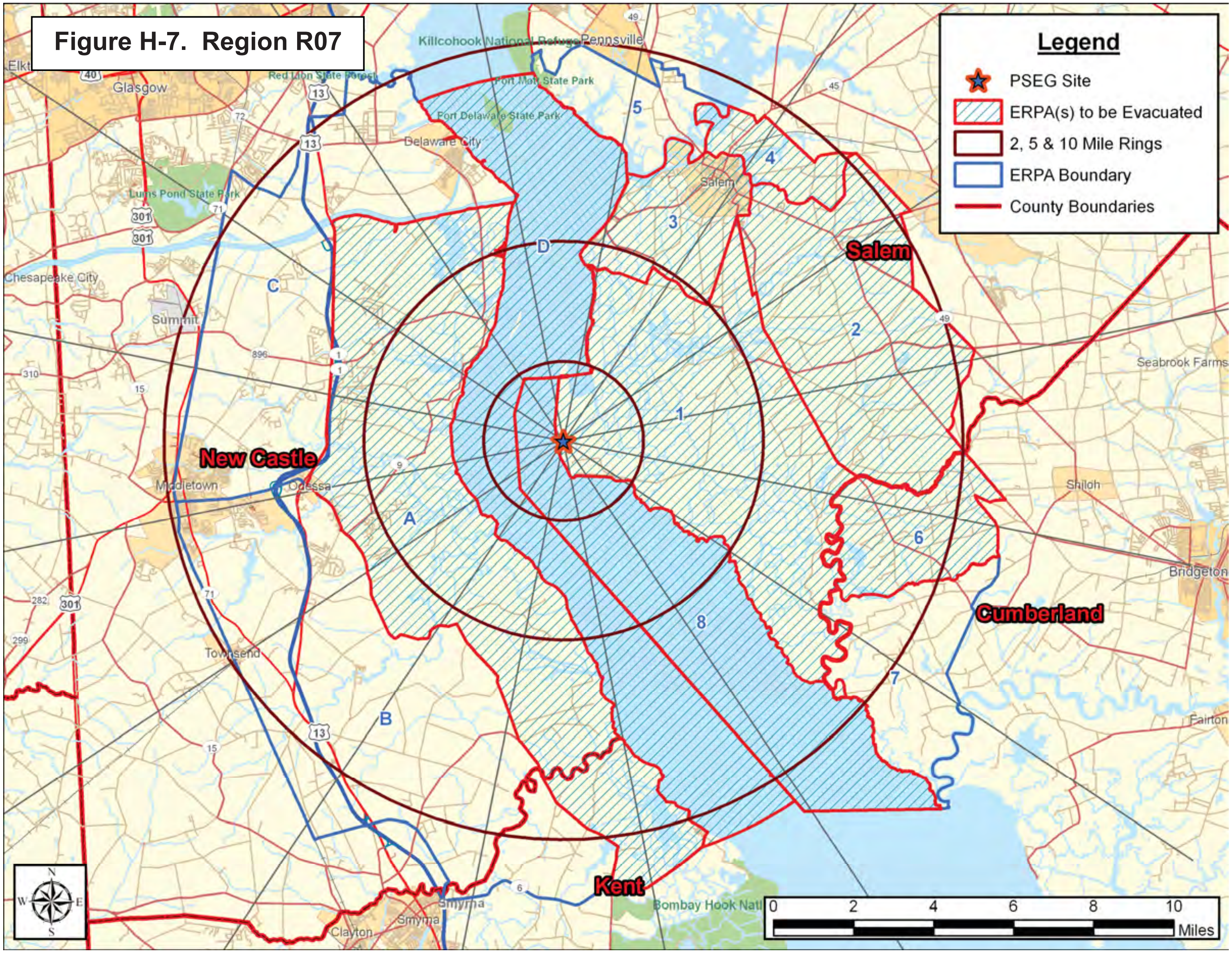
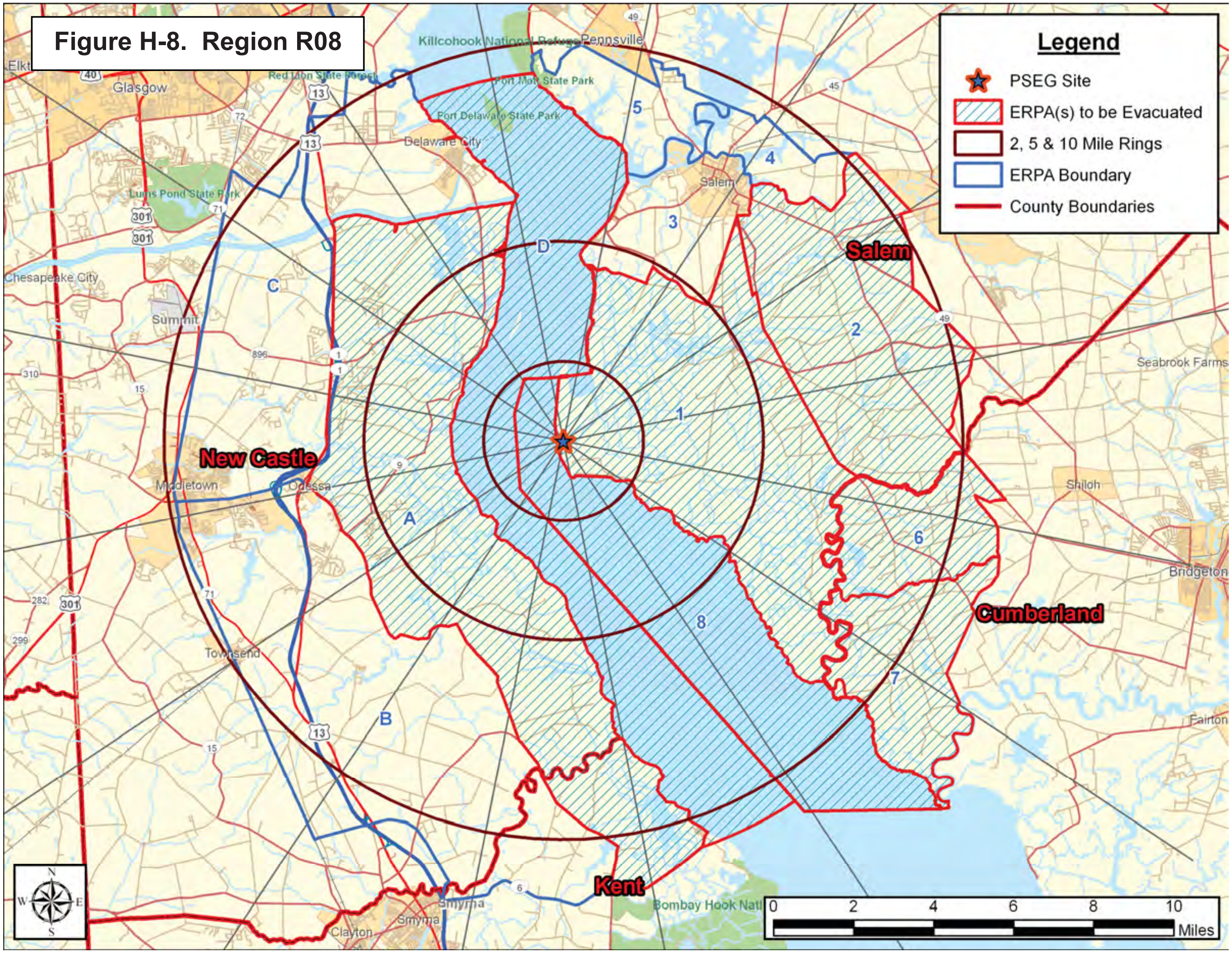


Figure H-7. Region R07
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
Salem
New Castle
Cumberland
Kent
Killcohook National Refuge
Pennsville
Fort Mott State Park
Port Delaware State Park
Red Lion State Forest
Delaware City
Glasgow
Lums Pond State Park
Chesapeake City
Summit
Middletown
Odessa
Townsend
Smyrna
Clayton
Bombay Hook Natl
Seabrook Farms
Shiloh
Bridgeton
Fairton
0 2 4 6 8 10 Miles

Figure H-8. Region R08



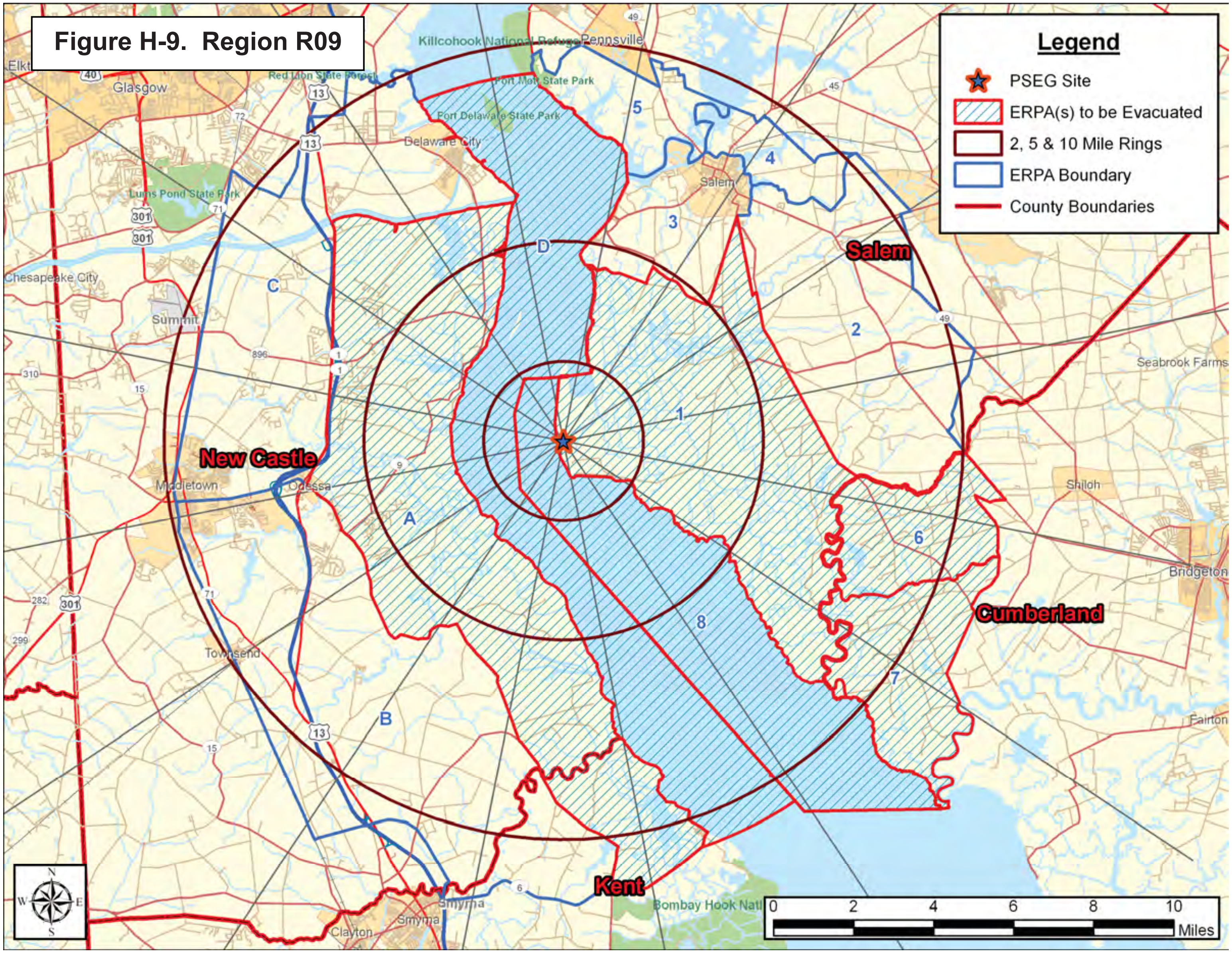
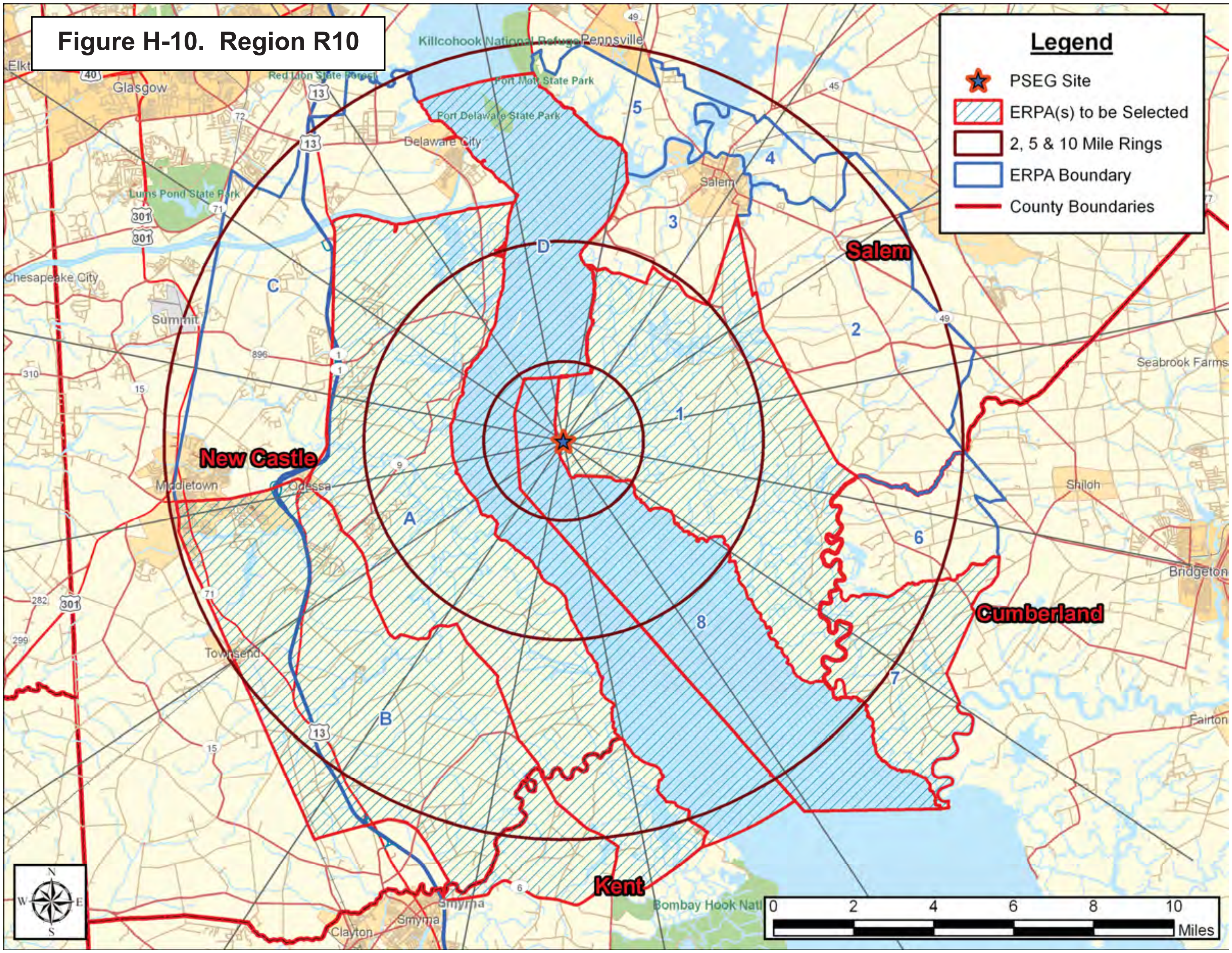


Figure H-9. Region R09
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
Salem
New Castle
Cumberland
Kent
Killcohook National Refuge
Pennsville
Red Lion State Forest
Fort Mott State Park
Port Delaware State Park
Delaware City
Glasgow
Lums Pond State Park
Chesapeake City
Summit
Middletown
Odessa
Townsend
Smyrna
Clayton
Bombay Hook Natl
Seabrook Farms
Shiloh
Bridgeton
Fairton
1
2
3
4
5
6
7
8
A
B
C
D
0
2
4
6
8
10
Miles

Figure H-10. Region R10



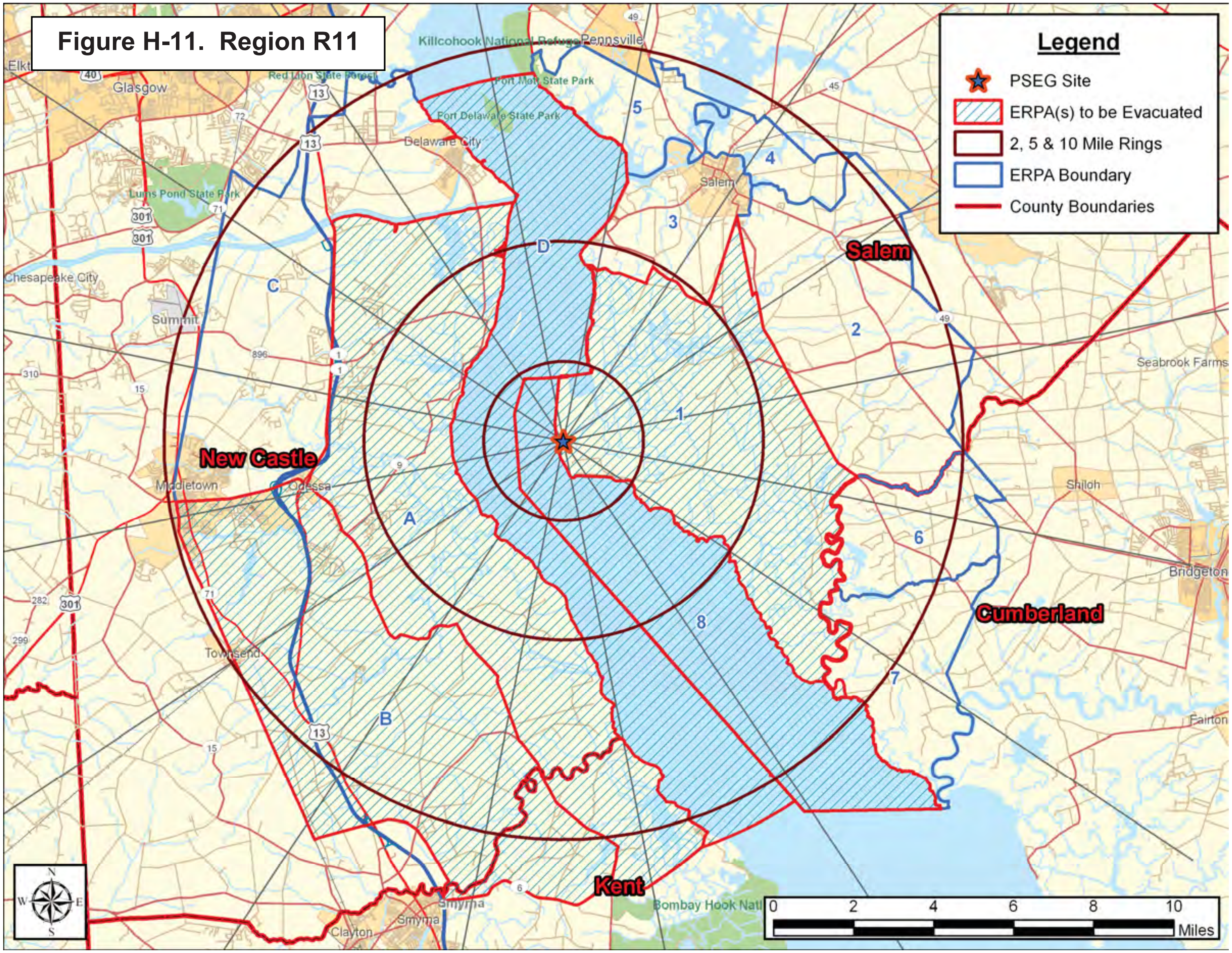


Figure H-11. Region R11
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
Salem
New Castle
Cumberland
Kent
Pennsville
Delaware City
Glasgow
Middletown
Odessa
Townsend
Smyrna
Clayton
Shiloh
Bridgeton
Fairton
Seabrook Farms
Chesapeake City
Summit
Killcohook National Refuge
Fort Mott State Park
Port Delaware State Park
Lums Pond State Park
Bombay Hook Natl
A
B
C
D
1
2
3
4
5
6
7
8
0
2
4
6
8
10
Miles

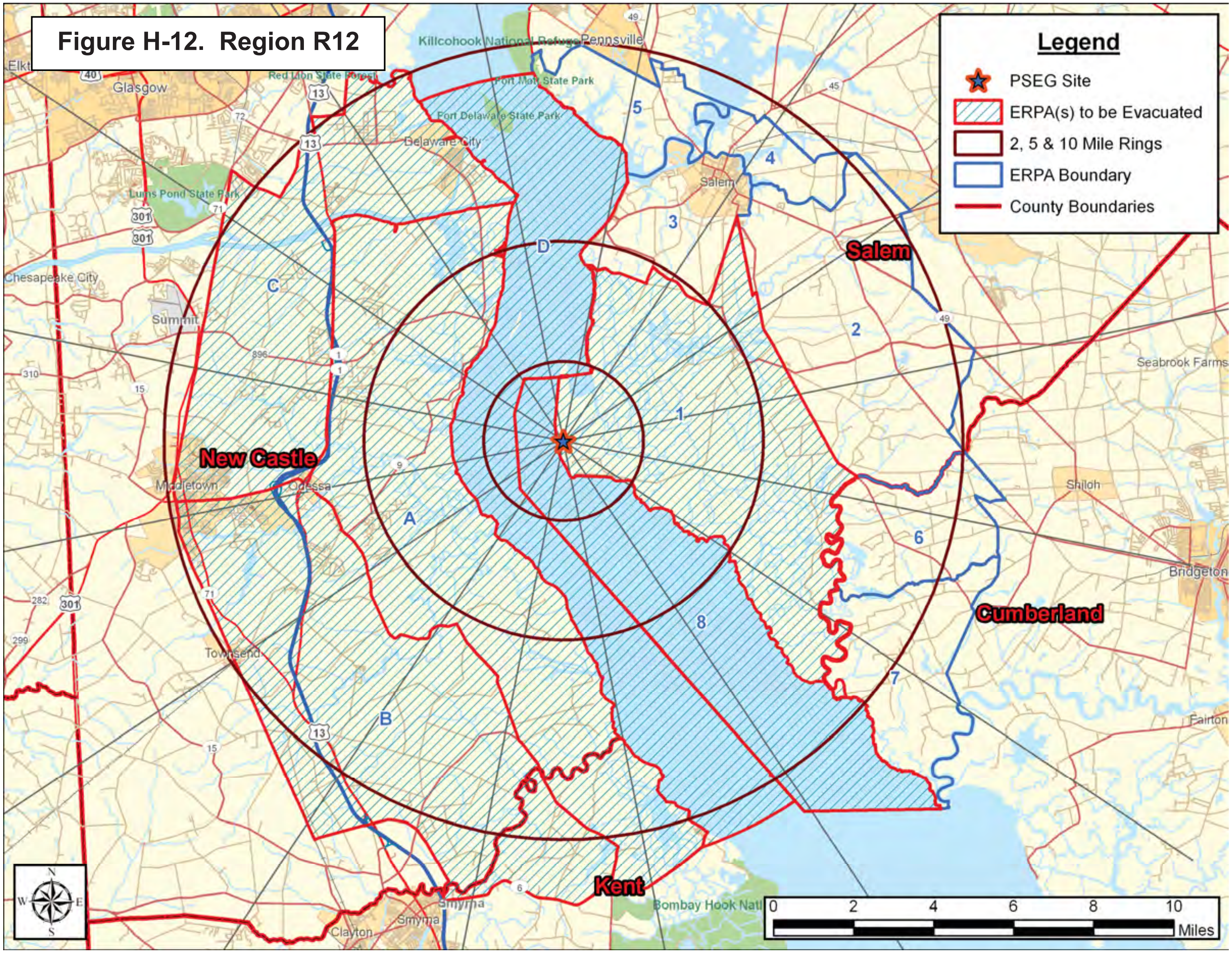


Figure H-12. Region R12
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
Salem
New Castle
Cumberland
Kent
0 2 4 6 8 10 Miles

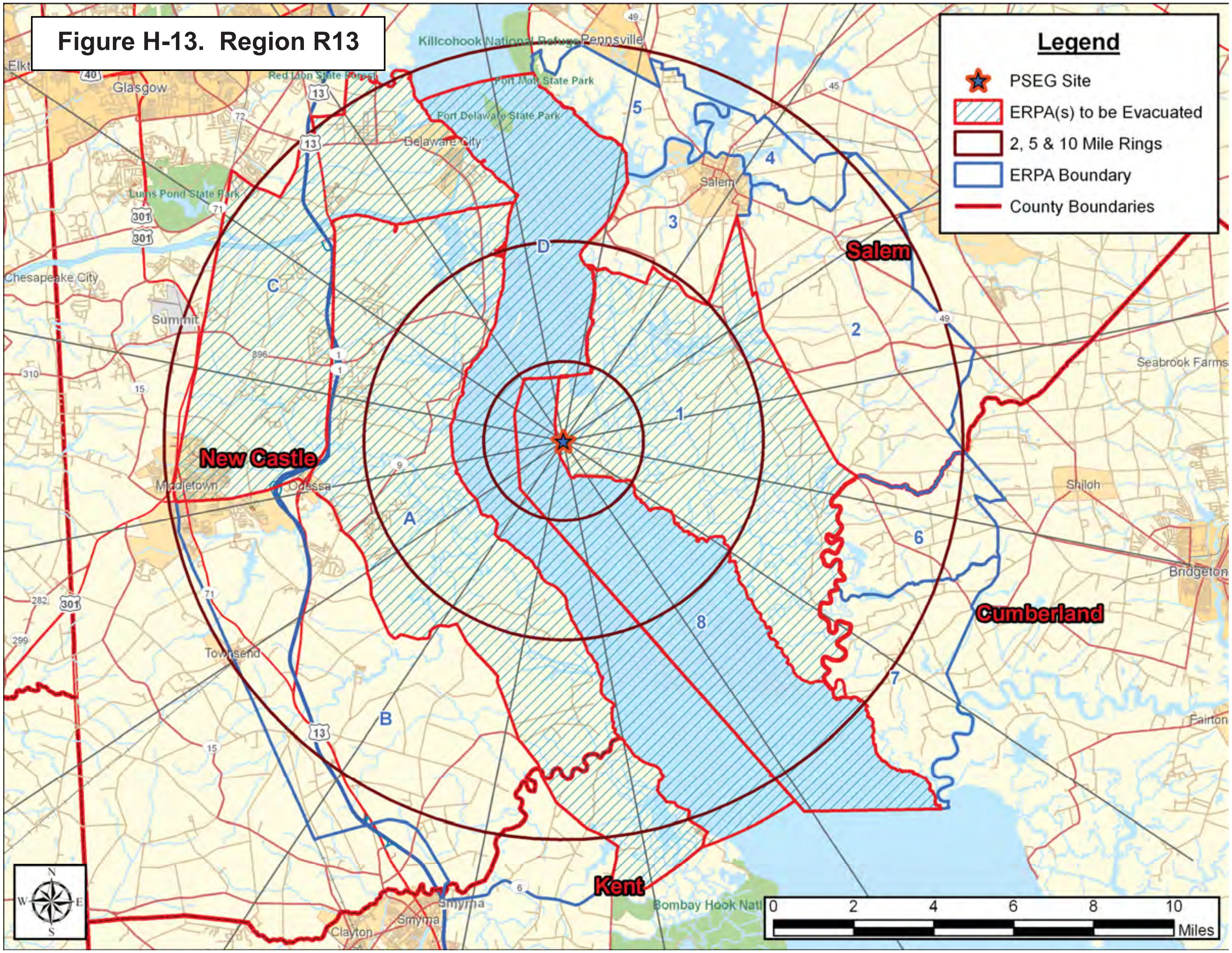


Figure H-13. Region R13
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
Salem
New Castle
Cumberland
Kent
0 2 4 6 8 10 Miles

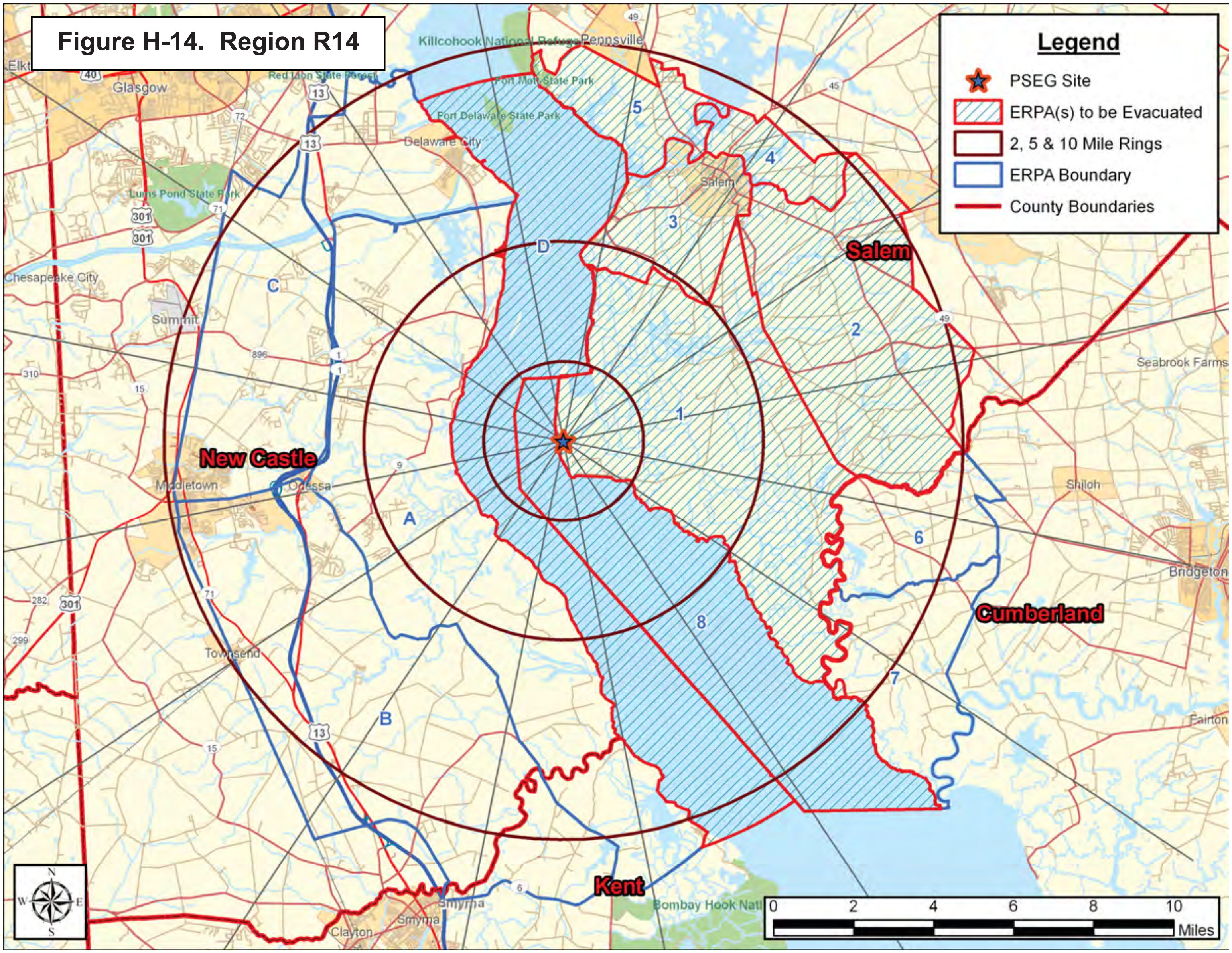


Figure H-14. Region R14
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
New Castle
Salem
Cumberland
Kent
Middletown
Odessa
Townsend
Smyrna
Clayton
Glasgow
Delaware City
Salem
Pennsville
Shiloh
Bridgeton
Seabrook Farms
Fairton
Chesapeake City
Summit
0 2 4 6 8 10 Miles

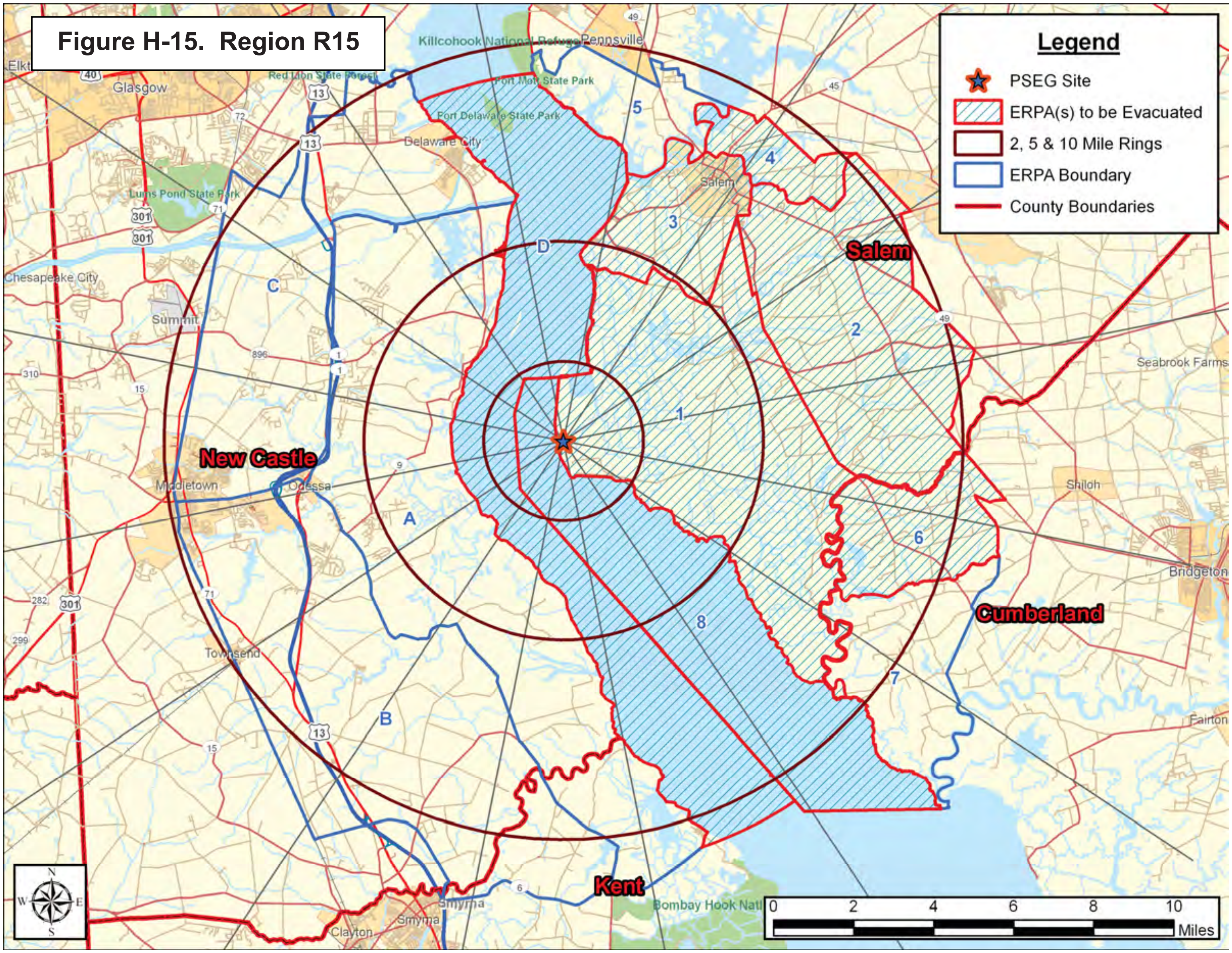


Figure H-15. Region R15
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
New Castle
Salem
Cumberland
Kent
Killcohook National Refuge
Pennsville
Red Lion State Forest
Fort Mott State Park
Port Delaware State Park
Delaware City
Glasgow
Lums Pond State Park
Chesapeake City
Summit
Salem
Middletown
Odessa
Townsend
Smyrna
Clayton
Bombay Hook Natl
Seabrook Farms
Shiloh
Bridgeton
Fairton
A
B
C
D
1
2
3
4
5
6
7
8
0
2
4
6
8
10
Miles

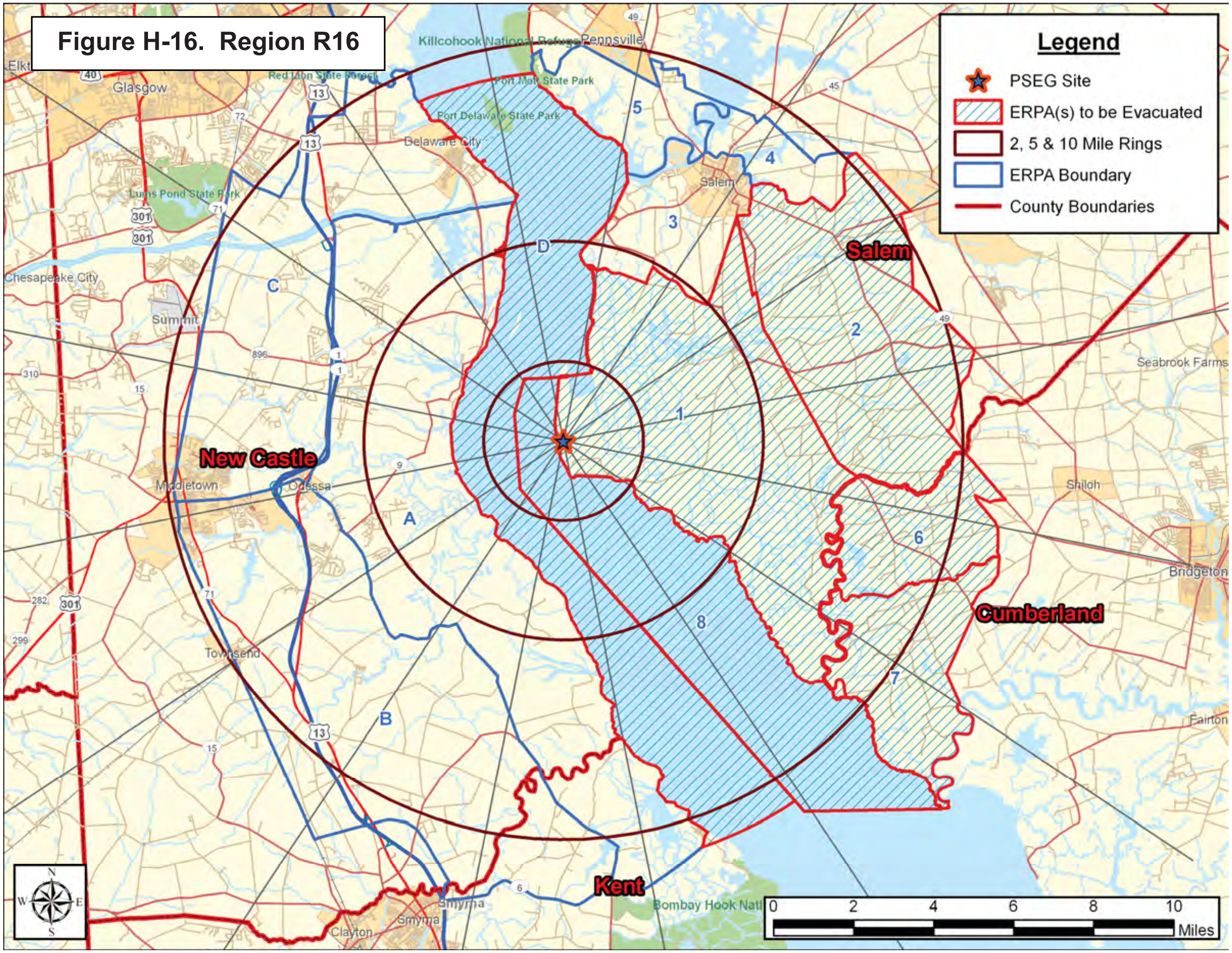


Figure H-16. Region R16
Legend
PSEG Site
ERPA(s) to be Evacuated
2, 5 & 10 Mile Rings
ERPA Boundary
County Boundaries
Salem
New Castle
Cumberland
Kent
Glasgow
Killcohook National Refuge
Pennsville
Red Lion State Forest
Fort Mott State Park
Port Delaware State Park
Delaware City
Lums Pond State Park
Salem
Chesapeake City
Summit
Seabrook Farms
Middletown
Odessa
Shiloh
Bridgeton
Townsend
Fairton
Smyrna
Clayton
Bombay Hook Natl
1
2
3
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5
6
7
8
A
B
C
D
0
2
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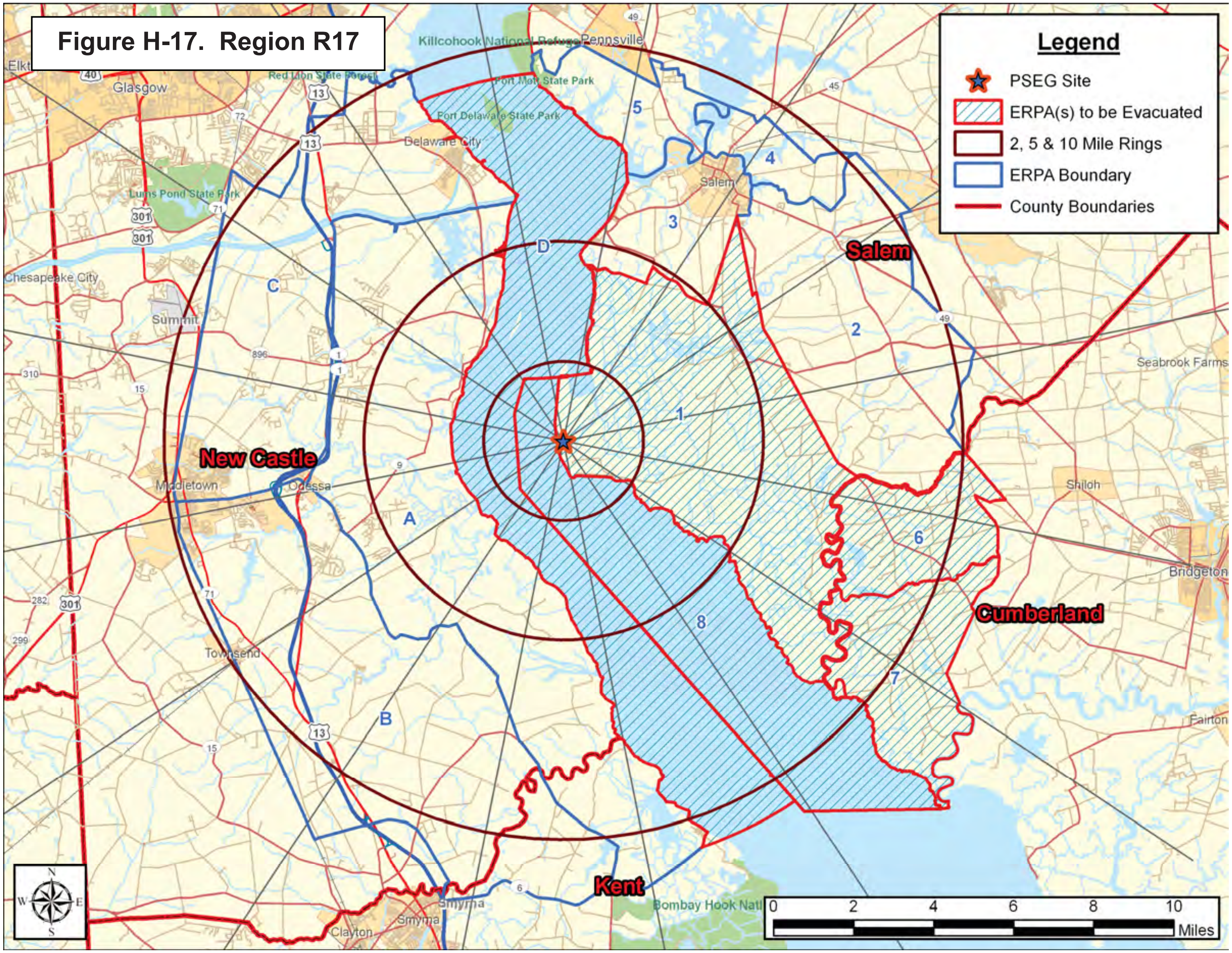
8
10
Miles

Figure H-17. Region R17



APPENDIX I

Evacuation Sensitivity Studies

APPENDIX I: EVACUATION SENSITIVITY STUDIES

A sensitivity study was performed to determine whether changes in the estimated trip generation time have an effect upon the evacuation time estimate (ETE) for the entire EPZ. The case considered was Scenario 6, Region 3; a winter, midweek, midday, good weather evacuation of the entire EPZ. Table I-1 presents the results of this study.

Table I-1. Evacuation Time Estimates for Trip Generation Sensitivity Study

Trip Generation Period	Evacuation Time Estimate for Entire EPZ		
	90th Percentile	95th Percentile	100th Percentile
4 Hours	2:15	2:35	4:10
5 Hours	2:15	2:35	5:10
6 Hours (Base)	2:15	2:35	6:10

The results confirm the importance of accurately estimating the trip generation times. The evacuation time estimates for the 100th percentile closely mirror the values for the time the last evacuation trip is generated. As indicated in Section 7.2, congestion within the EPZ clears by 3 hours after the Advisory to Evacuate. The results indicate that programs to educate the public and encourage them toward faster responses for a radiological emergency can enhance county emergency planning programs.

A sensitivity study was conducted to determine the effects on ETE of changes in the percentage of people who decide to relocate from the Shadow Region. The case considered was Scenario 6, Region 3; a winter, midweek, midday, good weather evacuation for the entire EPZ. The movement of people in the Shadow Region has the potential to impede vehicles evacuating from an Evacuation Region within the EPZ. Refer to Section 7.1 for additional information on population within the shadow region.

Table I-2 presents the evacuation time estimates for each of these cases. The results show that the ETE is slightly sensitive to shadow evacuation. Doubling the shadow percentage increases the ETE by 10 and 15 minutes at the 90th and 95th percentiles, respectively. Reducing the shadow evacuation percentage to 15 or 0 percent has no effect on ETE. The Shadow Region is densely populated to the north of the EPZ; the additional shadow evacuees do somewhat inhibit those people evacuating from within the EPZ.

Table I-2. Evacuation Time Estimates for Shadow Sensitivity Study

Percent Shadow Evacuation	Evacuating Shadow Vehicles	Evacuation Time Estimate for Entire EPZ		
		90th Percentile	95th Percentile	100th Percentile
0	0	2:15	2:35	6:10
15	13,473	2:15	2:35	6:10
30 (Base)	26,946	2:15	2:35	6:10
60	53,892	2:25	2:50	6:10

A sensitivity study was conducted to determine the effect on ETE of adding an additional travel lane to the existing site access road with the use of gantry lights (see page 3-19 for additional information). The cases considered were Scenario 13, Regions 1, 2 and 3; winter, midweek, midday, good weather evacuations for the two-mile region, five-mile region and entire EPZ during peak construction of the new plant coincident with refueling of one of the operational units. As expected, the additional access lane does not have an effect on ETE. As discussed in Section 7.2, the bottleneck for traffic evacuating in the New Jersey portion of the EPZ is Salem City. The construction workers, for the most part, are evacuating northbound on Salem-Hancocks Bridge Rd into Salem City, and then out of the EPZ. Doubling the capacity on the access road gets the workers to Salem-Hancocks Bridge Rd more efficiently; however, without improvements in Salem City and along Salem-Hancocks Bridge Rd, adding an additional lane to the access road has no benefit from an ETE standpoint.

Table I-3. Evacuation Time Estimates for a 2-Lane Site Access Road

Case	Evacuation Time Estimate for Region R01		
	90th Percentile	95th Percentile	100th Percentile
Construction (base)	2:25	2:35	4:00
2 Lane Access Road	2:25	2:35	4:00
Case	**Evacuation Time Estimate for Region R02**		
	90th Percentile	**95th Percentile**	**100th Percentile**
Construction (base)	1:50	2:15	4:10
2 Lane Access Road	1:50	2:15	4:10
Case	**Evacuation Time Estimate for Region R03**		
	90th Percentile	**95th Percentile**	**100th Percentile**
Construction (base)	2:45	3:05	6:10
2 Lane Access Road	2:45	3:05	6:10

APPENDIX J

Evacuation Time Estimates for All Evacuation Regions and Scenarios
And
Evacuation Time Graphs for Region R03, for all Scenarios

APPENDIX J: EVACUATION TIME ESTIMATES FOR ALL EVACUATION REGIONS AND SCENARIOS

AND

EVACUATION TIME GRAPHS FOR REGION R03, FOR ALL SCENARIOS

This appendix presents the ETE Results for all 17 Regions and all 15 Scenarios (Tables J-1A through J-1D), and plots of Evacuating Vehicles vs. Elapsed Time leaving the 2-mile and 5-mile circular areas and the entire EPZ for Region R03, for all 15 scenarios. Each plot has points indicating the evacuation times corresponding to the 50^{th}, 90^{th}, and 95^{th} percentiles of evacuated vehicles.

J.1 Guidance on Using ETE Tables

Tables J-1A through J-1D present the ETE values for all 17 Evacuation Regions and all 15 Evacuation Scenarios. They are organized as follows:

Table	Contents
J-1A	ETE represents the elapsed time required for **50** percent of the population within a Region, to evacuate from that Region.
J-1B	ETE represents the elapsed time required for **90** percent of the population within a Region, to evacuate from that Region.
J-1C	ETE represents the elapsed time required for **95** percent of the population within a Region, to evacuate from that Region.
J-1D	ETE represents the elapsed time required for **100** percent of the population within a Region, to evacuate from that Region.

The user first determines the percentile of population for which the ETE is sought. The applicable value of ETE within the chosen Table may then be identified using the following procedure:

1. Identify the applicable **Scenario**:
   - Season
     - Summer
     - Winter (also Autumn and Spring)
   - Day of Week
     - Midweek
     - Weekend
   - Time of Day
     - Midday

    - Evening
- Weather Condition
    - Good Weather
    - Rain
    - Snow
- Special Event
    - New Plant Construction + Refueling

While these Scenarios are designed, in aggregate, to represent conditions throughout the year, some further clarification is warranted:

- The conditions of a summer evening (either midweek or weekend) and rain are not explicitly identified in Tables J-1A through J-1D. For these conditions, Scenario (4) applies.
- The conditions of a winter evening (either midweek or weekend) and rain are not explicitly identified in Tables J-1A through J-1D. For these conditions, Scenarios (7) and (10) for rain apply.
- The conditions of a winter evening (either midweek or weekend) and snow are not explicitly identified in Tables J-1A through J-1D. For these conditions, Scenarios (8) and (11) for snow apply.
- The seasons are defined as follows:
    - Summer assumes that public schools are *not* in session.
    - Winter, Spring and Autumn imply that public schools *are* in session.
- Time of Day: Midday implies the time over which most commuters are at work.

2. With the Scenario identified, now identify the **Evacuation Region**:
    - Determine the projected azimuth direction of the plume (coincident with the wind direction). This direction is expressed in terms of compass orientation: *towards* N, NNE, NE, …
    - Determine the distance that the Evacuation Region will extend from the PSEG Site. The applicable distances and their associated candidate Regions are given below:
        - 2 Miles (Region R01)
        - 5 Miles (Region R02)
        - to EPZ Boundary (Regions R03 through R17)
    - Enter Table J-2 and identify the applicable group of candidate Regions based on the distance that the selected Region extends from the PSEG Site. Select the Evacuation Region identifier in that row from the first column of the Table.

3. Determine the **ETE for the Scenario** identified in Step 1 and the Region identified in Step 2, as follows:
    - The columns of Table J-1 are labeled with the Scenario numbers. Identify the proper column in the selected Table using the Scenario number

determined in Step 1.

- Identify the row in this table that provides ETE values for the Region identified in Step 2.
- The unique data cell defined by the column and row so determined contains the desired value of ETE expressed in Hours:Minutes.

Example

It is desired to identify the ETE for the following conditions:

- Sunday, August 10th at 4:00 AM.
- It is raining.
- Wind direction is *toward* the northeast (NE).
- Wind speed is such that the distance to be evacuated is judged to be 10 miles (to EPZ boundary).
- The desired ETE is that value needed to evacuate 90 percent of the population from within the impacted Region.

Table J-1B is applicable because the 90th-percentile population is desired. Proceed as follows:

1. Identify the Scenario as summer, weekend, evening and raining. Entering Table J-1B, it is seen that there is no match for these descriptors. However, the clarification given above assigns this combination of circumstances to Scenario 4.

2. Enter Table J-2 and locate the Region described as "5-Mile Ring and Downwind to EPZ Boundary" for wind direction to the NE and read REGION R06 in the first column of that row.

3. Enter Table J-1B to locate the data cell containing the value of ETE for Scenario 4 and Region R06. This data cell is in column (4) and in the row for Region R06; it contains the ETE value of **1:50**.

Table J-1A. Time to Clear the Indicated Area of _50_ Percent of The Affected Population

	Summer		Summer		Summer		Winter			Winter			Winter		Winter		
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend			Midweek Weekend		Midweek		
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	(12)	Scenario:	(13)	(14)	(15)
	Midday		Midday		Evening		Midday			Midday			Evening		Midday		
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Region Wind Toward:	New Plant Construction + Refueling	Proposed Causeway	Refueling Only
Entire 2-Mile Region, 5-Mile Region, and EPZ																	
R01 2-mile ring	0:55	0:55	0:55	0:55	0:55	R01 2-mile ring	0:55	0:55	1:05	0:55	0:55	1:20	0:55	R01 2-mile ring	1:25	1:00	0:55
R02 5-mile ring	0:55	0:55	0:50	0:55	0:55	R02 5-mile ring	0:55	0:55	1:05	0:50	0:55	1:05	0:55	R02 5-mile ring	1:00	0:55	0:55
R03 Entire EPZ	1:10	1:15	1:05	1:10	1:05	R03 Entire EPZ	1:10	1:15	1:30	1:05	1:10	1:25	1:05	R03 Entire EPZ	1:20	1:20	1:20
5-Mile Ring and Downwind to EPZ Boundary																	
R04 NNW	1:05	1:10	1:00	1:05	1:00	R04 NNW	1:05	1:10	1:25	1:00	1:05	1:15	1:00	R04 NNW	1:15	1:15	1:10
R05 N	1:05	1:10	1:00	1:05	1:00	R05 N	1:05	1:10	1:20	1:00	1:05	1:15	1:00	R05 N	1:15	1:15	1:10
R06 NNE, NE	1:00	1:05	0:55	1:00	0:55	R06 NNE, NE	1:00	1:05	1:15	0:55	1:00	1:10	0:55	R06 NNE, NE	1:05	1:05	1:00
R07 ENE	1:00	1:05	0:55	1:00	0:55	R07 ENE	1:00	1:05	1:15	0:55	1:00	1:10	0:55	R07 ENE	1:05	1:05	1:00
R08 E, ESE	0:55	1:00	0:55	0:55	0:55	R08 E, ESE	0:55	1:00	1:10	0:55	0:55	1:05	0:55	R08 E, ESE	1:00	1:00	0:55
R09 SE	0:55	1:00	0:55	0:55	0:55	R09 SE	0:55	1:00	1:05	0:55	0:55	1:05	0:55	R09 SE	1:00	0:55	0:55
R10 SSE	1:00	1:05	1:00	1:00	1:00	R10 SSE	1:05	1:05	1:20	1:00	1:00	1:15	1:00	R10 SSE	1:10	1:05	1:05
R11 S, SSW, SW	1:00	1:05	1:00	1:00	1:00	R11 S, SSW, SW	1:05	1:05	1:20	1:00	1:00	1:15	1:00	R11 S, SSW, SW	1:10	1:05	1:05
R12 W, WSW, WNW	1:10	1:10	1:05	1:10	1:05	R12 W, WSW, WNW	1:10	1:15	1:25	1:05	1:10	1:25	1:05	R12 W, WSW, WNW	1:20	1:15	1:20
R13 NW	1:05	1:05	1:00	1:00	1:00	R13 NW	1:05	1:05	1:20	1:00	1:00	1:15	1:00	R13 NW	1:10	1:10	1:10
2-Mile Ring and Downwind to EPZ Boundary																	
R14 NNE, NE	1:10	1:15	1:00	1:05	1:05	R14 NNE, NE	1:10	1:15	1:30	1:00	1:05	1:25	1:05	R14 NNE, NE	1:25	1:20	1:10
R15 ENE	1:10	1:10	1:00	1:00	1:00	R15 ENE	1:10	1:15	1:25	1:00	1:00	1:20	1:00	R15 ENE	1:20	1:20	1:10
R16 E, ESE	1:00	1:05	0:55	0:55	0:55	R16 E, ESE	1:00	1:05	1:15	0:55	0:55	1:15	0:55	R16 E, ESE	1:15	1:05	1:00
R17 SE	1:00	1:00	0:55	0:55	0:55	R17 SE	1:00	1:00	1:10	0:55	0:55	1:25	0:55	R17 SE	1:25	1:00	1:00

Table J-1B. Time to Clear the Indicated Area of *90* Percent of The Affected Population

	Summer		Summer		Summer		Winter			Winter			Winter		Winter		
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend			Midweek Weekend		Midweek		
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	(12)	Scenario:	(13)	(14)	(15)
	Midday		Midday		Evening		Midday			Midday			Evening		Midday		
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Region Wind Toward:	New Plant Construction + Refueling	Proposed Causeway	Refueling Only
Entire 2-Mile Region, 5-Mile Region, and EPZ																	
R01 2-mile ring	1:50	1:50	1:45	1:45	1:45	R01 2-mile ring	1:50	1:50	2:05	1:45	1:45	2:40	1:45	R01 2-mile ring	2:25	1:45	1:50
R02 5-mile ring	1:35	1:45	1:35	1:40	1:35	R02 5-mile ring	1:35	1:45	2:10	1:35	1:40	2:00	1:35	R02 5-mile ring	1:50	1:40	1:40
R03 Entire EPZ	2:15	2:25	2:00	2:10	2:00	R03 Entire EPZ	2:15	2:25	2:55	2:00	2:10	2:40	2:00	R03 Entire EPZ	2:45	2:45	2:40
5-Mile Ring and Downwind to EPZ Boundary																	
R04 NNW	2:10	2:15	1:50	2:00	1:55	R04 NNW	2:10	2:15	2:50	1:50	1:55	2:30	1:55	R04 NNW	2:35	2:35	2:30
R05 N	2:10	2:15	1:50	2:00	1:55	R05 N	2:10	2:15	2:50	1:50	1:55	2:30	1:55	R05 N	2:35	2:35	2:30
R06 NNE, NE	2:00	2:05	1:40	1:50	1:45	R06 NNE, NE	2:00	2:05	2:35	1:40	1:45	2:15	1:45	R06 NNE, NE	2:15	2:15	2:00
R07 ENE	1:55	2:00	1:40	1:45	1:40	R07 ENE	1:55	2:00	2:30	1:35	1:45	2:15	1:40	R07 ENE	2:15	2:15	1:55
R08 E, ESE	1:40	1:50	1:35	1:40	1:40	R08 E, ESE	1:40	1:50	2:15	1:35	1:40	2:05	1:40	R08 E, ESE	1:55	1:45	1:45
R09 SE	1:40	1:45	1:35	1:40	1:35	R09 SE	1:40	1:45	2:10	1:35	1:40	2:05	1:35	R09 SE	1:50	1:40	1:40
R10 SSE	2:00	2:10	1:50	2:00	1:50	R10 SSE	2:00	2:10	2:45	1:50	2:00	2:30	1:50	R10 SSE	2:20	2:15	2:15
R11 S, SSW, SW	2:00	2:10	1:50	2:00	1:50	R11 S, SSW, SW	2:00	2:10	2:45	1:50	2:00	2:30	1:50	R11 S, SSW, SW	2:20	2:15	2:15
R12 W, WSW, WNW	2:10	2:20	2:00	2:10	2:00	R12 W, WSW, WNW	2:10	2:20	2:55	2:00	2:10	2:40	2:00	R12 W, WSW, WNW	2:40	2:40	2:40
R13 NW	2:00	2:05	1:50	1:55	1:50	R13 NW	2:00	2:05	2:40	1:45	1:55	2:25	1:50	R13 NW	2:30	2:30	2:30
2-Mile Ring and Downwind to EPZ Boundary																	
R14 NNE, NE	2:25	2:35	1:55	2:05	2:00	R14 NNE, NE	2:30	2:35	3:05	1:55	2:05	2:40	2:00	R14 NNE, NE	2:45	2:45	2:25
R15 ENE	2:15	2:25	1:50	2:00	1:55	R15 ENE	2:20	2:25	2:55	1:50	1:55	2:40	1:55	R15 ENE	2:40	2:40	2:15
R16 E, ESE	2:00	2:00	1:40	1:40	1:50	R16 E, ESE	2:00	2:00	2:40	1:40	1:45	2:30	1:50	R16 E, ESE	2:25	1:55	2:05
R17 SE	2:00	2:00	1:50	1:50	1:55	R17 SE	2:00	2:00	2:30	1:55	1:55	2:45	1:50	R17 SE	2:25	1:50	2:00

Table J-1C. Time to Clear the Indicated Area of *95* Percent of The Affected Population

	Summer		Summer		Summer
	Midweek		Weekend		Midweek Weekend
Scenario:	(1)	(2)	(3)	(4)	(5)
	Midday		Midday		Evening
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather
Entire 2-Mile Region, 5-Mile Region, and EPZ					
R01 2-mile ring	2:05	2:05	2:05	2:05	2:05
R02 5-mile ring	1:50	2:00	1:40	1:50	1:50
R03 Entire EPZ	2:35	2:40	2:15	2:25	2:20
5-Mile Ring and Downwind to EPZ Boundary					
R04 NNW	2:30	2:35	2:05	2:15	2:15
R05 N	2:30	2:35	2:05	2:10	2:15
R06 NNE, NE	2:25	2:30	1:55	2:05	2:05
R07 ENE	2:20	2:25	1:50	2:00	2:00
R08 E, ESE	2:00	2:05	1:45	1:55	1:55
R09 SE	1:55	2:00	1:45	1:55	1:50
R10 SSE	2:25	2:30	2:05	2:15	2:10
R11 S, SSW, SW	2:20	2:30	2:05	2:15	2:10
R12 W, WSW, WNW	2:30	2:35	2:15	2:25	2:20
R13 NW	2:25	2:25	2:05	2:10	2:10
2-Mile Ring and Downwind to EPZ Boundary					
R14 NNE, NE	2:45	2:50	2:10	2:20	2:15
R15 ENE	2:30	2:40	2:10	2:15	2:15
R16 E, ESE	2:25	2:25	2:05	2:05	2:15
R17 SE	2:20	2:20	2:10	2:15	2:15

	Winter			Winter			Winter
	Midweek			Weekend			Midweek Weekend
Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Midday			Midday			Evening
Region Wind Toward:	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather
Entire 2-Mile Region, 5-Mile Region, and EPZ							
R01 2-mile ring	2:05	2:05	2:40	2:05	2:05	2:55	2:05
R02 5-mile ring	1:50	2:00	2:30	1:40	1:50	2:20	1:50
R03 Entire EPZ	2:35	2:45	3:25	2:15	2:25	3:00	2:20
5-Mile Ring and Downwind to EPZ Boundary							
R04 NNW	2:30	2:35	3:20	2:05	2:10	2:55	2:15
R05 N	2:30	2:35	3:15	2:05	2:10	2:55	2:15
R06 NNE, NE	2:25	2:30	3:05	1:50	2:00	2:40	2:05
R07 ENE	2:20	2:25	3:00	1:50	2:00	2:35	2:00
R08 E, ESE	2:00	2:05	2:45	1:45	1:55	2:25	1:55
R09 SE	1:55	2:00	2:35	1:45	1:55	2:25	1:50
R10 SSE	2:25	2:30	3:10	2:05	2:15	2:50	2:10
R11 S, SSW, SW	2:20	2:30	3:05	2:05	2:15	2:50	2:10
R12 W, WSW, WNW	2:30	2:40	3:20	2:15	2:25	3:00	2:20
R13 NW	2:25	2:25	3:10	2:00	2:10	2:50	2:10
2-Mile Ring and Downwind to EPZ Boundary							
R14 NNE, NE	2:45	2:50	3:30	2:10	2:15	3:05	2:20
R15 ENE	2:35	2:40	3:20	2:10	2:15	3:05	2:15
R16 E, ESE	2:25	2:25	3:10	2:05	2:05	3:00	2:15
R17 SE	2:20	2:20	3:00	2:15	2:15	3:00	2:15

	Winter		
	Midweek		
Scenario:	(13)	(14)	(15)
	Midday		
Region Wind Toward:	New Plant Construction + Refueling	Proposed Causeway	Refueling Only
Entire 2-Mile Region, 5-Mile Region, and EPZ			
R01 2-mile ring	2:35	1:55	2:05
R02 5-mile ring	2:15	1:50	1:55
R03 Entire EPZ	3:05	3:05	3:05
5-Mile Ring and Downwind to EPZ Boundary			
R04 NNW	3:00	3:00	2:55
R05 N	3:00	3:00	2:55
R06 NNE, NE	2:45	2:45	2:25
R07 ENE	2:40	2:40	2:20
R08 E, ESE	2:20	2:05	2:05
R09 SE	2:15	1:55	2:00
R10 SSE	2:35	2:35	2:35
R11 S, SSW, SW	2:35	2:35	2:35
R12 W, WSW, WNW	3:05	3:05	3:05
R13 NW	2:55	2:55	2:55
2-Mile Ring and Downwind to EPZ Boundary			
R14 NNE, NE	3:05	3:05	2:40
R15 ENE	2:55	2:55	2:30
R16 E, ESE	2:35	2:15	2:30
R17 SE	2:35	2:05	2:25

Table J-1D. Time to Clear the Indicated Area of *__100__* Percent of The Affected Population

	Summer		Summer		Summer		Winter			Winter			Winter		Winter		
	Midweek		Weekend		Midweek Weekend		Midweek			Weekend			Midweek Weekend		Midweek		
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	(11)	(12)	Scenario:	(13)	(14)	(15)
	Midday		Midday		Evening		Midday			Midday			Evening		Midday		
Region Wind Toward:	Good Weather	Rain	Good Weather	Rain	Good Weather	Region Wind Toward:	Good Weather	Rain	Snow	Good Weather	Rain	Snow	Good Weather	Region Wind Toward:	New Plant Construction + Refueling	Proposed Causeway	Refueling Only
Entire 2-Mile Region, 5-Mile Region, and EPZ																	
R01 2-mile ring	4:00	4:05	3:10	3:10	3:10	R01 2-mile ring	4:00	4:05	5:10	3:10	3:10	4:10	3:10	R01 2-mile ring	4:00	4:00	4:00
R02 5-mile ring	4:10	4:10	4:10	4:10	4:10	R02 5-mile ring	4:10	4:10	5:10	4:10	4:10	5:10	4:10	R02 5-mile ring	4:10	4:10	4:10
R03 Entire EPZ	6:10	6:10	6:00	6:00	6:00	R03 Entire EPZ	6:10	6:15	6:15	6:00	6:00	6:00	6:00	R03 Entire EPZ	6:10	6:10	6:10
5-Mile Ring and Downwind to EPZ Boundary																	
R04 NNW	6:05	6:10	4:10	4:10	4:10	R04 NNW	6:05	6:10	6:10	4:10	4:20	5:10	4:10	R04 NNW	6:10	6:10	6:10
R05 N	6:05	6:05	4:10	4:10	4:10	R05 N	6:05	6:10	6:10	4:10	4:20	5:10	4:10	R05 N	6:10	6:10	6:10
R06 NNE, NE	6:00	6:00	4:10	4:10	4:10	R06 NNE, NE	6:10	6:10	6:10	4:10	4:10	5:10	4:10	R06 NNE, NE	6:10	6:10	6:00
R07 ENE	6:00	6:00	4:10	4:10	4:10	R07 ENE	6:00	6:10	6:10	4:10	4:10	5:10	4:10	R07 ENE	6:00	6:00	6:00
R08 E, ESE	4:10	4:10	4:10	4:10	4:10	R08 E, ESE	4:10	4:10	5:10	4:10	4:10	5:10	4:10	R08 E, ESE	4:10	4:10	4:10
R09 SE	4:10	4:10	4:10	4:10	4:10	R09 SE	4:10	4:10	5:10	4:10	4:10	5:10	4:10	R09 SE	4:10	4:10	4:10
R10 SSE	6:10	6:10	6:00	6:00	6:00	R10 SSE	6:10	6:10	6:10	6:00	6:00	6:00	6:00	R10 SSE	6:10	6:10	6:10
R11 S, SSW, SW	6:10	6:10	6:00	6:00	6:00	R11 S, SSW, SW	6:10	6:10	6:10	6:00	6:00	6:00	6:00	R11 S, SSW, SW	6:10	6:10	6:10
R12 W, WSW, WNW	6:10	6:10	6:00	6:00	6:00	R12 W, WSW, WNW	6:10	6:10	6:15	6:00	6:00	6:00	6:00	R12 W, WSW, WNW	6:10	6:10	6:10
R13 NW	6:00	6:05	4:10	4:10	4:10	R13 NW	6:00	6:05	6:10	4:10	4:15	5:10	4:10	R13 NW	6:10	6:10	6:10
2-Mile Ring and Downwind to EPZ Boundary																	
R14 NNE, NE	6:00	6:00	4:10	4:10	4:10	R14 NNE, NE	6:10	6:10	6:10	4:10	4:10	5:10	4:10	R14 NNE, NE	6:10	6:10	6:00
R15 ENE	6:00	6:00	4:10	4:10	4:10	R15 ENE	6:00	6:10	6:10	4:10	4:10	5:10	4:10	R15 ENE	6:00	6:00	6:00
R16 E, ESE	4:10	4:10	4:10	4:10	4:10	R16 E, ESE	4:10	4:10	5:10	4:10	4:10	5:00	4:10	R16 E, ESE	4:10	4:10	4:10
R17 SE	4:10	4:10	3:10	3:10	3:10	R17 SE	4:10	4:10	5:10	3:10	3:10	4:10	3:10	R17 SE	4:10	4:10	4:10

Table J-2. Description of Evacuation Regions*

Region	Description	ERPA											
		New Jersey								Delaware			
		1	2	3	4	5	6	7	8	A	B	C	D
R01	2-Mile	x							x				x
R02	5-Mile	x							x	x			x
R03	Entire EPZ	x	x	x	x	x	x	x	x	x	x	x	x
5-Mile Ring and Downwind to EPZ Boundary													
Region	Wind Direction Towards:	ERPA											
		New Jersey								Delaware			
		1	2	3	4	5	6	7	8	A	B	C	D
R04	NNW	x		x		x			x	x		x	x
R05	N	x		x	x	x			x	x		x	x
R06	NNE, NE	x	x	x	x	x			x	x			x
R07	ENE	x	x	x	x		x		x	x			x
R08	E, ESE	x	x				x	x	x	x			x
R09	SE	x					x	x	x	x			x
R10	SSE	x						x	x	x	x		x
R11	S, SSW, SW	x							x	x	x		x
R12	WSW, W, WNW	x							x	x	x	x	x
R13	NW	x							x	x		x	x
2-Mile Ring and Downwind to EPZ Boundary													
Region	Wind Direction Towards:	ERPA											
		New Jersey								Delaware			
		1	2	3	4	5	6	7	8	A	B	C	D
R14	NNE, NE	x	x	x	x	x			x				x
R15	ENE	x	x	x	x		x		x				x
R16	E, ESE	x	x				x	x	x				x
R17	SE	x					x	x	x				x
N/A	NNW	Refer to Region R04											
	N	Refer to Region R05											
	SSE	Refer to Region R10											
	S, SSW, SW	Refer to Region R11											
	WSW, W, WNW	Refer to Region R12											
	NW	Refer to Region R13											
2-Mile Ring and Downwind to 5 Miles													
Region	Wind Direction Towards:	ERPA											
		New Jersey								Delaware			
		1	2	3	4	5	6	7	8	A	B	C	D
N/A	NNE, NE, ENE, E, ESE, SE	Refer to Region R01											
N/A	N, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW	Refer to Region R02											
x = ERPA EVACUATES		ERPA SHELTERS IN PLACE											

*Adapted from Region definitions in County/State Radiological Emergency Plans

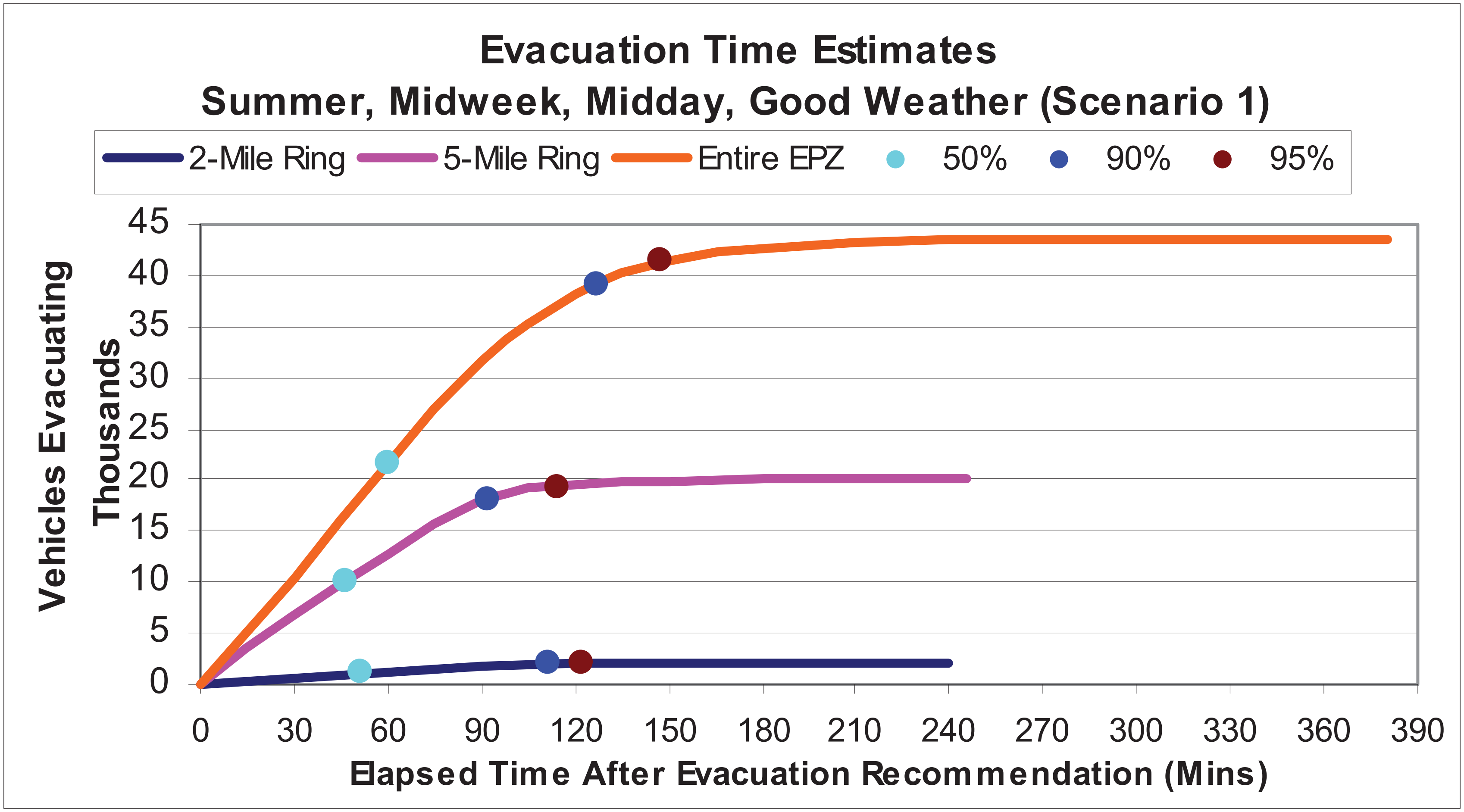


Figure J-1. Evacuation Time Estimates – Scenario 1 for Region R03 (Entire EPZ)

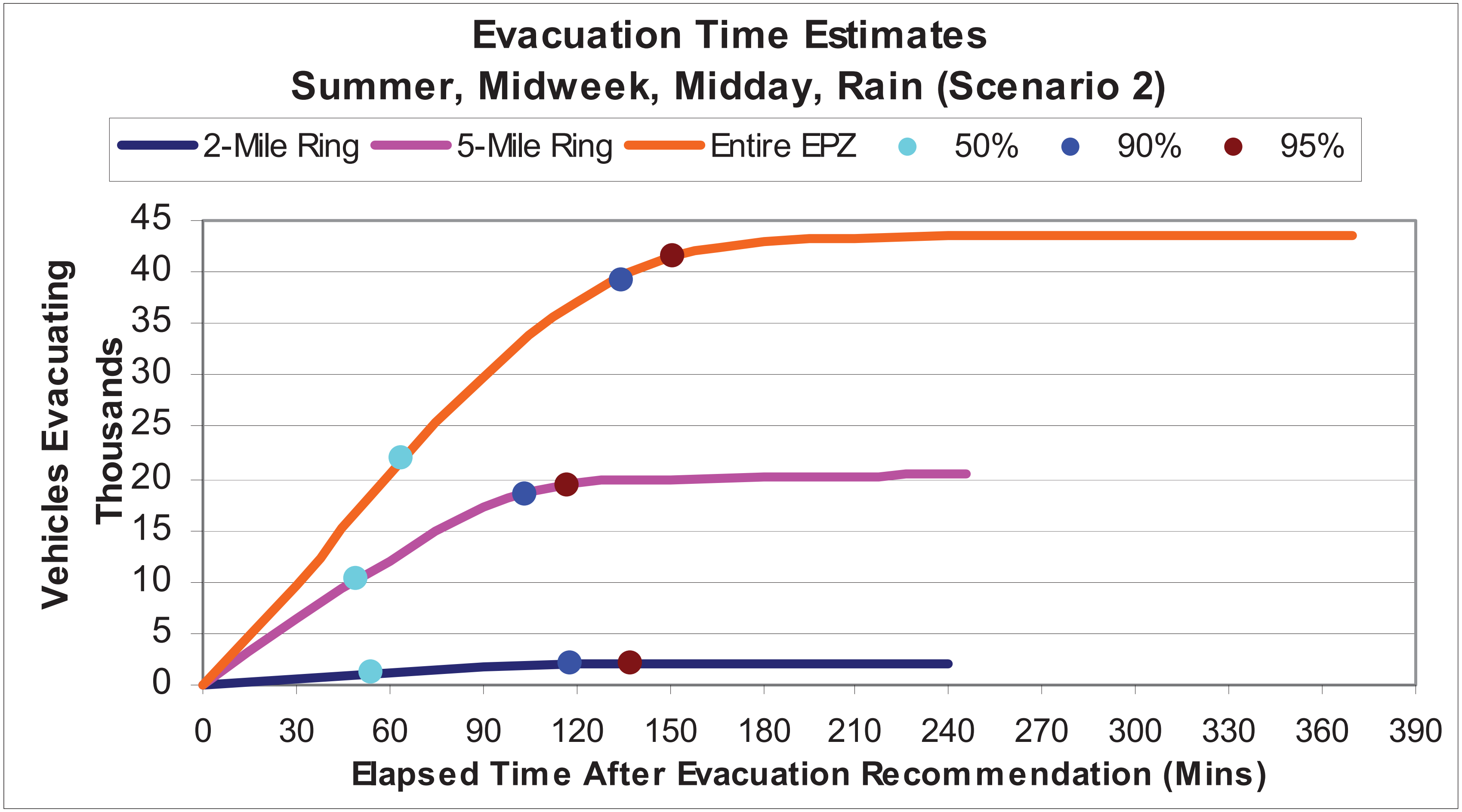


Figure J-2. Evacuation Time Estimates – Scenario 2 for Region R03 (Entire EPZ)

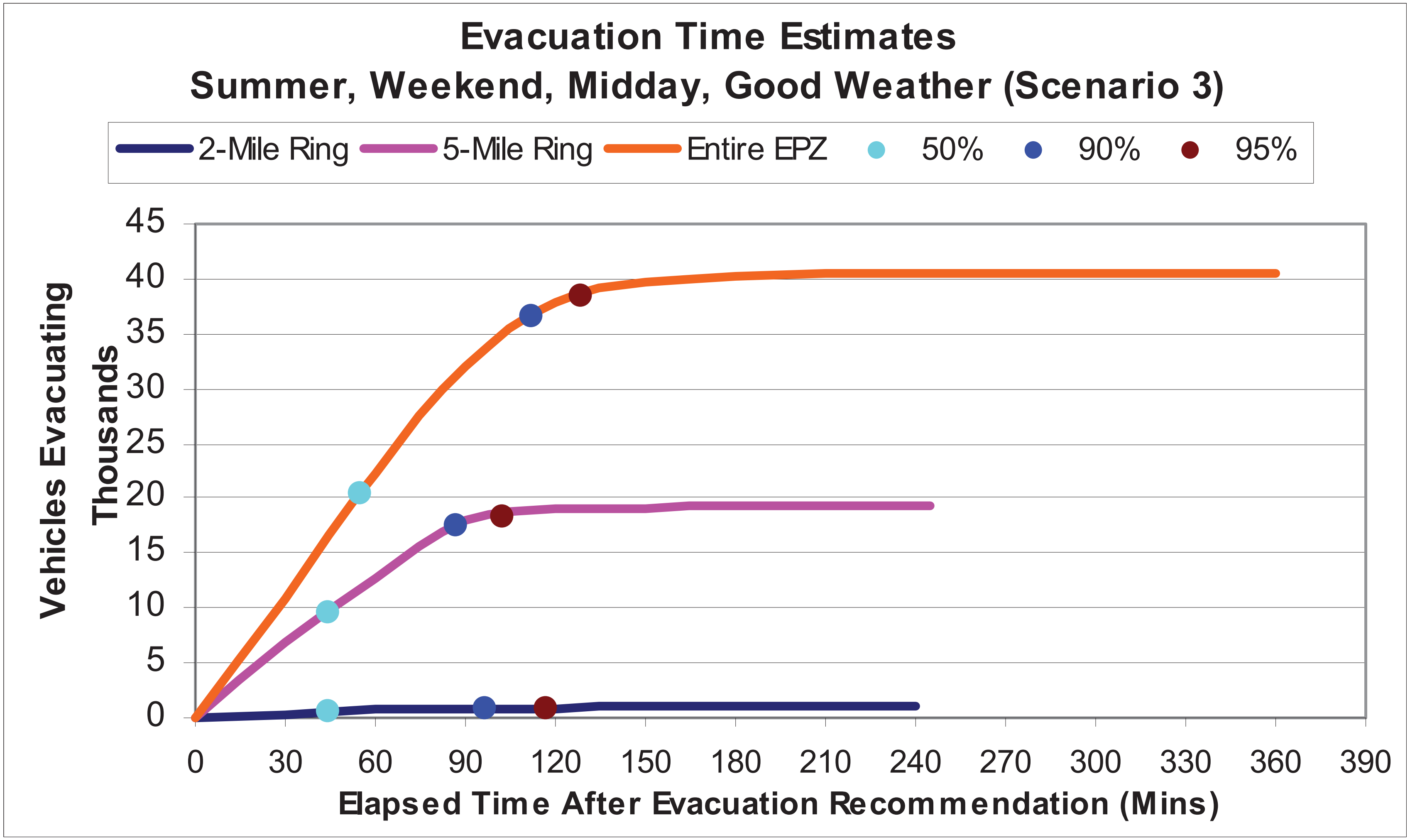


Figure J-3. Evacuation Time Estimates – Scenario 3 for Region R03 (Entire EPZ)

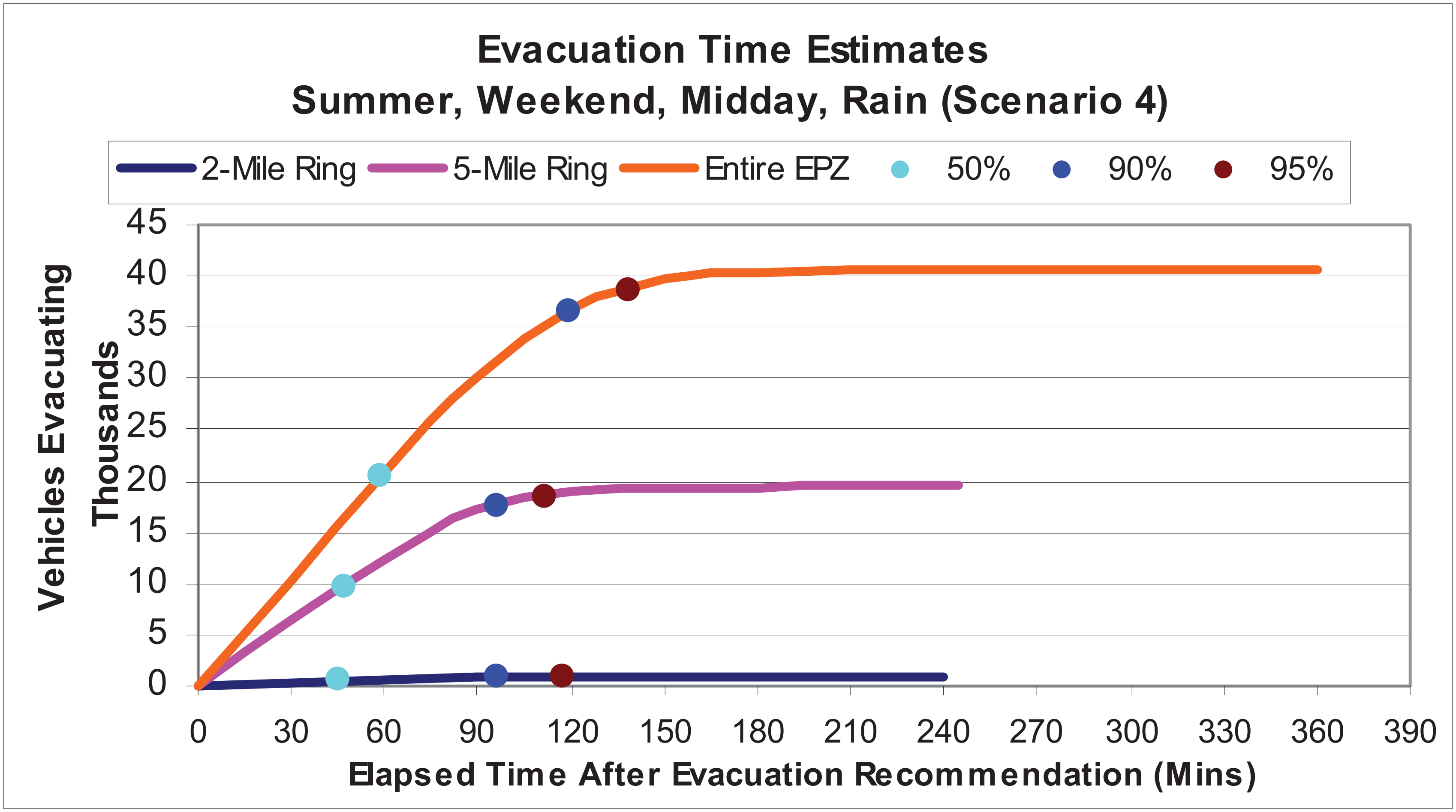


Figure J-4. Evacuation Time Estimates – Scenario 4 for Region R03 (Entire EPZ)

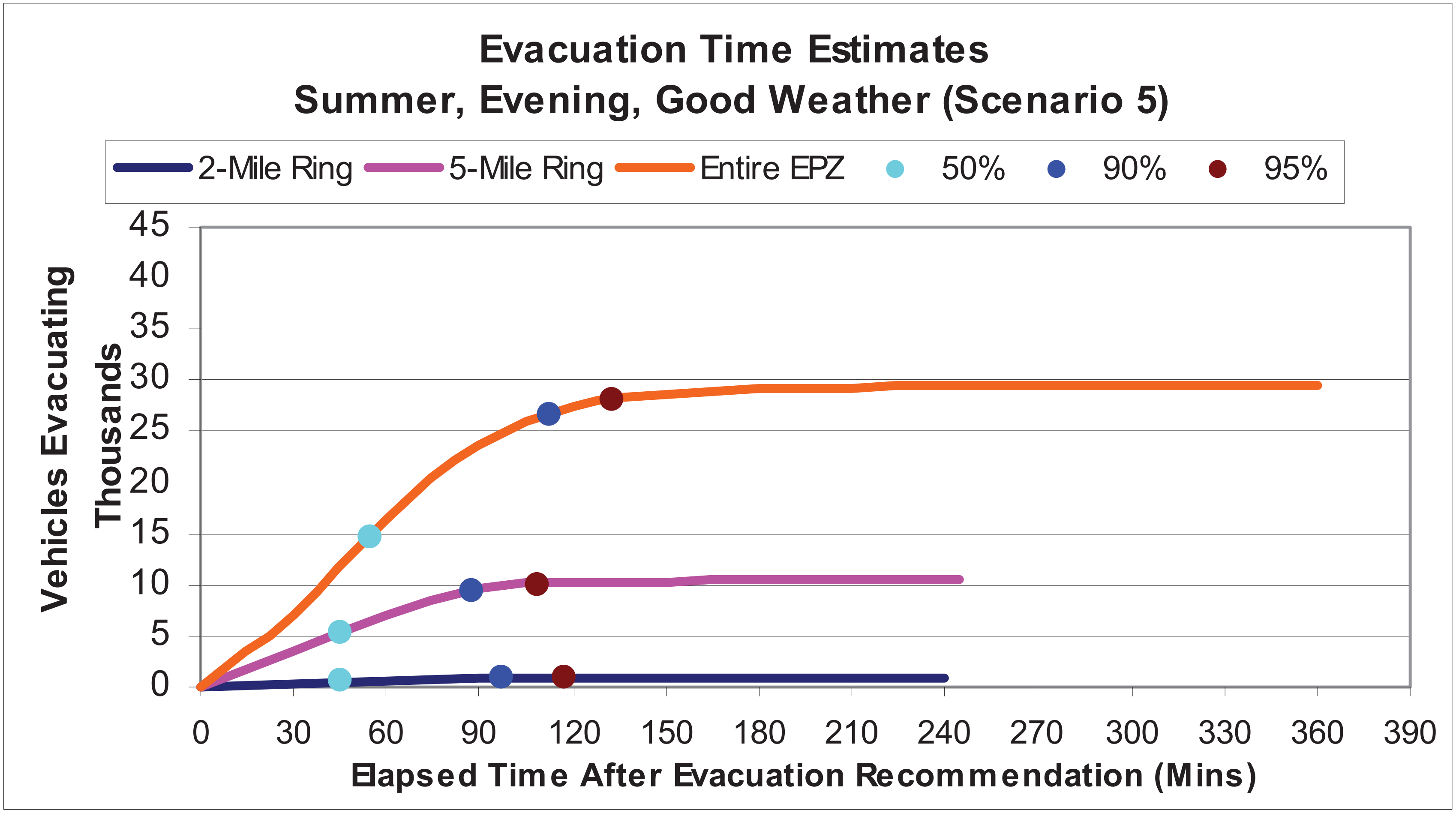


Figure J-5. Evacuation Time Estimates – Scenario 5 for Region R03 (Entire EPZ)

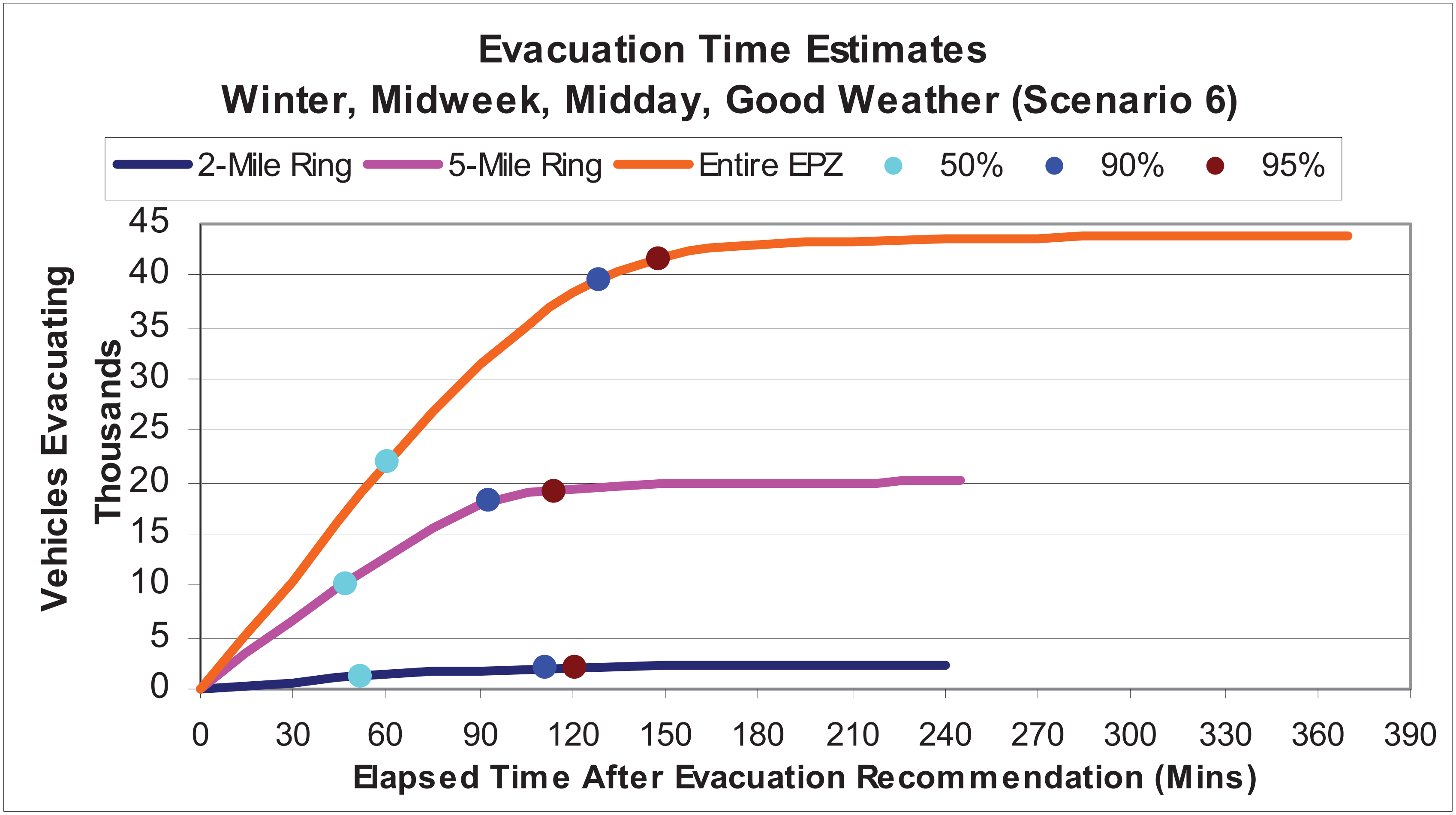


Figure J-6. Evacuation Time Estimates –
Scenario 6 for Region R03 (Entire EPZ)

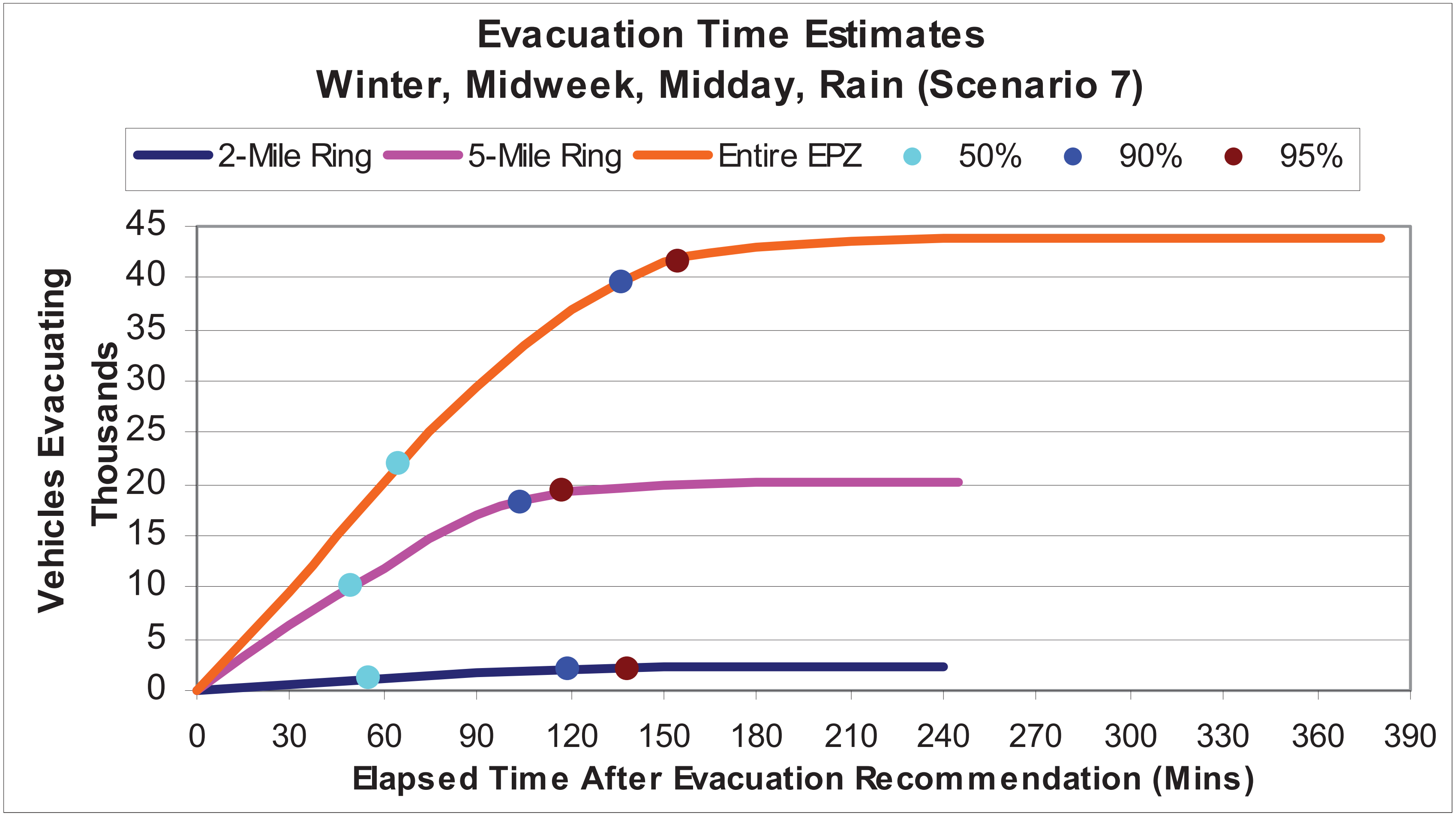


Figure J-7. Evacuation Time Estimates – Scenario 7 for Region R03 (Entire EPZ)

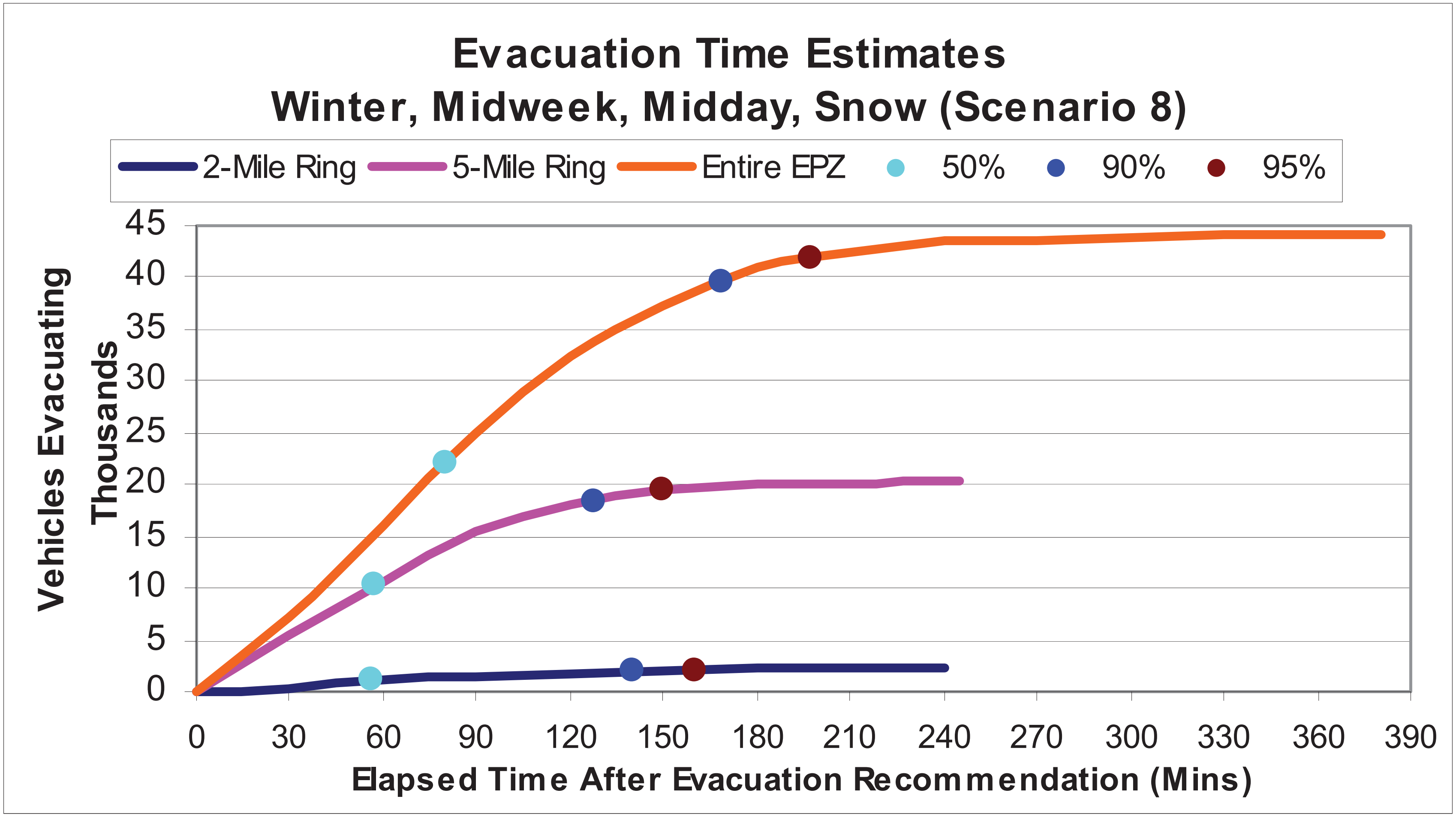


Figure J-8. Evacuation Time Estimates – Scenario 8 for Region R03 (Entire EPZ)

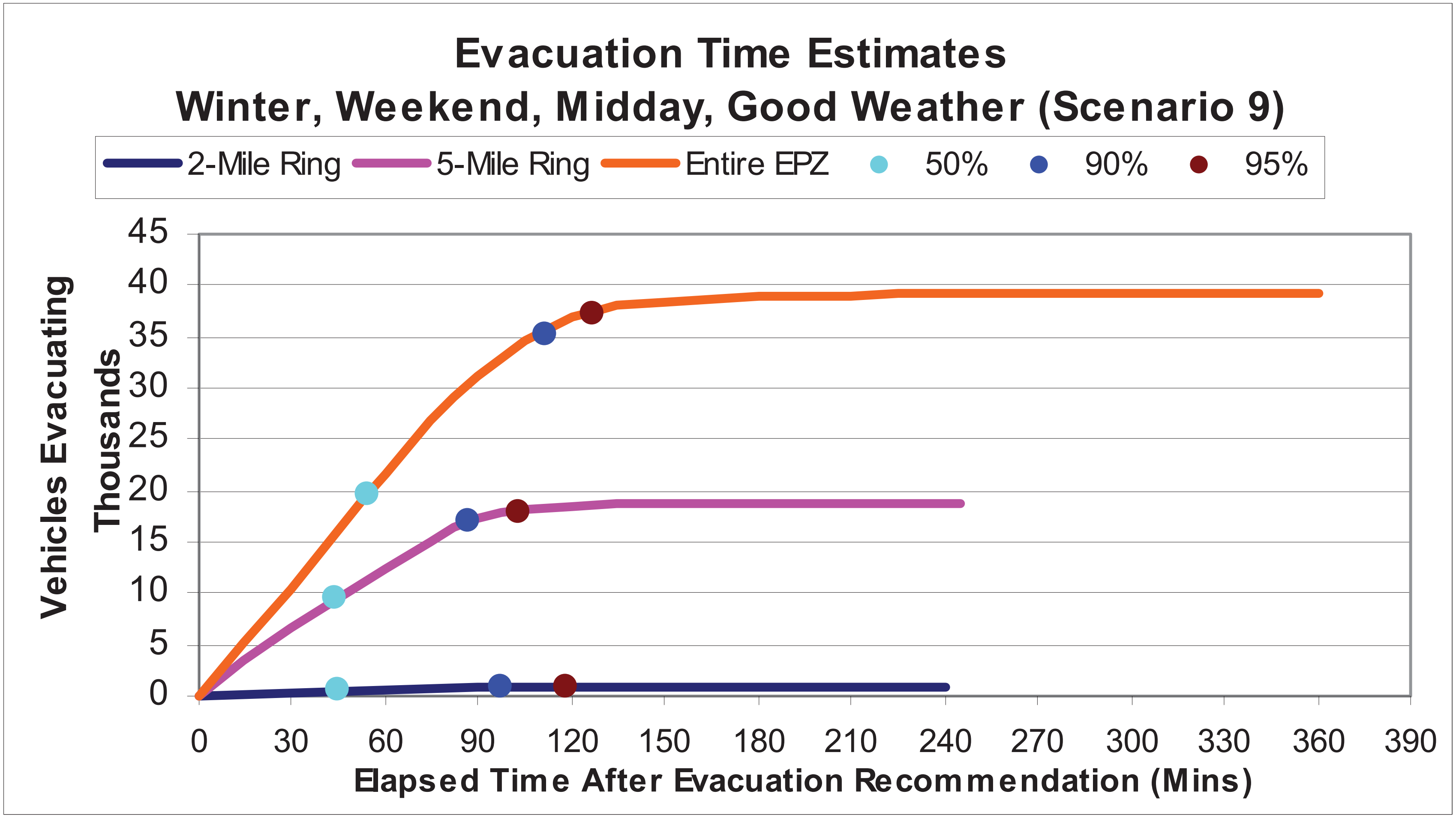


Figure J-9. Evacuation Time Estimates – Scenario 9 for Region R03 (Entire EPZ)

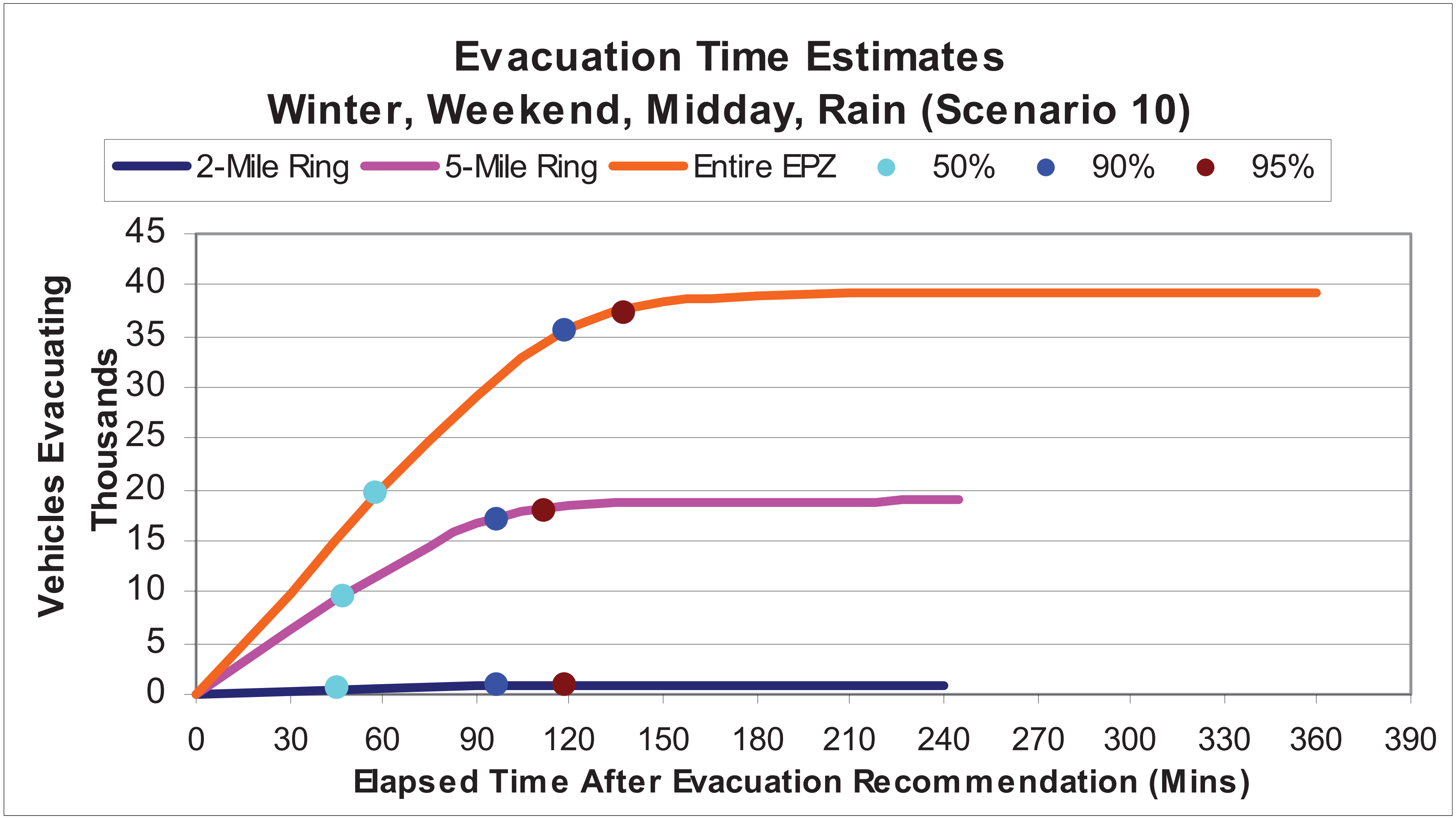


Figure J-10. Evacuation Time Estimates – Scenario 10 for Region R03 (Entire EPZ)

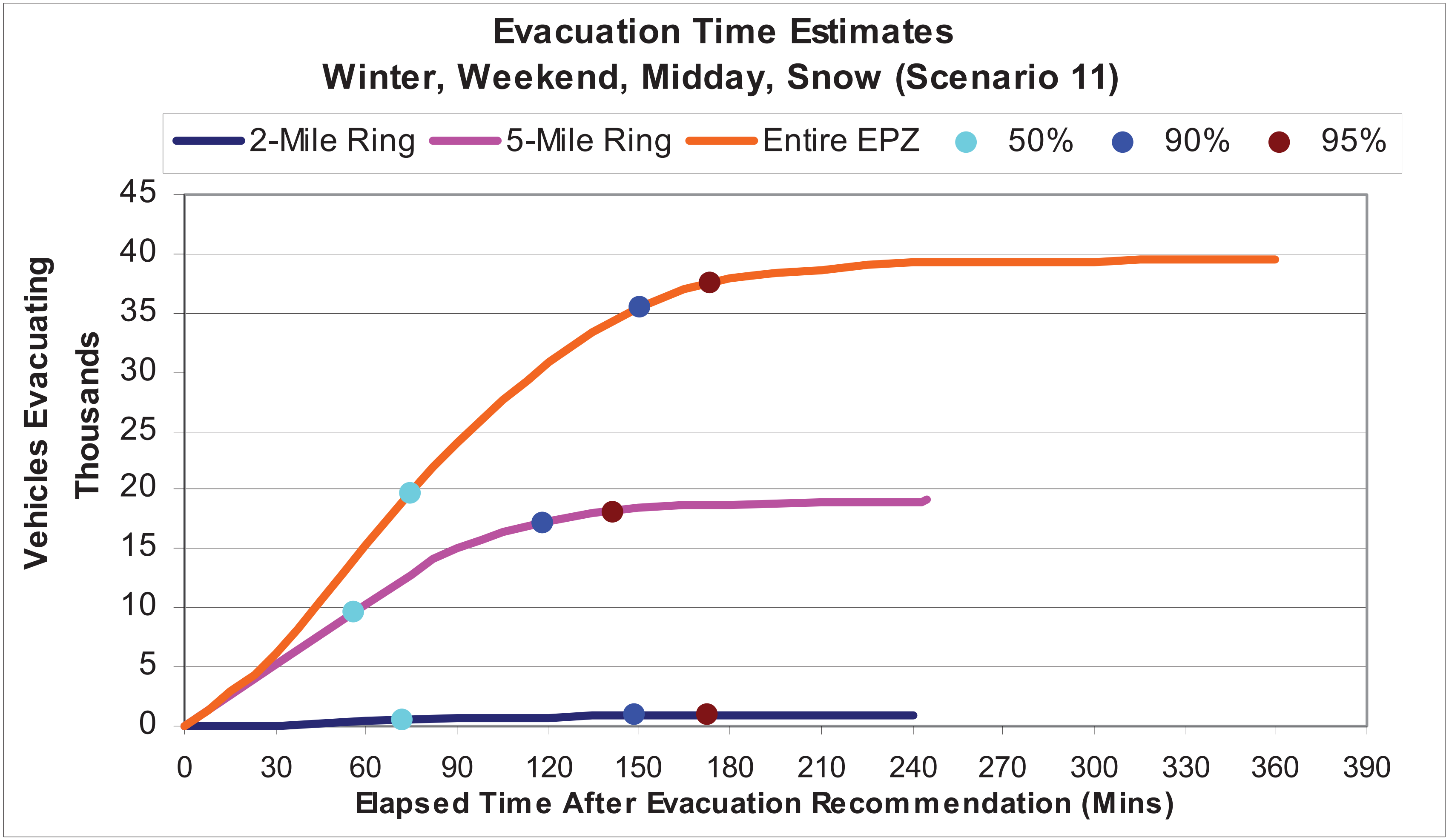


Figure J-11. Evacuation Time Estimates – Scenario 11 for Region R03 (Entire EPZ)

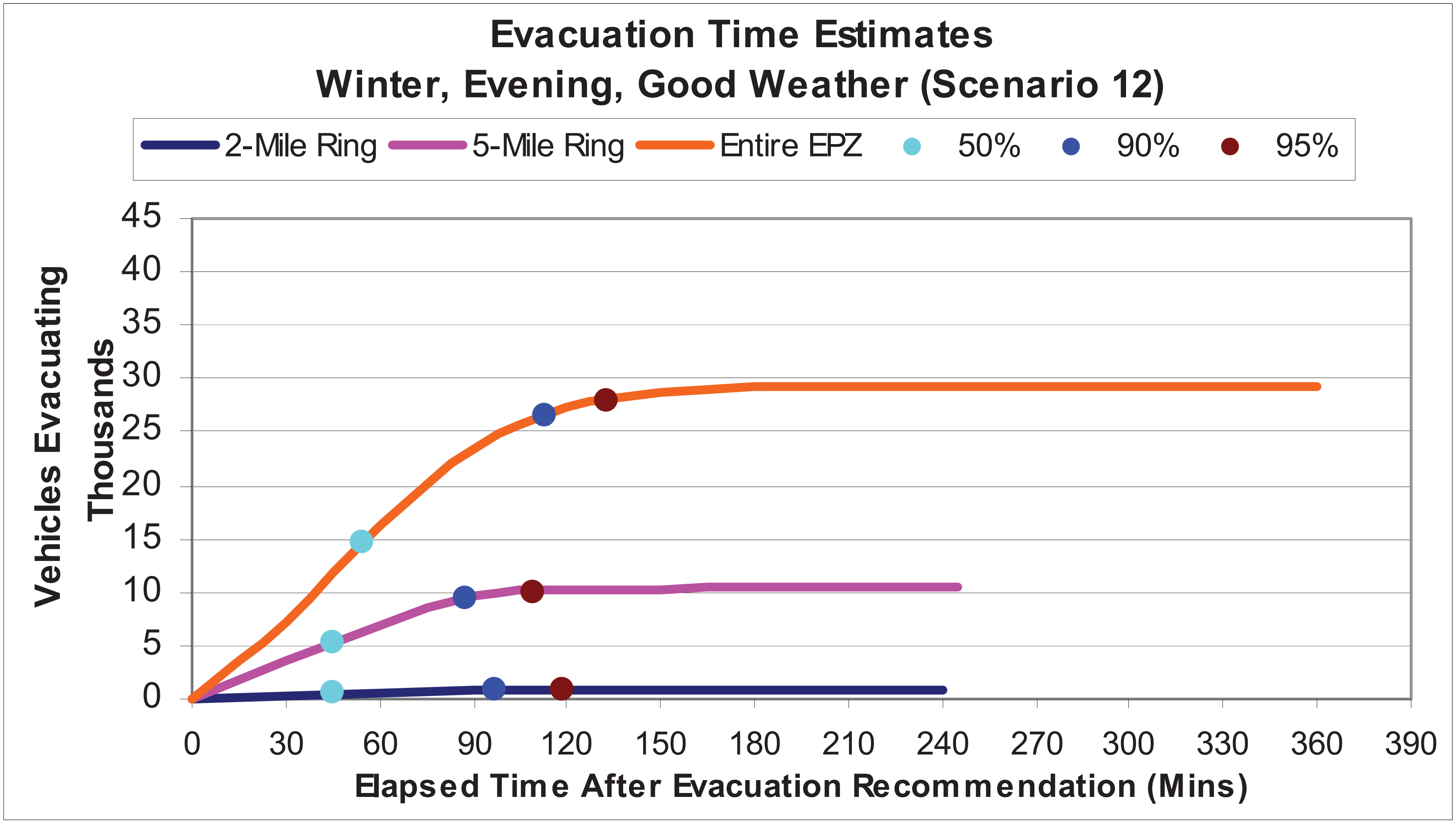


Figure J-12. Evacuation Time Estimates –
Scenario 12 for Region R03 (Entire EPZ)

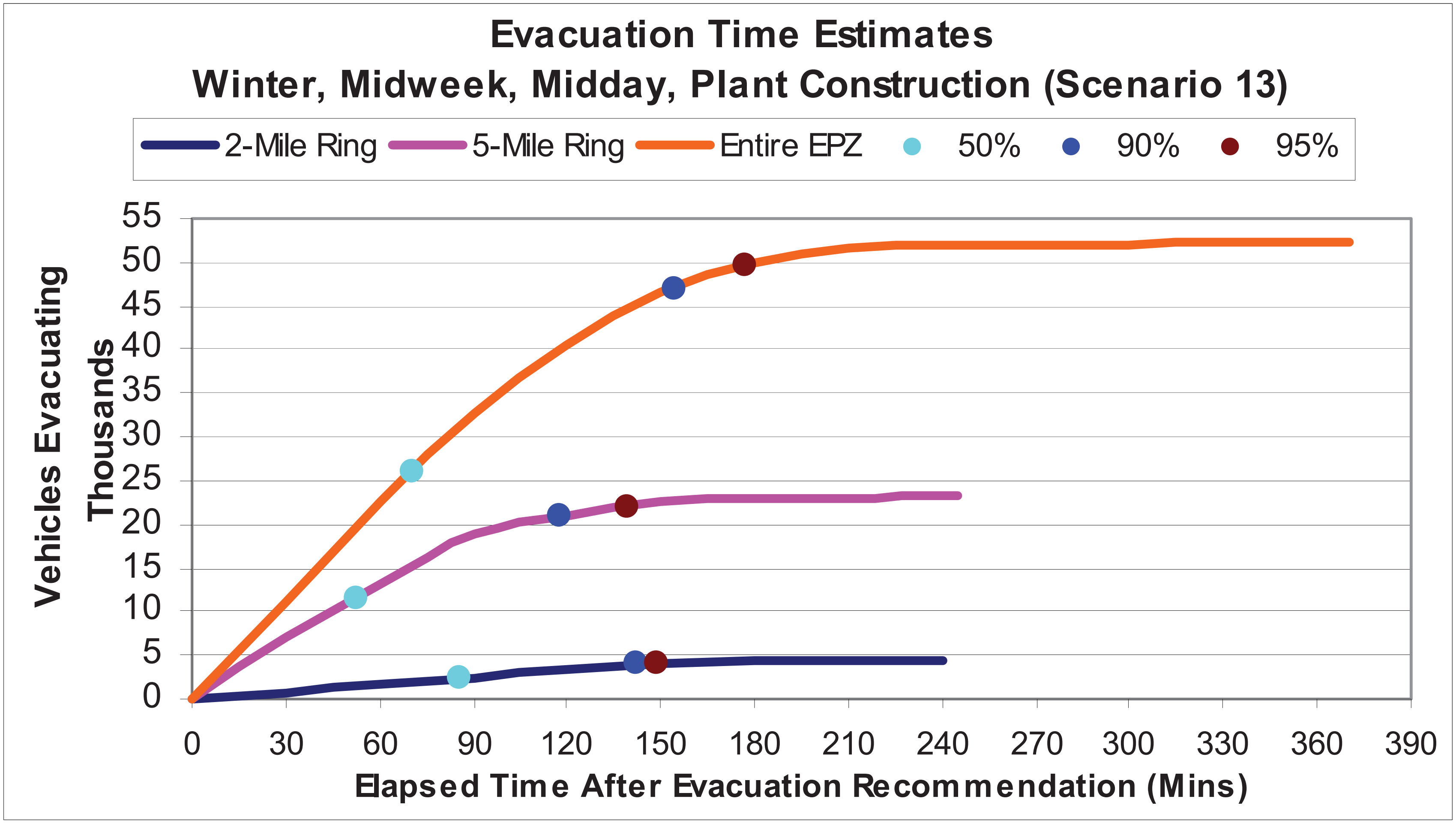


Figure J-13. Evacuation Time Estimates – Scenario 13 for Region R03 (Entire EPZ)

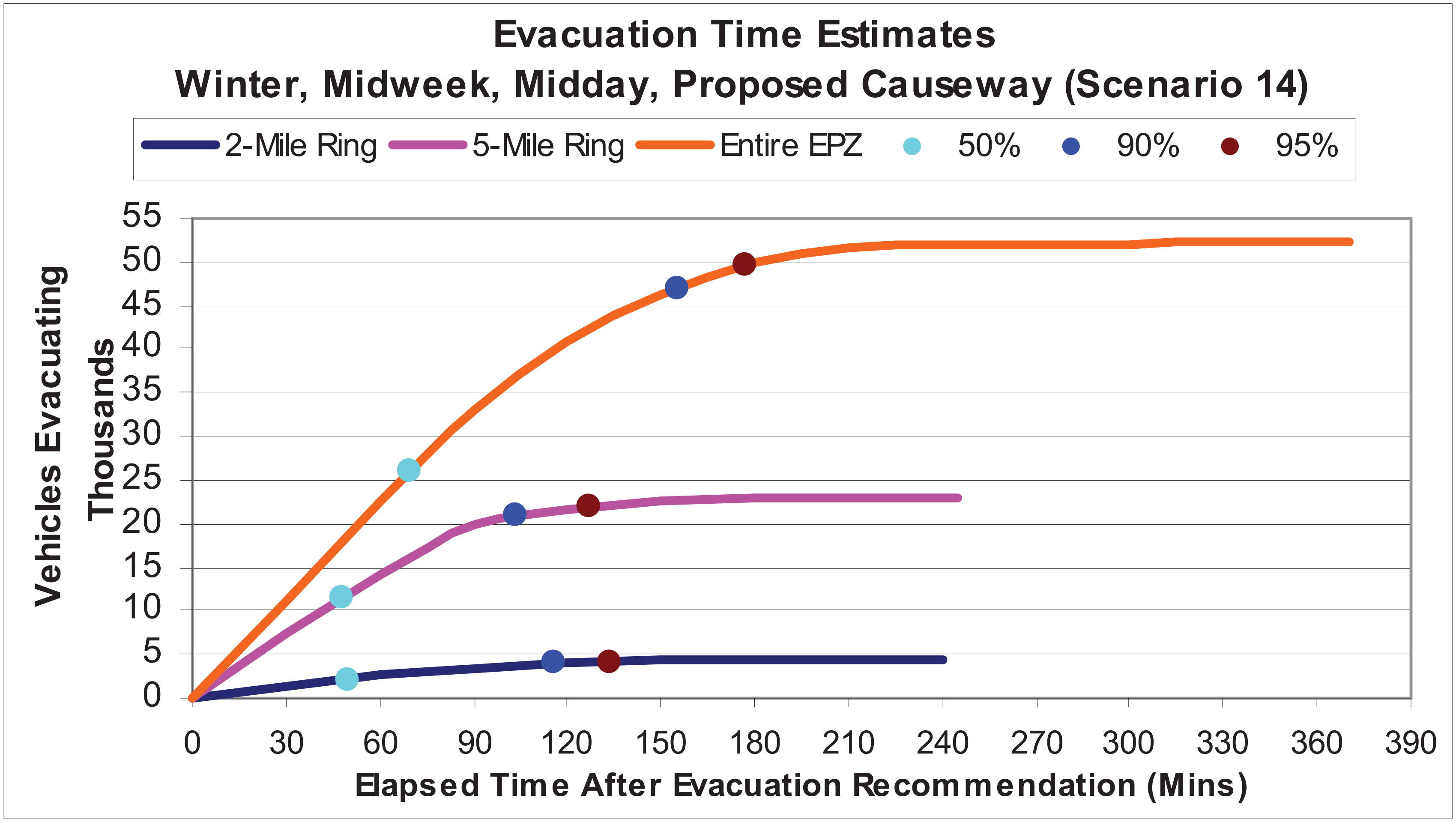


Figure J-14. Evacuation Time Estimates – Scenario 14 for Region R03 (Entire EPZ)

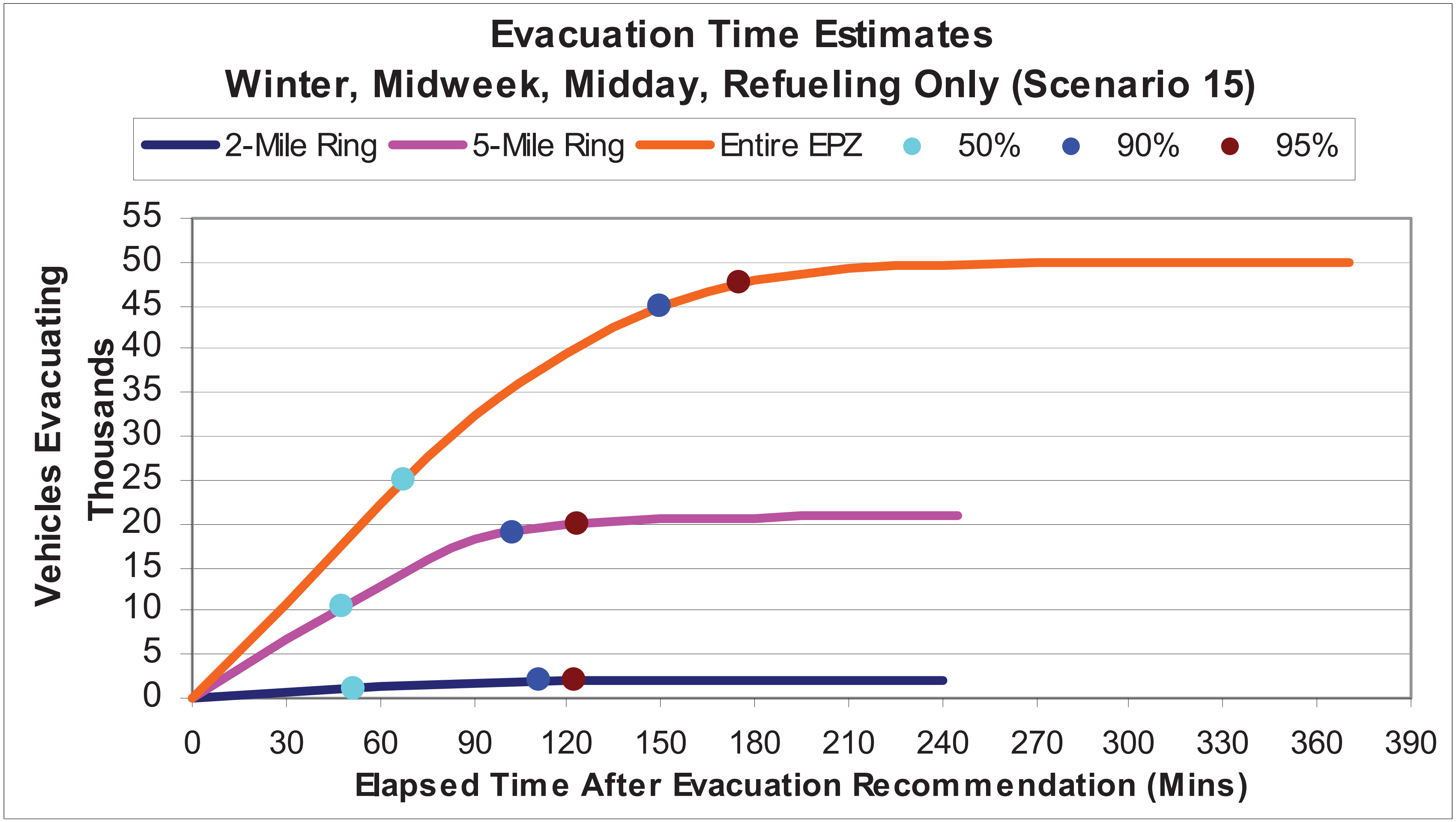


Figure J-15. Evacuation Time Estimates – Scenario 15 for Region R03 (Entire EPZ)

APPENDIX K

Evacuation Roadway Network

APPENDIX K: EVACUATION ROADWAY NETWORK

As discussed in Section 1.3, a computerized link-node analysis network was constructed to model the roadway network within the study area. Figure K-1 provides an overview of the link-node analysis network. The figure has been divided up into 24 more detailed figures (Figures K-2 through K-25) which show each of the links and nodes in the network.

The analysis network was calibrated using the observations made during the field survey conducted in April 2009. Table K-1 lists the characteristics of each roadway section modeled in the ETE analysis. Each link is identified by its upstream and downstream node numbers. These node numbers can be cross-referenced to Figures K-1 through K-25 to identify the geographic location of each link.

The term, “Full Lanes” in Table K-1 identifies the number of lanes that extend throughout the length of the link. Many links have additional lanes on the immediate approach to an intersection (turn pockets); these have been recorded and entered into the I-DYNEV System input stream.

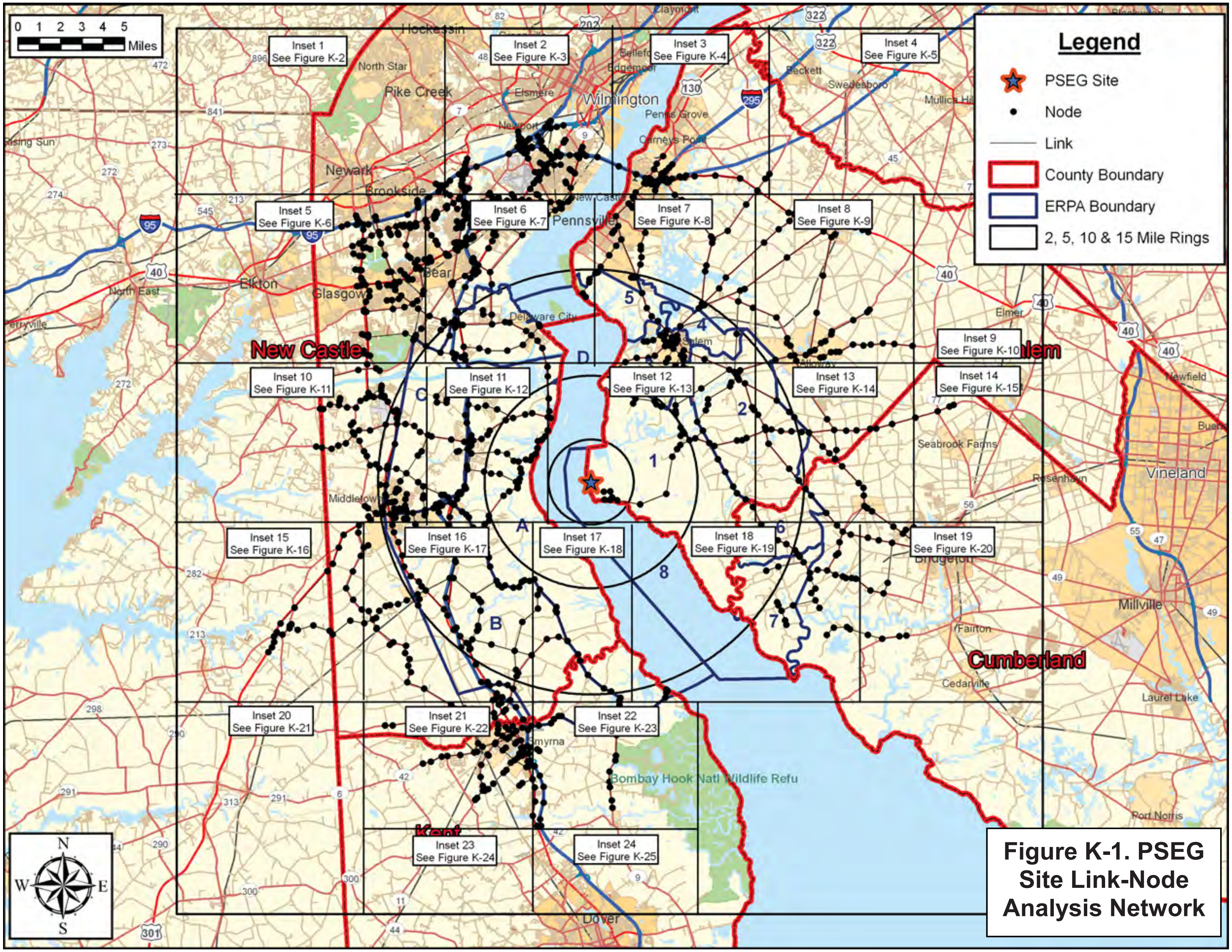


Figure K-1. PSEG Site Link-Node Analysis Network

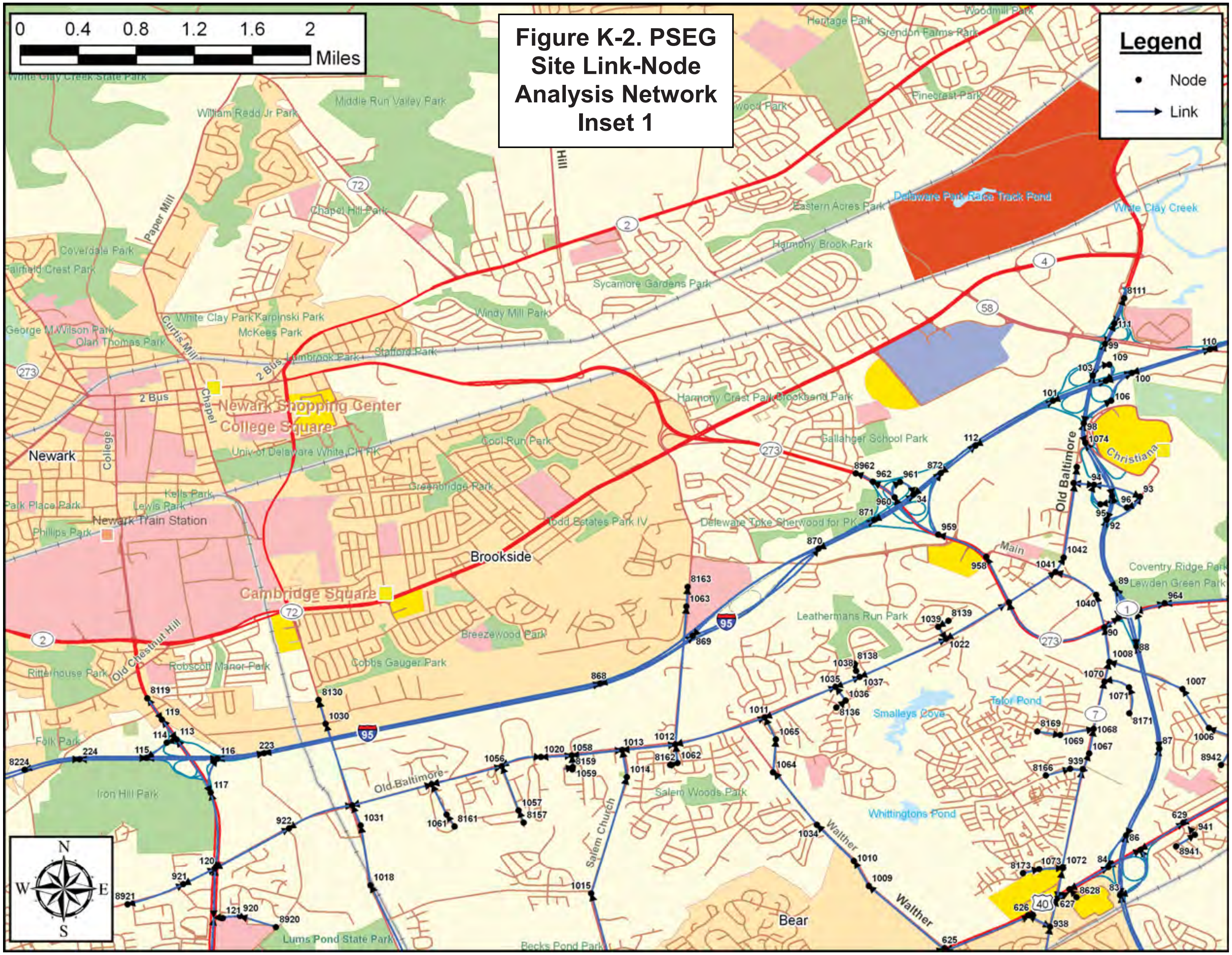


Figure K-2. PSEG Site Link-Node Analysis Network Inset 1
Legend
Node
Link
0 0.4 0.8 1.2 1.6 2 Miles
Newark
Newark Shopping Center
College Square
Cambridge Square
Brookside
Bear
Newark Train Station
Iron Hill Park
Lums Pond State Park
Delaware Park Race Track Pond
White Clay Creek
Christiana
Old Baltimore
Walther
Salem Church
N
S
E
W

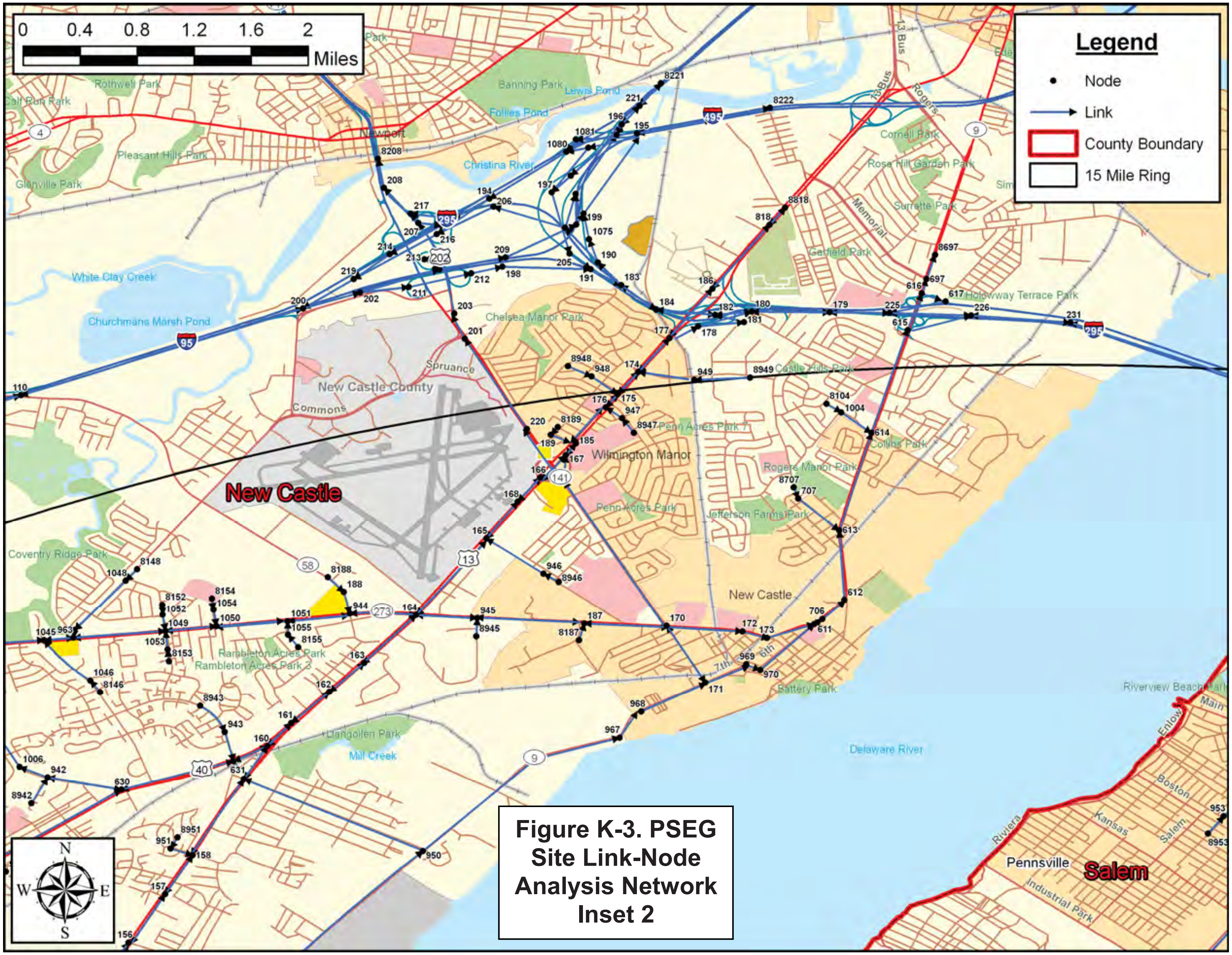


Figure K-3. PSEG Site Link-Node Analysis Network Inset 2

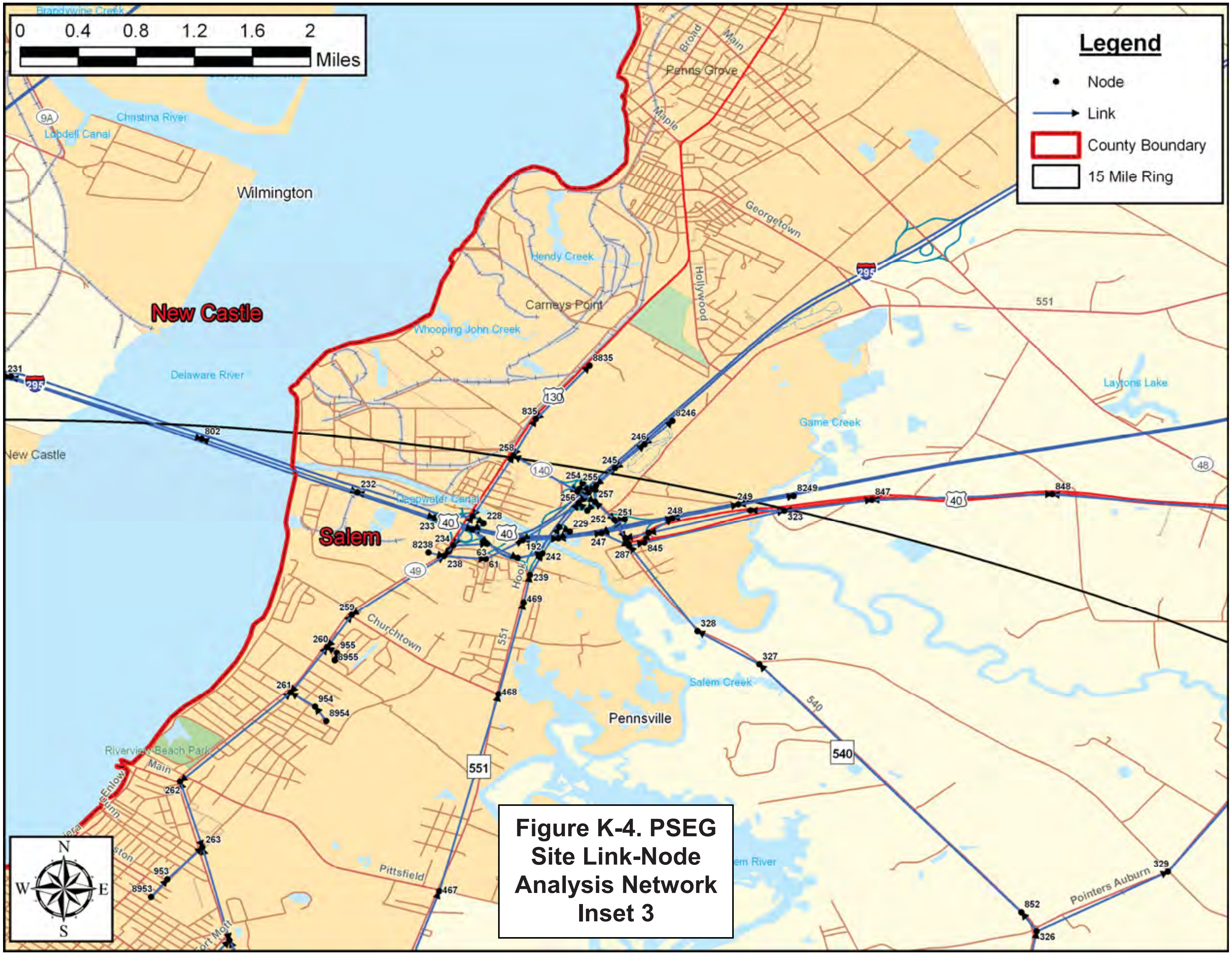


Figure K-4. PSEG Site Link-Node Analysis Network Inset 3

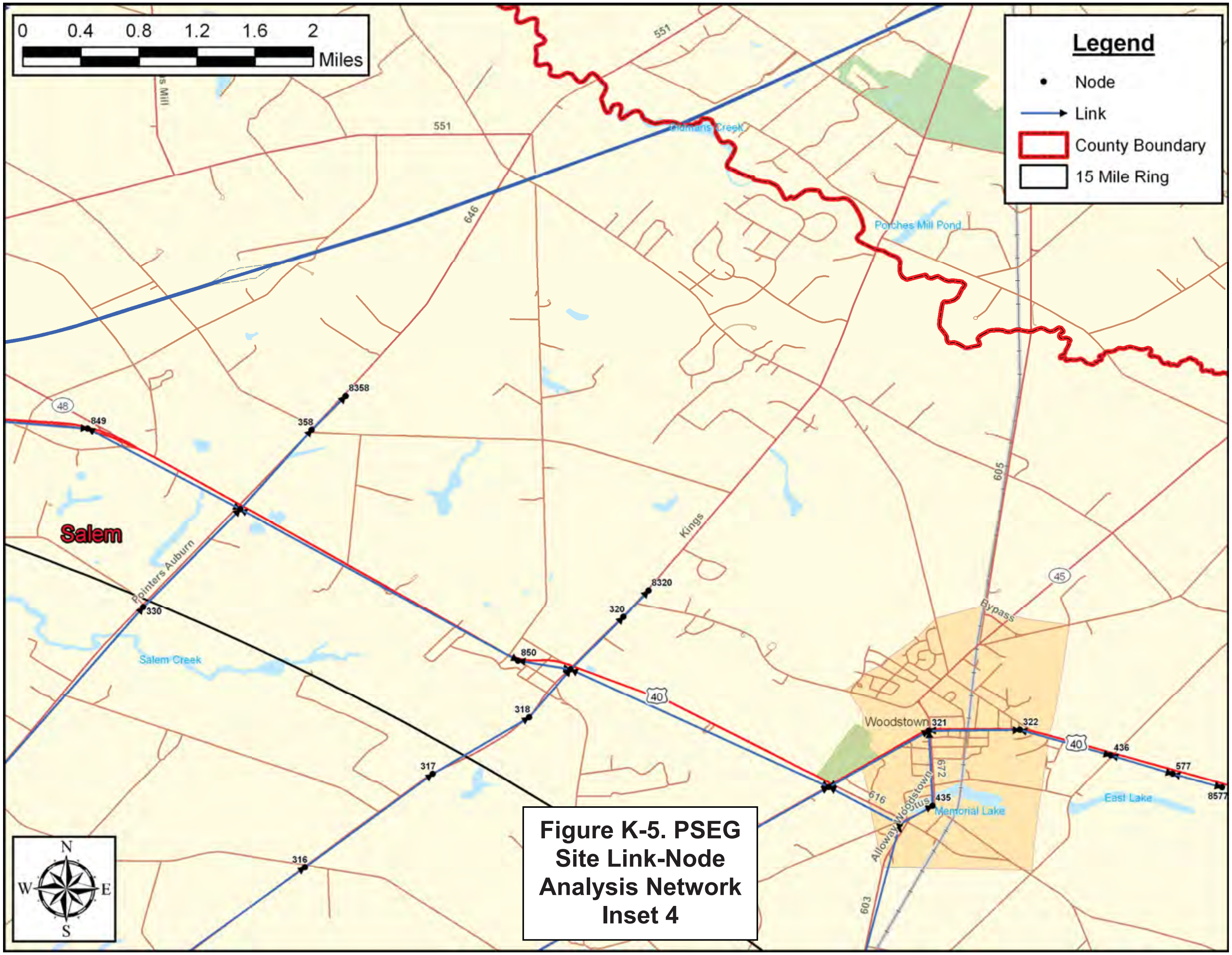


Figure K-5. PSEG Site Link-Node Analysis Network Inset 4

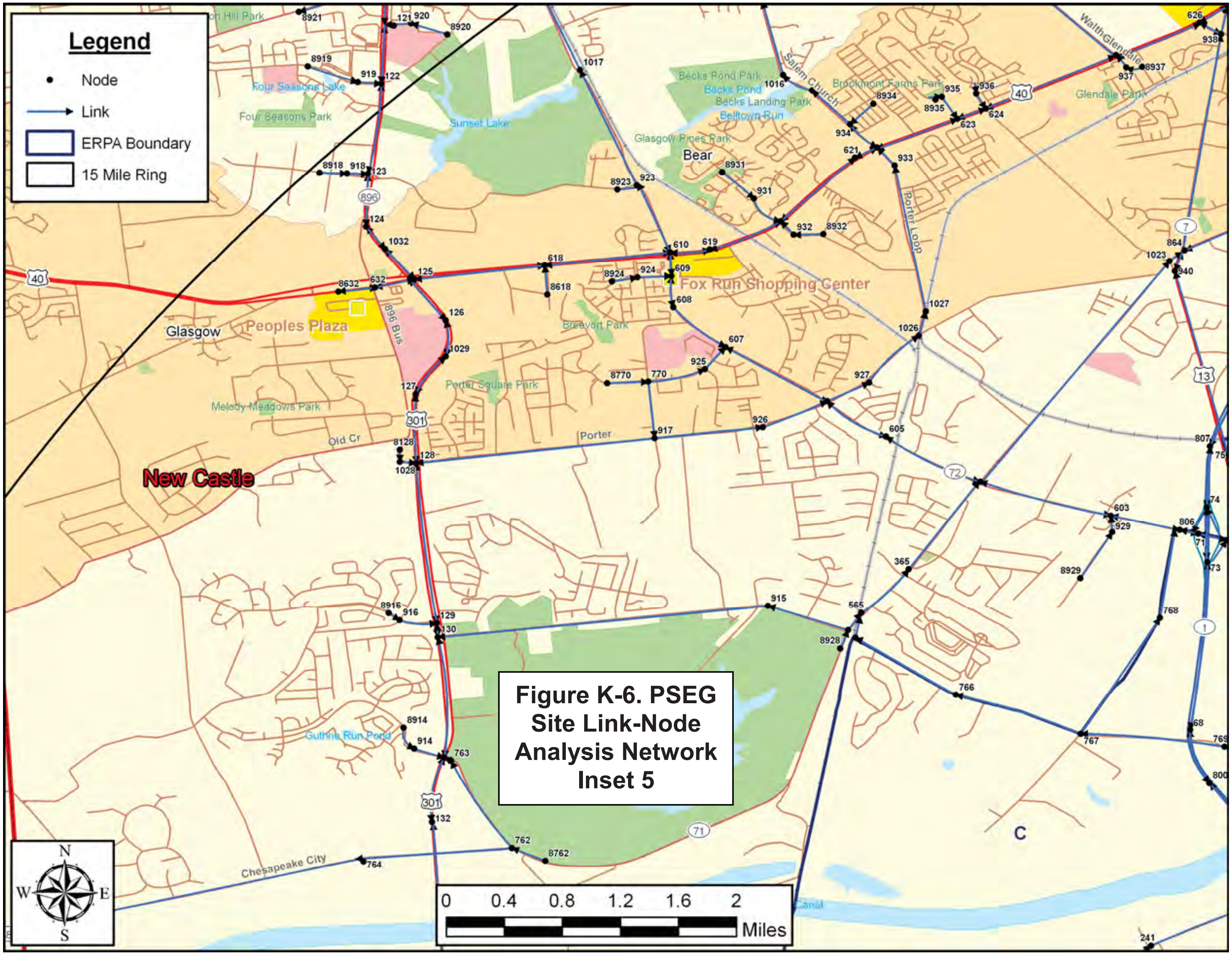


Figure K-6. PSEG Site Link-Node Analysis Network Inset 5

Figure K-7. PSEG Site Link-Node Analysis Network Inset 6


Figure K-8. PSEG Site Link-Node Analysis Network Inset 7
Legend
Node
Link
County Boundary
ERPA Boundary
Pennsville
Salem
New Castle
Delaware River
Mill Creek
Delaware Bay
Salem River
Washington Creek
Fenwick Creek
Keasbey Creek
D
1
2
3
4
5
0 0.4 0.8 1.2 1.6 2
Miles
N
S
E
W

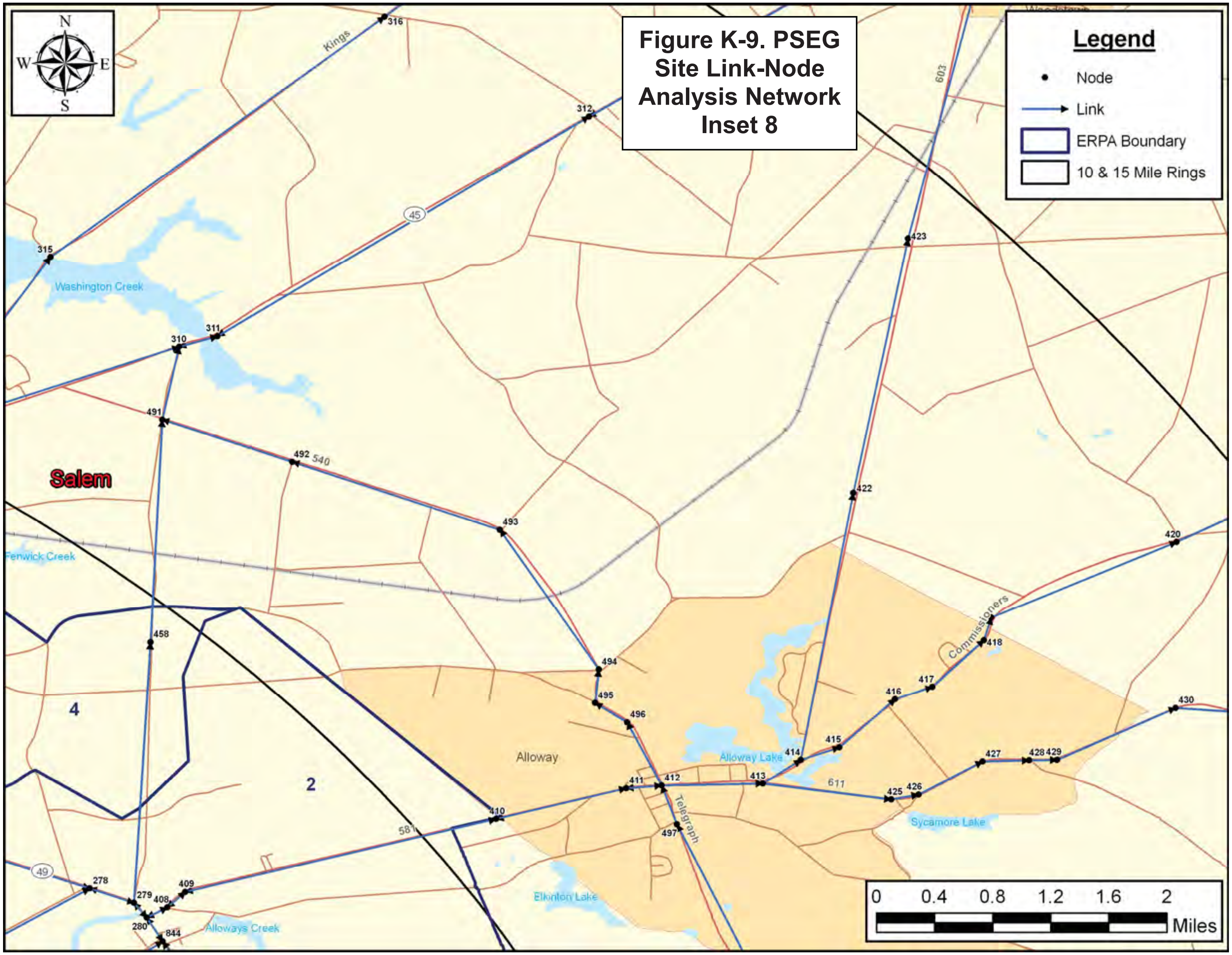
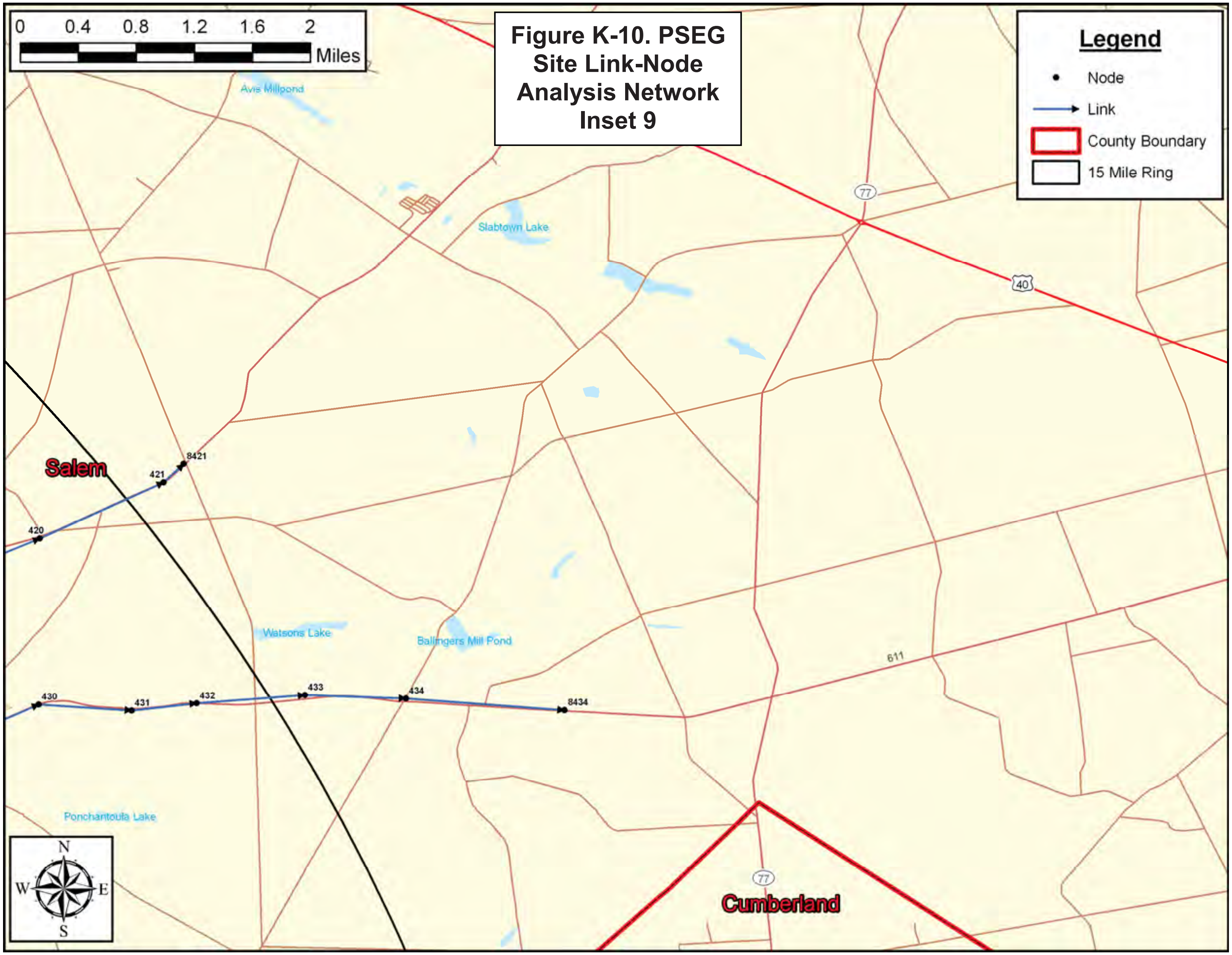


Figure K-9. PSEG Site Link-Node Analysis Network Inset 8
Legend
Node
Link
ERPA Boundary
10 & 15 Mile Rings
N
S
E
W
Salem
Alloway
Washington Creek
Fenwick Creek
Alloway Lake
Sycamore Lake
Elkinton Lake
Alloways Creek
Kings
Commissioners
Telegraph
540
45
49
581
603
611
4
2
0
0.4
0.8
1.2
1.6
2
Miles


0 0.4 0.8 1.2 1.6 2
Miles
Figure K-10. PSEG Site Link-Node Analysis Network Inset 9
Legend
Node
Link
County Boundary
15 Mile Ring
Avis Millpond
Slabtown Lake
77
40
Salem
8421
421
420
Watsons Lake
Ballingers Mill Pond
611
430
431
432
433
434
8434
Ponchatoula Lake
Cumberland
N
W
E
S

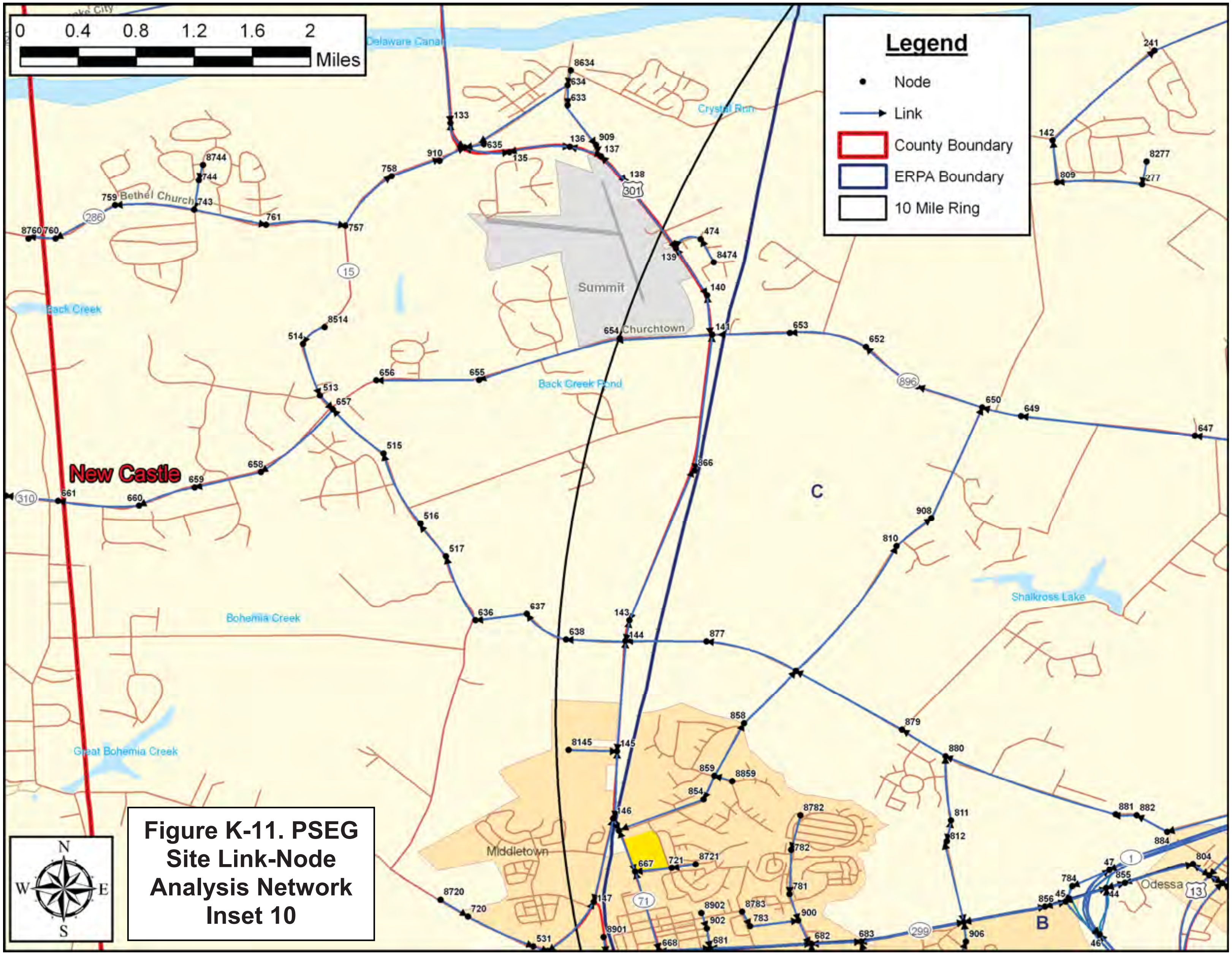


Figure K-11. PSEG Site Link-Node Analysis Network Inset 10

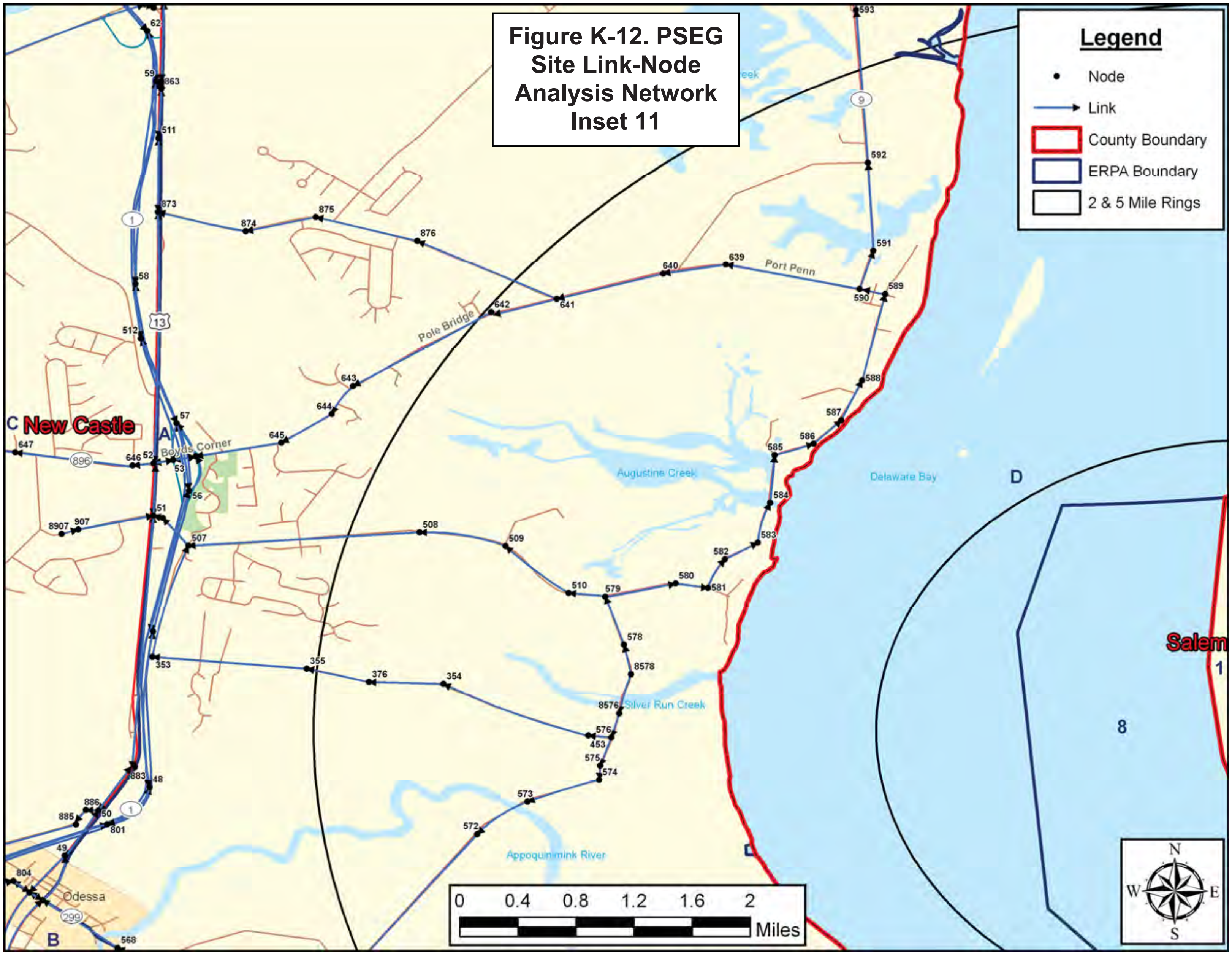


Figure K-12. PSEG Site Link-Node Analysis Network Inset 11
Legend
Node
Link
County Boundary
ERPA Boundary
2 & 5 Mile Rings
New Castle
Salem
Boyds Corner
Pole Bridge
Port Penn
Augustine Creek
Delaware Bay
Silver Run Creek
Appoquinimink River
Odessa
0 0.4 0.8 1.2 1.6 2
Miles
N
W
E
S

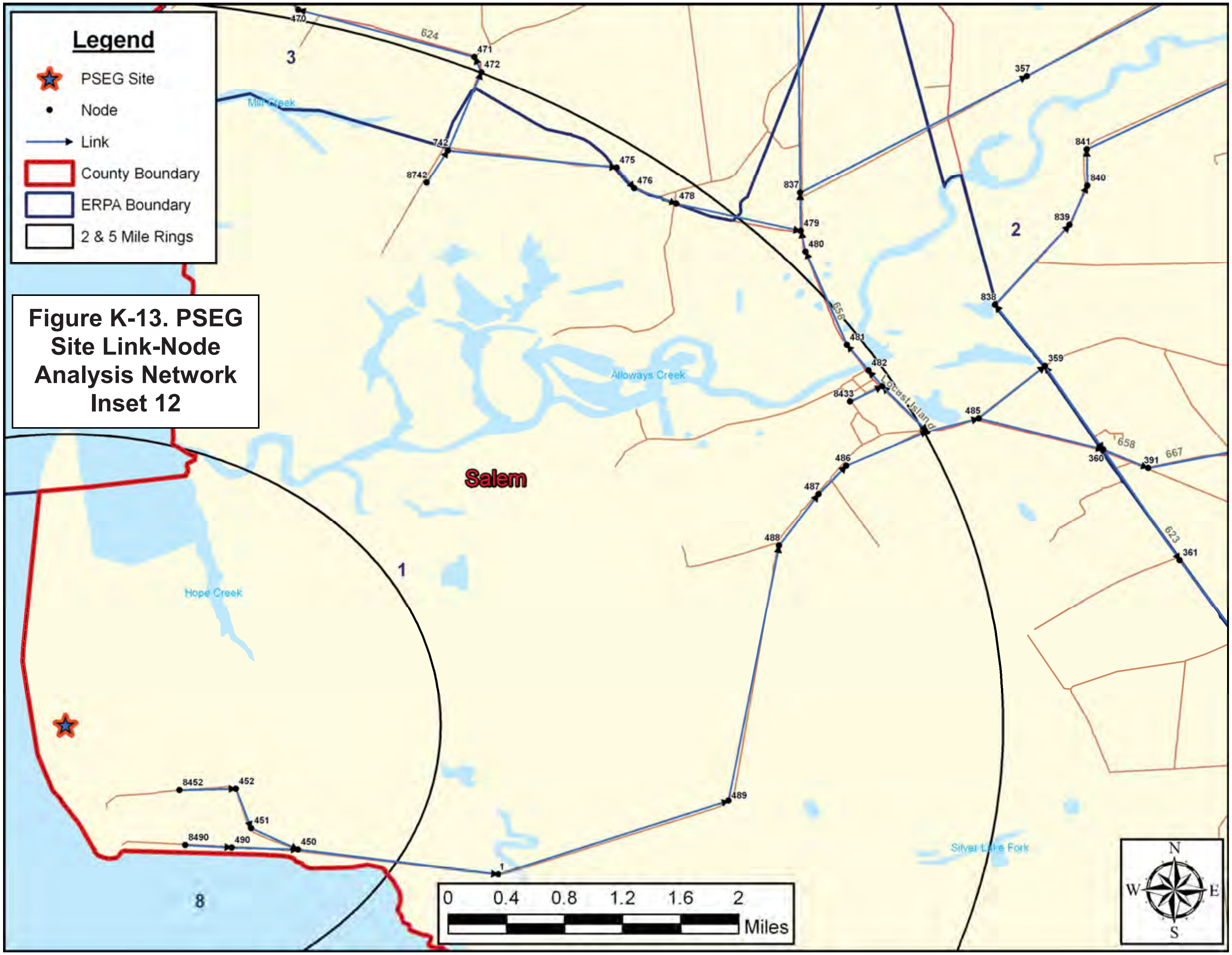


Figure K-13. PSEG Site Link-Node Analysis Network Inset 12

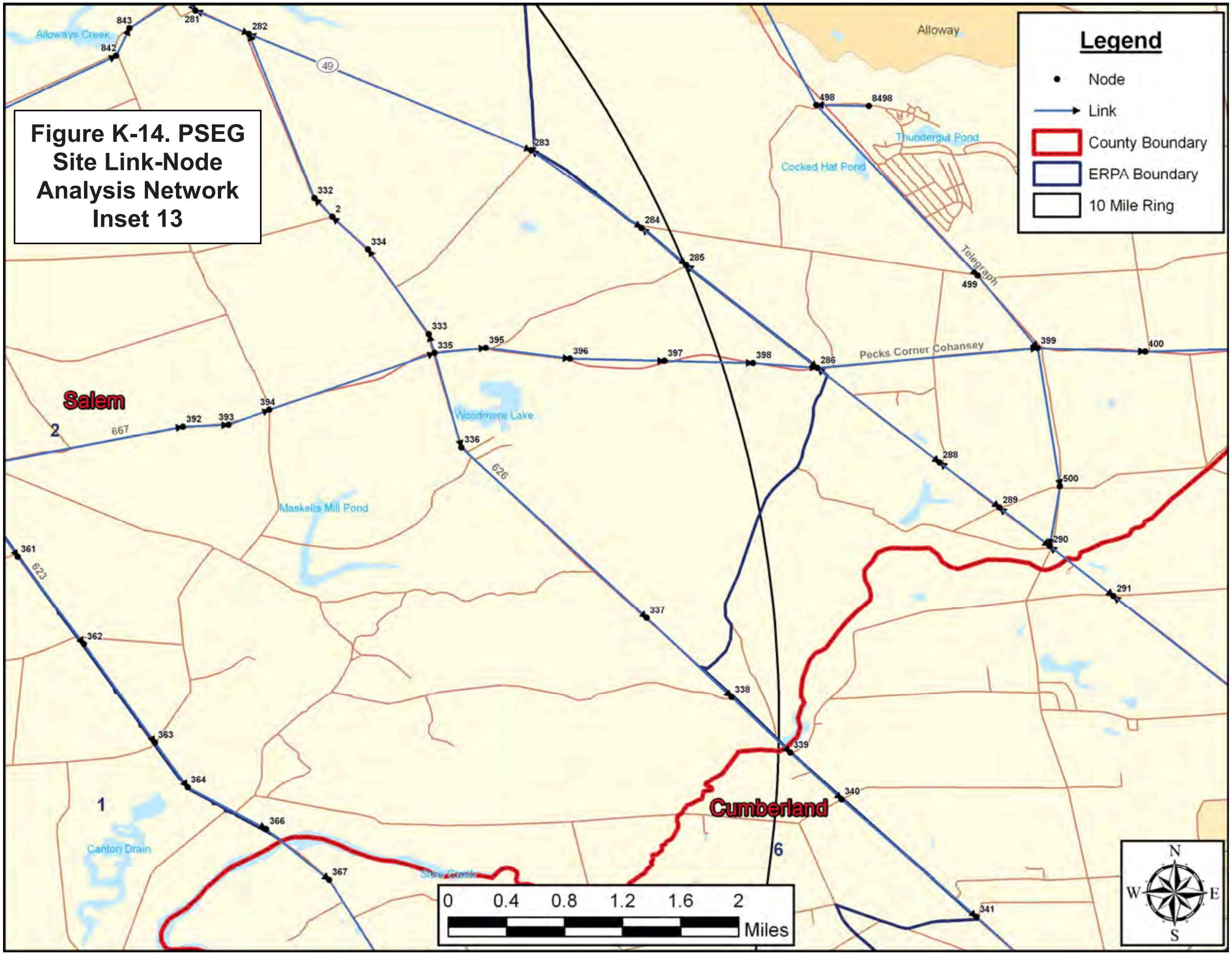


Figure K-14. PSEG Site Link-Node Analysis Network Inset 13
Legend
Node
Link
County Boundary
ERPA Boundary
10 Mile Ring
Salem
Cumberland
Alloway
Alloways Creek
Thundergut Pond
Cocked Hat Pond
Woodmere Lake
Maskells Mill Pond
Canton Drain
Pecks Corner Cohansey
Telegraph
0 0.4 0.8 1.2 1.6 2
Miles

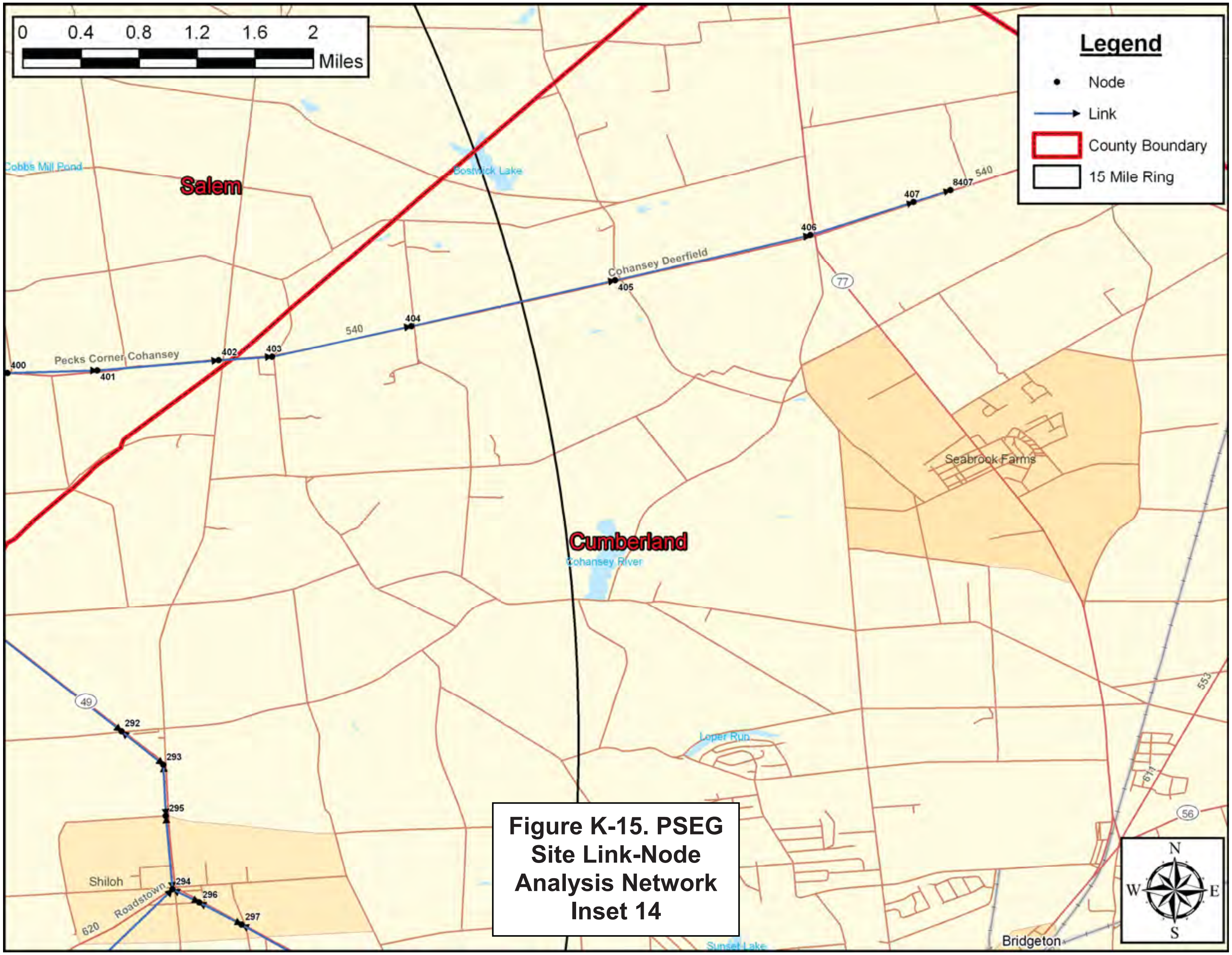
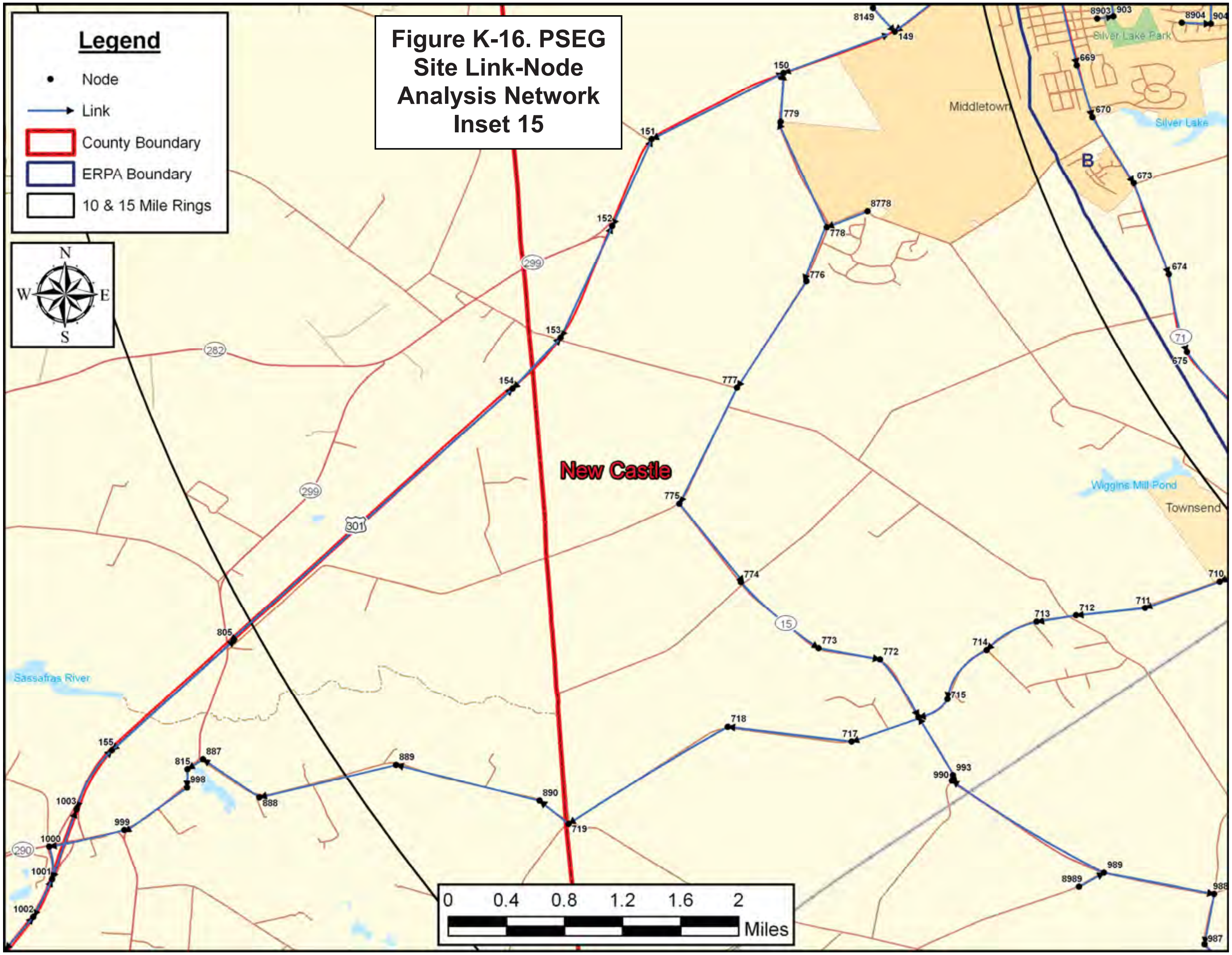


Figure K-15. PSEG Site Link-Node Analysis Network Inset 14


Legend
Node
Link
County Boundary
ERPA Boundary
10 & 15 Mile Rings
Figure K-16. PSEG Site Link-Node Analysis Network Inset 15
New Castle
Middletown
Silver Lake Park
Silver Lake
Wiggins Mill Pond
Townsend
Sassafras River
B
0 0.4 0.8 1.2 1.6 2
Miles

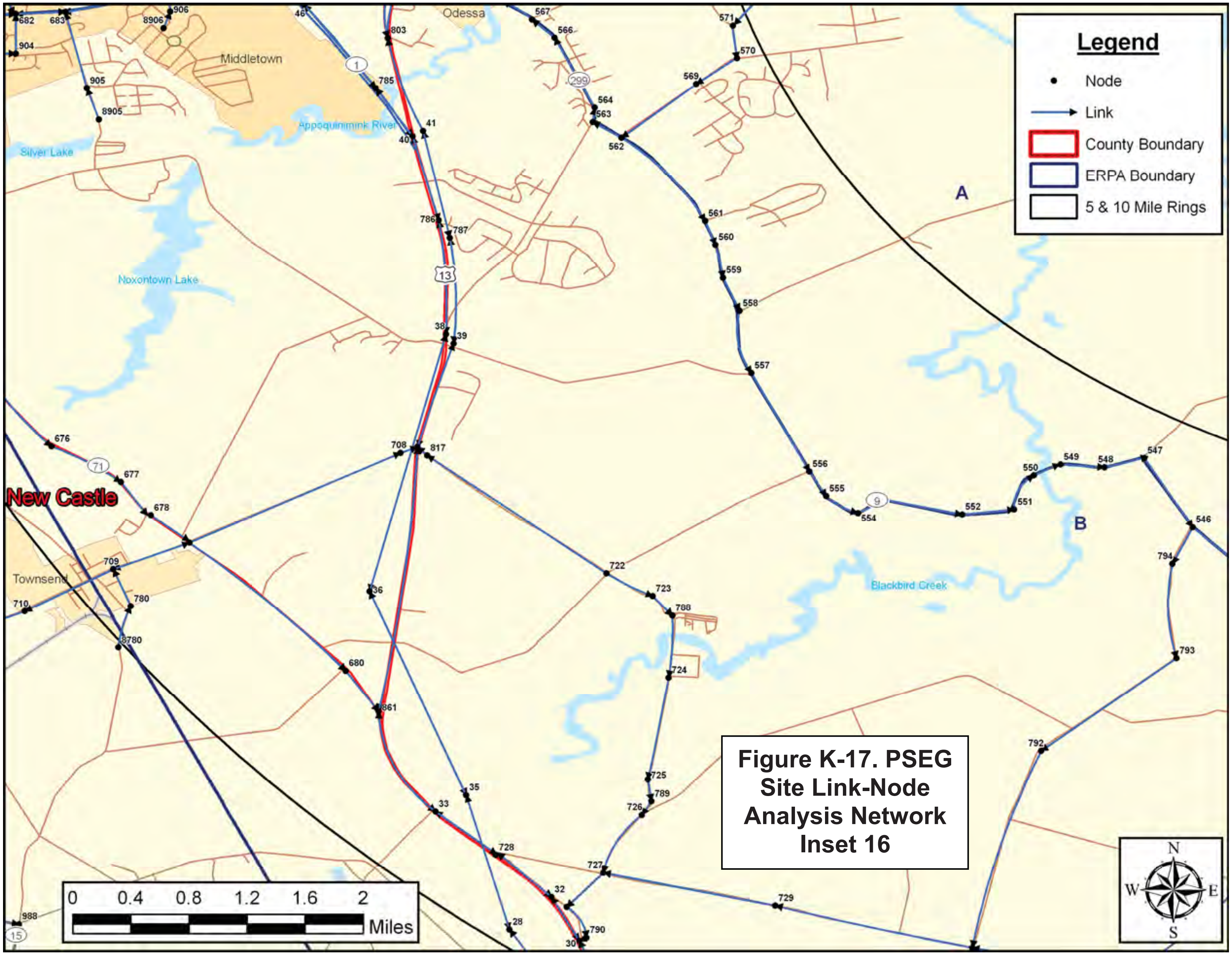


Figure K-17. PSEG Site Link-Node Analysis Network Inset 16

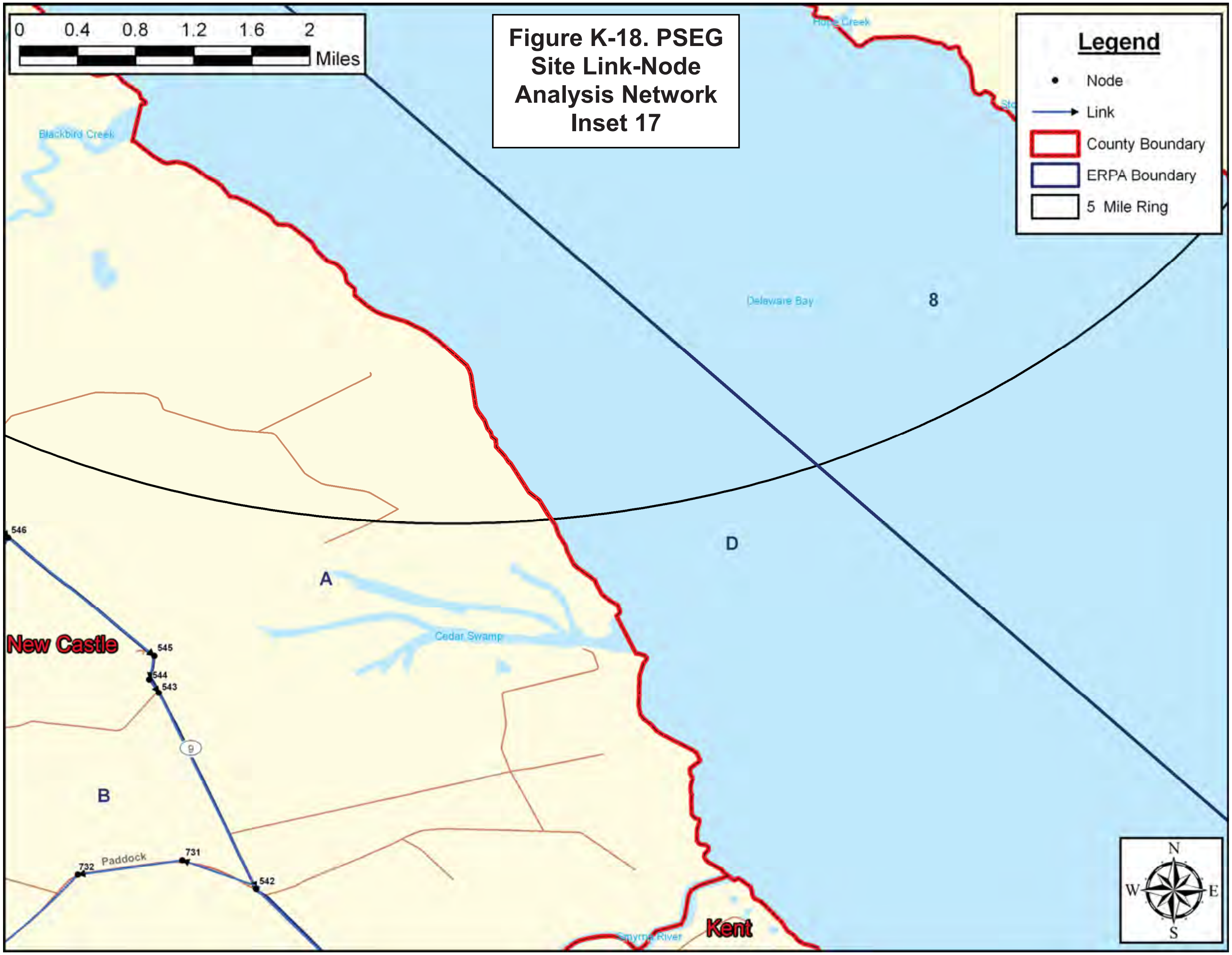
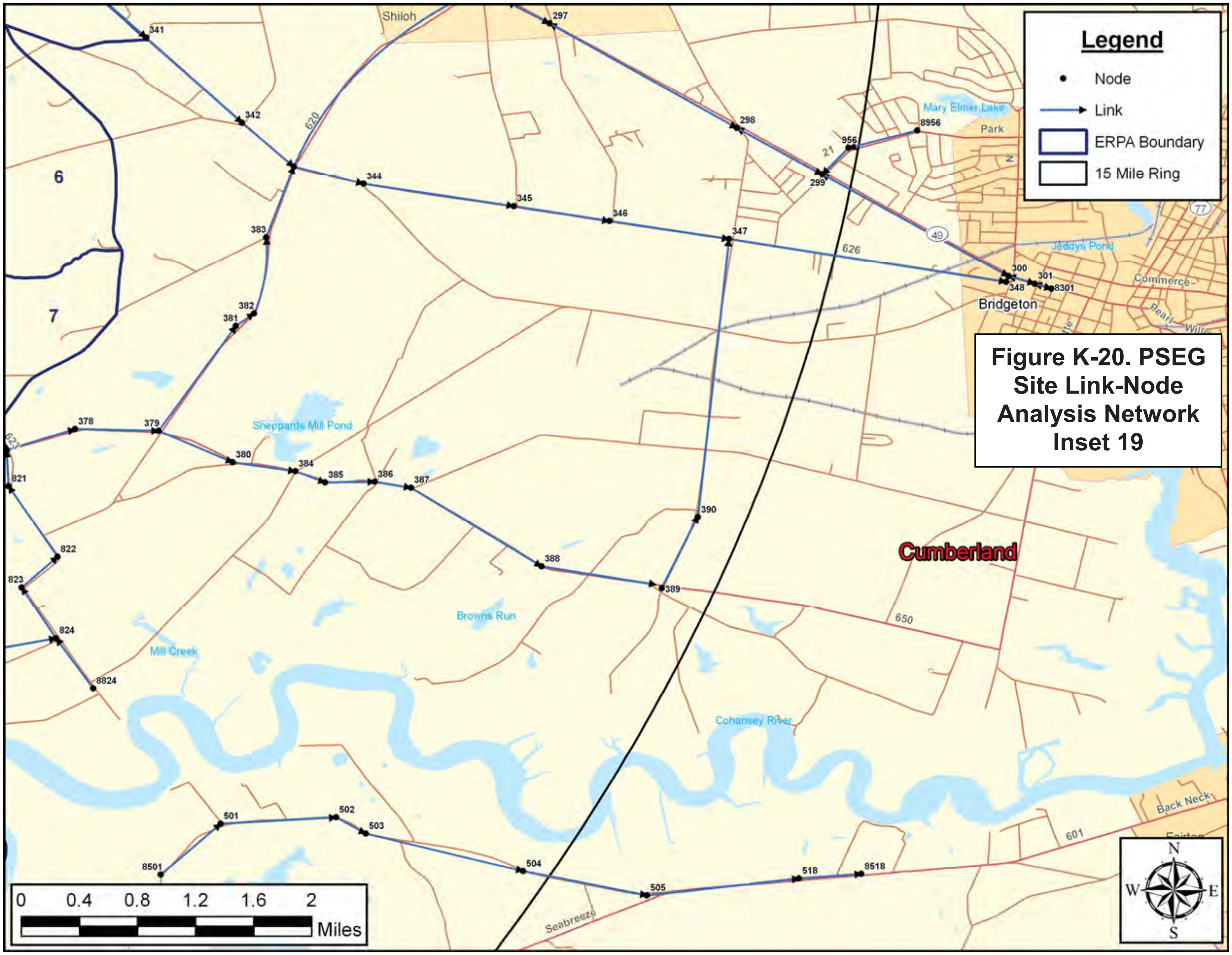

0 0.4 0.8 1.2 1.6 2
Miles
Figure K-18. PSEG Site Link-Node Analysis Network Inset 17
Legend
Node
Link
County Boundary
ERPA Boundary
5 Mile Ring
Blackbird Creek
Delaware Bay
8
D
A
Cedar Swamp
New Castle
B
Paddock
Kent
546
545
544
543
731
732
542
9
N
S
E
W

Figure K-19. PSEG Site Link-Node Analysis Network Inset 18


Legend
Node
Link
ERPA Boundary
15 Mile Ring
Figure K-20. PSEG Site Link-Node Analysis Network Inset 19
Shiloh
Mary Elmer Lake
Park
Jeddys Pond
Bridgeton
Commerce
Sheppards Mill Pond
Browns Run
Mill Creek
Cohansey River
Cumberland
Back Neck
Seabreeze
6
7
341
342
344
345
346
347
297
298
299
956
8956
300
301
348
8301
383
382
381
378
379
380
384
385
386
387
388
389
390
821
822
823
824
8824
501
502
503
504
505
518
8518
8501
620
626
650
601
21
49
77
0 0.4 0.8 1.2 1.6 2
Miles
N
W
E
S

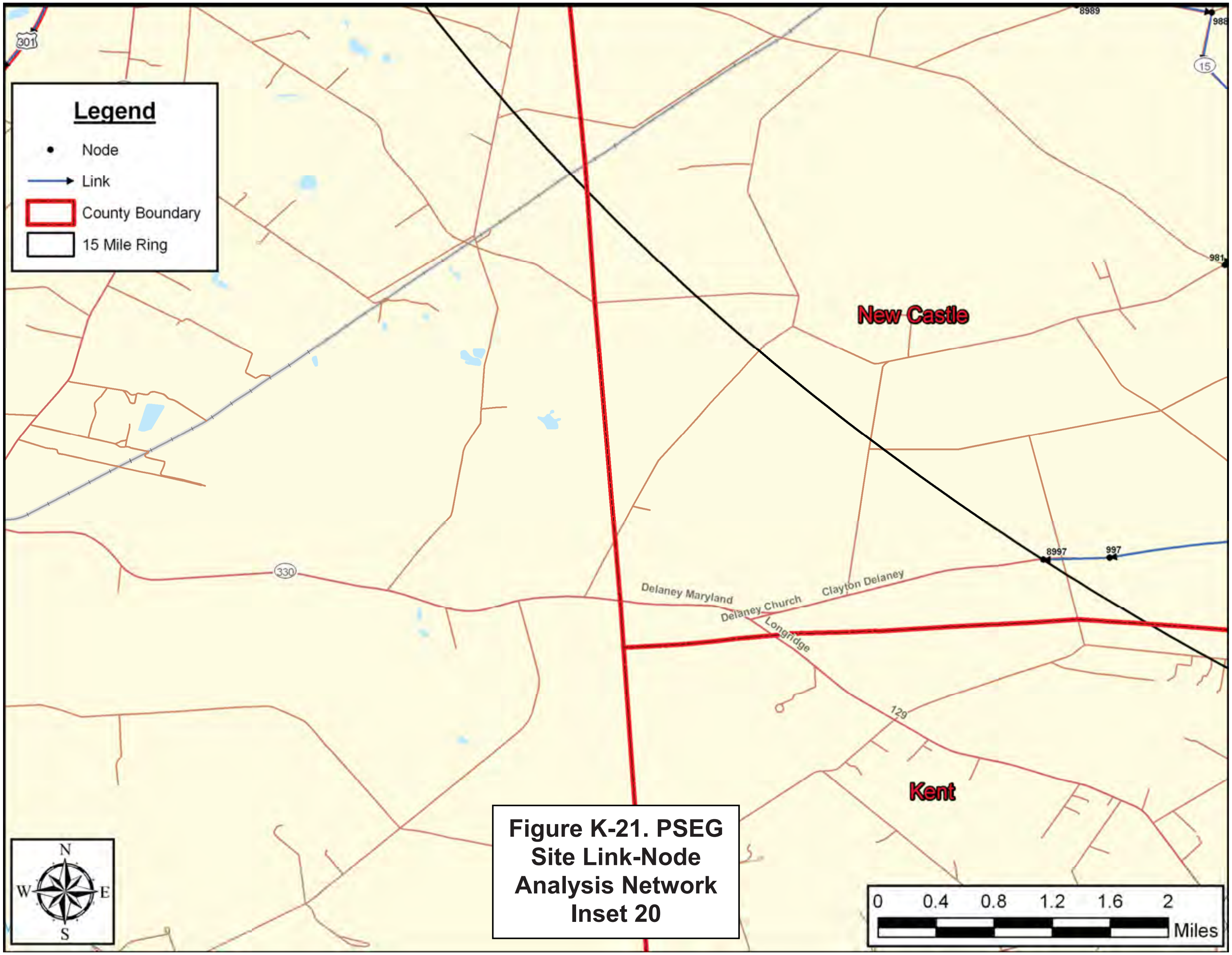
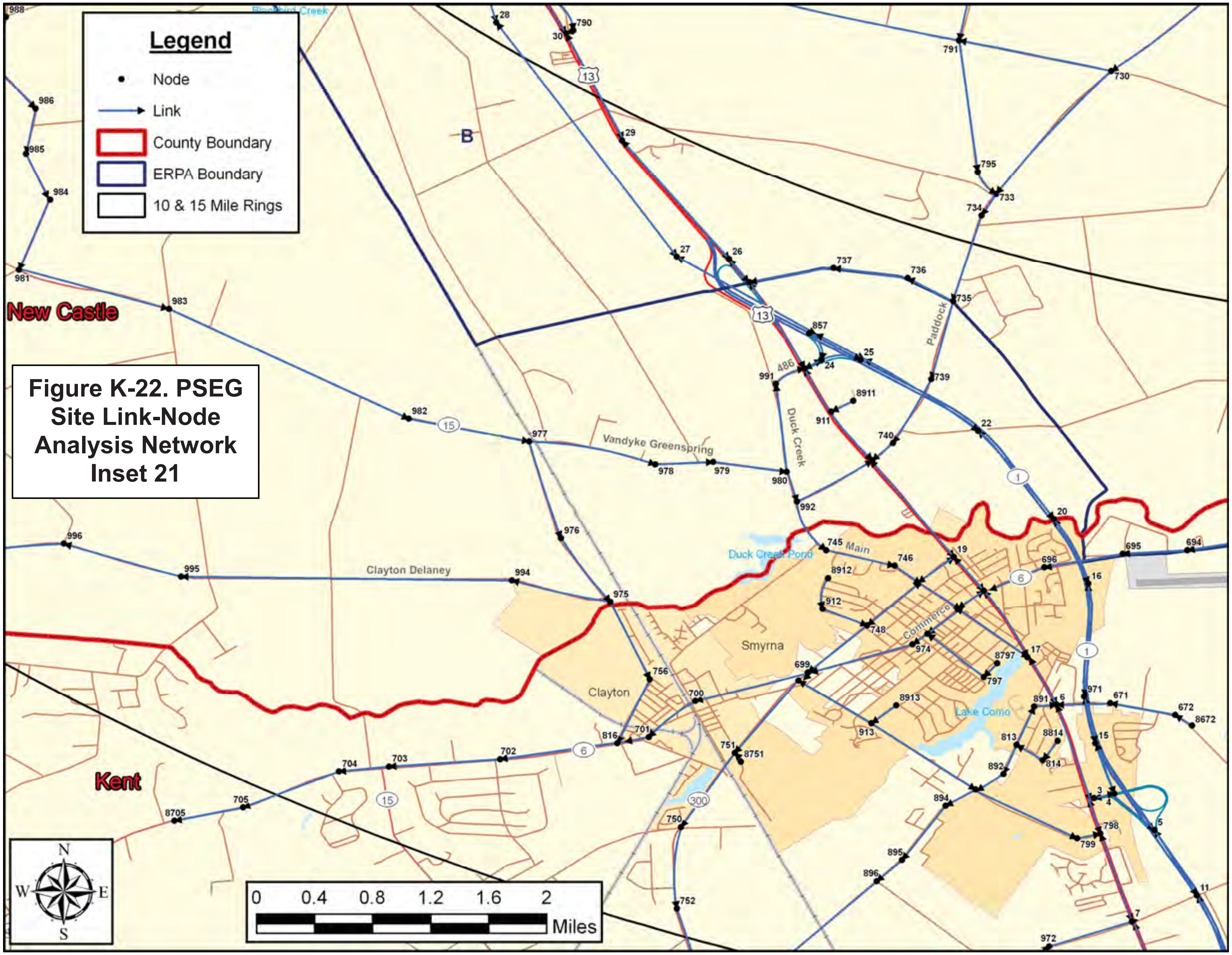


Figure K-21. PSEG Site Link-Node Analysis Network Inset 20


Legend
Node
Link
County Boundary
ERPA Boundary
10 & 15 Mile Rings
Figure K-22. PSEG Site Link-Node Analysis Network Inset 21
New Castle
Kent
Smyrna
Clayton
Duck Creek Pond
Lake Como
Vandyke Greenspring
Clayton Delaney
Duck Creek
Paddock
Main
Commerce
B
0 0.4 0.8 1.2 1.6 2
Miles
N
S
E
W

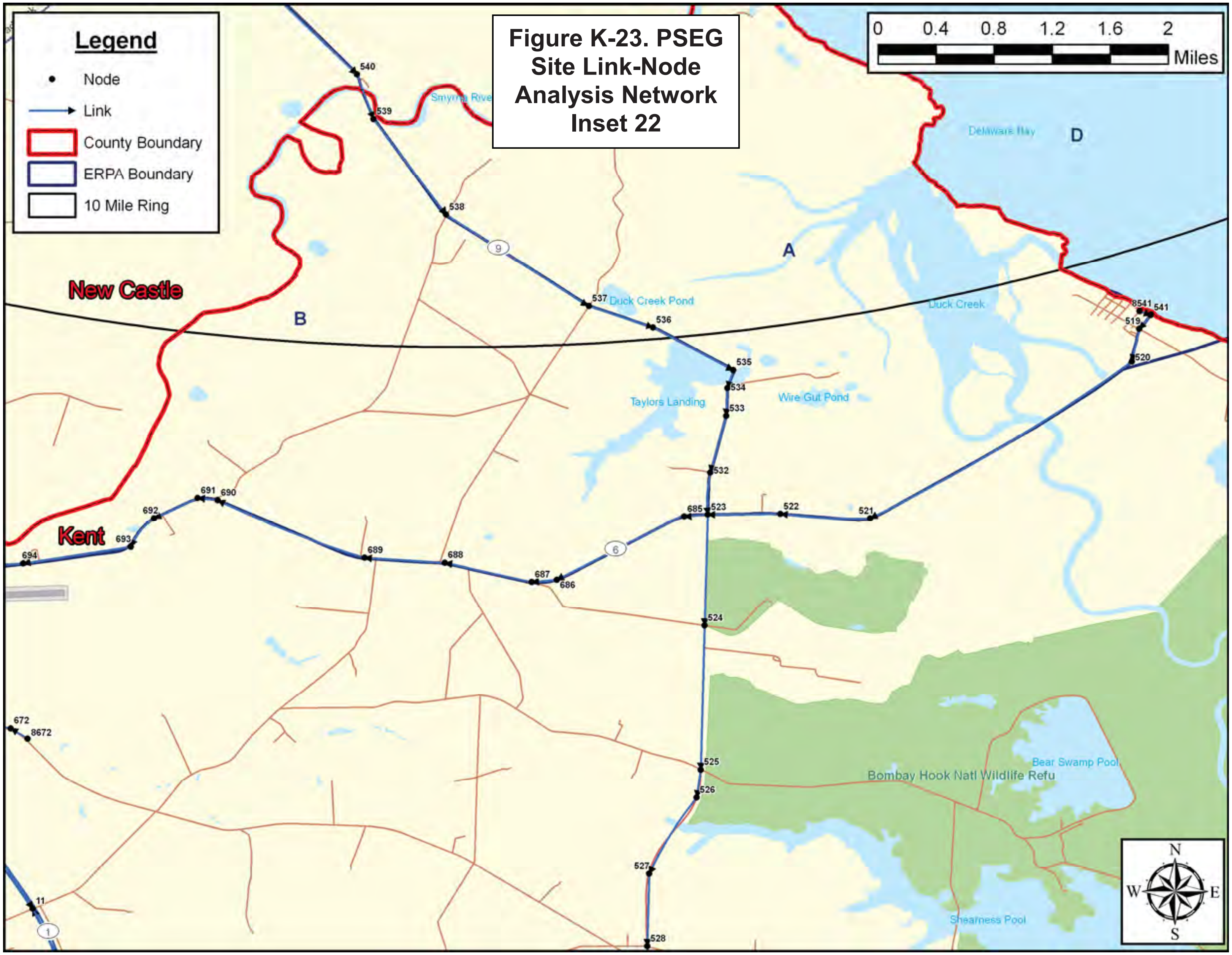


Figure K-23. PSEG Site Link-Node Analysis Network Inset 22

Figure K-24. PSEG Site Link-Node Analysis Network Inset 23

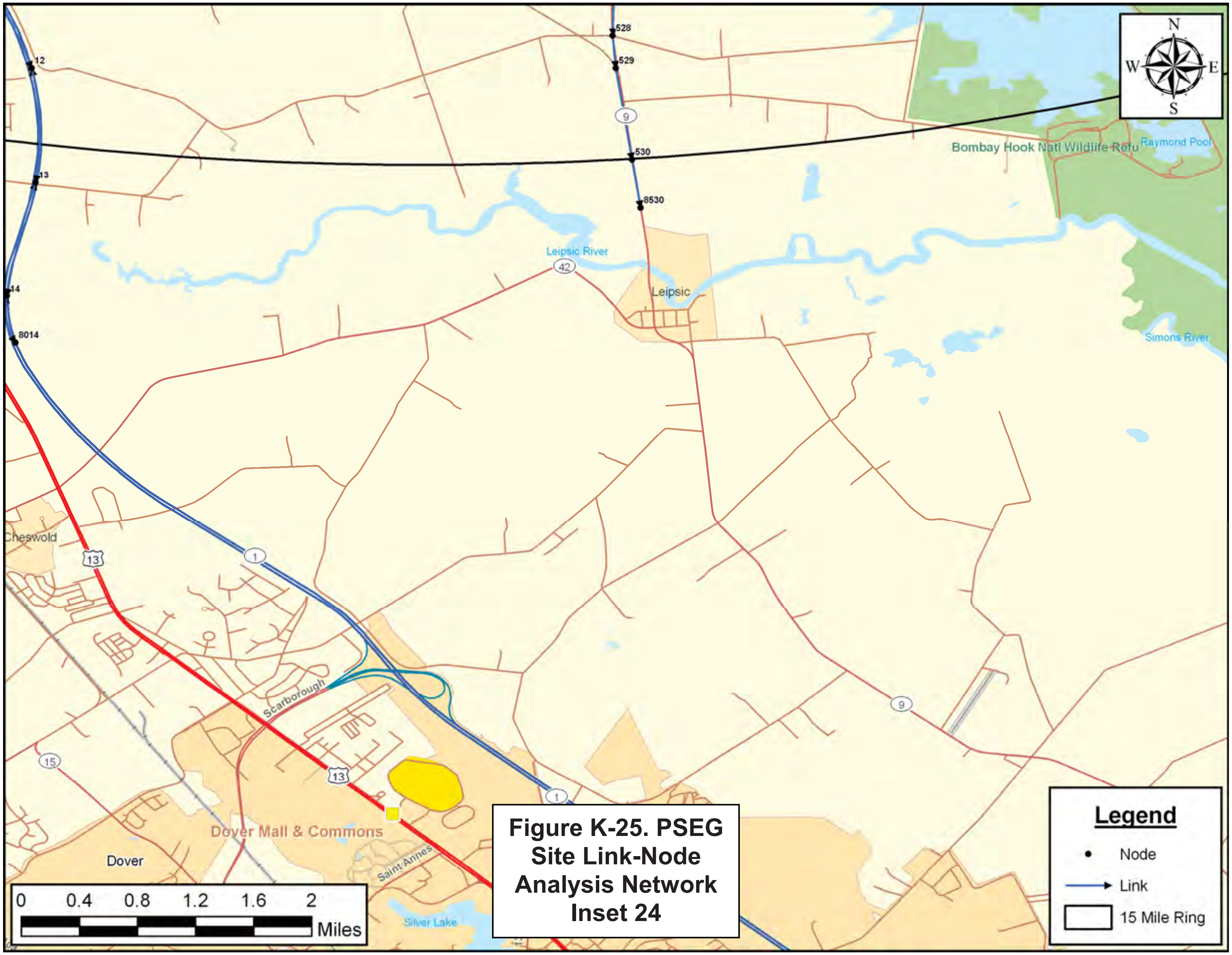


Figure K-25. PSEG Site Link-Node Analysis Network Inset 24

Table K-1. Evacuation Roadway Network Characteristics					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
1	489	7022.4	1	1700	55
2	332	844.8	1	1700	50
3	4	580.8	1	1700	40
3	6	3590.4	2	1900	50
3	798	1267.2	2	1900	50
4	3	580.8	2	1700	40
4	5	1795.2	1	1700	50
5	11	2692.8	2	2250	60
5	15	3537.6	2	2250	70
6	3	3590.4	2	1900	50
6	17	1900.8	2	1700	35
7	8	2112	2	1900	50
7	798	3273.6	2	1900	50
8	7	2112	2	1900	50
8	9	3484.8	2	1900	50
9	8	3484.8	2	1900	50
9	10	3590.4	2	1900	50
10	9	3590.4	2	1900	50
11	5	2692.8	2	2250	70
11	12	2904	2	2250	70
12	11	2904	2	2250	70
12	13	3960	2	2250	70
13	12	3960	2	2250	70
13	14	4171.2	2	2250	70
14	13	4171.2	2	2250	70
15	4	1900.8	1	1700	40
15	5	3537.6	2	2250	70
15	971	1848	2	2250	75
16	20	2904	2	2250	75
16	971	3960	2	2250	75
17	6	1900.8	2	1900	50
17	18	2692.8	2	1700	35
18	17	2692.8	2	1700	35
18	19	1478.4	2	1700	35
18	973	950.4	1	1500	35
19	18	1478.4	2	1700	35
19	21	4224	2	1900	40
19	747	1372.8	1	1500	35
20	16	2904	2	2250	75

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
20	22	3590.4	2	2250	75
21	19	4224	2	1700	35
21	911	2112	2	1900	50
22	20	3590.4	2	2250	75
22	25	4171.2	2	2250	70
23	24	686.4	1	1700	40
23	738	3537.6	2	1900	60
23	911	1742.4	2	1900	50
24	23	686.4	1	1700	40
24	25	1003.2	1	1700	40
25	22	4171.2	2	2250	75
25	857	1636.8	2	2250	75
26	29	5227.2	2	1900	50
26	738	1056	2	1900	60
27	28	9926.4	2	2250	75
27	857	4804.8	2	2250	75
28	27	9926.4	2	2250	75
28	35	5016	2	2250	75
29	26	5227.2	2	1900	60
29	30	4171.2	2	1900	60
30	29	4171.2	2	1900	50
30	32	1742.4	2	1900	60
31	790	1267.2	1	1500	30
32	30	1742.4	2	1900	60
32	728	2217.6	2	1900	60
33	728	2323.2	2	1900	60
33	861	4065.6	2	1900	60
34	871	1267.2	4	2250	70
34	872	1108.8	4	2250	70
35	28	5016	2	2250	75
35	36	7920	2	2250	75
36	35	7920	2	2250	75
36	38	9556.8	2	2250	75
37	39	4065.6	2	1900	65
37	861	9345.6	2	1900	60
38	36	9556.8	2	2250	75
38	786	4171.2	2	2250	75
39	37	4065.6	2	1900	60
39	787	3854.4	2	1900	65
40	785	2006.4	2	2250	75

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
40	786	3115.2	2	2250	75
41	787	3960	2	1900	65
41	803	3590.4	2	1900	50
42	43	422.4	2	1700	35
42	803	3432	2	1700	35
42	804	739.2	1	1500	30
43	42	422.4	2	1700	35
43	49	1636.8	2	1700	35
44	45	1267.2	2	1700	50
44	47	792	1	1700	50
44	855	422.4	2	1700	50
45	44	1267.2	2	1700	50
45	46	1478.4	1	1700	50
45	856	580.8	2	1700	50
46	44	1689.6	1	1500	30
46	47	2428.8	2	2250	75
46	785	3854.4	2	2250	75
47	46	2428.8	2	2250	75
47	784	897.6	1	1500	30
47	801	5808	2	2250	75
48	55	5649.6	2	2250	75
48	801	1900.8	2	2250	60
49	42	1584	2	1700	35
49	50	1900.8	2	1900	65
50	49	1900.8	2	1900	65
50	883	1848	2	1900	65
50	886	369.6	1	1500	30
51	52	1848	3	1900	65
51	883	9187.2	2	1900	65
52	51	1848	2	1900	65
52	53	528	2	1700	40
52	646	792	2	1700	40
52	873	9187.2	2	1900	65
53	52	528	2	1700	40
53	54	897.6	2	1700	40
54	53	897.6	2	1700	40
54	57	1372.8	1	1700	50
55	48	5649.6	2	2250	75
55	56	5280	2	2250	75
56	54	1320	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
56	55	5280	2	2250	75
56	57	2534.4	2	2250	75
57	53	1478.4	1	1700	40
57	56	2534.4	2	2250	75
57	512	3326.4	2	2250	75
58	59	7339.2	3	2250	75
58	512	1953.6	3	2250	75
59	58	7339.2	3	2250	65
59	62	1953.6	3	2250	75
60	255	369.6	2	2250	60
60	256	475.2	3	2250	60
61	192	1267.2	1	1700	50
62	59	1953.6	3	2250	75
62	800	5808	3	2250	70
63	240	1003.2	2	1700	45
64	65	739.2	2	1900	50
64	862	2904	2	1900	50
65	64	739.2	2	1900	50
65	66	475.2	2	1900	50
66	65	475.2	2	1900	65
66	67	2481.6	1	1700	50
67	66	2481.6	1	1700	50
67	69	1161.6	1	1700	50
68	73	6336	3	2250	70
68	800	1531.2	3	2250	70
69	67	1161.6	1	1700	50
69	771	2112	2	1900	65
70	72	844.8	2	1700	40
70	75	3168	2	1700	60
70	771	5596.8	2	1900	65
71	72	844.8	2	1700	40
71	806	528	2	1700	40
72	70	844.8	2	1700	40
72	71	844.8	2	1700	40
72	74	1214.4	1	1700	50
73	68	6336	3	2250	70
73	72	844.8	1	1700	40
73	74	1900.8	3	2250	70
74	71	1003.2	1	1700	40
74	73	1900.8	3	2250	70

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
74	807	2217.6	3	2250	70
75	70	3168	2	1900	65
75	940	6864	1	1700	50
76	78	2904	2	1700	40
76	808	2534.4	3	2250	70
76	952	1795.2	2	1900	50
77	81	1214.4	2	1900	55
77	82	1108.8	2	1700	40
77	156	4857.6	2	1900	55
78	79	2904	2	1900	50
78	80	1161.6	1	1200	25
79	78	2904	1	1700	40
79	83	4435.2	2	2250	60
79	1025	2640	2	1700	50
80	952	739.2	1	1200	30
81	77	1214.4	2	1900	50
81	865	369.6	1	1500	30
81	952	792	2	1900	50
82	77	1108.8	2	1700	40
82	79	844.8	1	1500	50
83	79	4435.2	2	2250	60
83	85	1848	1	1700	40
83	86	1953.6	2	2250	60
84	85	1267.2	3	1900	50
84	628	1267.2	3	1900	50
85	83	1900.8	1	1200	50
85	84	1267.2	2	1900	50
85	629	1425.6	2	1900	50
86	83	1953.6	2	2250	60
86	84	1372.8	1	1700	40
86	87	3432	2	2250	60
87	86	3432	2	2250	60
87	88	4171.2	2	2250	60
88	87	4171.2	2	2250	60
88	89	1214.4	2	2250	60
88	91	844.8	1	1700	40
89	88	1214.4	2	2250	60
89	92	2956.8	3	2250	60
89	1044	686.4	1	1700	40
90	957	1953.6	2	1900	50

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
90	1040	1214.4	1	1700	40
90	1044	475.2	2	1900	50
91	89	686.4	1	1700	50
91	964	686.4	2	1900	50
91	1044	686.4	2	1900	50
92	89	2956.8	3	2250	60
92	93	1320	1	1700	40
92	97	1003.2	2	2250	60
93	94	1372.8	1	1700	40
93	96	686.4	1	1200	25
94	93	1372.8	1	1700	40
94	1043	528	1	1700	40
95	94	792	1	1700	40
96	97	633.6	1	1200	50
97	92	1003.2	2	2250	60
97	95	475.2	1	1200	20
97	1074	2112	2	2250	60
98	103	1742.4	2	2250	60
98	106	1056	1	1700	40
98	1074	686.4	3	2250	60
99	103	1214.4	2	2250	60
99	111	792	2	1500	50
100	105	528	4	2250	70
100	110	2640	4	2250	70
101	105	1584	4	2250	70
101	112	2692.8	4	2250	70
103	98	1742.4	2	2250	60
103	99	1214.4	2	2250	60
103	109	739.2	1	1200	20
105	100	528	4	2250	70
105	101	1584	4	2250	70
106	100	897.6	1	1700	50
109	105	844.8	1	1700	50
110	100	2640	4	2250	70
110	200	8659.2	4	2250	60
111	99	792	2	2250	60
112	101	2692.8	4	2250	70
112	872	1372.8	4	2250	70
113	114	316.8	1	1700	40
113	117	2059.2	2	1900	50

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
113	119	1003.2	2	1500	50
114	115	633.6	1	1700	50
115	116	1795.2	4	2250	70
115	224	2270.4	4	2250	70
116	115	1795.2	4	2250	70
116	223	1161.6	4	2250	70
117	113	2112	2	1900	50
117	116	1320	1	1700	50
117	120	2745.6	2	1900	50
119	113	1003.2	2	1500	50
120	117	2745.6	2	1900	50
120	121	1795.2	2	1900	50
120	921	1267.2	1	1700	40
120	922	2376	1	1700	40
121	120	1795.2	2	1900	50
121	122	2112	2	1900	60
122	121	2112	2	1900	50
122	123	3484.8	2	1900	60
123	122	3484.8	2	1900	60
123	124	1900.8	2	1900	60
124	123	1900.8	2	1900	60
124	1032	950.4	2	1900	60
125	126	1848	3	1900	60
125	618	3220.8	2	1900	50
125	632	1056	2	1500	50
125	1032	1108.8	3	1900	60
126	125	1848	3	1900	50
126	1029	1320	2	1900	60
127	128	2481.6	2	1900	55
127	1029	1584	2	1900	60
128	127	2481.6	2	1900	60
128	129	5755.2	2	1900	55
129	128	5755.2	2	1900	55
129	130	580.8	2	1900	55
130	129	580.8	2	1900	55
130	131	4382.4	2	1900	55
131	130	4382.4	2	1900	55
131	132	2376	2	1900	55
132	131	2376	2	1900	55
132	133	7075.2	2	1900	55

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
133	132	7075.2	2	1900	55
133	134	950.4	2	1900	50
134	133	950.4	2	1900	50
134	135	1161.6	2	1900	50
135	134	1161.6	2	1900	50
135	136	1689.6	2	1900	50
136	135	1689.6	2	1900	50
136	137	950.4	2	1900	50
137	136	950.4	2	1900	50
137	138	1320	2	1900	50
138	137	1320	2	1900	50
138	139	2798.4	2	1900	60
139	138	2798.4	2	1900	60
139	140	1953.6	2	1900	60
140	139	1953.6	2	1900	60
140	141	1425.6	2	1900	60
141	140	1425.6	2	1900	60
141	654	2904	1	1700	45
141	866	4963.2	1	1700	60
142	241	4329.6	1	1700	40
143	144	792	1	1700	40
143	866	5755.2	1	1700	60
144	143	792	1	1700	40
144	145	4012.8	1	1700	40
144	638	1900.8	1	1700	40
145	144	4012.8	1	1700	40
145	146	2428.8	1	1700	35
146	145	2428.8	1	1700	40
146	147	3062.4	2	1700	40
146	867	475.2	1	1700	30
147	146	3062.4	2	1700	35
147	148	2270.4	2	1700	40
148	147	2270.4	2	1700	40
148	149	2270.4	2	1700	40
149	148	2270.4	2	1700	40
149	150	3273.6	2	1700	40
150	149	3273.6	2	1700	40
150	151	4435.2	1	1700	50
151	150	4435.2	1	1700	50
151	152	3326.4	1	1700	50

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
152	151	3326.4	1	1700	50
152	153	4329.6	1	1700	60
153	152	4329.6	1	1700	60
153	154	2323.2	1	1700	60
154	153	2323.2	1	1700	60
154	805	12144	2	1900	65
155	805	5280	2	1900	65
155	1003	2323.2	2	1900	65
156	77	4857.6	2	1900	50
156	157	2059.2	2	1900	55
157	156	2059.2	2	1900	55
157	158	1636.8	2	1900	55
158	157	1636.8	2	1900	55
158	159	3168	2	1900	55
159	158	3168	2	1900	55
159	160	1372.8	2	1900	50
160	159	1372.8	2	1900	55
160	161	1108.8	4	1500	50
160	631	1108.8	2	1900	50
161	160	1108.8	4	1900	50
161	162	1531.2	4	1500	50
162	161	1531.2	4	1500	50
162	163	1478.4	4	1500	50
163	162	1478.4	4	1500	50
163	164	2376	4	1900	50
164	163	2376	4	1900	50
164	165	3432	4	1900	50
164	944	1900.8	2	1900	50
164	945	1742.4	2	1700	40
165	164	3432	4	1900	50
165	168	1636.8	4	1900	50
166	167	1161.6	3	1900	50
166	168	1108.8	3	1900	50
167	166	1161.6	3	1900	50
167	185	528	3	1900	50
168	165	1636.8	4	1900	50
168	166	1108.8	3	1900	50
169	167	1003.2	1	1700	40
169	220	2270.4	2	1200	40
170	169	6177.6	2	1200	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
170	171	2376	1	1700	30
170	172	2112	1	1500	35
170	187	2428.8	1	1700	40
171	170	2376	1	1500	35
171	969	1372.8	1	1500	30
172	173	792	1	1200	30
173	611	1425.6	1	1700	40
174	175	1003.2	3	1900	50
174	177	1531.2	4	1900	50
175	174	1003.2	3	1900	50
175	176	580.8	3	1900	50
176	175	580.8	3	1900	50
176	185	1584	4	1900	50
177	174	1531.2	3	1900	50
177	178	844.8	2	1700	40
177	186	2164.8	2	1900	50
178	180	1636.8	1	1700	50
178	181	1320	1	1200	25
179	180	2217.6	4	2250	60
179	225	1689.6	4	2250	60
180	179	2217.6	4	2250	60
180	182	1056	2	2250	60
181	182	897.6	1	1500	50
182	180	1056	2	2250	60
182	184	1742.4	4	2250	60
183	184	1372.8	3	2250	60
183	190	1056	4	2250	60
184	182	1742.4	2	2250	60
184	183	1372.8	4	2250	60
185	167	528	3	1900	50
185	176	1584	3	1900	50
186	177	2164.8	3	1900	50
186	818	2851.2	3	1200	50
187	170	2428.8	1	1500	35
187	945	2956.8	1	1700	40
188	944	792	2	1700	40
189	185	633.6	1	1700	30
190	1075	897.6	2	1900	50
190	1076	1584	3	2250	60
191	183	1056	4	2250	60

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
192	230	1003.2	3	2250	60
192	237	369.6	4	2250	60
193	199	475.2	3	2250	60
193	1077	1161.6	2	1900	50
194	216	2006.4	3	2250	60
194	218	1267.2	2	1900	50
195	222	2217.6	3	2250	65
195	1078	1478.4	3	2250	60
195	1081	1795.2	1	1700	40
196	221	844.8	3	2250	60
196	1079	422.4	1	1700	50
196	1080	1900.8	2	2250	60
197	205	2481.6	2	2250	60
198	191	2587.2	2	2250	60
199	195	3484.8	3	2250	60
200	110	8659.2	4	2250	70
200	202	1742.4	4	2250	60
201	203	950.4	2	1900	50
202	210	2428.8	3	2250	70
202	211	1425.6	2	2250	60
203	204	2164.8	2	1900	50
204	207	1425.6	2	1900	50
204	213	528	1	1200	20
205	191	844.8	1	1700	60
206	216	1900.8	2	1900	50
207	215	1003.2	1	1200	20
207	217	422.4	2	1900	50
209	193	2481.6	4	2250	60
210	209	1953.6	4	2250	60
211	212	1848	2	2250	60
212	198	897.6	2	2250	60
213	210	686.4	1	1200	50
214	219	1372.8	1	1700	50
215	214	1848	2	1900	50
216	219	2904	5	2250	60
217	208	1161.6	2	2250	60
218	215	422.4	1	1700	50
218	217	1214.4	1	1700	50
219	200	1795.2	5	2250	60
220	201	3801.6	2	1200	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
221	196	844.8	3	2250	60
222	195	2217.6	3	2250	60
223	116	1161.6	4	2250	70
223	868	9979.2	4	2250	70
224	115	2270.4	4	2250	70
225	179	1689.6	4	2250	60
225	226	2323.2	4	2250	60
226	225	2323.2	4	2250	60
226	231	2851.2	4	2250	70
227	247	897.6	1	1700	50
228	236	422.4	1	1500	40
229	230	422.4	1	1500	40
230	192	1003.2	3	2250	60
230	247	1214.4	3	2250	60
231	226	2851.2	4	2250	60
231	802	5808	4	2250	70
232	233	2376	4	2250	70
232	802	4752	4	2250	70
233	232	2376	4	2250	70
233	236	1161.6	4	2250	60
234	63	950.4	1	1700	40
234	235	1214.4	1	1700	35
234	238	475.2	1	1700	35
235	228	422.4	1	1200	25
235	233	1108.8	1	1700	50
235	234	1214.4	1	1700	35
235	258	2481.6	1	1700	40
236	63	633.6	2	1700	40
236	233	1161.6	4	2250	60
236	237	1108.8	3	2250	60
237	192	369.6	2	2250	60
237	236	1108.8	4	2250	60
238	61	1161.6	1	1700	40
238	234	475.2	1	1700	35
238	259	3379.2	1	1700	35
239	242	844.8	1	1700	40
240	242	792	2	1700	45
241	244	5121.6	1	1700	40
242	243	1056	3	2250	60
243	229	528	1	1200	20

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
243	256	1056	3	2250	60
244	267	475.2	1	1500	30
245	246	1214.4	2	2250	60
245	255	792	2	2250	60
246	245	1214.4	2	2250	60
247	230	1214.4	2	2250	60
247	248	2059.2	2	2250	60
247	287	897.6	1	1700	40
248	247	2059.2	2	2250	60
248	249	1900.8	2	2250	65
249	248	1900.8	2	2250	60
250	251	739.2	1	1700	40
250	287	316.8	1	1700	40
251	227	369.6	1	1200	25
251	250	739.2	1	1700	40
251	257	844.8	1	1700	30
252	256	422.4	1	1500	40
253	254	422.4	1	1200	25
253	257	633.6	1	1700	30
253	258	2217.6	1	1700	40
254	60	528	1	1500	40
255	60	369.6	2	2250	60
255	245	792	2	2250	60
256	60	475.2	3	2250	60
256	192	2112	2	1700	50
257	251	844.8	1	1700	40
257	252	475.2	1	1200	25
257	253	633.6	1	1700	40
257	255	633.6	1	1700	40
258	235	2481.6	1	1700	35
258	253	2217.6	1	1700	40
258	835	1478.4	1	1700	45
259	238	3379.2	1	1700	35
259	260	1372.8	1	1700	35
260	259	1372.8	1	1700	35
260	261	1953.6	1	1700	35
261	260	1953.6	1	1700	35
261	262	4488	1	1700	40
262	261	4488	1	1700	35
262	263	2481.6	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
263	262	2481.6	1	1700	40
263	264	3432	1	1700	40
264	263	3432	1	1700	40
264	265	10032	1	1700	45
265	264	10032	1	1700	40
265	266	4276.8	1	1700	45
265	463	3220.8	1	1700	55
266	265	4276.8	1	1700	45
266	268	3907.2	1	1700	55
267	302	792	1	1200	20
268	266	3907.2	1	1700	55
268	269	2323.2	1	1700	55
269	268	2323.2	1	1700	55
269	270	2006.4	1	1700	55
270	269	2006.4	1	1700	55
270	271	3062.4	1	1700	40
271	270	3062.4	1	1700	55
271	272	1056	1	1500	35
271	274	3009.6	1	1700	30
272	271	1056	1	1700	35
272	446	1372.8	1	1700	35
272	833	1848	1	1500	25
273	274	897.6	1	1500	30
273	275	528	1	1500	30
273	445	528	1	1500	25
274	271	3009.6	1	1700	30
274	273	897.6	1	1500	25
274	304	2376	1	1700	40
275	273	528	1	1500	25
275	276	3062.4	1	1500	25
276	275	3062.4	1	1500	30
276	820	5596.8	1	1700	45
277	809	2376	1	1700	40
278	279	1372.8	1	1700	40
278	820	6652.8	1	1700	55
279	278	1372.8	1	1700	55
279	280	633.6	1	1700	35
279	458	9451.2	1	1700	50
280	279	633.6	1	1700	40
280	408	686.4	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
280	844	950.4	1	1700	35
281	282	1742.4	1	1700	55
281	844	686.4	1	1700	35
282	281	1742.4	1	1700	35
282	283	8976	1	1700	55
283	282	8976	1	1700	55
283	284	4171.2	1	1700	55
284	283	4171.2	1	1700	55
284	285	1848	1	1700	55
285	284	1848	1	1700	55
285	286	5227.2	1	1700	55
286	285	5227.2	1	1700	55
286	288	4857.6	1	1700	55
286	399	6230.4	1	1700	50
287	250	316.8	1	1700	40
287	845	422.4	2	1700	40
288	286	4857.6	1	1700	55
288	289	2323.2	1	1700	55
289	288	2323.2	1	1700	55
289	290	2006.4	1	1700	55
290	289	2006.4	1	1700	55
290	291	2534.4	1	1700	55
291	290	2534.4	1	1700	55
291	292	5808	1	1700	55
292	291	5808	1	1700	55
292	293	1689.6	1	1700	55
293	292	1689.6	1	1700	55
293	295	1848	1	1700	45
294	295	2692.8	1	1700	40
294	296	897.6	1	1700	40
295	293	1848	1	1700	40
295	294	2692.8	1	1700	35
296	294	897.6	1	1700	35
296	297	1425.6	1	1700	40
297	296	1425.6	1	1700	40
297	298	6494.4	1	1700	55
298	297	6494.4	1	1700	40
298	299	2904	1	1700	45
299	298	2904	1	1700	55
299	300	6441.6	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
300	299	6441.6	1	1700	45
300	301	792	2	1500	30
301	300	792	2	1500	30
302	303	264	1	1200	20
303	309	739.2	1	1200	20
304	274	2376	1	1700	30
304	819	6441.6	1	1700	50
305	307	686.4	1	1700	40
305	819	950.4	2	1700	50
306	324	8025.6	1	1700	55
307	305	686.4	1	1700	50
307	308	369.6	2	1700	40
307	310	9662.4	1	1700	50
308	306	369.6	2	1700	40
308	314	5544	1	1700	50
309	64	264	1	1200	20
310	307	9662.4	1	1700	40
310	311	1161.6	1	1700	50
311	310	1161.6	1	1700	50
311	312	13147.2	1	1700	50
312	311	13147.2	1	1700	50
312	313	11088	1	1700	40
313	312	11088	1	1700	50
313	319	8448	1	1700	40
313	321	3484.8	1	1700	30
314	315	3115.2	1	1700	50
315	316	12777.6	1	1700	50
316	317	4910.4	1	1700	50
317	318	3432	1	1700	50
318	319	2112	1	1700	40
319	313	8448	1	1700	40
319	320	2428.8	1	1700	40
319	850	1531.2	1	1700	40
321	313	3484.8	1	1700	40
321	322	2534.4	1	1700	35
322	321	2534.4	1	1700	30
322	436	2692.8	1	1700	40
323	846	950.4	2	1900	60
323	847	2481.6	2	1900	60
324	325	1478.4	1	1700	55

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
325	853	5808	1	1700	55
326	329	4276.8	1	1700	40
326	852	792	1	1700	55
327	328	2112	1	1700	50
328	287	3643.2	1	1700	50
329	330	7920	1	1700	55
330	331	4488	1	1700	55
331	358	3537.6	1	1700	55
331	849	5174.4	1	1700	55
331	850	9556.8	1	1700	55
332	282	6230.4	1	1700	50
333	334	3537.6	1	1700	55
334	2	1531.2	1	1700	55
335	333	686.4	1	1700	55
335	336	3537.6	1	1700	40
335	395	1478.4	1	1700	50
336	337	8078.4	1	1700	55
337	338	3748.8	1	1700	55
338	339	2587.2	1	1700	55
339	340	2217.6	1	1700	55
340	341	5702.4	1	1700	60
341	342	4118.4	1	1700	60
342	343	2164.8	1	1700	50
343	294	8553.6	1	1700	35
343	344	2059.2	1	1700	50
344	345	4329.6	1	1700	50
345	346	2745.6	1	1700	50
346	347	3432	1	1700	50
347	348	7972.8	1	1700	40
348	300	211.2	1	1700	40
349	597	3062.4	1	1500	25
350	276	1372.8	1	1700	35
350	831	2481.6	1	1700	35
351	350	897.6	1	1700	35
352	351	792	1	1700	40
353	507	4118.4	1	1700	40
354	376	2112	1	1700	40
355	353	4171.2	1	1500	30
356	352	2059.2	1	1700	40
357	278	8395.2	1	1700	45

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
359	360	3432	1	1700	40
359	838	2640	1	1500	35
360	359	3432	1	1700	40
360	361	4540.8	1	1700	50
360	391	1425.6	1	1700	50
361	362	3696	1	1700	50
362	363	4118.4	1	1700	40
363	364	1848	1	1700	45
364	366	2692.8	1	1700	50
365	604	3748.8	1	1700	50
366	367	2587.2	1	1700	50
367	368	4804.8	1	1700	55
368	369	3168	1	1700	50
369	370	2851.2	1	1700	50
370	371	2323.2	1	1700	50
371	372	2587.2	1	1700	40
372	373	1108.8	1	1700	35
373	374	1108.8	1	1500	35
374	375	1636.8	1	1700	50
375	377	3115.2	1	1700	40
376	355	1795.2	1	1700	40
377	378	2059.2	1	1700	45
378	379	2376	1	1700	45
379	380	2428.8	1	1700	40
379	381	4382.4	1	1700	50
380	384	1848	1	1700	40
381	382	686.4	1	1700	50
382	383	2798.4	1	1700	50
383	343	2692.8	1	1700	50
384	385	950.4	1	1700	40
385	386	1425.6	1	1700	40
386	387	1056	1	1700	40
387	388	4646.4	1	1700	40
388	389	3273.6	1	1700	40
389	390	2745.6	1	1700	40
390	347	10032	1	1700	50
391	392	5702.4	1	1700	50
392	393	1267.2	1	1700	50
393	394	1267.2	1	1700	50
394	335	5068.8	1	1700	50

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
395	396	2376	1	1700	50
396	397	2745.6	1	1700	50
397	398	2587.2	1	1700	50
398	286	1848	1	1700	40
399	400	3009.6	1	1700	50
399	500	5068.8	1	1700	50
400	401	2534.4	1	1700	50
401	402	3432	1	1700	50
402	403	1478.4	1	1700	50
403	404	4065.6	1	1700	50
404	405	5966.4	1	1700	50
405	406	5755.2	1	1700	50
406	407	3115.2	1	1700	50
408	280	686.4	1	1700	40
408	409	739.2	1	1700	40
409	408	739.2	1	1700	40
409	410	9134.4	1	1700	55
410	409	9134.4	1	1700	55
410	411	3854.4	1	1700	35
411	410	3854.4	1	1700	40
411	412	1003.2	1	1700	35
412	411	1003.2	1	1700	35
412	413	2851.2	1	1700	40
412	496	2481.6	1	1700	40
413	414	1425.6	1	1700	40
413	425	3643.2	1	1700	40
414	415	1161.6	1	1700	40
414	422	9820.8	1	1700	40
415	416	2323.2	1	1700	40
416	417	1161.6	1	1700	55
417	418	2217.6	1	1700	55
418	419	844.8	1	1700	55
419	420	5913.6	1	1700	55
420	421	4012.8	1	1700	55
422	423	9345.6	1	1700	50
423	424	9820.8	1	1700	40
424	313	2428.8	1	1700	40
424	435	1161.6	1	1700	30
425	426	792	1	1700	40
426	427	2164.8	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
427	428	1320	1	1700	40
428	429	792	1	1700	40
429	430	3801.6	1	1700	40
430	431	2640	1	1700	50
431	432	1848	1	1700	50
432	433	3062.4	1	1700	50
433	434	2851.2	1	1700	50
435	321	2745.6	1	1700	30
436	322	2692.8	1	1700	40
436	577	1848	1	1700	50
437	439	2956.8	1	1700	50
438	437	2904	1	1700	40
439	440	1689.6	1	1700	35
440	441	3484.8	1	1700	35
441	442	844.8	1	1700	35
441	443	1108.8	1	1700	35
442	443	739.2	1	1700	35
442	446	1161.6	1	1700	35
442	832	1003.2	1	1500	25
443	442	739.2	1	1700	35
443	444	1214.4	1	1500	25
443	831	1214.4	1	1700	35
444	443	1214.4	1	1700	25
444	445	1056	1	1500	25
444	830	475.2	1	1500	25
444	832	475.2	1	1500	25
445	273	528	1	1500	25
445	833	528	1	1500	25
446	272	1372.8	1	1500	35
446	442	1161.6	1	1700	35
447	446	1478.4	1	1700	35
448	447	2164.8	1	1700	30
449	448	1478.4	1	1700	40
450	1	5702.4	1	1700	55
451	450	1531.2	1	1700	30
452	451	1478.4	1	1700	30
453	354	4488	1	1700	40
454	455	3220.8	1	1700	25
455	456	792	1	1700	25
456	457	2112	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
457	459	580.8	1	1700	40
458	491	8078.4	1	1700	50
459	460	1584	1	1700	40
460	461	3537.6	1	1700	55
461	462	2904	1	1700	35
462	264	2006.4	1	1700	35
463	464	1848	1	1700	55
464	465	1900.8	1	1700	55
465	466	950.4	1	1700	55
466	467	3432	1	1700	50
467	468	7392	1	1700	50
468	469	3432	1	1700	40
469	239	1003.2	1	1700	40
470	741	2006.4	1	1500	30
471	470	5227.2	1	1700	40
472	471	580.8	1	1700	40
473	831	2640	1	1700	35
474	139	792	1	1700	30
475	476	897.6	1	1700	50
476	478	1320	1	1700	55
477	565	792	1	1700	40
478	479	3643.2	1	1700	40
479	837	1372.8	1	1700	55
480	479	792	1	1700	55
481	480	3590.4	1	1700	55
482	481	1108.8	1	1700	55
483	482	686.4	1	1700	40
483	484	2059.2	1	1700	40
484	483	2059.2	1	1700	40
484	485	1531.2	1	1700	50
485	359	2640	1	1700	40
485	360	3696	1	1700	50
486	484	2587.2	1	1700	50
487	486	1320	2	1700	55
488	487	2164.8	1	1700	55
489	488	9345.6	1	1700	55
490	450	1848	1	1700	30
491	310	2692.8	1	1700	50
492	491	3960	1	1700	50
493	492	6336	1	1700	55

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
494	493	5755.2	1	1700	55
495	494	1214.4	1	1700	55
496	495	1161.6	1	1700	40
497	412	1478.4	1	1700	40
498	497	8976	1	1700	55
498	499	7656	1	1700	50
499	399	3115.2	1	1700	50
500	290	2217.6	1	1700	40
501	502	3273.6	1	1700	40
502	503	1003.2	1	1700	40
503	504	4699.2	1	1700	40
504	505	3590.4	1	1700	40
505	518	4329.6	1	1700	40
506	51	264	3	1700	40
507	506	1214.4	1	1700	40
508	507	6494.4	1	1700	40
509	508	2481.6	1	1700	40
510	509	2376	1	1700	40
511	863	1689.6	3	1900	50
511	873	2640	2	1900	65
512	57	3326.4	2	2250	75
512	58	1953.6	3	2250	65
513	657	633.6	1	1700	45
514	513	1900.8	1	1700	40
515	657	2112	1	1700	45
516	515	2798.4	1	1700	40
517	516	1372.8	1	1700	40
519	520	1214.4	1	1500	25
520	521	9345.6	1	1700	50
521	522	2323.2	1	1700	40
522	523	2270.4	1	1700	40
523	524	3960	1	1700	50
523	685	739.2	1	1700	55
524	525	5174.4	1	1700	50
525	526	1108.8	1	1700	50
526	527	3168	1	1700	50
527	528	2534.4	1	1700	50
528	529	1320	1	1700	50
529	530	3379.2	1	1700	50
531	148	475.2	3	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
532	523	1320	1	1700	40
533	532	2270.4	1	1700	45
534	533	1108.8	1	1700	45
535	534	633.6	1	1500	30
536	535	2798.4	1	1700	50
537	536	1953.6	1	1700	50
538	537	5174.4	1	1700	50
539	538	4012.8	1	1700	40
540	539	1689.6	1	1700	50
541	519	580.8	1	1500	25
542	540	4171.2	1	1700	50
542	731	2428.8	1	1700	40
543	542	7603.2	1	1700	50
544	543	528	1	1500	30
545	544	897.6	1	1500	30
546	545	5913.6	1	1700	50
546	794	1425.6	1	1700	40
547	546	2851.2	1	1700	50
548	547	1267.2	1	1700	40
549	548	1267.2	1	1700	40
550	549	844.8	1	1700	40
551	550	1372.8	1	1700	40
552	551	1478.4	1	1700	40
553	552	2164.8	1	1700	40
554	553	897.6	1	1500	30
555	554	1108.8	1	1500	30
556	555	1003.2	1	1700	45
556	722	6758.4	1	1700	45
557	556	3907.2	1	1700	45
558	557	2270.4	1	1700	45
559	558	1267.2	1	1700	45
560	559	1267.2	1	1700	40
561	560	897.6	1	1700	45
562	561	3854.4	1	1700	45
562	563	1003.2	1	1700	40
563	564	528	1	1700	40
564	566	2798.4	1	1700	40
565	365	2059.2	1	1700	40
566	567	897.6	1	1700	45
567	568	1214.4	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
568	43	2640	1	1700	35
569	562	2851.2	1	1700	45
570	569	1478.4	1	1700	45
571	570	1214.4	1	1700	40
572	571	6124.8	1	1700	40
573	572	1848	1	1700	40
574	573	2164.8	1	1700	40
575	574	528	1	1500	25
576	453	739.2	1	1700	40
576	575	1056	1	1700	45
577	436	1848	1	1700	50
578	579	1848	1	1700	40
579	510	1161.6	1	1700	40
579	580	1900.8	1	1700	40
580	581	1108.8	1	1700	40
581	582	1108.8	1	1700	40
582	583	1108.8	1	1700	40
583	584	1478.4	1	1700	40
584	585	1742.4	1	1700	30
585	586	1056	1	1700	20
586	587	1161.6	1	1700	40
587	588	1584	1	1700	35
588	589	3168	1	1700	25
589	590	792	1	1700	25
590	591	1425.6	1	1700	35
590	639	3960	1	1700	40
591	592	3220.8	1	1700	40
592	593	5544	1	1700	55
593	594	2376	1	1700	55
594	595	4804.8	1	1700	55
595	596	2217.6	1	1700	40
596	597	2006.4	1	1500	25
597	598	1689.6	1	1500	25
597	662	3115.2	1	1700	30
598	599	4593.6	1	1700	40
599	600	1108.8	1	1700	40
600	601	3326.4	1	1700	60
601	602	7286.4	1	1700	60
601	930	2428.8	1	1700	40
602	70	686.4	2	1700	50

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
603	604	3696	1	1700	50
603	806	2006.4	1	1700	50
604	603	3696	1	1700	50
604	605	3326.4	1	1700	55
604	1023	9662.4	1	1700	50
605	604	3326.4	1	1700	50
605	606	1795.2	1	1700	50
606	605	1795.2	1	1700	55
606	607	3537.6	1	1700	55
606	927	1320	1	1700	45
607	606	3537.6	1	1700	50
607	608	2112	1	1700	40
608	607	2112	1	1700	55
608	609	1056	1	1700	40
609	608	1056	1	1700	40
609	610	897.6	1	1700	40
610	609	897.6	1	1700	40
610	618	4065.6	2	1900	50
610	619	1108.8	2	1900	50
610	923	2692.8	1	1700	50
611	706	316.8	1	1700	40
612	613	2587.2	2	1700	45
613	614	3748.8	2	1700	45
614	615	3960	2	1200	40
615	226	1848	1	1700	50
615	616	1425.6	2	1700	40
616	617	633.6	1	1200	20
616	697	580.8	2	1200	30
617	225	1689.6	1	1700	50
618	125	3220.8	2	1900	50
618	610	4065.6	2	1900	50
619	610	1108.8	2	1900	50
619	620	2270.4	2	1900	50
620	619	2270.4	2	1900	50
620	621	3115.2	2	1900	50
621	620	3115.2	2	1900	50
621	622	739.2	2	1900	50
622	621	739.2	2	1900	50
622	623	2534.4	2	1900	50
622	934	1372.8	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
623	622	2534.4	2	1900	50
623	624	897.6	2	1900	50
624	623	897.6	2	1900	50
624	625	4118.4	2	1900	55
625	624	4118.4	2	1900	50
625	626	2640	3	1900	50
625	1009	3115.2	1	1700	40
626	625	2640	2	1900	55
626	627	1003.2	3	1900	50
626	938	686.4	1	1700	40
627	626	1003.2	3	1900	50
627	628	422.4	3	1900	50
627	1072	1003.2	2	1700	40
628	84	1267.2	2	1900	50
628	627	422.4	3	1900	50
629	85	1425.6	2	1900	50
629	630	4540.8	2	1900	50
630	629	4540.8	2	1900	50
630	631	3379.2	2	1900	50
630	942	2164.8	1	1700	40
631	160	1108.8	2	1900	50
631	630	3379.2	2	1900	50
632	125	1056	2	1900	50
633	909	1584	1	1700	40
634	633	739.2	1	1700	40
634	635	3273.6	1	1700	40
635	134	369.6	1	1700	40
636	517	2481.6	1	1700	40
637	636	1478.4	1	1500	35
638	637	1320	1	1500	35
639	640	1795.2	1	1700	55
640	641	3115.2	1	1700	55
641	642	1900.8	1	1700	55
641	876	4435.2	1	1700	55
642	643	4699.2	1	1700	40
643	644	1161.6	1	1700	40
644	645	1742.4	1	1700	40
645	54	2059.2	2	1700	40
646	647	3326.4	1	1700	60
647	649	4963.2	1	1700	50

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
648	771	3907.2	1	1700	40
649	650	950.4	1	1700	40
650	651	2112	1	1700	60
651	652	2059.2	1	1700	35
652	653	2323.2	1	1700	40
653	141	2006.4	1	1700	40
654	655	4118.4	1	1700	45
655	656	2745.6	1	1700	45
656	657	1584	1	1700	45
657	658	3115.2	1	1700	50
658	659	1953.6	1	1700	50
659	660	1848	1	1700	50
660	661	2323.2	1	1700	50
662	663	4118.4	1	1700	40
663	664	4857.6	1	1700	40
664	648	2164.8	1	1700	40
665	930	2059.2	1	1700	30
666	965	2956.8	1	1700	50
667	668	2904	1	1500	25
667	867	1531.2	1	1700	30
668	667	2904	1	1700	35
668	669	2745.6	1	1700	25
668	681	1175	1	1500	25
668	901	1848	1	1500	25
669	670	1953.6	1	1700	40
670	673	2640	1	1700	40
671	6	1478.4	1	1700	40
672	671	1900.8	1	1700	40
673	674	3484.8	1	1700	60
674	675	2798.4	1	1700	60
675	676	2904	1	1700	60
676	677	2376	1	1700	60
677	678	1425.6	1	1700	60
678	679	1425.6	1	1700	40
679	680	6494.4	1	1700	50
679	708	6652.8	1	1700	45
679	709	2270.4	1	1700	25
680	861	1742.4	1	1700	40
681	668	1161.6	1	1500	25
681	682	3046	1	1500	25

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
682	681	3062.4	1	1500	25
682	683	1425.6	1	1700	40
683	682	1425.6	1	1700	40
683	684	3062.4	1	1700	40
684	683	3062.4	1	1700	40
684	812	2956.8	1	1700	40
684	856	2112	1	1700	50
685	686	4276.8	1	1700	55
686	687	686.4	1	1700	55
687	688	2534.4	1	1700	55
688	689	2270.4	1	1700	55
689	690	4593.6	1	1700	55
690	691	633.6	1	1700	55
691	692	1425.6	1	1700	55
692	693	1214.4	1	1700	55
693	694	3115.2	1	1700	40
694	695	1848	1	1700	40
695	696	2270.4	1	1700	40
696	18	1742.4	1	1500	35
698	265	633.6	1	1700	30
699	700	3432	1	1500	30
699	749	316.8	1	1500	35
700	701	1848	1	1500	30
701	816	686.4	1	1700	30
702	703	3168	1	1700	45
703	704	1425.6	1	1700	45
704	705	3009.6	1	1700	45
706	612	950.4	2	1700	45
707	613	1689.6	1	1700	30
708	37	633.6	1	1700	30
709	679	2270.4	1	1700	25
709	710	3115.2	1	1700	25
710	711	2323.2	1	1700	40
711	712	1953.6	1	1700	40
712	713	1161.6	1	1700	40
713	714	1953.6	1	1700	40
714	715	1953.6	1	1700	40
715	716	897.6	1	1700	45
716	717	2323.2	1	1700	55
717	718	3537.6	1	1700	55

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
718	719	5438.4	1	1700	55
719	890	1161.6	1	1700	40
720	531	2323.2	1	1700	40
721	667	1056	1	1700	30
722	723	1531.2	1	1700	45
722	817	6600	1	1700	50
723	788	897.6	1	1500	30
724	725	3748.8	1	1700	45
725	789	792	1	1500	30
726	727	2481.6	1	1700	45
727	31	1478.4	1	1500	30
728	32	2217.6	2	1900	60
728	33	2323.2	2	1900	60
729	727	4910.4	1	1700	45
730	733	5544	1	1700	40
730	791	4382.4	1	1700	40
731	732	3009.6	1	1700	40
732	730	5596.8	1	1700	40
733	734	897.6	1	1700	40
734	735	3220.8	1	1700	40
735	736	1636.8	1	1700	40
735	739	2904	1	1700	40
736	737	2112	1	1700	30
737	738	2376	1	1700	30
738	23	3537.6	2	1900	50
738	26	1056	2	1900	60
739	740	2640	1	1700	40
740	21	739.2	1	1700	40
741	438	3643.2	1	1700	35
742	472	3009.6	1	1700	40
742	475	4804.8	1	1700	40
743	759	2217.6	1	1700	40
743	761	2112	1	1700	40
744	743	1056	1	1700	30
745	746	1953.6	1	1500	35
746	747	1003.2	1	1500	35
747	19	1372.8	1	1500	30
747	748	2217.6	1	1500	35
747	973	1478.4	1	1500	35
748	699	2376	1	1500	35

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
748	747	2217.6	1	1500	35
749	751	3168	1	1700	45
750	752	2956.8	1	1700	60
751	750	3115.2	1	1700	60
752	753	2323.2	1	1700	60
753	754	1214.4	1	1700	60
754	755	2323.2	1	1700	60
756	816	2481.6	1	1700	30
757	758	2059.2	1	1700	40
758	910	1478.4	1	1700	40
759	760	2112	1	1700	40
761	757	2323.2	1	1500	30
762	763	3537.6	1	1700	40
762	764	4435.2	1	1700	40
763	131	475.2	2	1700	40
764	765	9873.6	1	1700	40
766	477	3379.2	1	1200	20
767	766	3854.4	1	1700	40
767	768	4752	1	1700	40
768	806	3220.8	1	1700	40
769	767	3960	1	1700	40
770	917	2217.6	1	1700	30
770	925	1636.8	1	1700	30
771	69	2112	2	1900	65
771	70	5596.8	2	1900	65
772	716	2270.4	1	1700	45
773	772	1795.2	1	1700	45
774	773	3273.6	1	1700	45
775	774	3379.2	1	1700	45
776	777	4329.6	1	1700	45
777	775	4488	1	1700	40
778	776	2112	1	1700	45
778	779	4012.8	1	1700	45
779	150	1742.4	1	1700	40
780	709	1320	1	1700	25
781	900	1003.2	1	1500	25
782	781	1584	1	1500	25
783	900	1425.6	1	1500	25
784	45	792	1	1500	30
785	40	2006.4	2	2250	75

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
785	46	3854.4	2	2250	75
786	38	4171.2	2	2250	75
786	40	3168	2	2250	75
787	39	3854.4	2	1900	65
787	41	3960	2	1900	65
788	724	2112	1	1700	45
789	726	475.2	1	1500	30
790	30	264	1	1500	30
791	729	5966.4	1	1700	40
791	795	4752	1	1700	40
792	791	7444.8	1	1700	40
793	792	5068.8	1	1700	40
794	793	3432	1	1700	40
795	733	950.4	1	1700	30
796	973	1425.6	1	1200	35
796	974	580.8	1	1500	35
797	796	2217.6	1	1500	35
798	3	1267.2	2	1900	50
798	7	3273.6	2	1900	50
799	798	686.4	1	1700	40
800	62	5808	3	2250	70
800	68	1531.2	3	2250	70
801	47	5808	2	2250	75
801	48	1900.8	2	2250	60
802	231	5808	4	2250	70
802	232	4752	4	2250	70
803	41	3590.4	2	1900	65
803	43	3326.4	2	1700	35
804	42	739.2	1	1700	35
804	855	2164.8	1	1700	50
805	154	12144	2	1900	65
805	155	5280	2	1900	65
806	71	528	2	1700	40
806	603	2006.4	1	1700	50
807	74	2217.6	3	2250	70
807	808	6336	3	2250	70
808	76	2534.4	3	1900	60
808	807	6336	3	2250	70
809	142	1531.2	1	1700	40
810	908	1372.8	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
811	812	739.2	1	1700	40
811	880	2270.4	1	1700	40
812	684	2956.8	1	1700	40
812	811	739.2	1	1700	40
813	891	1478.4	1	1700	30
813	892	1108.8	1	1700	40
814	813	950.4	1	1700	30
815	998	686.4	1	1500	30
816	702	3590.4	1	1700	40
817	37	264	1	1700	30
818	186	2851.2	3	1200	50
819	304	6441.6	1	1700	50
819	305	950.4	1	1700	50
820	276	5596.8	1	1700	35
820	278	6652.8	1	1700	55
821	377	1320	1	1700	40
822	821	2904	1	1700	40
823	822	1478.4	1	1500	30
824	823	2112	1	1500	30
825	375	6388.8	1	1700	40
826	828	3273.6	1	1700	35
827	826	2481.6	1	1700	35
828	824	5755.2	1	1700	30
829	826	1584	1	1700	35
830	273	1056	1	1500	25
830	444	475.2	1	1500	25
830	834	422.4	1	1500	25
831	350	2481.6	1	1700	35
831	443	1214.4	1	1700	35
831	834	1531.2	1	1500	25
832	442	1003.2	1	1700	35
832	444	475.2	1	1500	25
832	833	1056	1	1500	25
833	272	1848	1	1500	35
833	445	528	1	1500	25
834	275	1003.2	1	1500	30
834	830	422.4	1	1500	25
835	258	1478.4	1	1700	45
836	350	2904	1	1700	35
837	357	7656	1	1700	50

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
837	836	9873.6	1	1700	55
838	839	3590.4	1	1700	55
839	840	1478.4	1	1700	55
840	841	1320	1	1700	55
841	842	6283.2	1	1700	50
842	843	1108.8	1	1700	40
843	844	1953.6	1	1700	35
844	280	950.4	1	1700	35
844	281	686.4	1	1700	35
845	323	4118.4	2	1900	60
845	851	369.6	1	1700	40
846	851	2956.8	2	1900	55
847	323	2481.6	2	1900	60
847	848	5068.8	2	1900	60
848	847	5068.8	2	1900	60
848	849	6230.4	2	1900	60
849	331	5174.4	1	1700	55
849	848	6230.4	2	1900	60
850	319	1531.2	1	1700	40
850	331	9556.8	1	1700	55
851	248	844.8	1	1700	50
851	250	686.4	2	1700	40
852	327	11616	1	1700	50
853	326	897.6	1	1700	55
854	867	2587.2	1	1700	30
855	44	422.4	2	1700	50
855	804	2164.8	1	1500	30
856	45	580.8	2	1700	50
856	684	2112	1	1700	40
857	24	1003.2	1	1700	40
857	25	1636.8	2	2250	70
857	27	4804.8	2	2250	75
858	878	2481.6	1	1700	40
859	854	897.6	1	1700	30
859	858	2059.2	1	1700	30
861	33	4065.6	2	1700	40
861	37	9345.6	2	1900	60
862	59	264	1	1700	40
862	863	316.8	2	1900	50
863	59	422.4	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
863	64	3220.8	2	1900	50
863	511	1689.6	2	1900	65
864	938	8025.6	1	1700	50
864	940	739.2	1	1700	60
864	1024	3379.2	1	1700	50
865	81	369.6	1	1500	30
865	1024	2904	1	1700	50
866	141	4963.2	1	1700	60
866	143	5755.2	1	1700	60
867	146	475.2	1	1700	30
867	667	1531.2	1	1700	35
868	223	9979.2	4	2250	70
868	869	3168	4	2250	70
869	868	3168	4	2250	70
869	870	3854.4	4	2250	70
870	869	3748.8	4	2250	70
870	871	2851.2	4	2250	70
871	34	1267.2	4	2250	70
871	870	2851.2	4	2250	70
872	34	1108.8	4	2250	70
872	112	1372.8	5	2250	70
873	52	9187.2	2	1900	65
873	511	2640	2	1900	65
874	873	2428.8	1	1700	40
875	874	2059.2	1	1700	55
876	875	3009.6	1	1700	55
877	144	2323.2	1	1700	50
878	810	5227.2	1	1700	40
878	877	2745.6	1	1700	50
879	878	3643.2	1	1700	50
880	811	2270.4	1	1700	40
880	879	1636.8	1	1700	40
881	880	5016	1	1700	40
882	881	686.4	1	1700	45
883	50	1848	2	1900	65
883	51	9187.2	2	1900	65
884	882	1108.8	1	1700	40
885	884	2640	1	1700	40
886	885	528	1	1500	30
887	815	580.8	1	1500	30

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
888	887	2112	1	1500	30
889	888	4012.8	1	1700	40
890	889	4276.8	1	1700	40
891	6	633.6	1	1700	30
892	893	1003.2	1	1700	40
893	799	3379.2	1	1700	40
893	894	1161.6	1	1700	40
894	895	2112	1	1700	40
895	896	1056	1	1700	40
896	897	3696	1	1700	50
897	898	1795.2	1	1700	50
898	899	897.6	1	1700	50
899	754	580.8	1	1700	40
900	682	897.6	1	1500	25
901	148	1372.8	1	1500	25
902	681	739.2	1	1500	25
903	681	1003.2	1	1500	25
904	682	1425.6	1	1500	25
905	683	2798.4	1	1700	40
906	684	686.4	1	1700	30
907	51	2164.8	1	1700	40
908	650	4276.8	1	1700	40
909	137	369.6	1	1700	40
910	134	1003.2	2	1700	40
911	21	2112	2	1900	50
911	23	1742.4	2	1900	50
912	748	1372.8	1	1500	35
913	749	2587.2	1	1500	35
913	893	3801.6	1	1700	40
914	131	1003.2	2	1700	30
915	130	9240	1	1700	50
916	129	1056	1	1700	30
917	128	6705.6	1	1700	45
917	926	2798.4	1	1700	45
918	123	580.8	2	1700	30
919	122	897.6	2	1700	30
920	121	739.2	1	1700	30
921	120	1267.2	1	1700	40
922	120	2376	1	1700	40
922	1019	2059.2	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
923	610	2692.8	1	1700	40
923	1017	4488	1	1700	50
924	609	950.4	1	1700	30
925	607	1003.2	1	1700	30
926	606	2217.6	1	1700	45
927	1026	2217.6	1	1700	45
928	565	739.2	1	1700	40
928	915	2428.8	1	1700	50
929	603	686.4	1	1700	30
930	601	2428.8	1	1700	40
930	666	7603.2	1	1700	45
931	620	1108.8	1	1700	30
932	620	633.6	1	1700	30
933	622	686.4	1	1700	40
934	622	1372.8	1	1700	40
934	1033	1636.8	1	1700	40
935	623	897.6	1	1700	30
936	624	580.8	1	1700	30
937	625	580.8	1	1700	30
938	626	686.4	1	1700	40
938	627	1056	2	1700	40
939	1067	633.6	2	1700	40
939	1072	3696	2	1700	40
940	75	6811.2	1	1700	60
940	864	633.6	1	1700	50
941	629	369.6	1	1700	30
942	630	2164.8	1	1700	40
942	1006	897.6	1	1700	40
943	631	1108.8	1	1500	40
944	164	1900.8	2	1900	40
944	1051	1742.4	2	1900	50
945	164	1742.4	2	1900	40
945	187	2956.8	1	1700	40
946	165	2059.2	1	1700	40
947	176	633.6	1	1700	30
948	175	1003.2	1	1700	30
949	174	1531.2	1	1700	30
950	159	5755.2	1	1700	40
950	966	4699.2	1	1700	50
951	158	686.4	1	1700	30

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
952	76	1795.2	2	1900	60
952	81	792	2	1900	55
953	263	1531.2	1	1700	30
954	261	844.8	1	1700	30
955	260	369.6	1	1700	30
956	299	1214.4	1	1700	40
957	1021	1689.6	2	1900	50
958	959	1161.6	2	1200	40
959	872	2323.2	1	1700	40
959	960	1953.6	2	1900	50
960	961	844.8	1	1200	20
960	962	897.6	2	1500	40
961	34	844.8	1	1500	50
963	1045	844.8	2	1900	50
963	1049	2640	2	1900	50
964	91	686.4	2	1900	50
964	1045	1953.6	2	1900	50
965	77	3379.2	1	1700	40
965	950	12302.4	1	1700	50
966	967	2534.4	1	1700	40
967	968	1161.6	1	1700	30
968	171	2164.8	1	1700	30
969	970	369.6	1	1500	30
970	611	2270.4	1	1200	30
971	15	1795.2	2	2250	75
971	16	3960	2	2250	75
972	7	2692.8	1	1700	40
973	17	2640	1	1200	30
973	18	950.4	1	1500	35
973	796	1425.6	1	1200	35
974	699	3062.4	1	1500	35
975	756	3009.6	1	1700	30
975	994	2851.2	1	1700	45
976	975	2745.6	1	1700	45
977	976	3643.2	1	1700	45
977	978	3696	1	1700	45
978	979	1636.8	1	1700	45
979	980	2112	1	1700	45
980	991	3220.8	1	1700	40
980	992	1214.4	1	1700	45

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
981	983	4488	1	1700	45
982	977	3379.2	1	1700	45
983	982	7867.2	1	1700	45
984	981	2692.8	1	1700	45
985	984	1742.4	1	1700	45
986	985	1636.8	1	1700	45
987	986	1848	1	1700	45
988	987	1795.2	1	1700	45
989	988	3273.6	1	1700	45
989	990	5332.8	1	1700	45
990	993	264	1	1700	40
991	23	897.6	1	1700	40
992	21	2587.2	1	1700	40
992	745	1953.6	1	1700	40
993	716	2323.2	1	1700	45
994	995	9345.6	1	1700	45
995	996	3590.4	1	1700	45
996	997	4752	1	1700	45
998	999	2481.6	1	1700	40
999	1000	2164.8	1	1700	40
1000	1001	1320	1	1700	50
1001	1002	1425.6	2	1900	65
1001	1003	2587.2	2	1900	65
1002	1001	1425.6	2	1900	65
1003	155	2270.4	2	1900	65
1003	1001	2587.2	2	1900	65
1004	614	1161.6	1	1700	30
1005	82	844.8	1	1700	40
1006	1007	1584	1	1700	40
1007	1008	2323.2	1	1700	40
1008	90	1267.2	1	1700	40
1009	1010	1003.2	1	1700	40
1010	1034	1689.6	1	1700	40
1011	1012	2587.2	1	1700	40
1011	1035	2481.6	1	1700	40
1012	1011	2587.2	1	1700	40
1012	1013	1531.2	1	1700	40
1012	1063	5016	1	1700	40
1013	1012	1531.2	1	1700	40
1013	1058	1425.6	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
1014	1013	1003.2	1	1700	40
1015	1014	4329.6	1	1700	40
1016	1015	2745.6	1	1700	40
1017	1018	3009.6	1	1700	50
1018	1031	2164.8	1	1700	50
1019	922	2059.2	1	1700	40
1019	1030	3062.4	2	1500	40
1019	1060	2376	1	1700	40
1020	1056	1161.6	1	1700	40
1020	1058	897.6	1	1700	40
1021	958	2164.8	2	1900	50
1021	1022	2112	1	1700	40
1021	1041	1689.6	1	1700	40
1022	1021	2112	1	1700	40
1022	1037	2851.2	1	1700	40
1023	864	475.2	1	1700	50
1024	864	3379.2	1	1700	50
1024	865	2904	1	1700	50
1025	76	1742.4	1	1700	50
1026	1027	897.6	1	1700	45
1027	933	5385.6	1	1700	45
1028	128	528	1	1500	30
1029	126	1320	2	1900	60
1029	127	1584	2	1900	60
1031	1019	739.2	2	1700	50
1032	124	950.4	2	1900	60
1032	125	1108.8	4	1900	50
1033	1016	844.8	1	1700	40
1034	1064	2270.4	1	1700	40
1035	1011	2481.6	1	1700	40
1035	1037	686.4	1	1700	40
1036	1035	528	1	1700	30
1037	1022	2851.2	1	1700	40
1037	1035	686.4	1	1700	40
1038	1037	316.8	1	1700	30
1039	1022	475.2	1	1700	30
1040	1041	1372.8	1	1700	40
1041	1042	580.8	1	1700	40
1042	1043	2692.8	1	1700	40
1043	94	528	1	1700	40

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
1044	90	475.2	2	1700	40
1044	91	686.4	2	1900	50
1045	963	844.8	2	1900	50
1045	964	1953.6	2	1900	50
1046	1045	2006.4	1	1700	30
1047	963	264	1	1700	30
1048	1047	2323.2	1	1700	30
1049	963	2640	2	1900	50
1049	1050	1478.4	2	1900	50
1050	1049	1478.4	2	1900	50
1050	1051	2059.2	2	1900	50
1051	944	1742.4	2	1900	50
1051	1050	2059.2	2	1900	50
1052	1049	580.8	1	1700	30
1053	1049	686.4	1	1700	30
1054	1050	633.6	1	1700	30
1055	1051	475.2	1	1700	30
1056	1020	1161.6	1	1700	40
1056	1060	2059.2	1	1700	40
1057	1056	1689.6	1	1700	30
1058	1013	1425.6	1	1700	40
1058	1020	897.6	1	1700	40
1059	1058	422.4	1	1700	30
1060	1019	2376	1	1700	40
1060	1056	2059.2	1	1700	40
1061	1060	1161.6	1	1700	30
1062	1012	686.4	1	1700	30
1064	1065	1214.4	1	1700	40
1065	1011	897.6	1	1700	40
1066	939	633.6	1	1700	30
1067	1068	844.8	1	1700	40
1068	1070	1742.4	1	1700	40
1069	1068	1161.6	1	1700	30
1070	1008	739.2	1	1700	40
1071	1070	633.6	1	1700	30
1072	627	1003.2	2	1700	40
1072	939	3696	2	1700	40
1073	1072	686.4	1	1700	30
1074	97	2059.2	3	2250	60
1074	98	686.4	2	2250	60

Table K-1. Evacuation Roadway Network Characteristics (Cont.)					
Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
1075	199	950.4	1	1700	50
1076	206	2270.4	2	1900	50
1076	1077	1320	1	1700	50
1077	1079	2481.6	3	2250	60
1078	197	1953.6	1	1700	50
1078	1080	633.6	2	2250	60
1079	196	422.4	3	2250	60
1079	1082	2006.4	2	1900	50
1080	194	2798.4	5	2250	60

APPENDIX L

ERPA Boundaries

APPENDIX L: ERPA Boundaries

ERPA 1

County: Salem

Defined as the area within the following boundary: The western portion of Lower Alloways Creek (LAC) Township. It consists of the area from the edge of the Delaware River along Mill Creek to Money Island Road. It then goes north on Money Island Road to Fort Elfsborg-Hancocks Bridge Road and east on Fort Elfsborg-Hancocks Bridge Road to the LAC/Elsinboro boundary line. It continues northeast to the boundary for Salem City and proceeds south down the LAC/Quinton boundary and along Salem New Bridge/Harmersville Canton Road/Main Street Canton to the county line. It then continues south on the county line to Delaware Bay.

ERPA 2

County: Salem

Defined as the area within the following boundary: The eastern portion of Lower Alloways Creek Township and the western portion of Quinton Township. It starts at the intersection of Quaker Neck Road and the Salem City line and goes east along Quaker Neck Road to the Mannington Township line. It continues southeast along the Quinton/Alloway Township boundary to Alloway Road (Route 581), then turns west to Burden Hill Road and south to Route 49. It then goes southeast along Route 49 to Gravely Hill Road. It then continues southwest on Gravely Hill Road to Quinton Jericho Road, then southeast to the county line. It continues west along the county line to Main Street Canton. It then goes northwest along Main Street Canton/Harmersville Canton Road/Salem New Bridge Roads and continues northwest along the Lower Alloways Creek/Quinton Township boundary to the Salem City line and then proceeds northeast along Salem City/Quinton line to Quaker Neck Road.

ERPA 3

County: Salem

Defined as the area within the following boundary: The township of Elsinboro and Salem City. It starts at the Delaware River and goes east along the Salem River to the southern edge of Mannington Marsh. It then goes east along the boundary line between Salem City and Mannington and continues south/southeast along the Salem/Quinton and Lower Alloways Creek/Elsinboro township lines to Fort Elfsborg Hancocks Bridge Road. It then goes west to Money Island Road, then south to Mill Creek and west to the Delaware River.

ERPA 4 <u>County</u>: Salem
<u>Defined as the area within the following boundary</u>: The southern portion of Mannington Township. It starts at the intersection of Quaker Neck Road and the Salem City line and goes east along Quaker Neck Road to the Mannington Township line. It then goes northwest to Fenwick Creek and then north to Penna Reading Railroad line and northwest to East Robert Street. It continues west past Newell Street to the Salem River. It then goes south along the river to the former H.J. Heinz Company (now Anchor Hocking Glass), then goes east along the Salem/Mannington boundary to intersection of Salem City line and Quaker Neck Road.

ERPA 5 <u>County</u>: Salem
<u>Defined as the area within the following boundary</u>: The southern portion of Pennsville Township. It starts at Salem Cove and goes east along the Salem River to a point near the former H.J. Heinz Company (now Anchor Hocking Glass). It then goes north on a direct line to Old Toll Bridge Road then north and west into Lenape Drive to Route 49. It continues south on Route 49 to Lighthouse Road and then goes northwest on Lighthouse Road to Fort Mott Road, then south to the entrance to Finn's Point National Cemetery.

ERPA 6 <u>County</u>: Cumberland
<u>Defined as the area within the following boundary</u>: The western portion of Stow Creek. It starts at the intersection of Quinton Jericho Road and Stow Creek and continues southwest along Stow Creek across Main Street Canton and turns south along Stow Creek to Raccoon Ditch. It then goes east along Raccoon Ditch to the southern shore of Davis Mill Pond. It continues east to Macanippuck Road and turns north to Buckhorn Road, then turns east to Quinton Jericho Road. It continues northwest on Quinton Jericho Road to Stow Creek.

ERPA 7 <u>County</u>: Cumberland
<u>Defined as the area within the following boundary</u>: The western portion of Greenwich Township. It starts at Oyster Cove and goes north along Stow Creek (county line) to Raccoon Ditch. It then goes east on Raccoon Ditch to the southern shore of Davis Mill Pond and continues to the intersection of Chestnut Road. It then turns south on Chestnut Road to Mill Road (aka Bacon's Neck-Othello Road) and goes southwest along Mill Road to the intersection of Gum Tree Corner Road. It then goes south on Gum Tree Corner Road to Bacon's Neck Road, then turns southwest to Tindall Island Road. It continues south on Tindall Island Road to the Cohansey River, then goes southwest along the Cohansey River to the Delaware Bay.

ERPA 8 County: N/A
Defined as the area within the following boundary: A portion of Delaware Bay south of Artificial Island. It starts at the Delaware/New Jersey line on Artificial Island and goes west one mile then south to southeast along the Delaware Bay boundary line between New Jersey and Delaware to Cohansey Point. It then goes east three miles to Cohansey Point.

ERPA A County: New Castle & Kent
Defined as the area within the following boundary: Port Penn, Odessa, East of Townsend, North Smyrna and South St. George's Areas. The area bounded to the west by Routes 13, 299 and 9; to the east by the Delaware River; to the north by the Chesapeake and Delaware Canal; to the south by Route 6.

ERPA B County: New Castle & Kent
Defined as the area within the following boundary: Middletown, East of Townsend, and North Smyrna Areas. The area bounded to the west by the Norfolk Southern Railroad; to the east by Route 9; to the north by Route 299; to the south by Route 6 and Smyrna Landing Road.

ERPA C County: New Castle
Defined as the area within the following boundary: Delaware City, North Middletown, St. George's and Reybold Areas. The area bounded to the north of Route 299 by Kirkwood St. George's Road; to the east of the Norfolk Southern Railroad to Route 13; to the south of the Red Lion Creek and east of Route 9; to the south of the Norfolk Southern Railroad and east of Route 13 to the Chesapeake and Delaware Canal; to the south of Route 72 and east of McCoy Road to Route 13.

ERPA D County: N/A
Defined as the area within the following boundary: The Delaware River and Bay. The area just north of Pea Patch Island, near Delaware City, south to Woodland Beach.

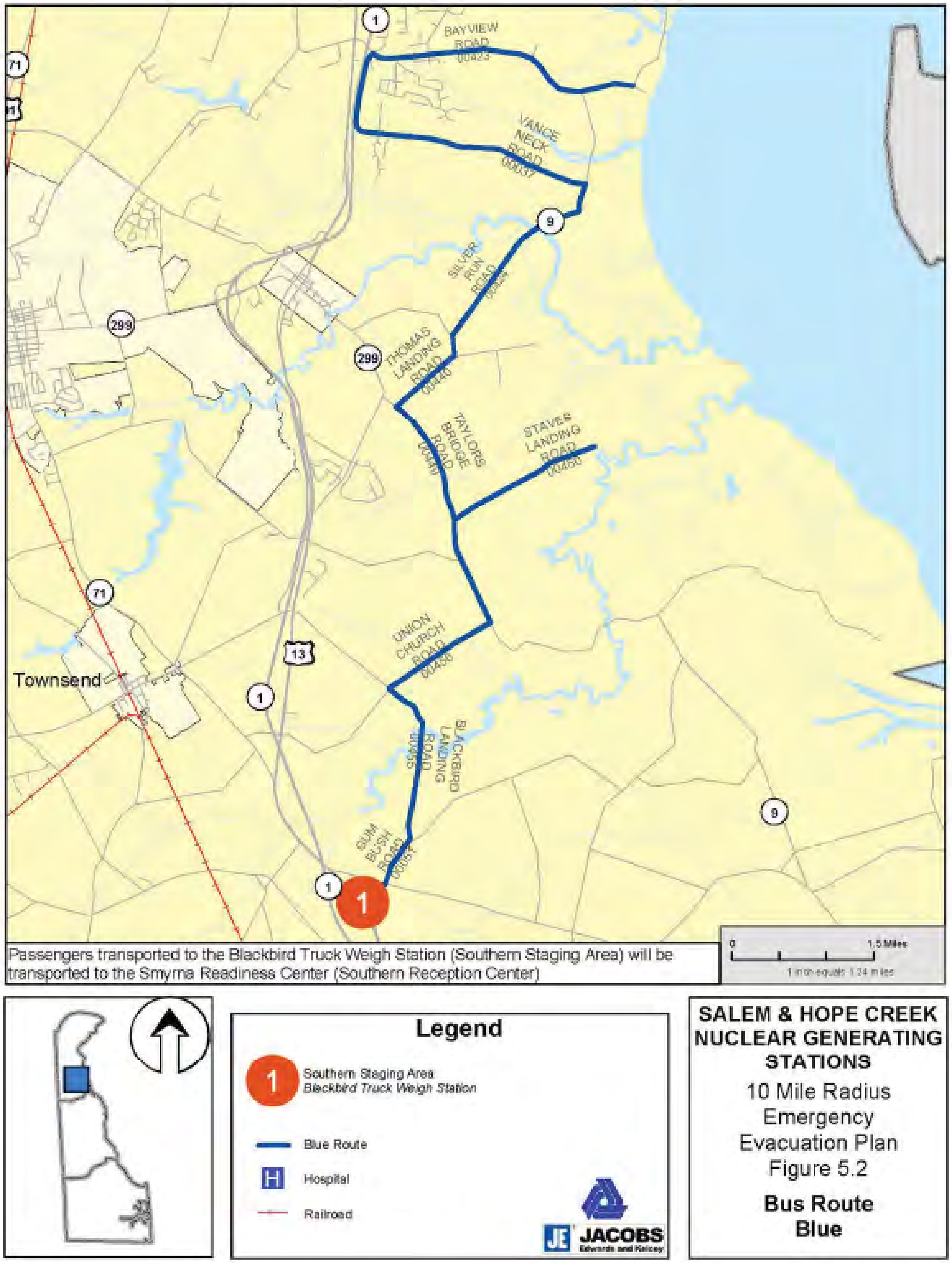
APPENDIX M

Transit-Dependent Bus Routes

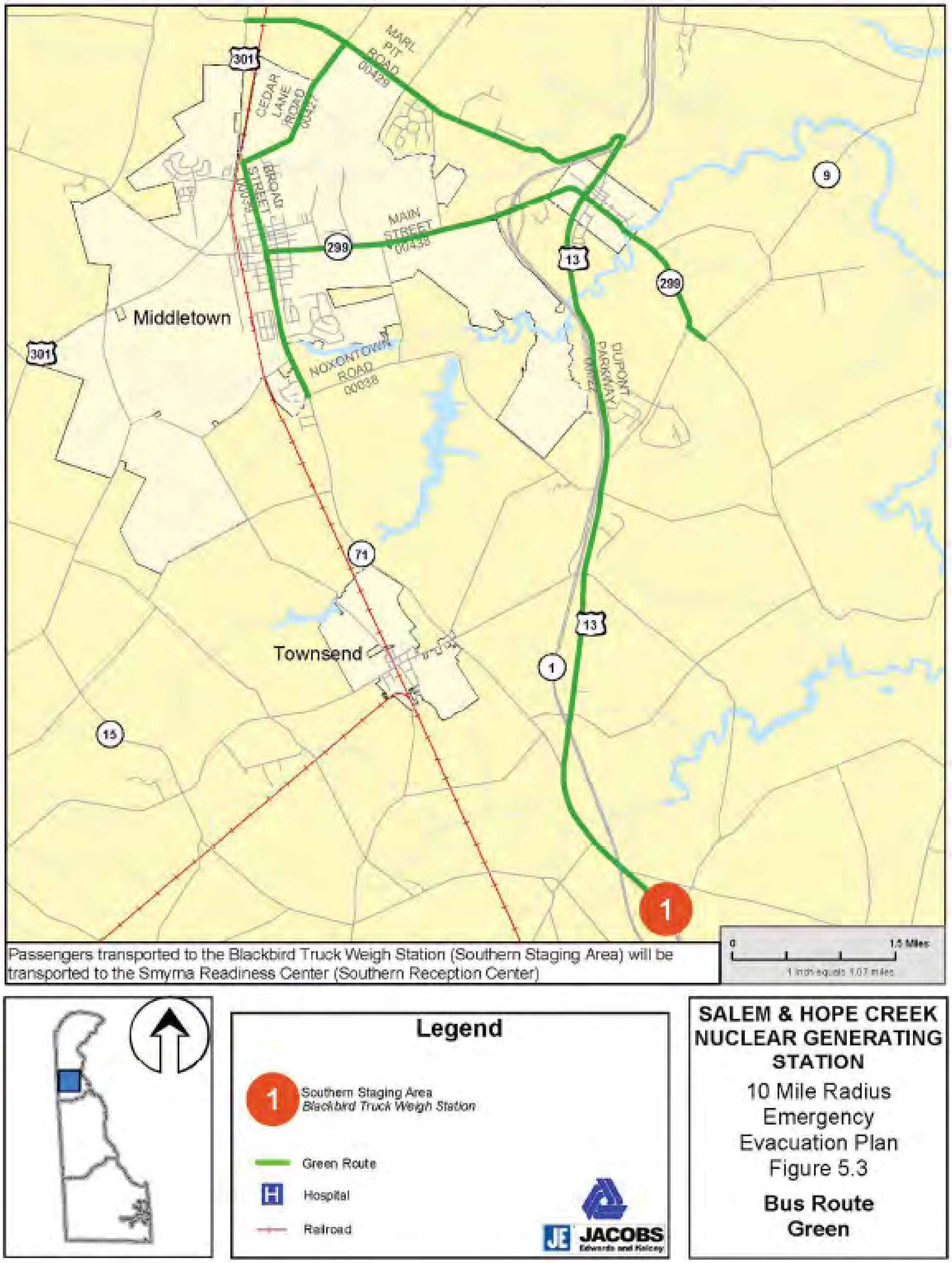
APPENDIX M: TRANSIT-DEPENDENT BUS ROUTES

This appendix presents the bus routes modeled in the ETE analysis described in Section 8 for evacuation of the transit-dependent population and of schools. These figures were extracted from the Delaware and New Jersey State Plans. Pages M-2 through M-7 identify the transit-dependent bus pickup routes for the Delaware portion of the EPZ, while pages M-8 through M-16 identify the routes for the New Jersey portion of the EPZ. Pages M-17 through M-36 identify the evacuation bus routes for each of the schools within the Delaware portion of the EPZ. Specific evacuation bus routes were not provided in the New Jersey State Plan; these schools were routed using the most likely route from the school to the host facility.

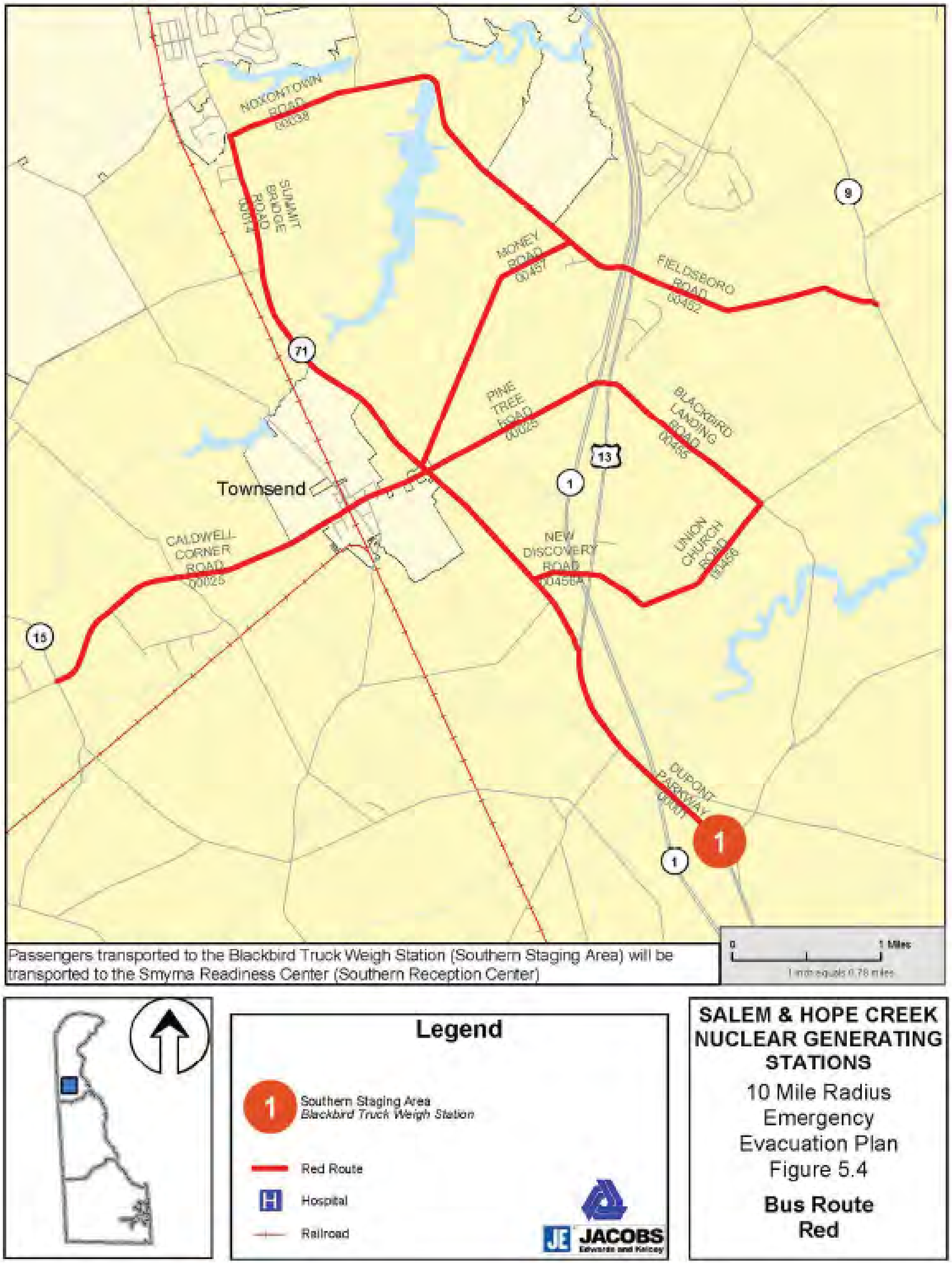
ATTACHMENT 1200-A2: EVACUATION BUS ROUTE MAPS (Continued)



ATTACHMENT 1200-A2: EVACUATION BUS ROUTE MAPS (Continued)

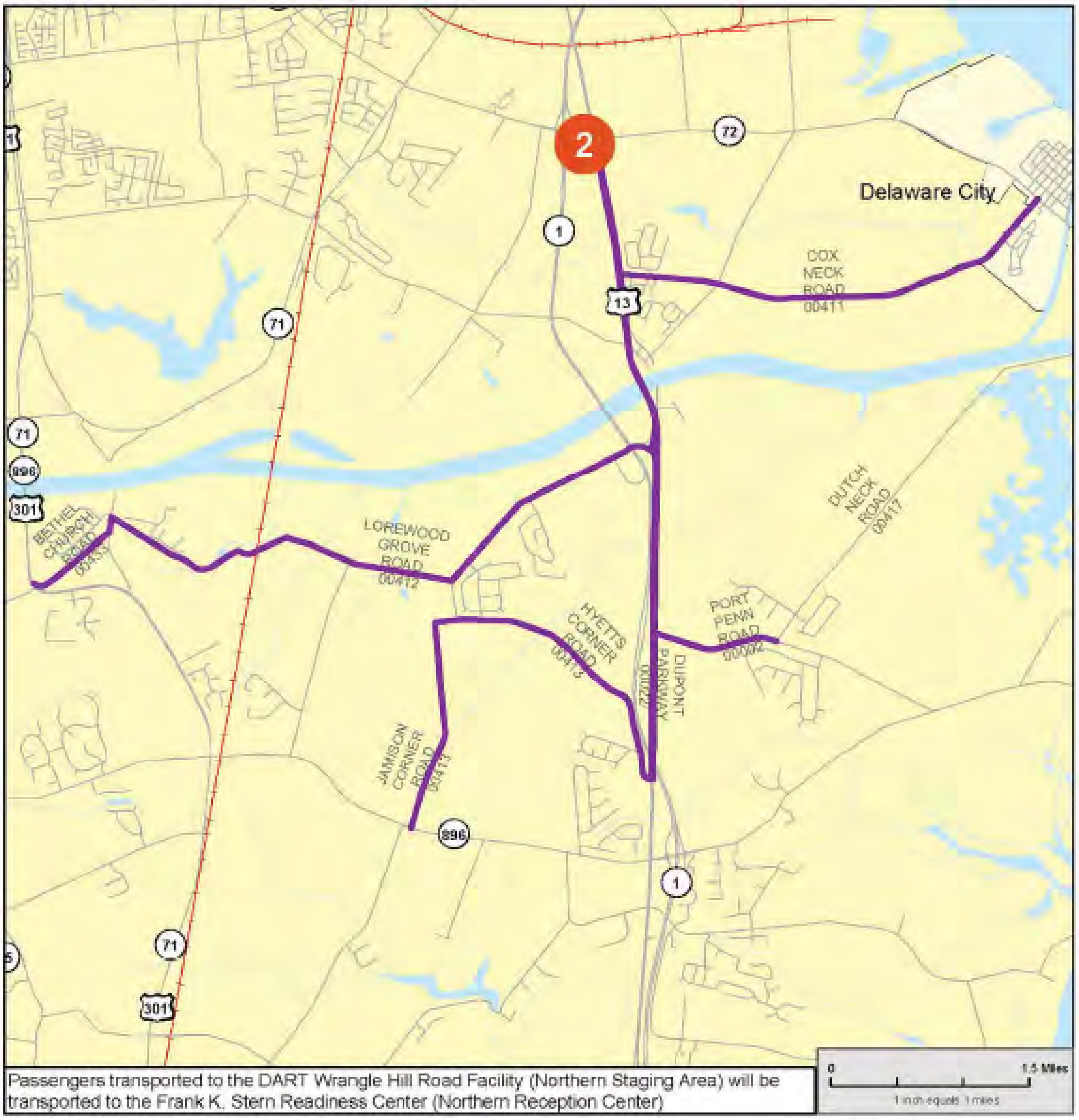


ATTACHMENT 1200-A2: EVACUATION BUS ROUTE MAPS (Continued)



ATTACHMENT 1200-A2: EVACUATION BUS ROUTE MAPS (Continued)

ATTACHMENT 1200-A2: EVACUATION BUS ROUTE MAPS (Continued)



Legend

2 Northern Staging Area *DART Wrangle Hill Road Facility*

Purple Route

Hospital

Railroad

JACOBS Edwards and Kelcey

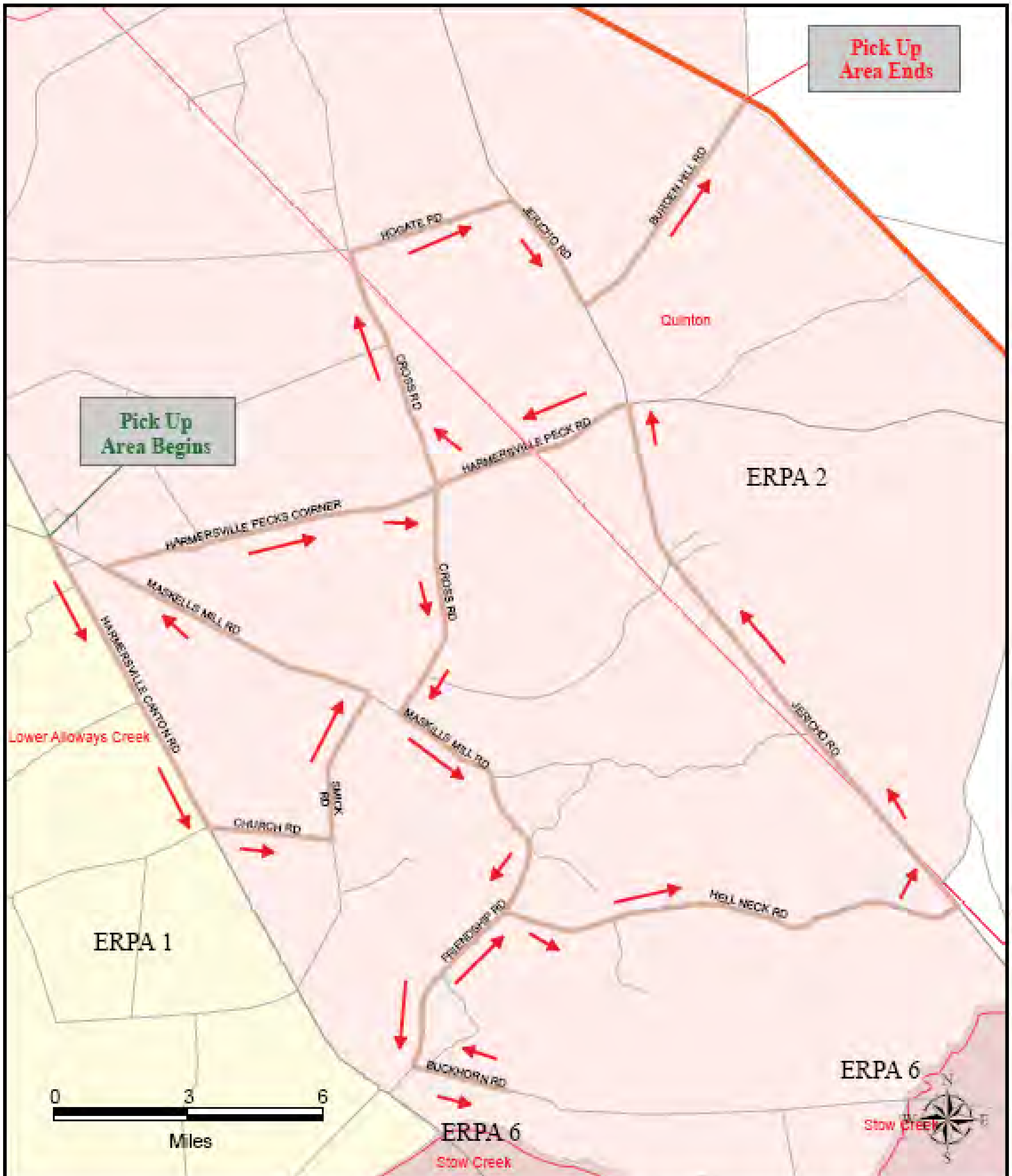
SALEM & HOPE CREEK NUCLEAR GENERATING STATIONS

10 Mile Radius Emergency Evacuation Plan Figure 5.6

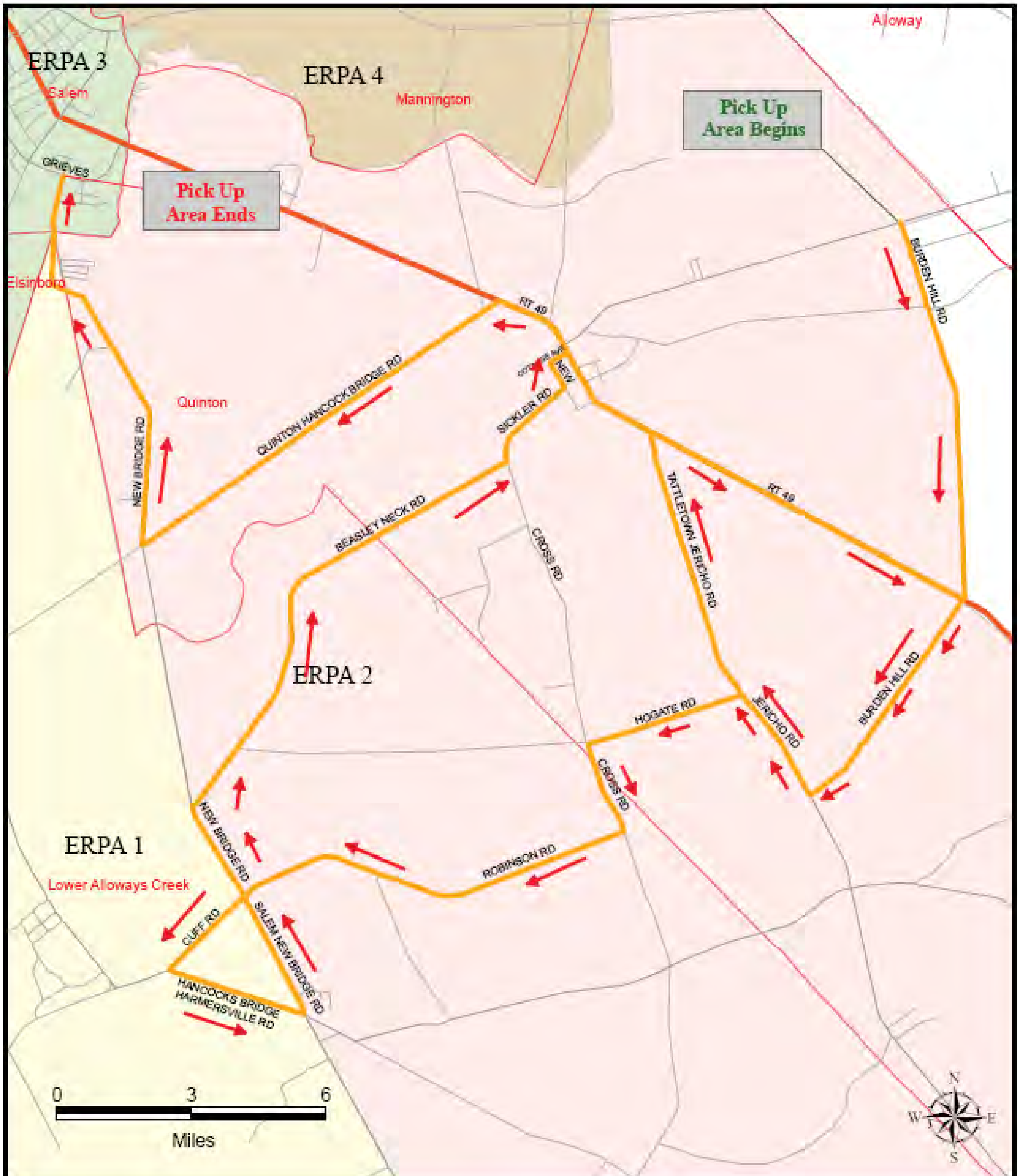
Bus Route Purple

ATTACHMENT 1200-A2: EVACUATION BUS ROUTE MAPS (Continued)

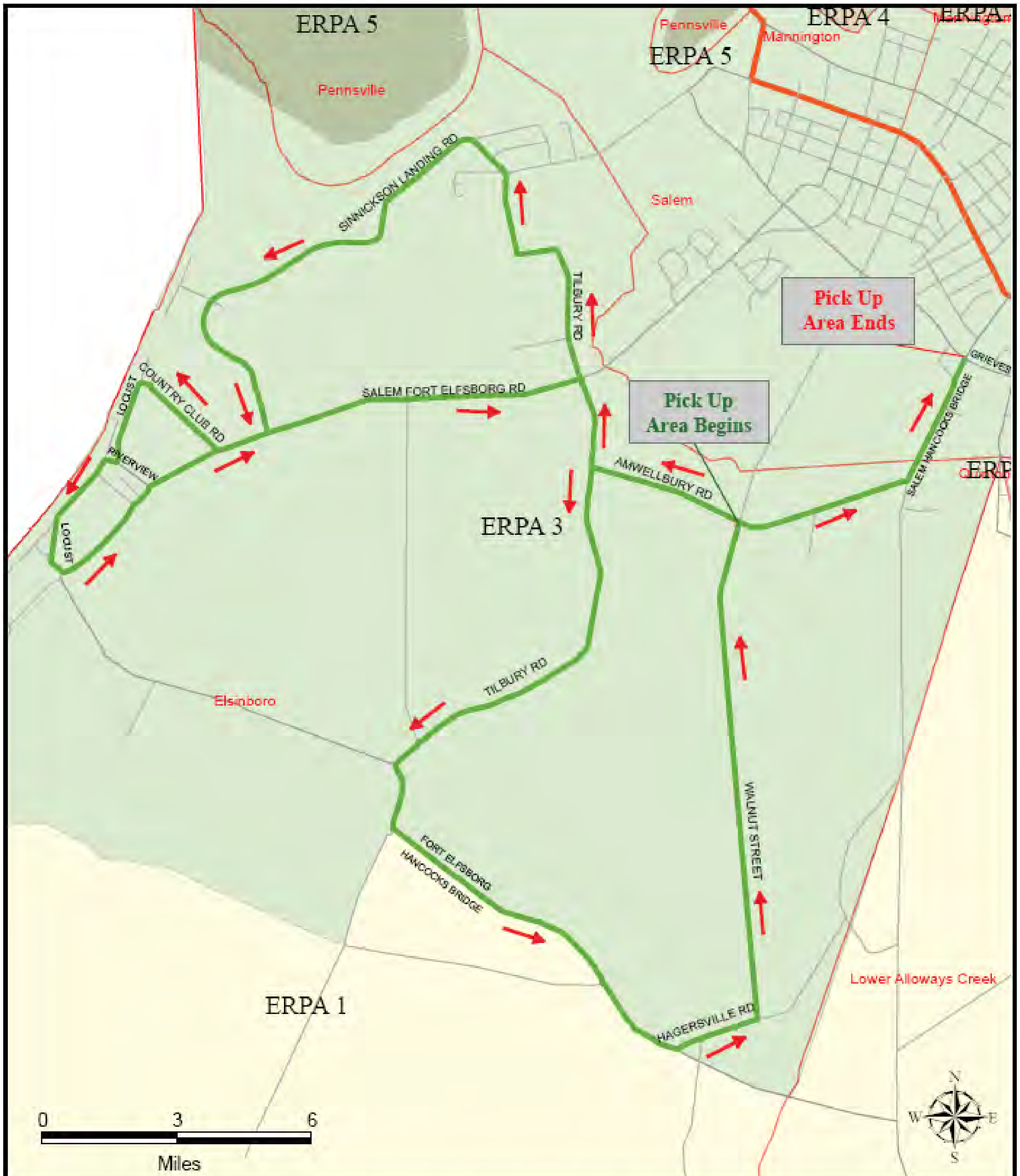
General Evacuation Bus Route #1
HANCOCKS BRIDGE
ERPA 1



General Evacuation Bus Route #2A
QUINTON - LAC
ERPA 2

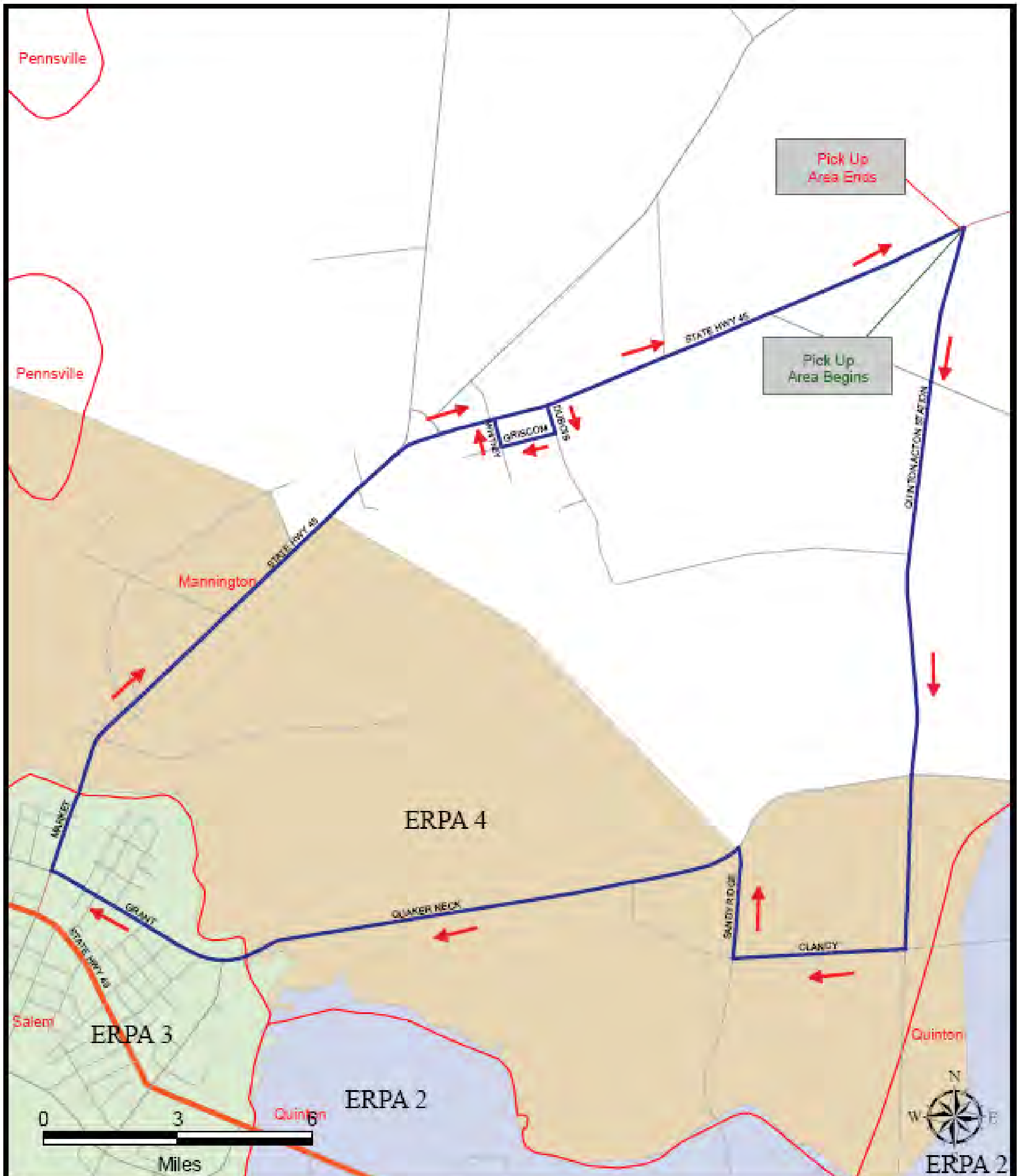


General Evacuation Bus Route #2B
QUINTON - LAC
ERPA 2

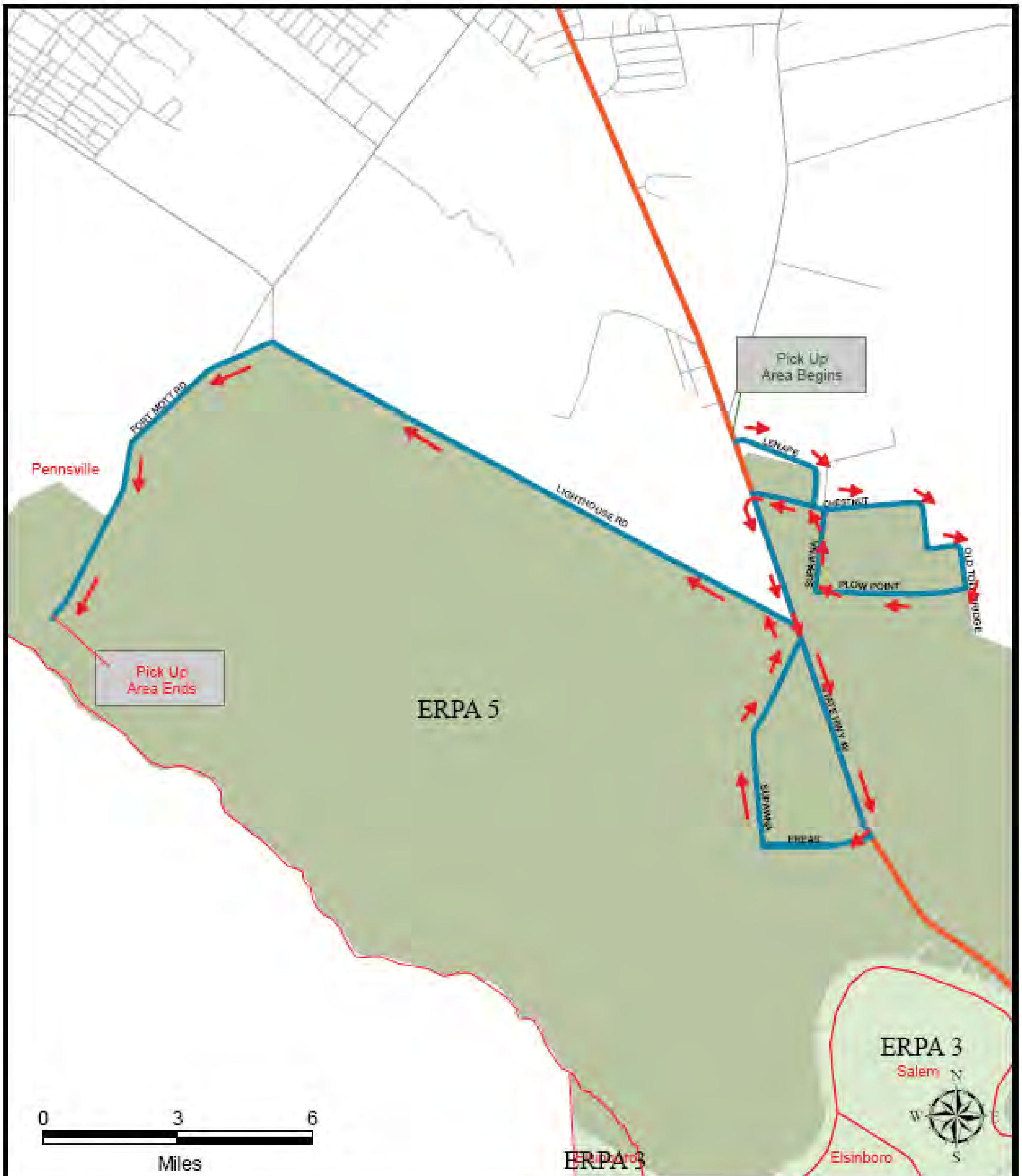


General Evacuation Bus Route #3A
ELSINBORO
ERPA 3

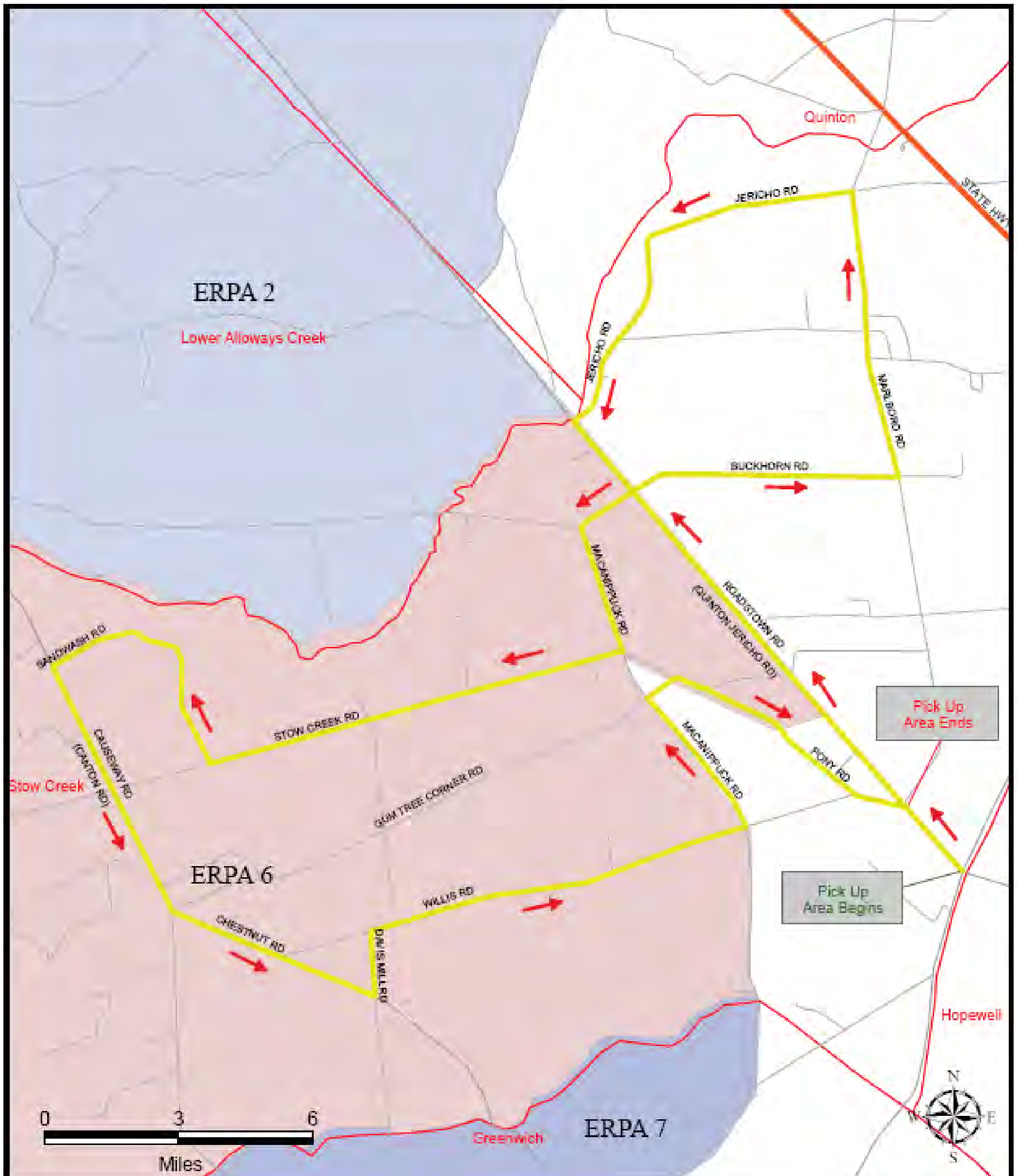
General Evacuation Bus Route #3B
SALEM CITY
ERPA 3



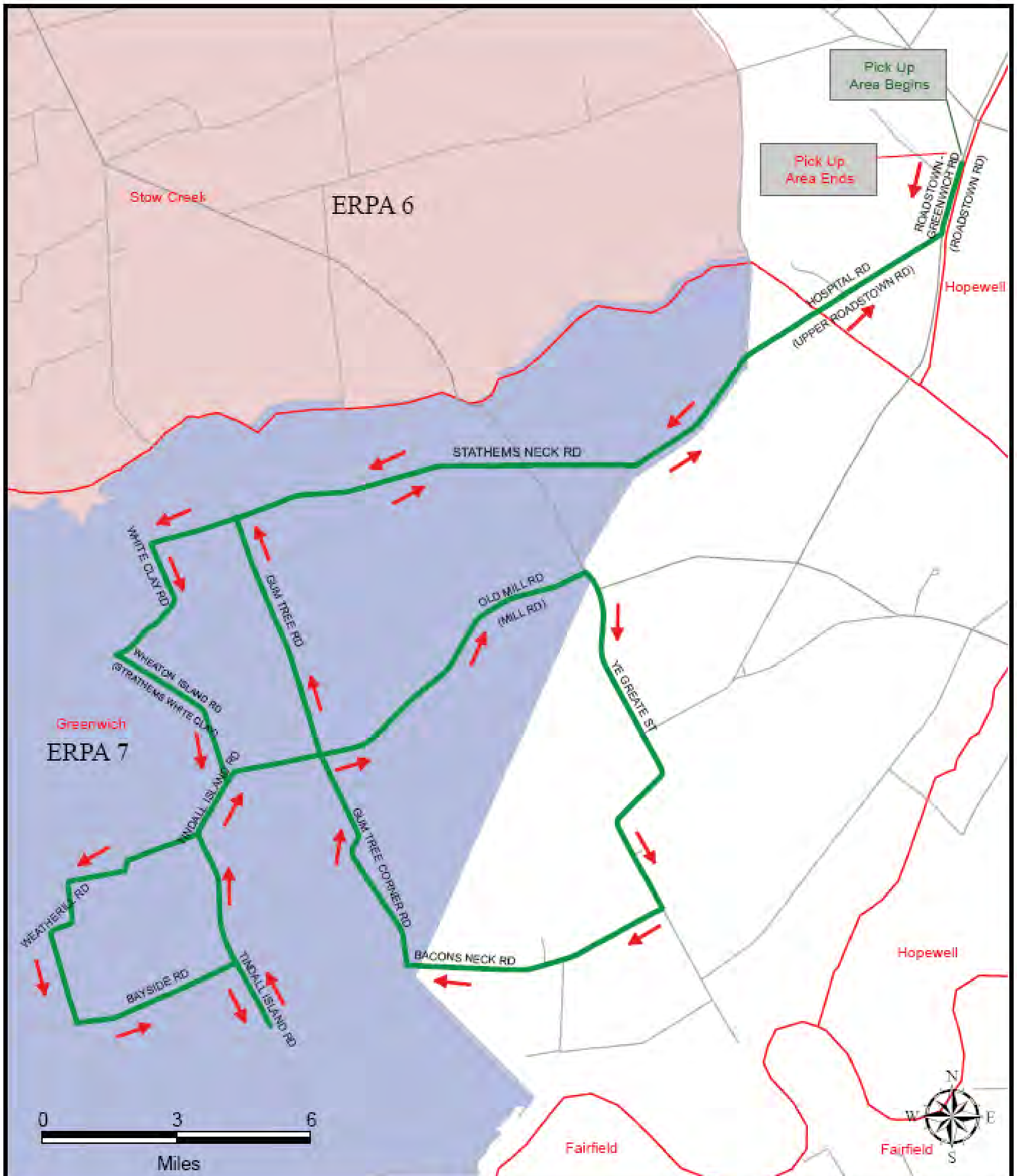
General Evacuation Bus Route #4
MANNINGTON
ERPA 4



General Evacuation Bus Route #5
PENNSVILLE
ERPA 5



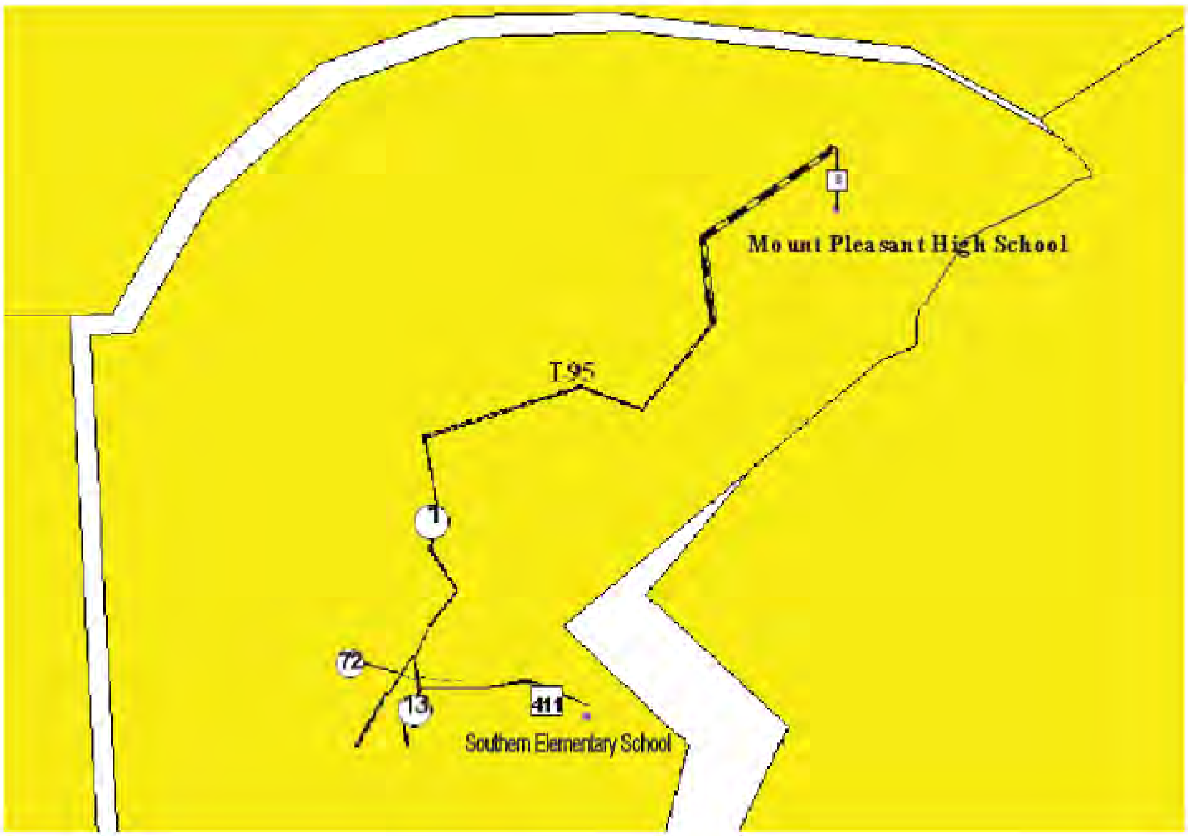
General Evacuation Bus Route #6
STOW CREEK
ERPA 6



General Evacuation Bus Route #7
GREENWICH
ERPA 7

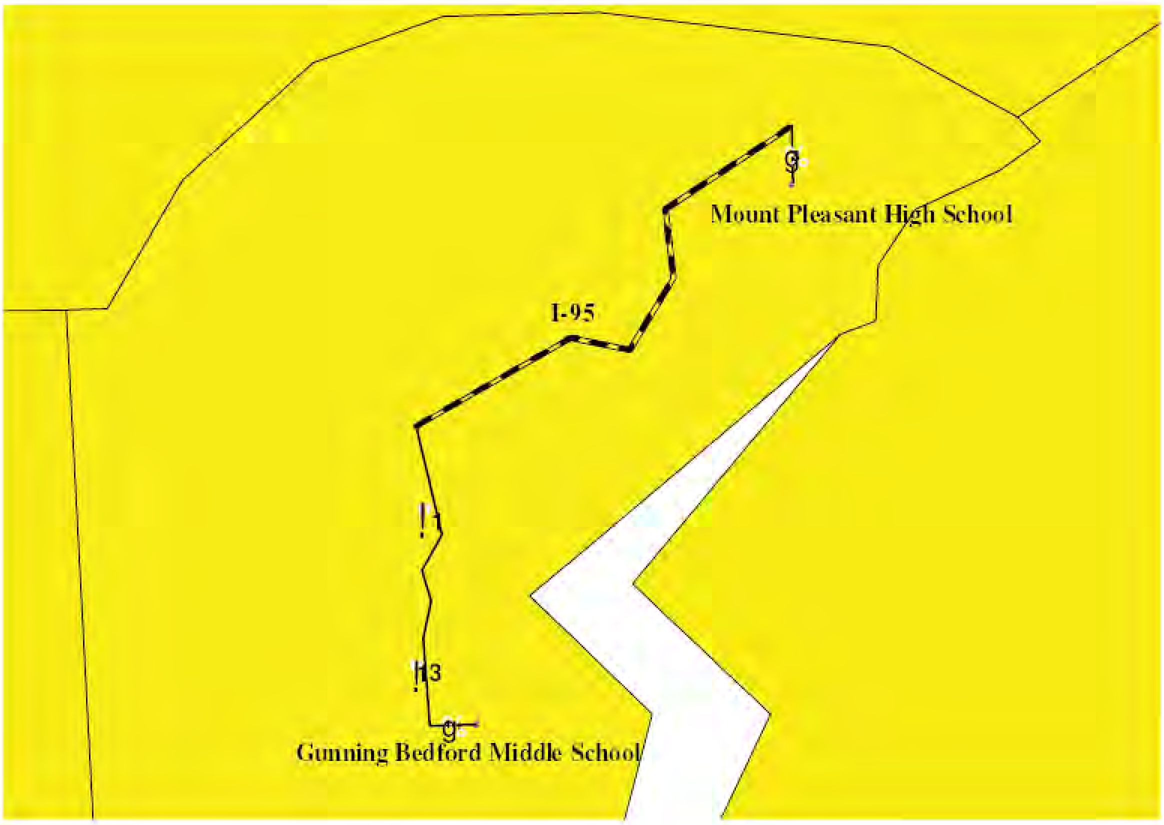
ATTACHMENT 1100-A6

SOUTHERN ELEMENTARY SCHOOL TO
MT. PLEASANT HIGH SCHOOL



ATTACHMENT 1100-A7

GUNNING BEDFORD MIDDLE SCHOOL TO MOUNT PLEASANT HIGH SCHOOL



ATTACHMENT 1100-A8

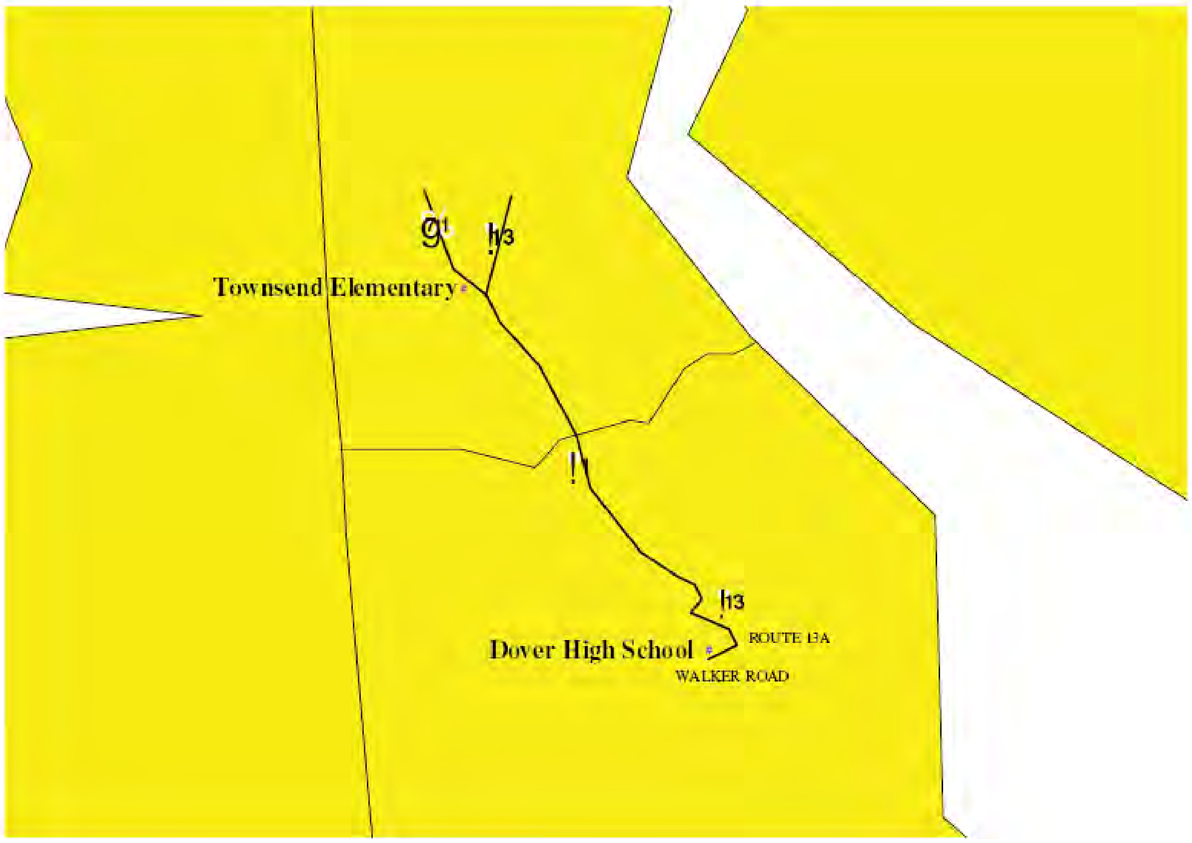
CEDAR LANE ELEMENTARY SCHOOL TO DOVER HIGH SCHOOL

ATTACHMENT 1100-A9

SILVER LAKE ELEMENTARY TO DOVER HIGH SCHOOL

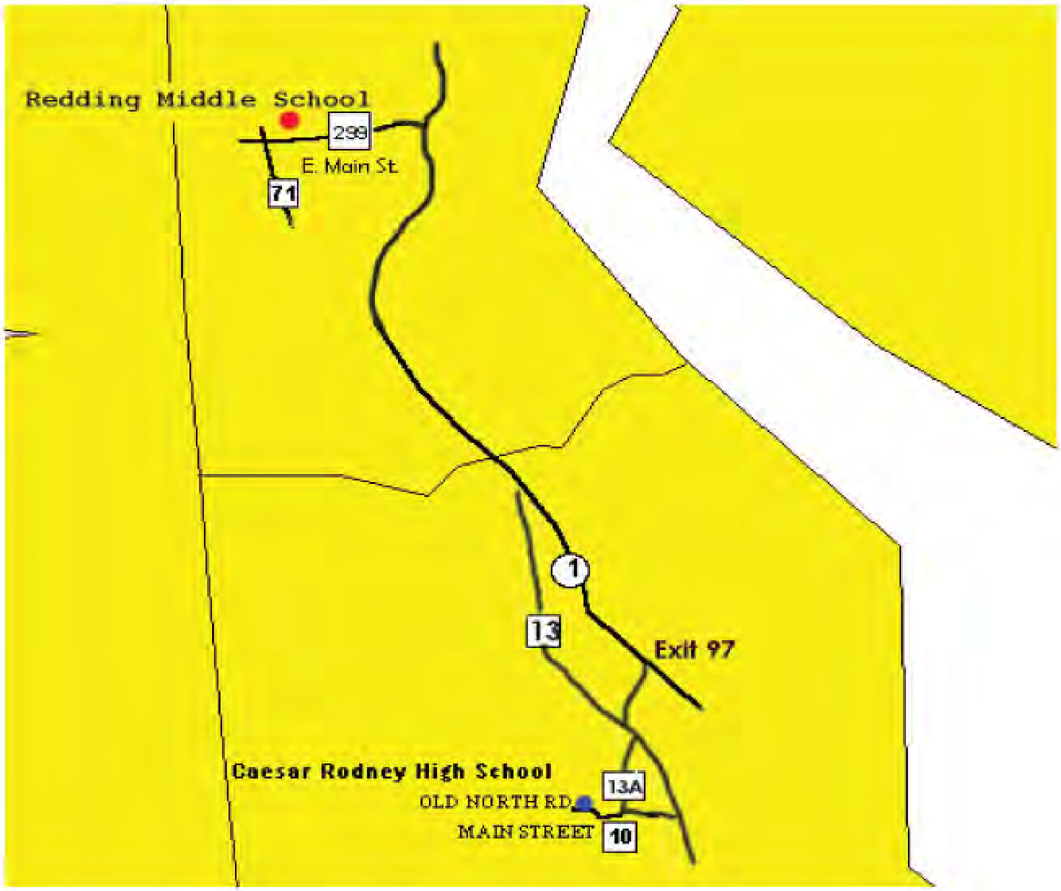
ATTACHMENT 1100-A10

TOWNSEND ELEMENTARY TO DOVER HIGH SCHOOL



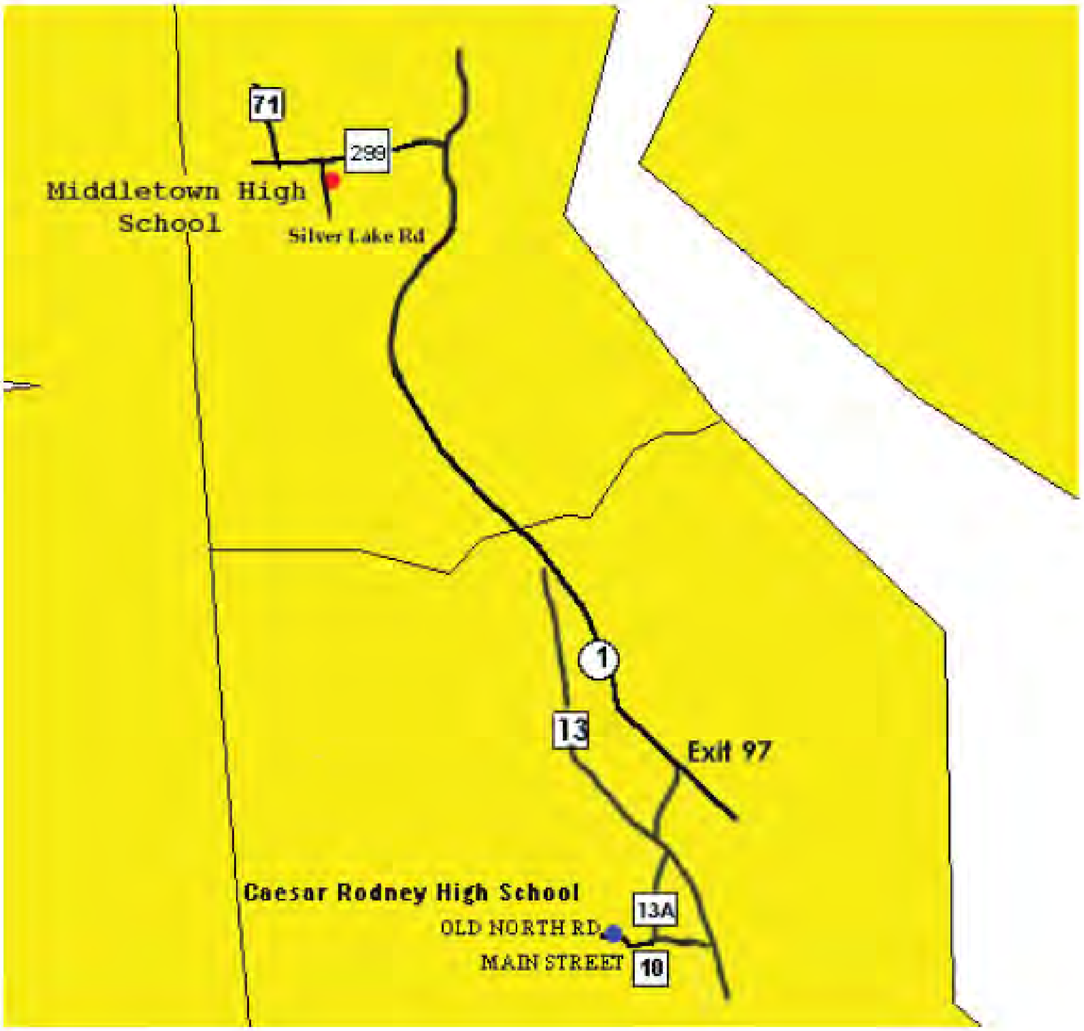
ATTACHMENT 1100-A11

REDDING MIDDLE SCHOOL TO
CAESAR RODNEY HIGH SCHOOL



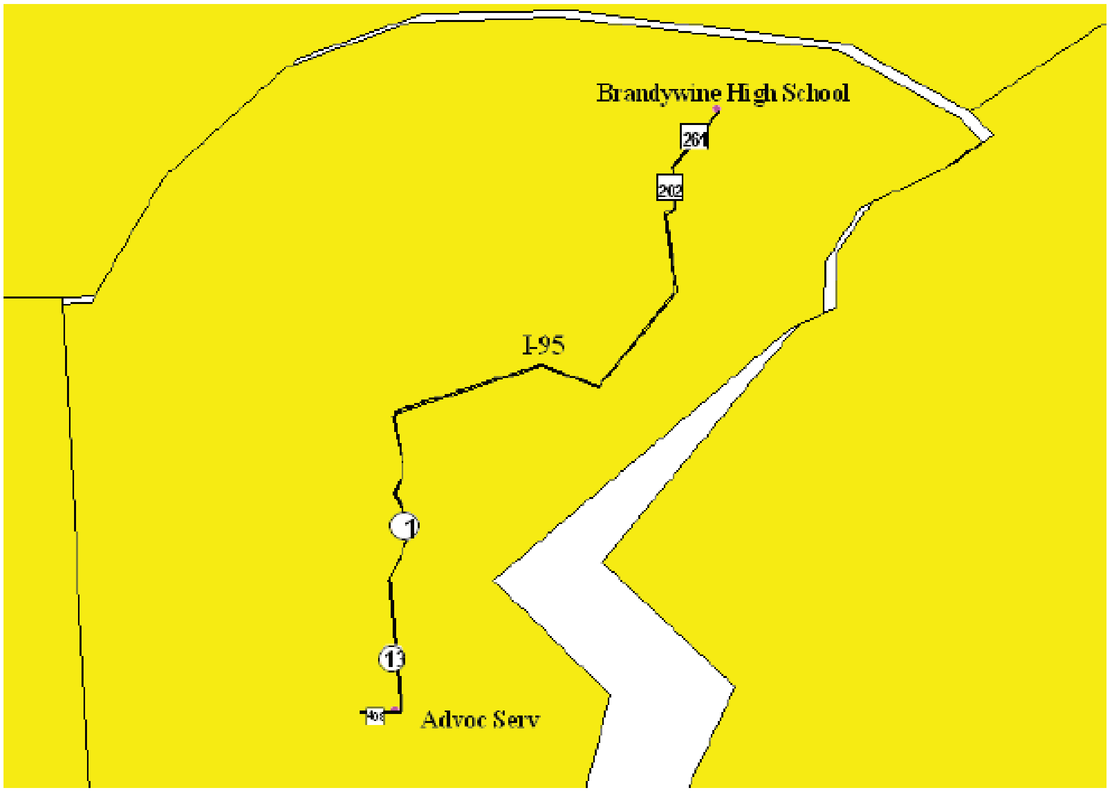
ATTACHMENT 1100-A12

MIDDLETOWN HIGH SCHOOL TO CAESAR RODNEY HIGH SCHOOL



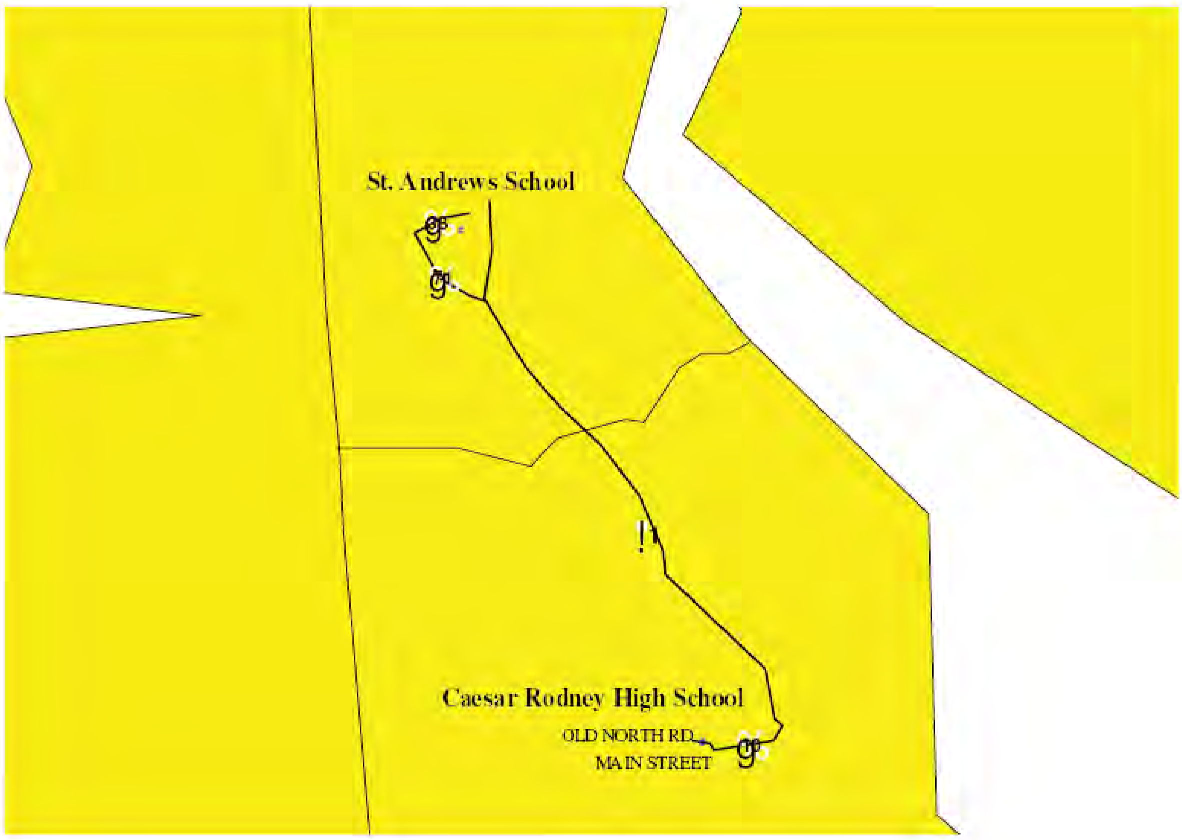
ATTACHMENT 1100-A13

ADVOC SERV SCHOOL TO BRANDYWINE HIGH SCHOOL



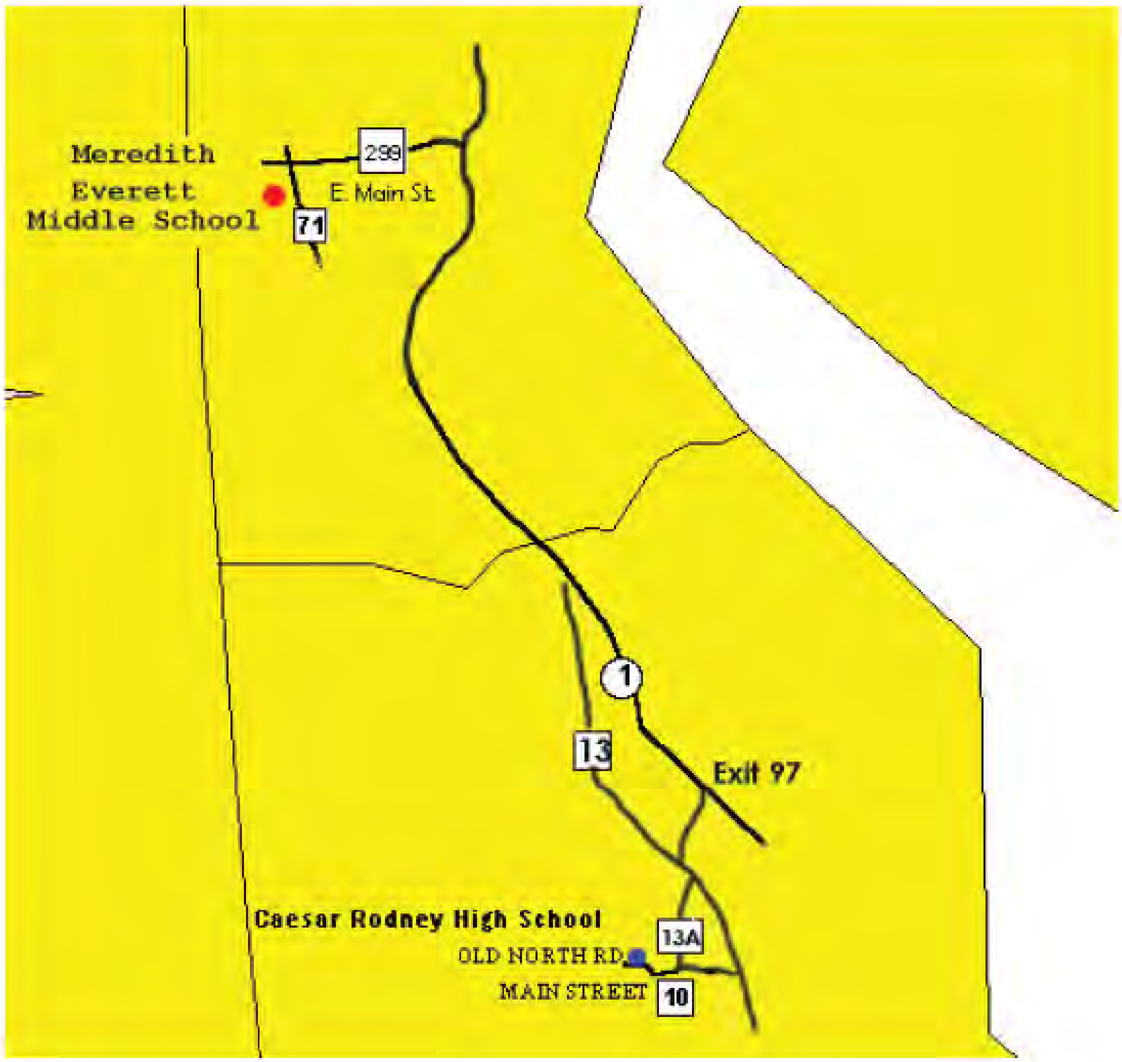
ATTACHMENT 1100-A14

ST. ANDREWS SCHOOL TO CAESAR RODNEY HIGH SCHOOL



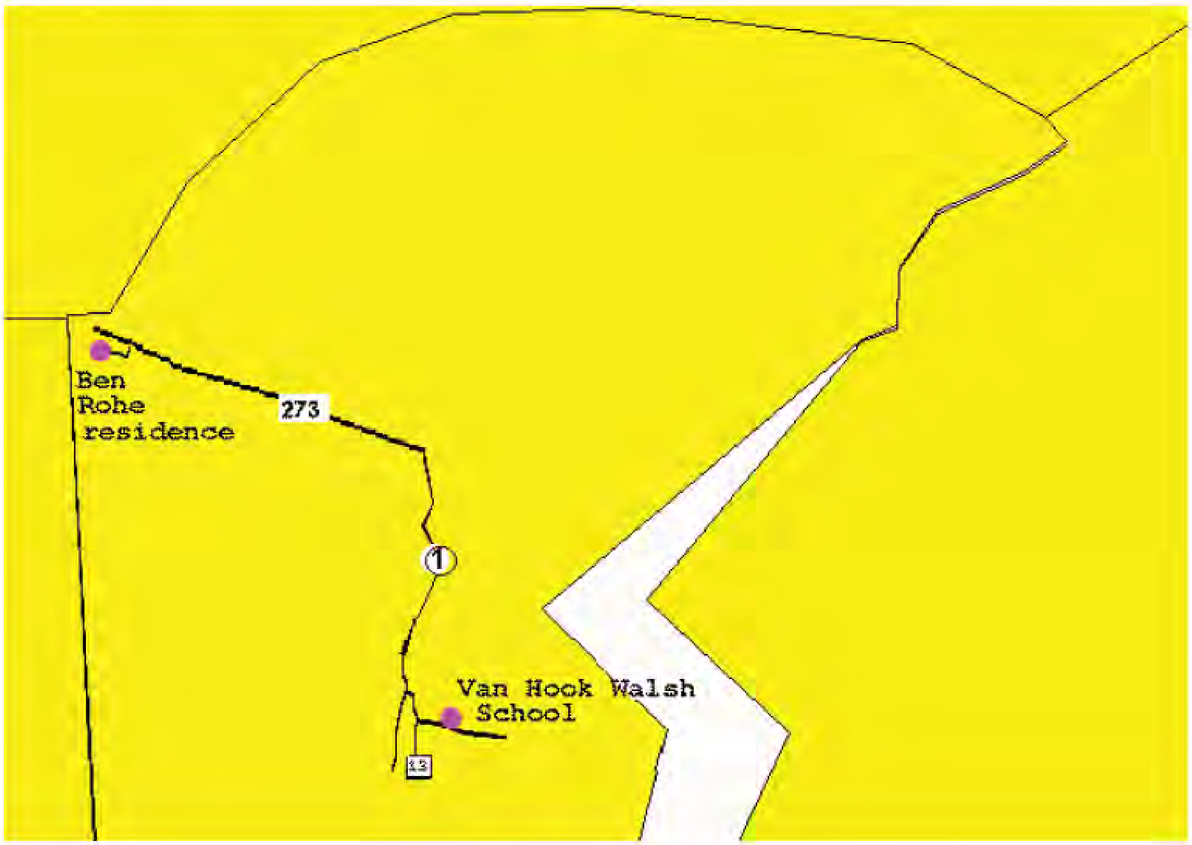
ATTACHMENT 1100-A15

EVERETT MEREDITH MIDDLE SCHOOL TO CAESAR RODNEY HIGH SCHOOL



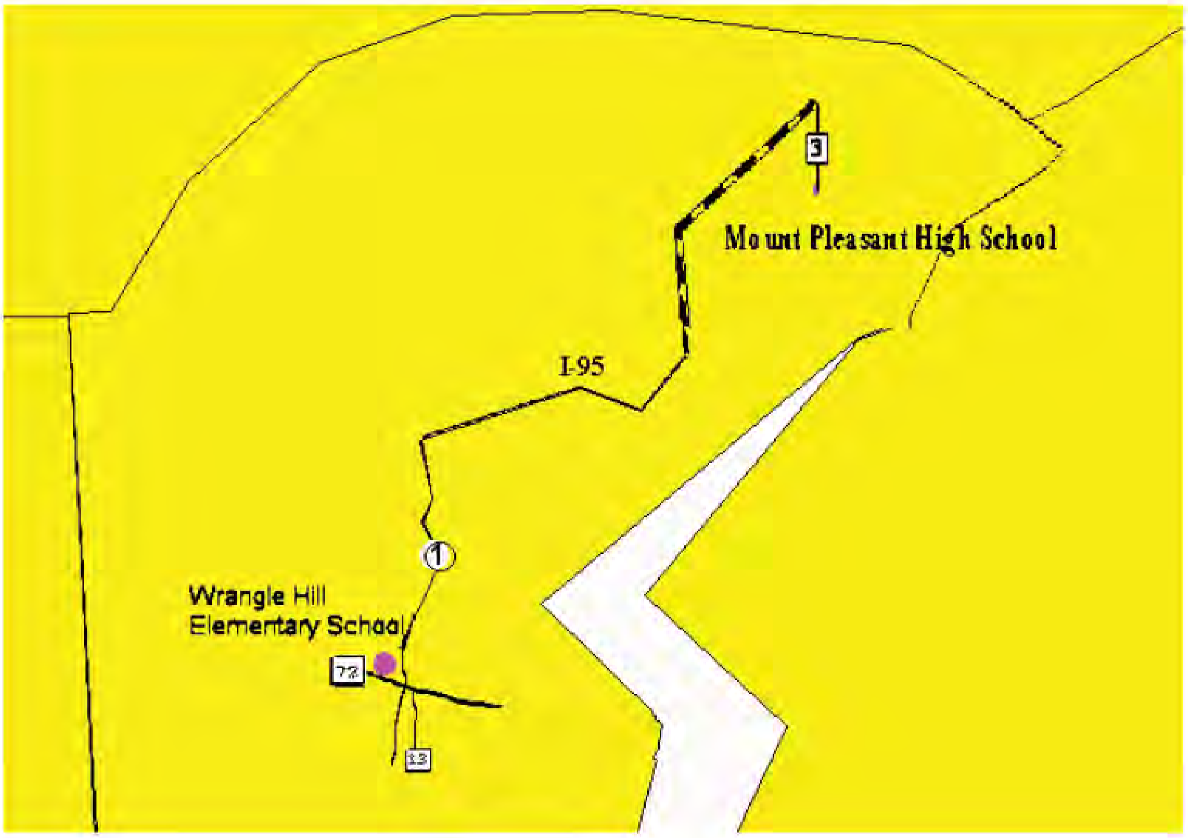
ATTACHMENT 1100-A16

VAN HOOK WALSH SCHOOL TO
BEN ROHE RESIDENCE
1134 POWDERHORN DRIVE
NEWARK, DE 19713



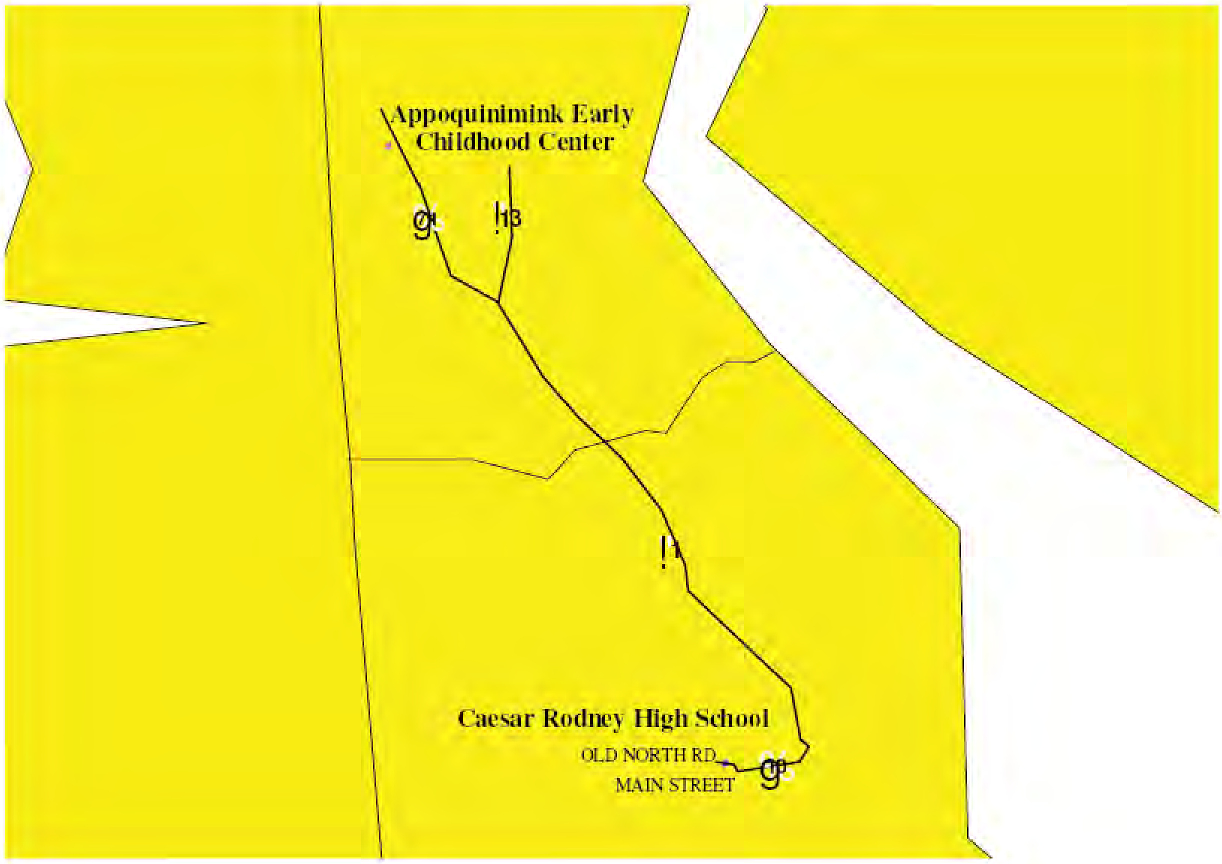
ATTACHMENT 1100-A21

WRANGLE HILL ELEMENTARY SCHOOL TO MT. PLEASANT HIGH SCHOOL



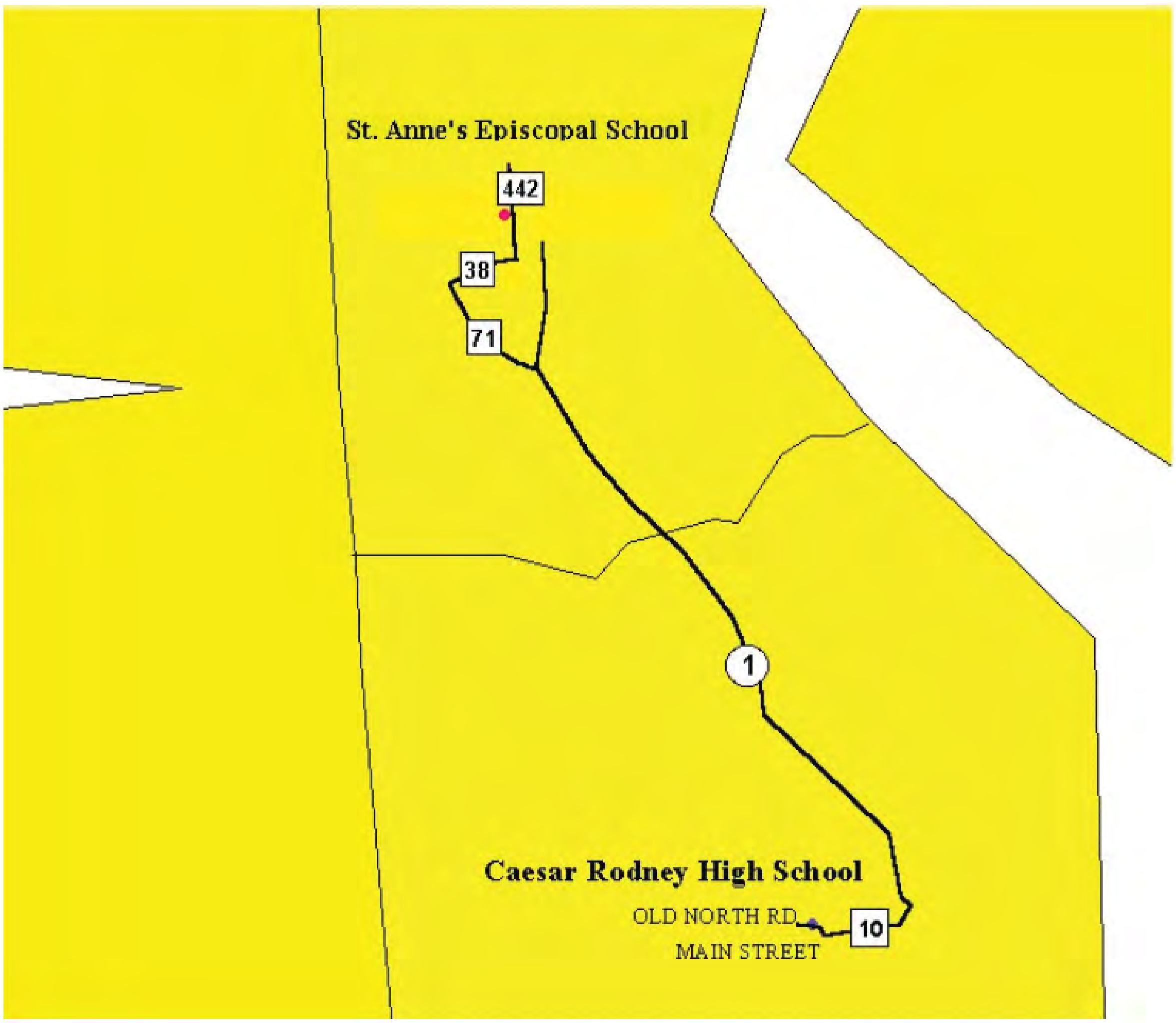
ATTACHMENT 1100-A22

APPOQUINIMINK EARLY CHILDHOOD CENTER TO CAESAR RODNEY HIGH SCHOOL



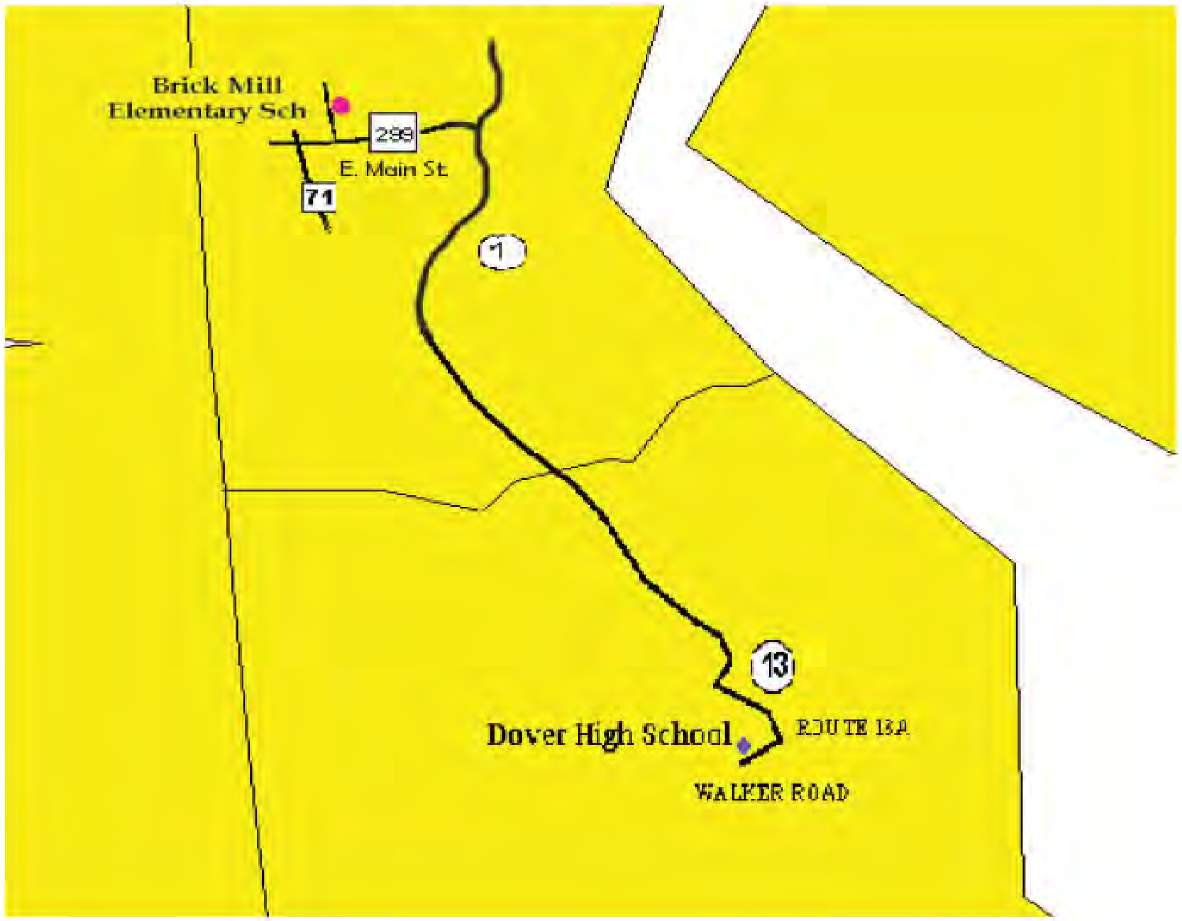
ATTACHMENT 1100 A-24

ST. ANNE'S EPISCOPAL SCHOOL TO
CAESAR RODNEY HIGH SCHOOL



ATTACHMENT 1100-A26

BRICK MILL ELEMENTARY SCHOOL TO DOVER HIGH SCHOOL

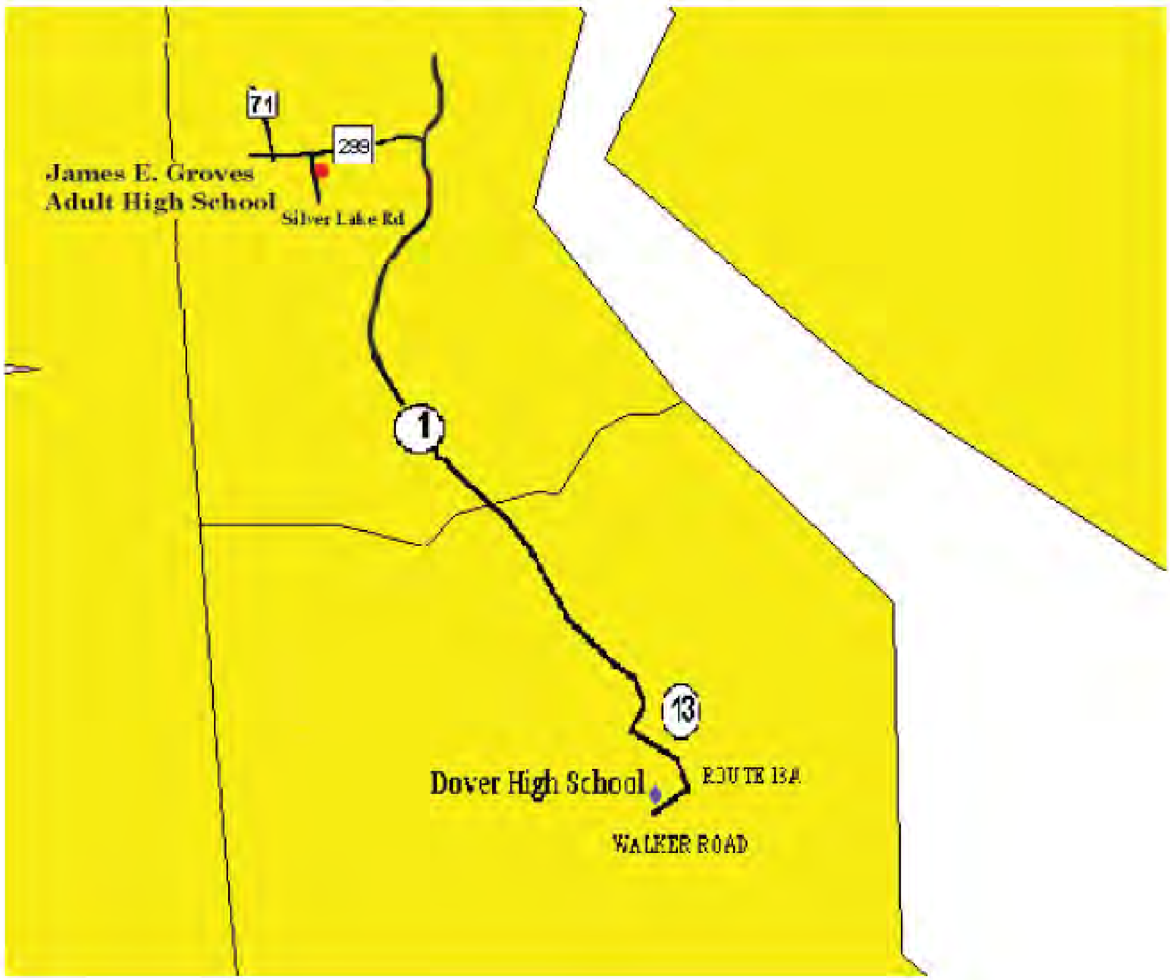


ATTACHMENT 1100 A-25
TOWNSEND EARLY CHILDHOOD CENTER TO
DOVER HIGH SCHOOL

TRAVEL SOUTH ON ROUTE 71 TO ROUTE 13. TRAVEL SOUTH ON ROUTE 13 TO ROUTE 1 JUST NORTH OF SMYRNA. TRAVEL SOUTH ON ROUTE 1 TO ROUTE 13 (NORTH DOVER EXIT). TRAVEL SOUTH ON ROUTE 13 TO ROUTE 13A (STATE STREET). TAKE ROUTE 13A SOUTH TO WALKER ROAD TO DOVER HIGH SCHOOL.

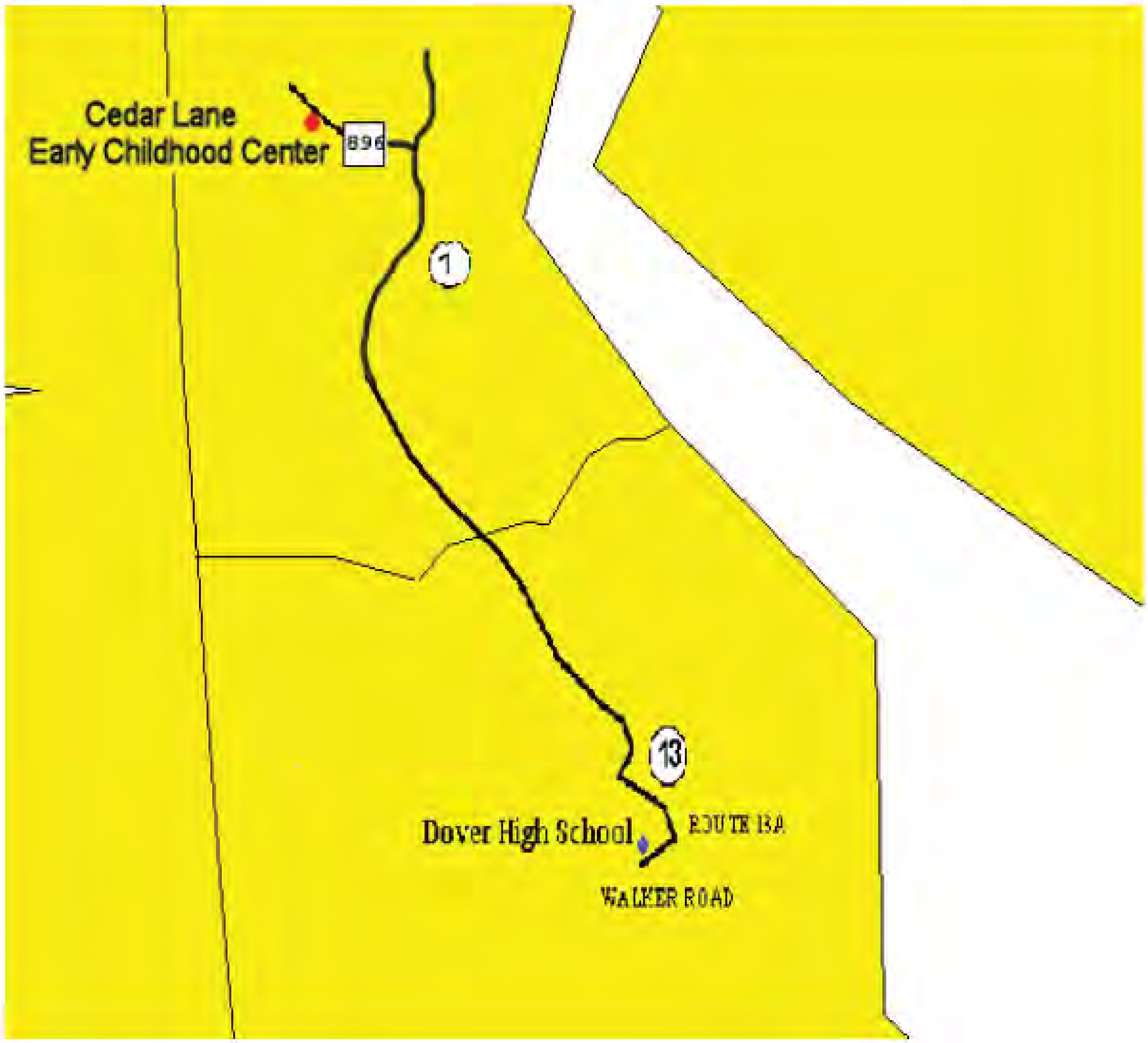
ATTACHMENT 1100-A27

JAMES H. GROVES ADULT HIGH SCHOOL TO DOVER HIGH SCHOOL



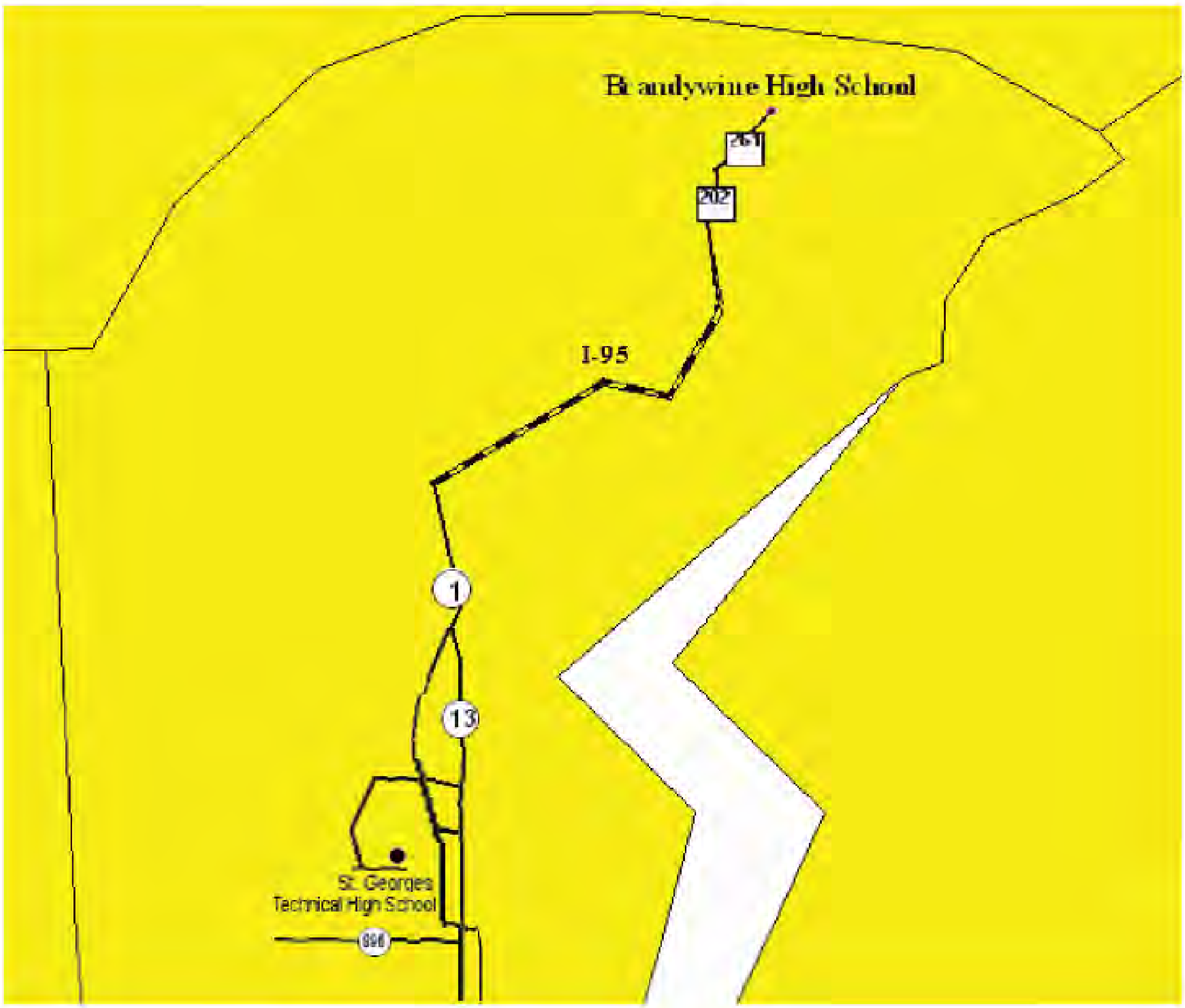
ATTACHMENT 1100-A32

CEDAR LANE EARLY CHILDHOOD CENTER TO DOVER HIGH SCHOOL



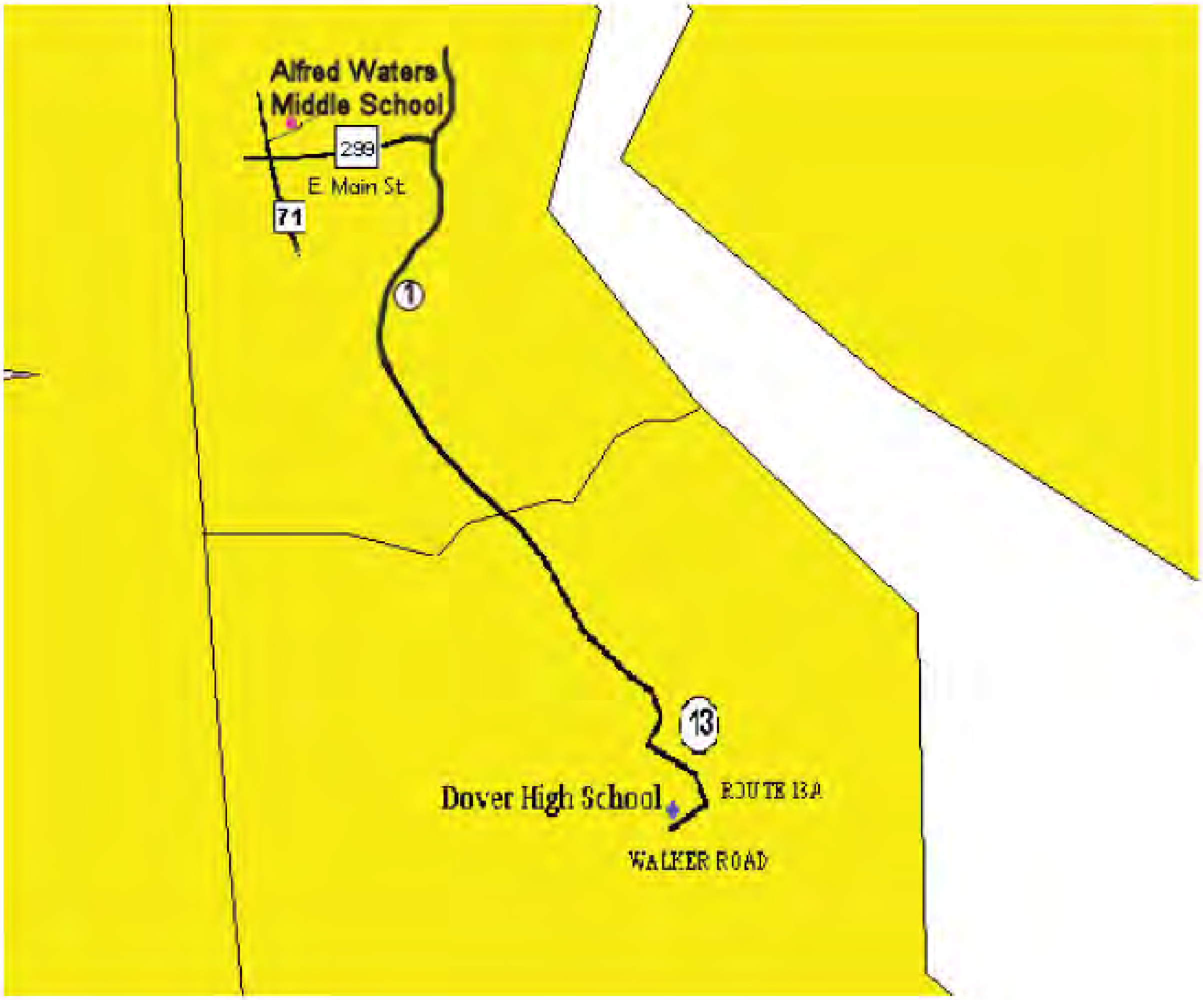
ATTACHMENT 1100-A34

ST. GEORGES TECHNICAL HIGH SCHOOL TO BRANDYWINE HIGH SCHOOL



ATTACHMENT 1100-A35

ALFRED WATERS MIDDLE SCHOOL TO DOVER HIGH SCHOOL



APPENDIX N

The Proposed Causeway Sensitivity Study

APPENDIX N: THE PROPOSED CAUSEWAY SENSITIVITY STUDY

1. INTRODUCTION

PSEG Power requested Sargent & Lundy LLC to prepare a feasibility study for constructing an alternate construction access road to the PSEG Site. The alternate route would be an elevated causeway linking local roads in Elsinboro Township with the existing site access road located within the Owners Controlled Area (OCA) of the PSEG Nuclear property. The alternate access road would be approximately 4.75 miles in length. A conceptual three lane roadway layout was developed for the feasibility study. A three lane roadway was selected in that three lanes would provide flexibility for changing the traffic pattern to and from the site during peak traffic hours; allow for wide loads when transporting equipment to and from the site; and allow for roadway maintenance or lane closure without significant disruption of traffic flow to and from the site. A copy of the conceptual roadway layout has been provided as Figure N-1.

This appendix studies the effect on evacuation time estimates (ETE) of using the proposed causeway as an additional access road to the site during peak construction of the proposed new plant at the PSEG Site.

2. METHODOLOGY

Figure 1-2 displays the link-node analysis network that was used to model the roadway system surrounding the PSEG Site and to compute ETE. Figures K-1 through K-25 provide additional detail of the link-node analysis network. The link-node analysis network was modified to include the proposed causeway. As shown in Figure N-2, nodes 1201, 1202 and 1203 and the links connecting these nodes in a northbound direction were added to the analysis network to represent the proposed causeway.

It is likely that traffic traveling northbound on the proposed causeway would use Amwellbury Rd to bypass Route 624 which has reduced speed limits through Fort Elfsborg and Oakwood Beach. Nodes 1204, 1205, 1206, 1207 and 1208 and the links connecting these nodes northbound along Amwellbury Rd were added to the analysis network to represent this bypass movement; Figure N-3 shows these links and nodes.

The proposed causeway and Amwellbury Rd were modeled as a single lane road outbound with a free speed of 50 mph and a capacity of 1,700 vehicles per hour per lane. Table K-1 provides the characteristics of all links in the analysis network. Table N-1 summarizes the characteristics of the links added to model the proposed causeway and Amwellbury Rd.

The vehicles used by existing employees at the operational Salem and Hope Creek units

and those vehicles associated with refueling of one of the operational units were loaded eastbound on the existing access road. Those vehicles at the site associated with the construction of, and operations at, the new plant were loaded northbound on the proposed causeway.

3. RESULTS

As noted on page I-3, a sensitivity study was conducted to determine the effect on ETE of adding an additional travel lane to the existing site access road. The cases considered were Scenario 13, Regions R01, R02 and R03; winter, midweek, midday, good weather evacuations for the two-mile region, five-mile region and entire EPZ during peak construction of the new plant coincident with refueling of one of the operational units. This addendum considers a third configuration – the addition of the proposed causeway as an additional access road to the PSEG Site. Table N-2 compares the ETE for the three possible roadway configurations for Regions R01, R02 and R03 at the 90^{th}, 95^{th} and 100^{th} percentiles.

As shown in Table N-2, there are significant ETE benefits for Regions R01 and R02 when using the proposed causeway, while the ETE for Region R03 are unaffected. As discussed in Section 7.2, the bottleneck for traffic evacuating in the New Jersey portion of the EPZ is Salem City. Many of the construction workers for the base case are evacuating northbound on Salem-Hancocks Bridge Rd toward Salem City and eastbound along Beasley Neck Rd and Harmersville Pecks Corner Rd to avoid the congestion in Salem City and travel out of the EPZ. Congestion propagates downstream along the access road from the signalized intersection with Salem-Hancocks Bridge Rd within the 2-mile and 5-mile regions. Adding the proposed causeway provides an additional northbound evacuation route and allows traffic to clear the 2-mile region forty minutes earlier at both the 90^{th} and 95^{th} percentiles relative to the existing access road for an evacuation of Region R01. The ETE is reduced by 10 minutes and 25 minutes for the 90^{th} and 95^{th} percentiles, respectively, for an evacuation of Region R02. Region R03, however, includes Salem City. The last of the congestion to clear during an evacuation is in Salem. The use of the proposed causeway as an additional evacuation route allows vehicles to leave the 2 and 5-mile regions more effectively; however, the bottleneck in Salem is not alleviated and the ETE for the entire EPZ is unaffected.

Figures N-4, N-5 and N-6 plot evacuating vehicles versus elapsed time after the advisory to evacuate for Regions R01, R02 and R03, respectively. As shown in Figures N-4 and N-5, the curve representing the proposed causeway alternative has a steeper slope due to the additional capacity of the extra evacuation route northbound. This additional capacity leads to faster ETE at the 90^{th} and 95^{th} percentiles. The 100^{th} percentile is not affected as it is dictated by the trip generation time, as discussed in Sections 7.2 and 7.3. Figure N-6 indicates that the ETE are nearly identical (curves are coincident) for all alternatives, which is to be expected as the ETE are dictated by the clearance of congestion within Salem City. This congestion is not alleviated by an additional lane on the existing access road or by the

use of the proposed causeway.

Figures N-7 through N-9 present the congestion patterns for an evacuation of Region R01 with the existing access road configuration, while Figures N-10 through N-12 present the congestion patterns for an evacuation of Region R01 with the proposed causeway. As shown in Figures N-7 and N-8, there is congestion on the access road within the 2-mile and 5-mile radii for two hours after the advisory to evacuate (ATE). Figure N-10 shows that there is congestion within the 2-mile and 5-mile radii at one hour after the advisory to evacuate (ATE); however, congestion within both radii is clear by 2 hours after the ATE (Figure N-11). Figures N-9 and N-12 indicate that congestion within the EPZ is clear by 3 hours after the ATE for both the existing access road configuration and the proposed causeway.

4. CONCLUSIONS

The proposed causeway would significantly reduce ETE at the 90th and 95th percentiles for an evacuation of the 2-mile region (Region R01) and of the 5-mile region (Region R02). The ETE for an evacuation of the entire EPZ (Region R03) is unaffected by the addition of the proposed causeway, unless coupled with roadway improvements within Salem City.

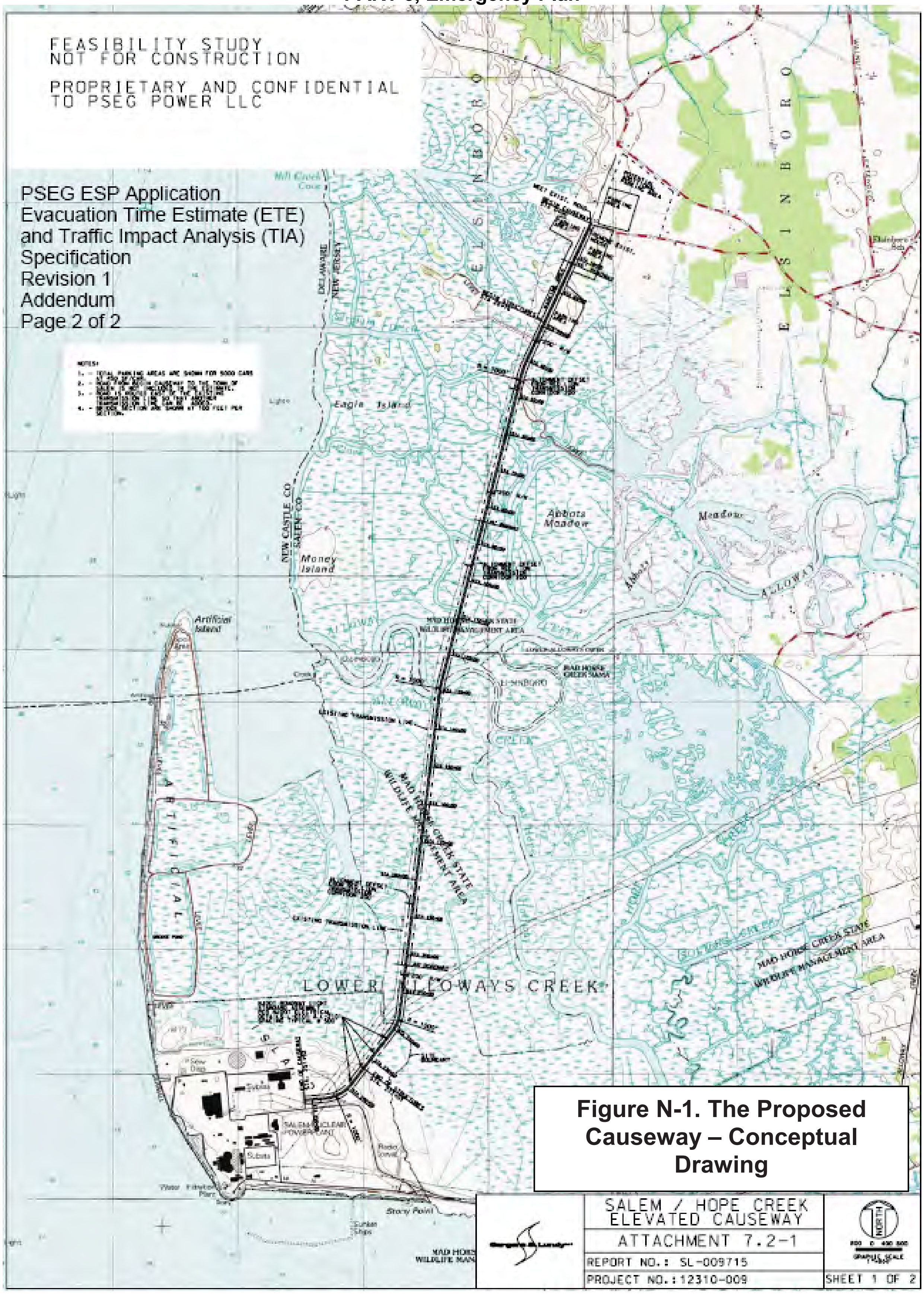


Figure N-1. The Proposed Causeway – Conceptual Drawing

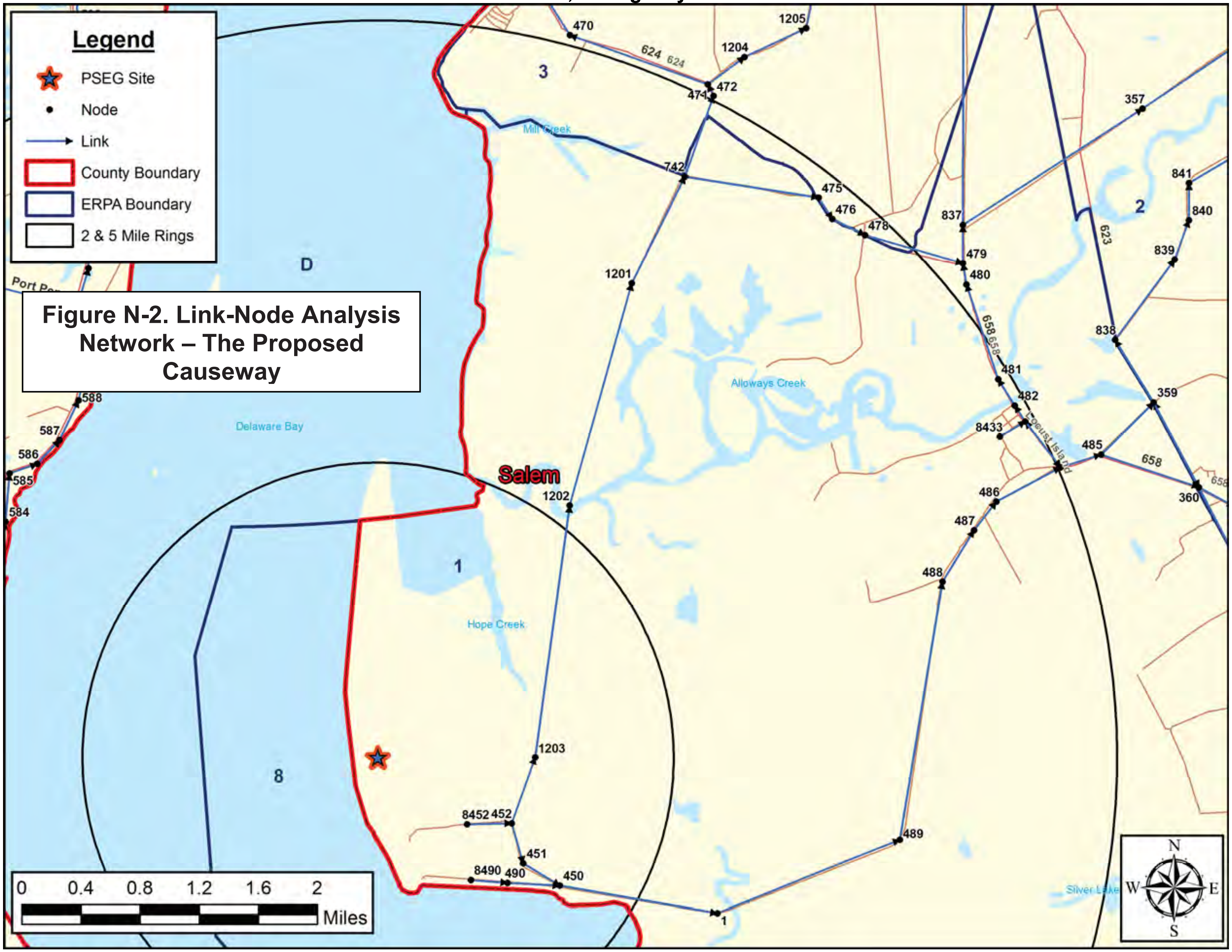


Figure N-2. Link-Node Analysis Network – The Proposed Causeway

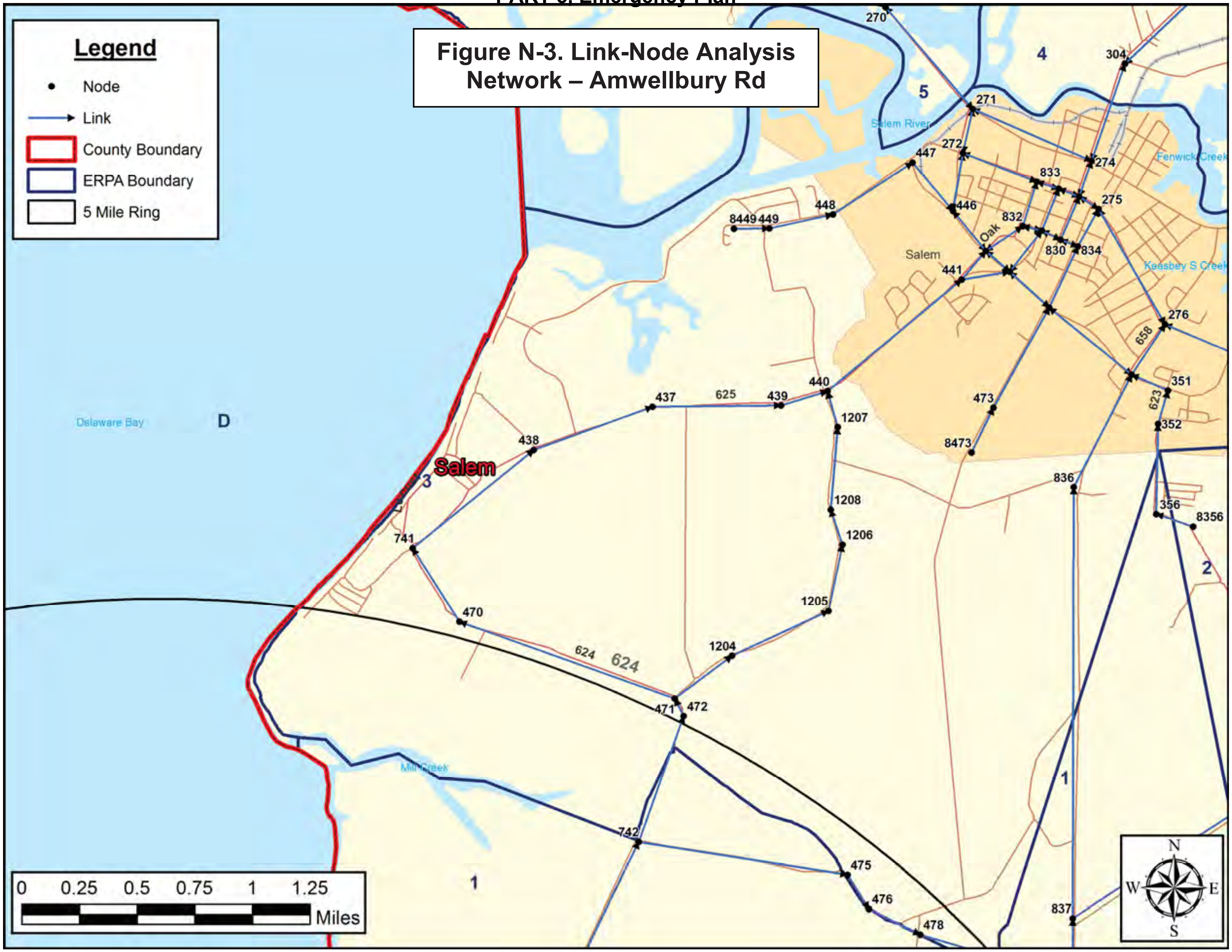


Figure N-3. Link-Node Analysis Network – Amwellbury Rd
Legend
Node
Link
County Boundary
ERPA Boundary
5 Mile Ring
Delaware Bay
D
Salem
Salem River
Fenwick Creek
Keasbey S Creek
Mill Creek
0 0.25 0.5 0.75 1 1.25
Miles
N
S
E
W

Table N-1. Evacuation Roadway Network Characteristics

Upstream Node Number	Downstream Node Number	Length (Feet)	Full Lanes	Saturation Flow Rate (Veh/hr/ln)	Free Flow Speed (MPH)
452	1203	2513.3	1	1700	50
471	1204	1637.9	1	1700	50
1201	742	4270.3	1	1700	50
1202	1201	8269.1	1	1700	50
1203	1202	9100.3	1	1700	50
1204	1205	2440.1	1	1700	50
1205	1206	1556.6	1	1700	50
1206	1208	845.6	1	1700	50
1207	440	857.6	1	1700	50
1208	1207	1900.8	1	1700	50

Table N-2. Evacuation Time Estimates for Construction Scenario			
Case	Evacuation Time Estimate for ***Region R01***		
	90th Percentile	95th Percentile	100th Percentile
Existing Access Road Configuration (Base)	2:25	2:35	4:00
2 Lane Access Road Outbound	2:25	2:35	4:00
The Proposed Causeway	1:45	1:55	4:00
Case	Evacuation Time Estimate for ***Region R02***		
	90th Percentile	95th Percentile	100th Percentile
Existing Access Road Configuration (Base)	1:50	2:15	4:10
2 Lane Access Road Outbound	1:50	2:15	4:10
The Proposed Causeway	1:40	1:50	4:10
Case	Evacuation Time Estimate for ***Region R03***		
	90th Percentile	95th Percentile	100th Percentile
Existing Access Road Configuration (Base)	2:45	3:05	6:10
2 Lane Access Road Outbound	2:45	3:05	6:10
The Proposed Causeway	2:45	3:05	6:10

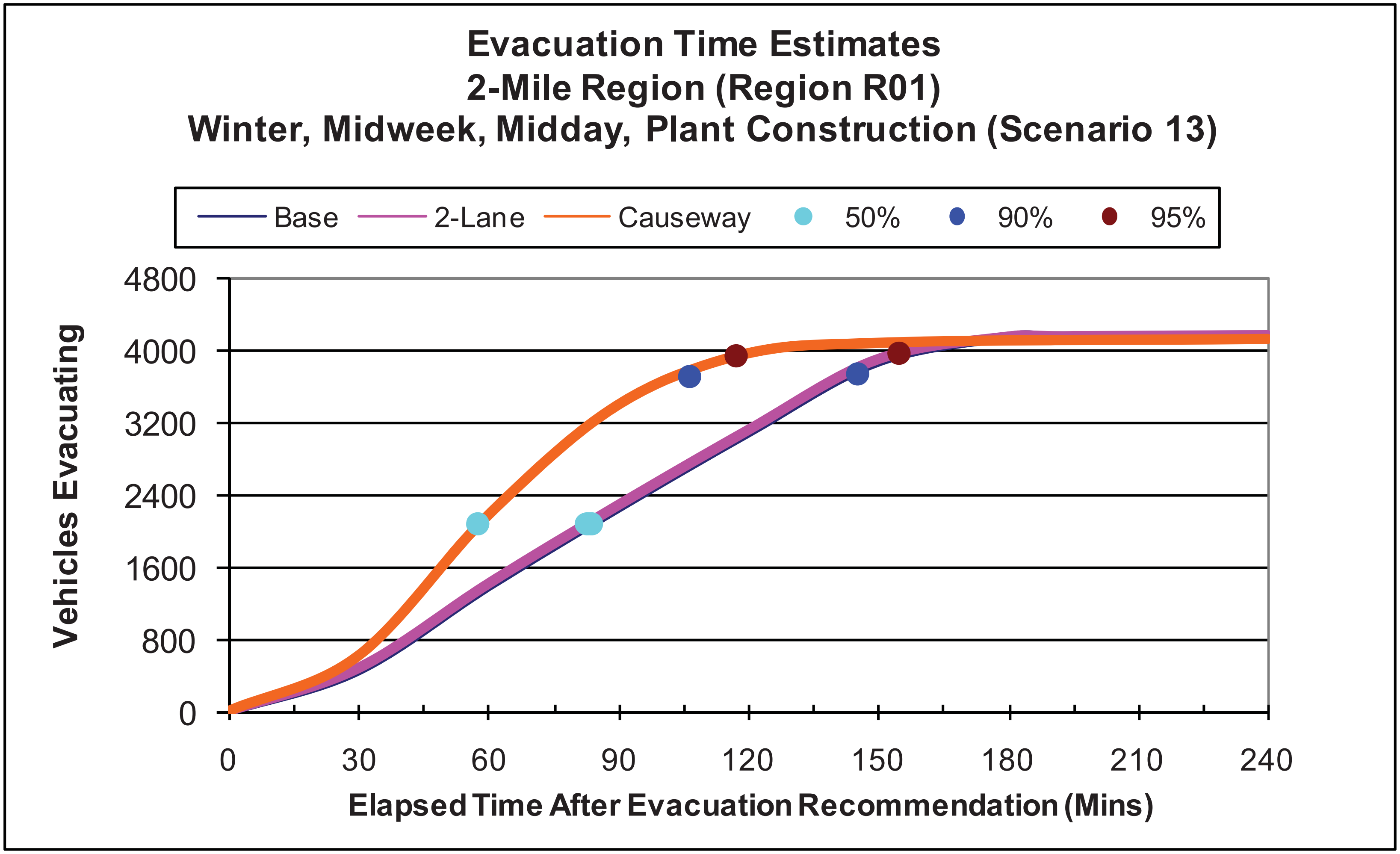


Figure N-4. Evacuation Time Estimate Plot for an Evacuation of the 2-Mile Region (Region R01)

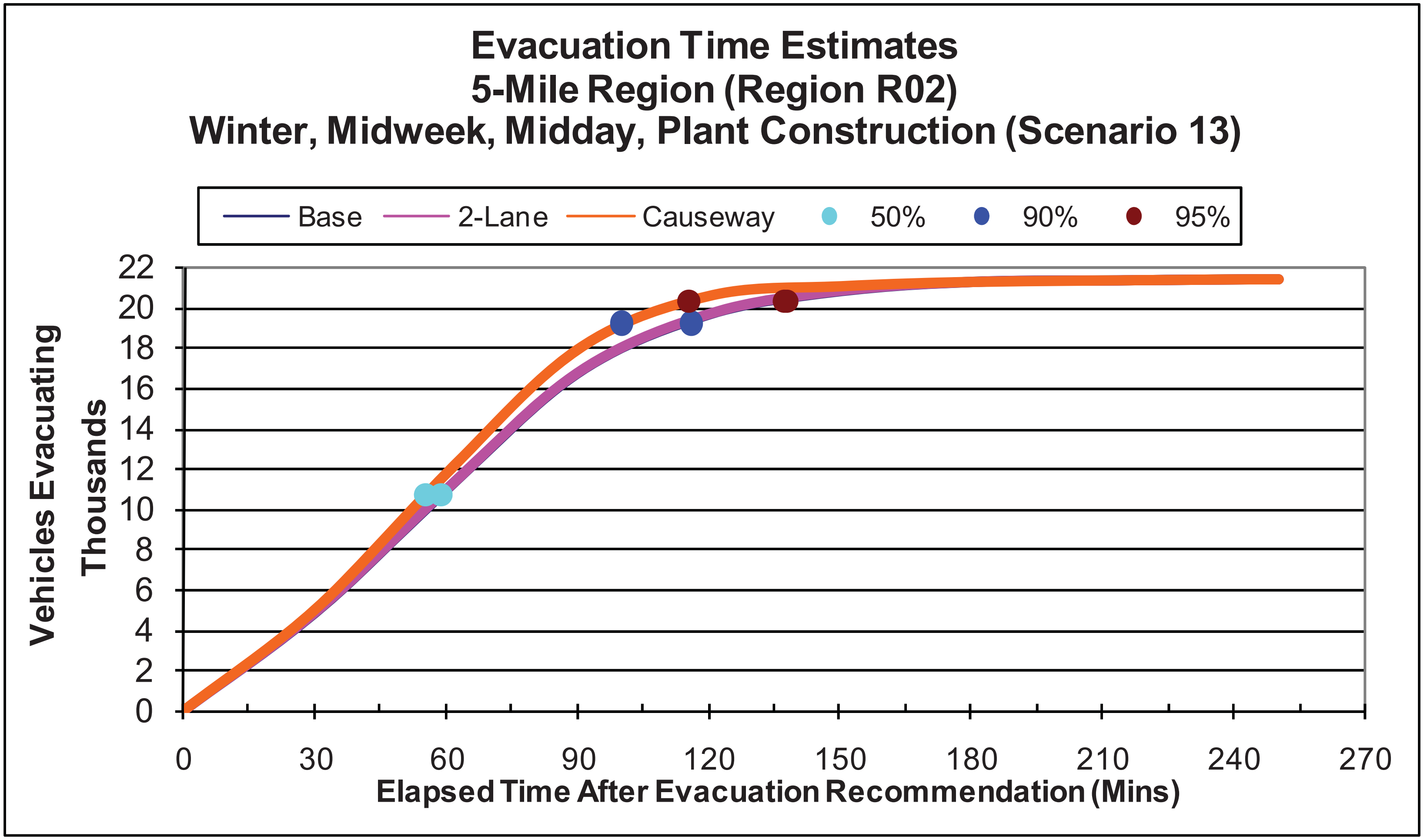


Figure N-5. Evacuation Time Estimate Plot for an Evacuation of the 5-Mile Region (Region R02)

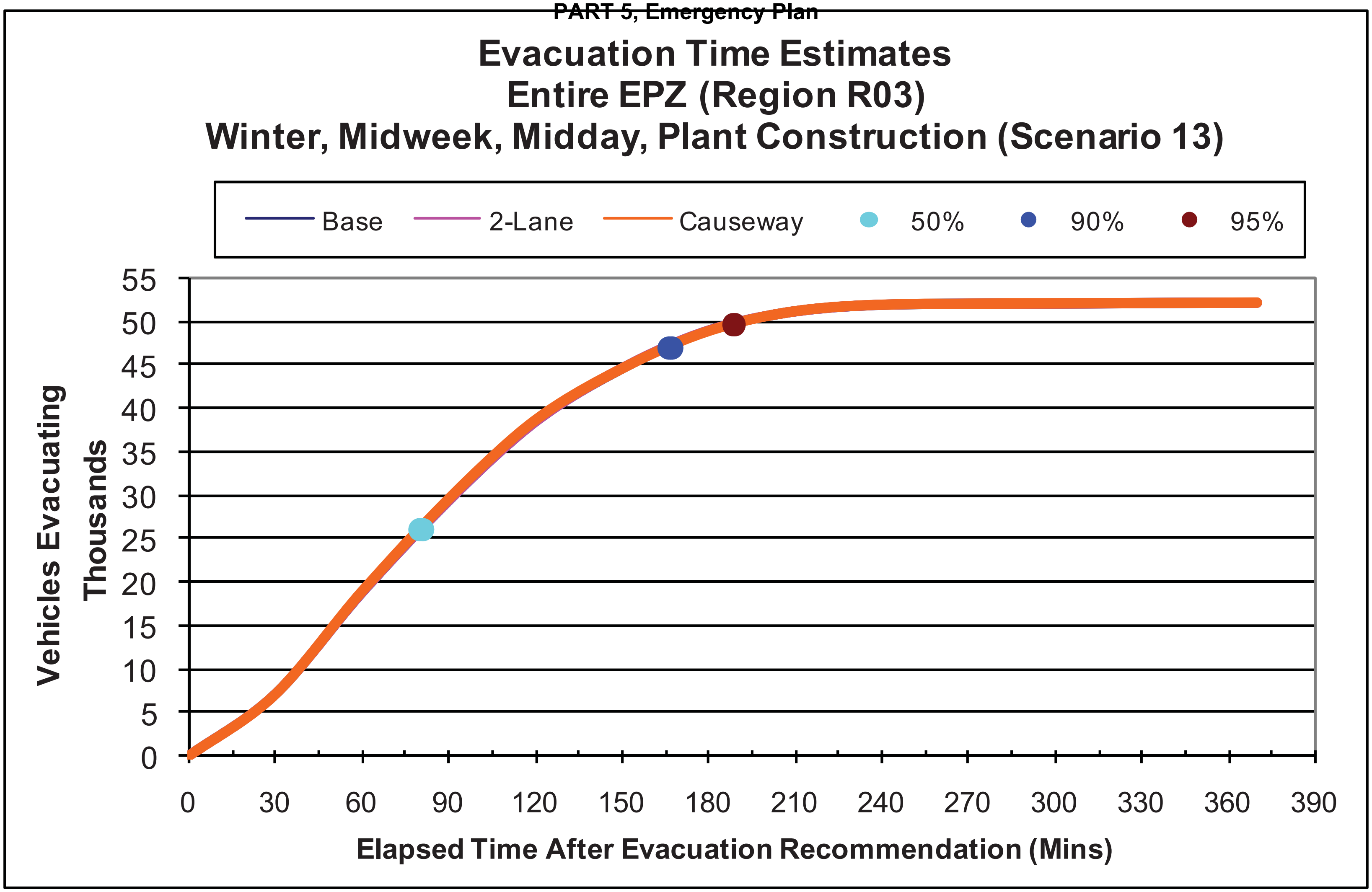


Figure N-6. Evacuation Time Estimate Plot for an Evacuation of the Entire EPZ (Region R03)

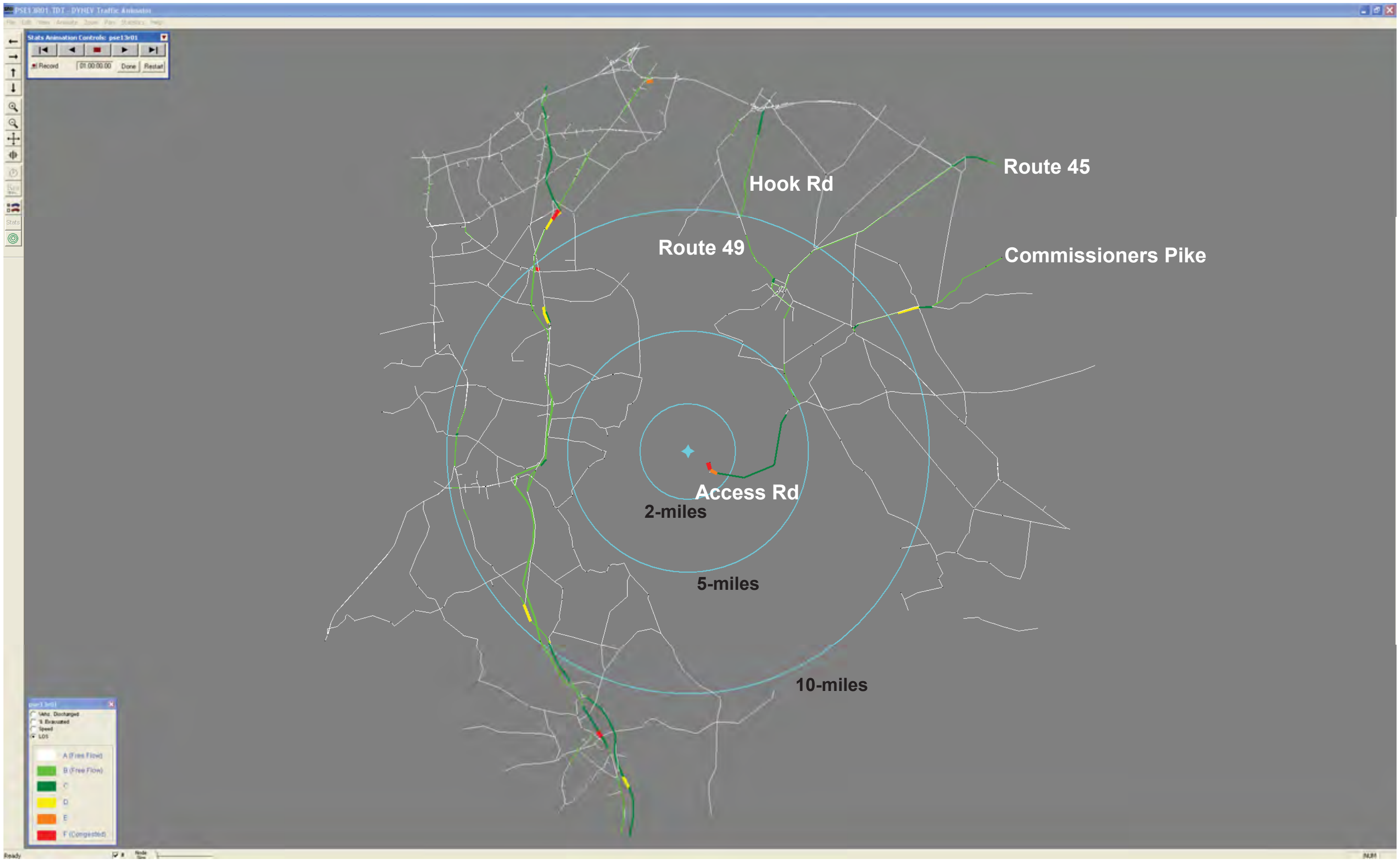


Figure N-7. Congestion Patterns for Base Case at *1 Hour* after the Advisory to Evacuate (Existing Access Road – Region R01)

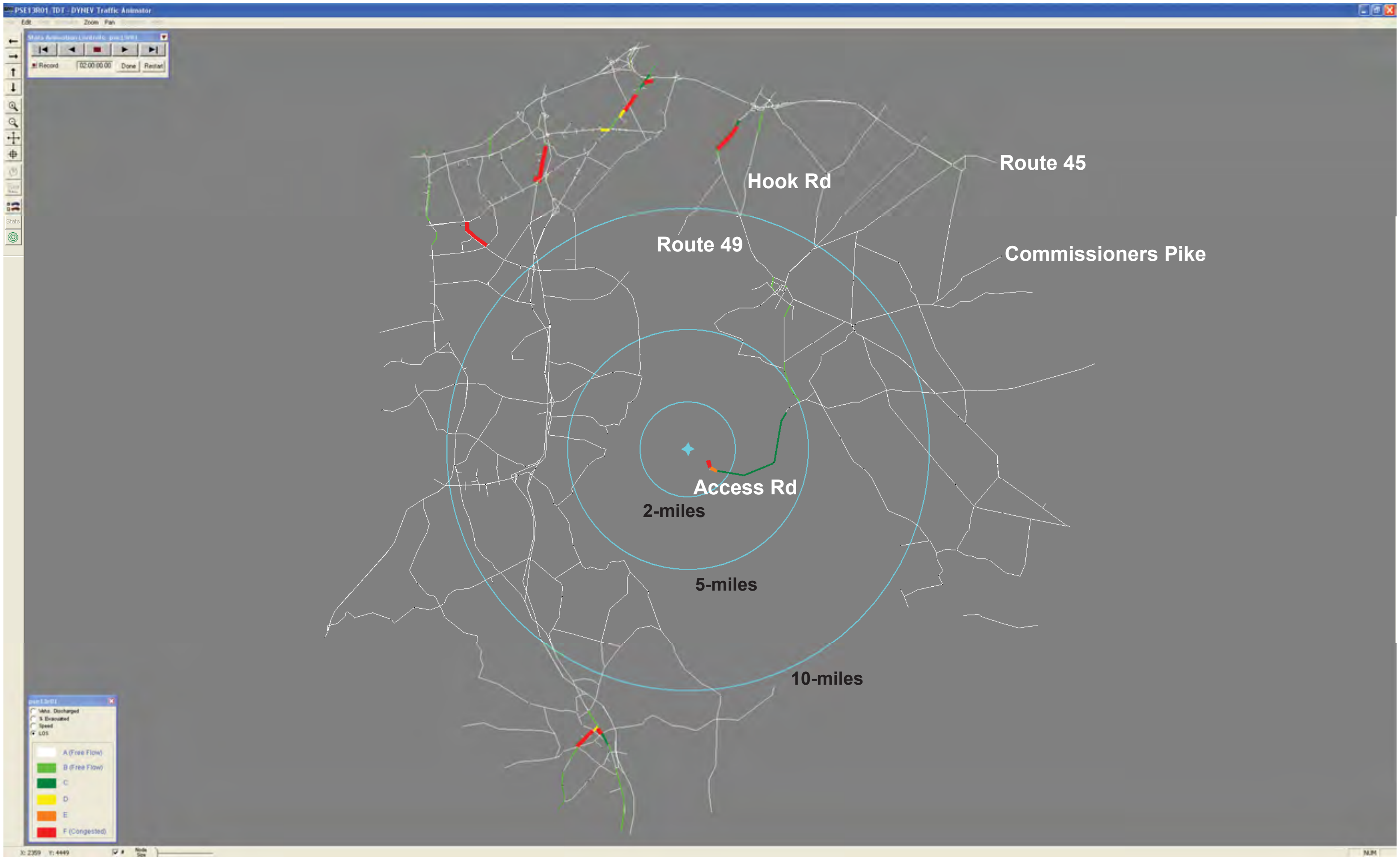


Figure N-8. Congestion Patterns for Base Case at *2 Hours* after the Advisory to Evacuate (Existing Access Road – Region R01)

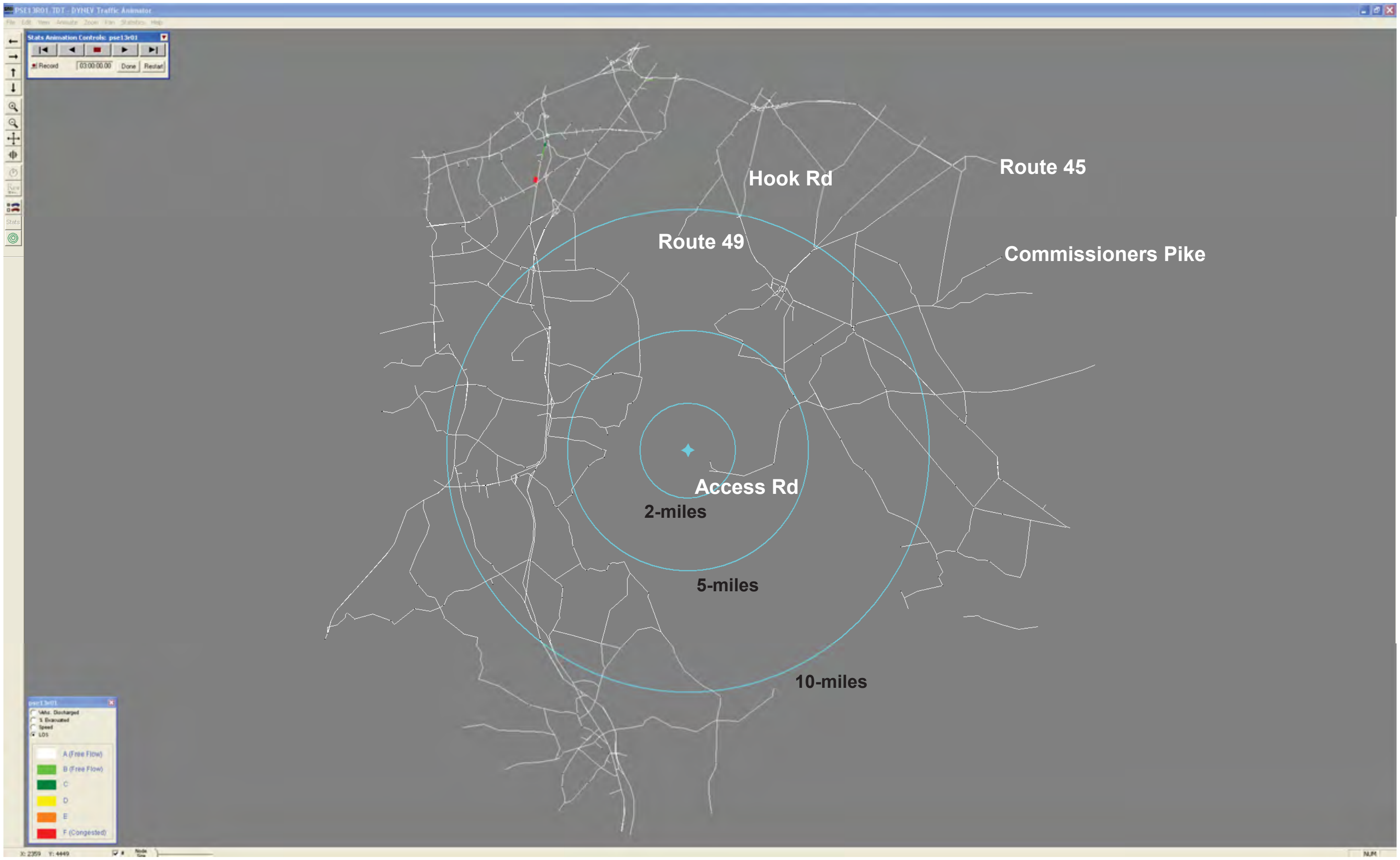


Figure N-9. Congestion Patterns for Base Case at *3 Hours* after the Advisory to Evacuate (Existing Access Road – Region R01)

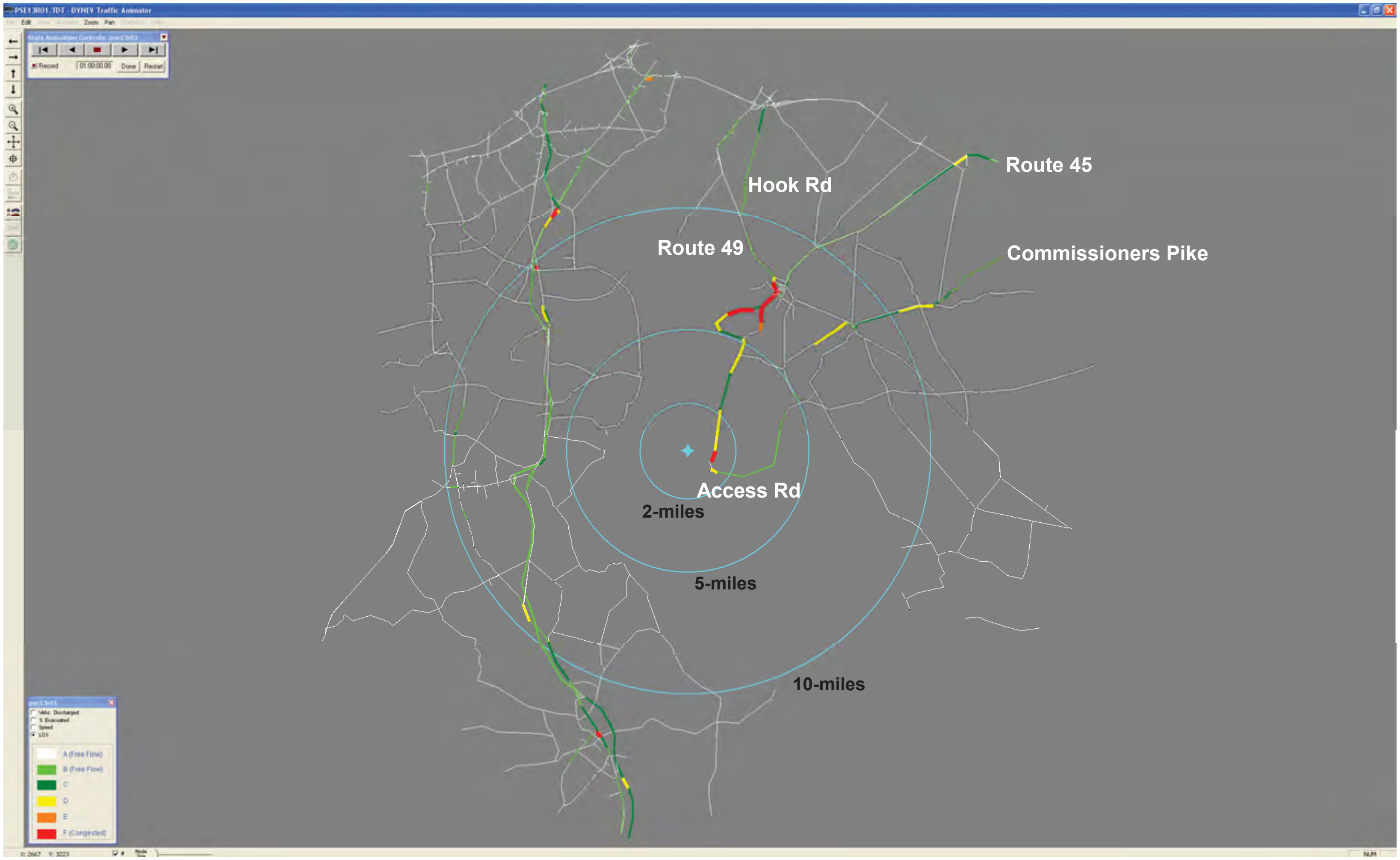


Figure N-10. Congestion Patterns for Causeway Alternative at *1 Hour* after the Advisory to Evacuate (Existing Access Road – Region R01)

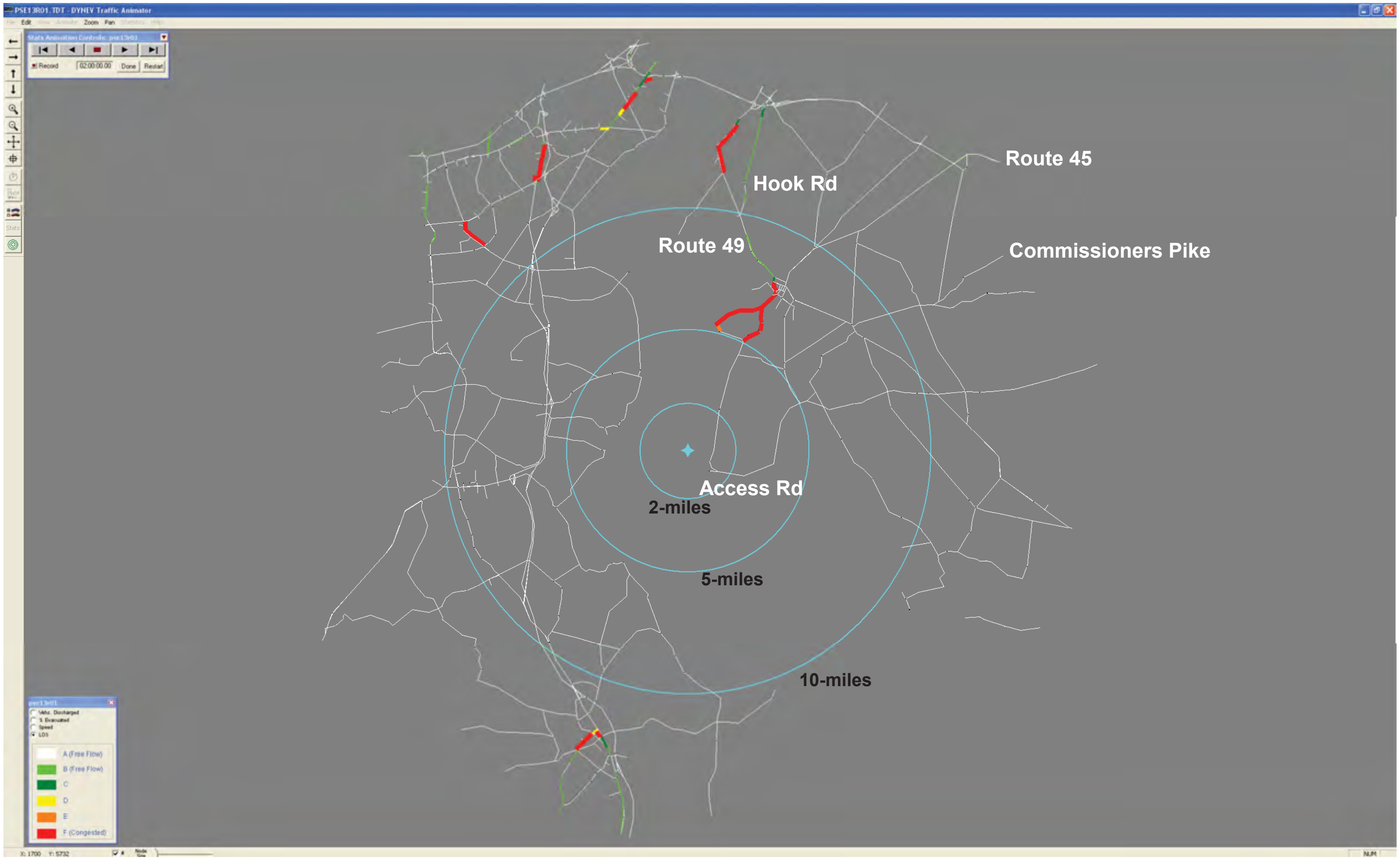


Figure N-11. Congestion Patterns for Causeway Alternative at *2 Hours* after the Advisory to Evacuate (Existing Access Road – Region R01)

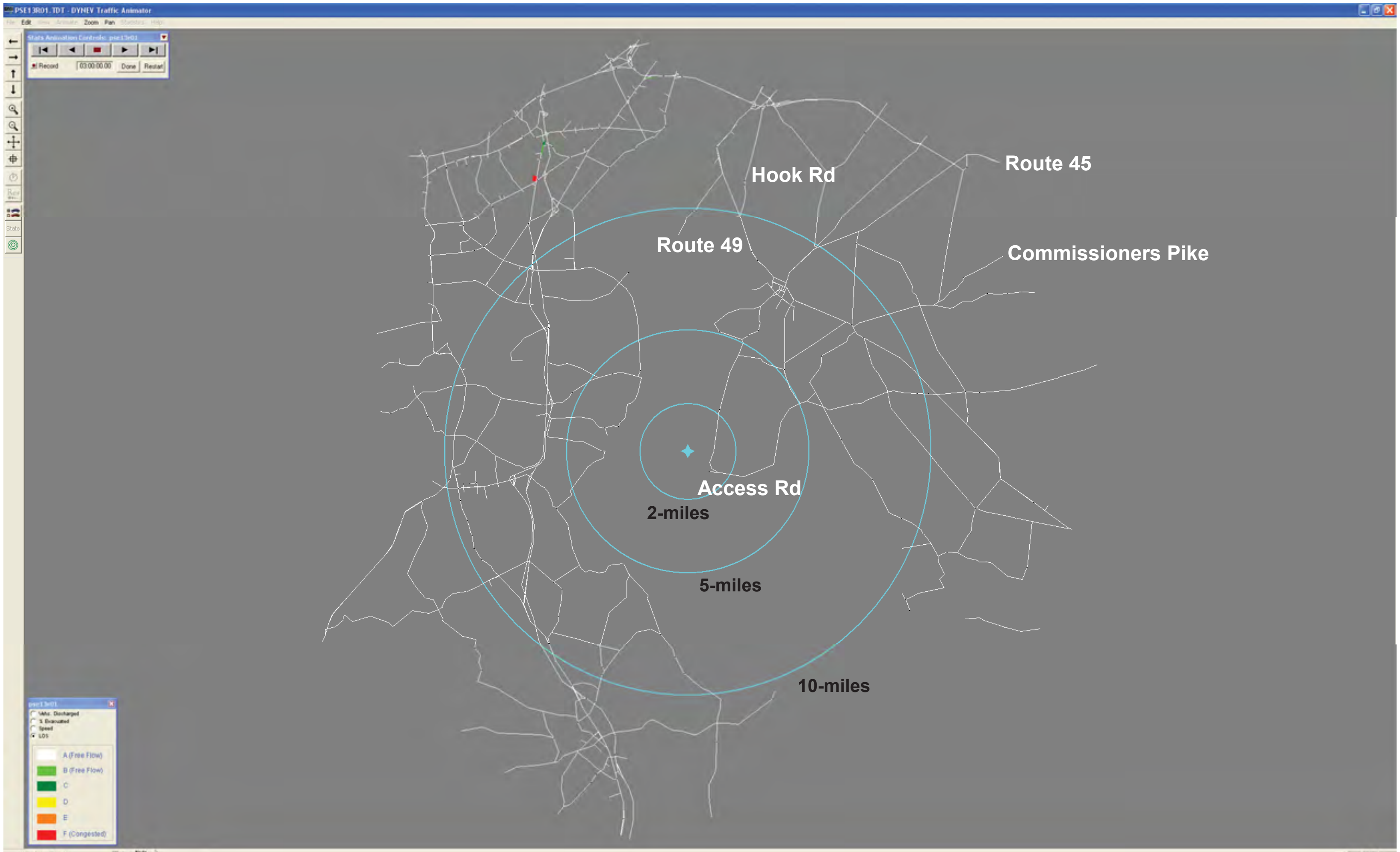


Figure N-12. Congestion Patterns for Causeway Alternative at *3 Hours* after the Advisory to Evacuate (Existing Access Road – Region R01)

Withheld under 10 CFR 2.390 as “Sensitive-Federal, State, foreign Government and International Agency Controlled” (See ESP Part 6)

State of Delaware Radiological Emergency Plan

(PUBLIC VERSION – REDACTED)

Withheld under 10 CFR 2.390 as “Sensitive-Federal, State, foreign Government and International Agency Controlled” (See ESP Part 6)

Maryland Emergency Operations Plan
Annex Q
Radiological Emergency Plan
Fixed Nuclear Facilities

(PUBLIC VERSION – REDACTED)

Withheld under 10 CFR 2.390 as “Sensitive-Federal, State, foreign Government and International Agency Controlled” (See ESPA Part 6)

State of New Jersey Radiological Emergency Response Plan for Nuclear Power Plants Annex A Salem/Hope Creek Nuclear Generating Stations Radiological Emergency Response Plan

(PUBLIC VERSION – REDACTED)

Withheld under 10 CFR 2.390 as “Sensitive-Federal, State, foreign Government and International Agency Controlled” (See ESP Part 6)

Commonwealth Of Pennsylvania Emergency Operations Plan Annex E Radiological Emergency Response to Nuclear Power Plant Incidents

(PUBLIC VERSION – REDACTED)