APPENDIX I

METHODOLOGY TO ESTIMATE ROADWAY TRAVEL TIMES DURING AN EVACUATION

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A. Introduction

This Appendix describes the traffic engineering computer model used to estimate roadway travel times during an evacuation of the JAF/NMP EPZ. The model used in this study has also been applied to the Indian Point (New York), Three Mile Island (Pennsylvania), and Salem/Hope Creek (New Jersey and Delaware) Emergency Planning Zones. To evaluate the computer model used in the aforementioned studies, a separate analysis was conducted using a different model for the purpose of comparing results. The Indian Point EPZ was selected for the comparative study because of the diverse characteristics of its roadway network and population density.

As described later in this Appendix, the comparative study showed that both models provide quite similar estimates of evacuation travel time. Thus, it is concluded that the model used to estimate travel times for the JAF/NMP EPZ can be applied with a high degree of confidence.

The remaining sections of this Appendix discuss the traffic assignment process used for the JAF/NMP EPZ, present the detailed results of the comparative study; and summarize the conclusions drawn from the comparison of traffic models.

B. Static Traffic Assignment Process

1. Inputs

The static traffic assignment process developed to estimate roadway travel times during an evacuation requires three basic types of input. The first type relates to the characteristics of the evacuation roadway network, which is comprised of one-directional links, each having its own attributes. The links are described in terms of their capability to accommodate evacuating traffic (evacuation capacity), length, and free-flow speed (speed limit).

The second type of input required for this assignment process is zonal vehicle trip generation data. The EPZ is disaggregated into traffic zones, and the numbers of trips by each vehicle type (e.g., autos, buses, ambulances) are estimated in terms of passenger car equivalents (PCE's) for each traffic zone. Buses are weighted as the equivalent of two passenger cars in this analysis. In addition, a terminal time for all trip types for each traffic zone is input.

The third input type used in the static assignment process is evacuation path data. Evacuation routes are designated fixed paths extending from the traffic zones to the Sector boundary via specific roadways. Separate paths are developed for each trip type and are expressed in terms of connecting link numbers. Destinations (e.g., reception centers) are defined for each traffic zone and input for the purpose of determining the number of vehicles and passengers expected at each destination. Average vehicle occupancies are used to estimate the number of passengers arriving in vehicles at the destination.

2. Static Assignment Algorithm

A computer program was written to process the above input data and compute roadway travel times for each trip type by traffic zone. A flow chart of the static traffic assignment computer program is included at the end of this Appendix.

Initially, the program calculates the total vehicular demand volume (in PCE's) on each link in the network by aggregating the vehicle trips generated by each traffic zone along the evacuation path. Implicit in this assignment is the assumption that all vehicles from all zones using a given evacuation route are on each link along the designated route concurrently. The assignment process is thus considered "static", because the spatial movement of vehicles across the network is not explicitly recognized as a function of time.

For each link in the network, three additional computations are performed. First, the free-flow speed is calculated as the quotient of the link length and the free flow speed. Second, the total vehicular demand volume is divided by the hourly evacuation capacity (for the appropriate weather condition) of the link to obtain the volume/capacity (V/C) relationship for the link. Finally, the evacuation speed or delay time is computed for each link, depending on whether the V/C ratio is less than or greater than 1.0, respectively. The formula contained in the Federal Highway Administration Traffic Assignment Manual, August 1973, was adopted and modified as follows for use in computing the speed at which evacuees will travel when capacity exceeds demand.

$$\text{Evacuation Speed} = \frac{\text{Free-Flow Speed}}{0.25 \left[\frac{\text{Demand}}{\text{Capacity}}\right]^4 + 1} \quad \text{(for demand} < \text{capacity)}$$

Following these calculations, the model computes the roadway travel time for each traffic zone's evacuation route (or routes since some buses and special vehicles had separate routes) by scanning the links comprising the evacuation route to determine maximum V/C ratio along the route.

When the hourly evacuation capacity exceeds the total demand volume (V/C ratio less than 1.0) for all links along the route, the link evacuation speeds are used to compute link travel time, and the travel times for each link along the path are summed to obtain the traffic zone-to-Sector boundary roadway travel time for the route.

When the total demand volume exceeds the hourly evacuation capacity (V/C ratio greater than 1.0) along any link of a traffic zone's evacuation route, the roadway travel time is represented by the maximum link delay time incurred along the route. Link delay time is calculated as the volume/capacity ratio in hours for each link along the route. The link with the maximum V/C ratio is identified as the bottleneck link for the evacuation route for use in future planning. Other links along the route where the V/C ratio exceeds 1.0 are also identified for planning purposes.

The roadway travel time as determined above is added to the terminal time and the free-flow travel time for each zone trip type to determine the total roadway evacuation travel time. The total roadway evacuation travel time resulting from this analysis represents the time for the last vehicle in the zone to clear the Sector.

3. Outputs

The computer program developed for the static assignment process provides five basic reports which are used in the evacuation planning process. The reports are described below:

a. Summary of link statistics: link number, description, length, free-flow speed and time, vehicular demand volume, evacuation capacity, and volume/capacity ratio.

b. Summary of traffic zone statistics: number of trips, evacuation route, destination, terminal time, free-flow travel time, roadway travel time, total evacuation time, and bottleneck link; for each trip type, sorted in ascending order by total evacuation time.

c. Summary of all bottleneck links and the traffic zones which are routed over them.

d. Summary of all destinations and the estimated number of vehicles (by type) and passengers assigned to each.

e. Distribution of the percent of the total population evacuated as a function of time.

C. Comparison of Static and Dynamic Traffic Assignment Processes

Because of the importance of the assignment process in the overall procedure to estimate evacuation travel times, it was decided to evaluate the static traffic assignment model used in the evacuation planning process. Travel times estimated by the static model were compared with times estimated by a state-of-the-art dynamic traffic assignment model.

The dynamic assignment model used in the comparative analysis is an offspring of the TRANSYT model* presently included in the Federal Highway Administration computer program batteries. The model employs principles of flow continuity and flow dynamics to move traffic on each link in the network towards its ultimate destination. Traffic flow representation changes with time to reflect changes in demand and roadway conditions. Traffic movement on each link in the network is constrained by roadway geometrics, control devices, and other vehicles present on the roadway.

Various types of test routes were selected for this comparison and were located in Rockland and Westchester Counties in the Indian Point EPZ in New York State. Input requirements for both models were basically identical with one exception, which relates to the time varying nature of vehicles entering the evacuation network. The static assignment process assumed a concurrent loading of the entire network; the distribution over time of vehicle trips feeding the network was not addressed by the static model. However, because of the time dependent nature of the dynamic simulation model, it was possible to input trip generation data which varied with time at each load point in the network. This time-based distribution curve used in the comparison of assignment processes was provided by the New York State Office of Disaster Preparedness.

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* The dynamic evacuation model, named DYNEV, was provided by KLD Associates, Inc.

Separate comparative analyses and evaluations of the static and dynamic model results were made using Level of Service D and Level of Service E evacuation capacities. Table I-1 presents a comparison of the percent of total vehicles (in PCEs) evacuated for each route by time in the test network. The comparison was made between the static and dynamic assignment results when one or the other reached a time period when the total vehicles traveling the evacuation route had cleared the EPZ boundary. In all cases, the static assignment evacuation reached 100 percent completion either before or at the same time as the dynamic assignment evacuation. The percentages enclosed by parentheses in Table I-1 correspond to static and dynamic evacuation roadway travel times using Level of Service D capacities. Percentages without parentheses correspond to static and dynamic evacuation roadway travel times estimated using Level of Service E capacities.

Examination of Table I-1 shows a 97 percent correlation between the two assignment model results on an aggregate basis for the sample Indian Point roadway network east of the Hudson River in Westchester County. That is, at the time that the static assignment estimated complete evacuation of vehicles beyond the EPZ, the dynamic assignment estimated 97 percent of the vehicles would have cleared the EPZ. On the west side of the Hudson River near Indian Point, where both Levels of Service E and D were analyzed by both models, the two model results were 99 percent and 98 percent, respectively. Overall, for the entire test evacuation network, comparison of the static and dynamic assignment results at Level of Service E indicated a 99 percent correlation. In other words, when the static model estimated the network would be cleared (total vehicle evacuation), the dynamic model estimated 99 percent of the vehicles would have cleared the EPZ boundary. The dynamic assignment results indicated that complete evacuation of all vehicles beyond the EPZ boundary would occur 15 minutes later than the static assignment estimate at Level of Service E.

In addition to the evacuation times generated by each assignment technique, the location of bottlenecks by each methodology was compared. The critical bottleneck links identified by the static model were identified in the dynamic assignment results as well. The dynamic assignment produced the percent of vehicles topped at each link during the evacuation. This statistic was used as a measure of the congestion level on each link. For the identified bottleneck links, the average percentage of stops as indicated by the dynamic mode output was roughly 45 percent higher than on non-critical links, indicating that an increase in congestion was appropriately simulated by the static model on the critical links.

D. Conclusions

The results of the comparative analysis presented in this Appendix indicate that the static traffic assignment model can be applied to highway networks to estimate evacuation roadway travel times with a high degree of confidence.

Under almost identical circumstances, the static assignment model results have proven comparable with those produced by a state-of-the art, complex dynamic assignment model, which simulates the evacuation process within the framework of time. Roadway travel times were estimated and congested roadways identified with a high degree of correlation using the less complex static assignment methodology. A close correlation between assignment procedures exists for varying roadway types, weather conditions, and loading characteristics. Thus the use of the static assignment model to estimate evacuation travel times in the JAF/NMP EPZ is appropriate.

TABLE I-1

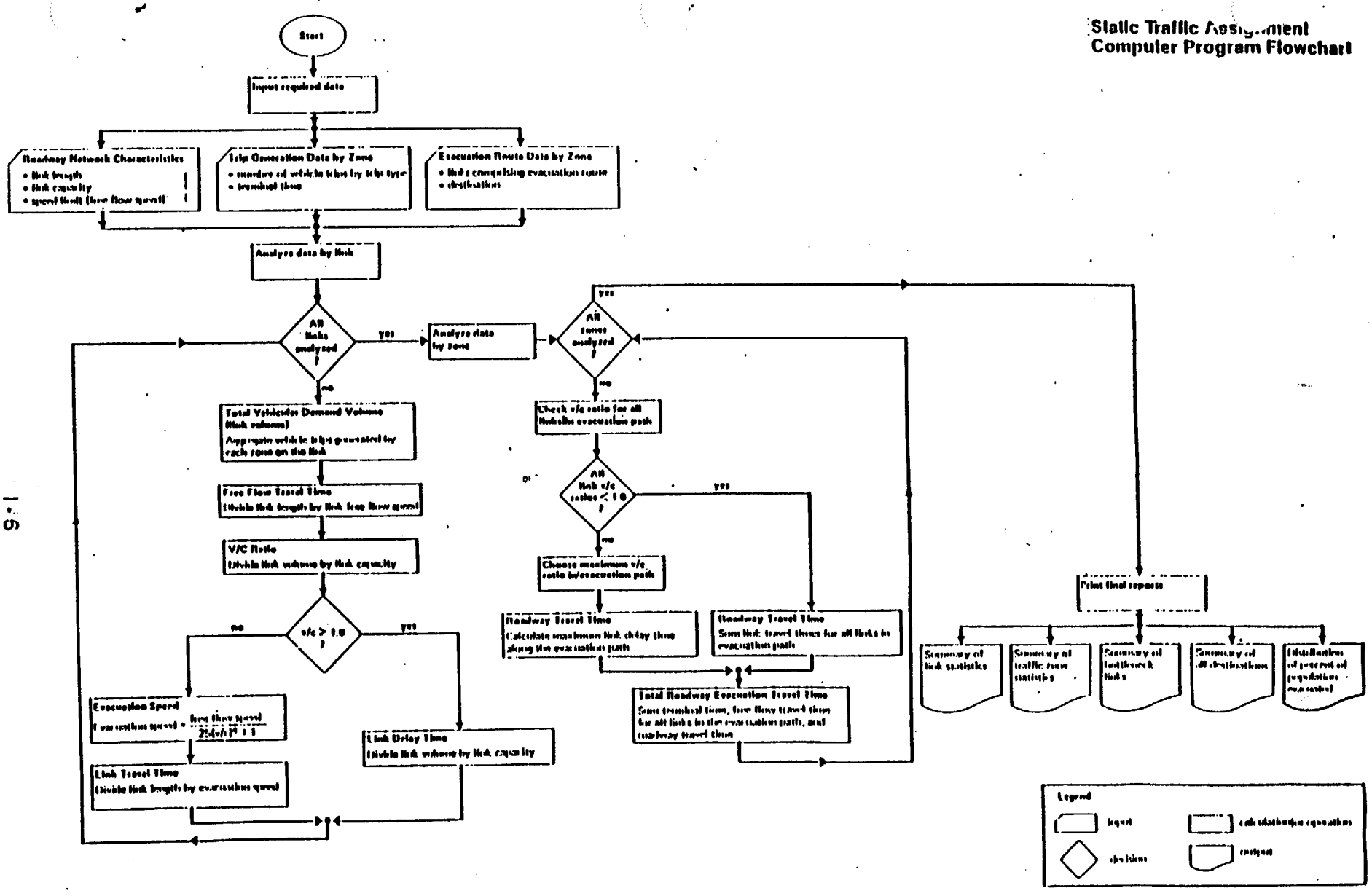
COMPARISON OF STATIC AND DYNAMIC ASSIGNMENT RESULTS

Evacuation Route	Total Vehicles Using Evacuation Route	Traffic Assignment Methodology	Percent of Total Vehicles Evacuated During the Following Time Period*																
			0:45 1:00	1:45 2:00	2:00 2:15	2:15 2:30	2:30 2:45	2:45 3:00	3:00 3:15	3:15 3:30	3:30 3:45	3:45 4:00	4:15 4:30	4:30 4:45	5:30 5:45	5:45 6:00	6:00 6:15	6:15 6:30	7:15 7:30
East of River (Westchester County)																			
Route 6	4,360	Static	–	–	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–
		Dynamic	–	–	–	–	–	–	–	–	–	84	–	100	–	–	–	–	–
Route 120	6	Static	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Dynamic	33	–	–	100	–	–	–	–	–	–	–	–	–	–	–	–	–
Route 9A	8,690	Static	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	–	–
		Dynamic	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	–	–
Taconic Parkway	6,165	Static	–	–	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Dynamic	–	–	92	–	–	–	100	–	–	–	–	–	–	–	–	–	–
Amawalk Road	2,675	Static	–	–	–	–	–	100	–	–	–	–	–	–	–	–	–	–	–
		Dynamic	–	–	–	–	–	89	–	100	–	–	–	–	–	–	–	–	–
Total East Routes	20,785	Static	–	–	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–
		Dynamic	–	–	–	–	–	–	–	–	–	97	–	100	–	–	–	–	–
West of River (Rockland County)																			
Palisades Parkway	8,655	Static	–	–	–	–	–	–	–	–	100	–	–	–	–	(100)	–	–	–
		Dynamic	–	–	–	–	–	–	–	–	97	100	–	–	–	(97)	–	(100)	–
Route 9W	3,050	Static	–	–	–	–	–	–	–	–	–	–	100	–	–	–	–	(100)	–
		Dynamic	–	–	–	–	–	–	–	–	–	–	99	100	–	–	–	(87)	(100)
Route 303	3,310	Static	–	100	–	–	(100)	–	–	–	–	–	–	–	–	–	–	–	–
		Dynamic	–	98	–	–	(90)	100	(100)	–	–	–	–	–	–	–	–	–	–
Route 45	1,920	Static	–	–	–	100	–	–	–	–	(100)	–	–	–	–	–	–	–	–
		Dynamic	–	–	–	98	–	100	–	–	(100)	–	–	–	–	–	–	–	–
Little Tor Road	3,025	Static	–	–	–	–	–	–	–	–	100	–	–	–	(100)	–	–	–	–
		Dynamic	–	–	–	–	–	–	–	–	99	100	–	–	(95)	–	(100)	–	–
Route 304	3,665	Static	–	–	–	100	–	–	–	–	–	(100)	–	–	–	–	–	–	–
		Dynamic	–	–	–	99	–	100	–	–	–	(100)	–	–	–	–	–	–	–
Total West Routes	24,415	Static	–	–	–	–	–	–	–	–	–	–	100	–	–	–	–	(100)	–
		Dynamic	–	–	–	–	–	–	–	–	–	–	99	100	–	–	–	(98)	(100)
Total Network Routes	45,200	Static	–	–	–	–	–	–	–	–	–	–	100	–	–	–	–	–	–
		Dynamic	–	–	–	–	–	–	–	–	–	–	99	100	–	–	–	–	–

* Note: Numbers enclosed by parentheses represent the percent of total vehicles along a route evacuated during the time period using Level of Service D capacities.

Numbers not enclosed by parentheses represent the percent of total vehicles along a route evacuated during the time period using Level of Service E capacities.

Static Traffic Assignment Computer Program Flowchart



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1 INTRODUCTION

The US Nuclear Regulatory Commission (NRC) and the Federal Emergency Management Agency (FEMA) require nuclear power plant licensees and state/local agencies to take necessary actions to prepare for evacuation of populations within a 10-mile radius around nuclear power plants. This area corresponds to a plume exposure pathway referred to as the Emergency Planning Zone (EPZ). Part of these regulatory requirements include the preparation of travel time estimates for the evacuation of the EPZ as outlined in *Criteria for the Preparation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants* (NUREG-0654, FEMA-REP-1: Rev. 1, November 1980 [NUREG-0654]). Specifically, the approach for preparing evacuation time estimates is documented in Appendix 4 of NUREG-0654.

This report is prepared in response to Appendix 4 of NUREG-0654 and represents an update and addition to a report prepared in July 1993 for the Nine Mile Point and James A. FitzPatrick (NMP/JAF) site in Oswego County, New York (PBQD, *Evacuation Travel Time Estimates for the James A. FitzPatrick/Nine Mile Point Emergency Planning Zone,* Rev. July 1993). This previous report presented travel time estimates for eight different evacuation scenarios as follows:

- School-in-Session;
- School-not-in-Session;
- Summer/Holiday Weekend;
- Winter/Holiday Weekend;
- Evening;
- Nighttime;
- A Special Event Scenario for "Classic Weekend" at the Oswego Speedway; and
- A Special Event Scenario for "Harborfest" in the City of Oswego.

This update evaluates an additional Special Event Scenario for venues held at the Oswego County Airport. While the airport is not located within the EPZ, travel routes to and from the facility often coincide with designated evacuation routes. Therefore, traffic generated by event goers at the airport could potentially affect the efficient movement of persons out of the EPZ under current evacuation procedures.

The basis for the Airport Special Event Scenario was developed in response to a planned 2-day concert (7:00 PM Saturday to 11:30 PM on Sunday) at the Oswego County Airport in July 1999. However, the assumptions, methodology, and modeling approach/output would be similar and applicable under any similar type of multi-day venue held at this facility (e.g., festival, air show, etc.).

1.1 Site Location

The JAP/NMF site location is depicted in Figure 1-1. The site is located on the shore of Lake Ontario in the Town of Scriba, Oswego County, New York. The site consists of the Nine Mile Point Nuclear Stations, Units 1 and 2, operated by the Niagara Mohawk Power Corporation and the James A. FitzPatrick Nuclear Power Plant, operated by the New York State Power Authority, . The site is approximately seven miles northeast of the City of Oswego and 36 miles northwest from the City of Syracuse.

The EPZ encompasses a 10-mile radius around the NMP/JAF site. As shown in Figure 1.1, over Lake Ontario, this is comprised of a circle defining the plume exposure pathway. However, over land areas, the perimeter of the 10-mile radius is defined by an irregularly shaped boundary following physical and/or political subdivisions as much as practicable to facilitate recognition by the public.

The Oswego County Airport, the subject of this update of the 1993 report, is located along NYS Rt. 176 in the Town of Volney, New York, immediately northeast of the City of Fulton. While this airport is technically outside the NMP/JAF EPZ, it is within two miles of the 10-mile radius from the site. Given the geography of the Lake Ontario shoreline, regional transportation routes and proximity of adjacent communities that could support residents and visitors in an evacuation, the primary pattern of evacuation would be from north to south, passing in close proximity to the airport.

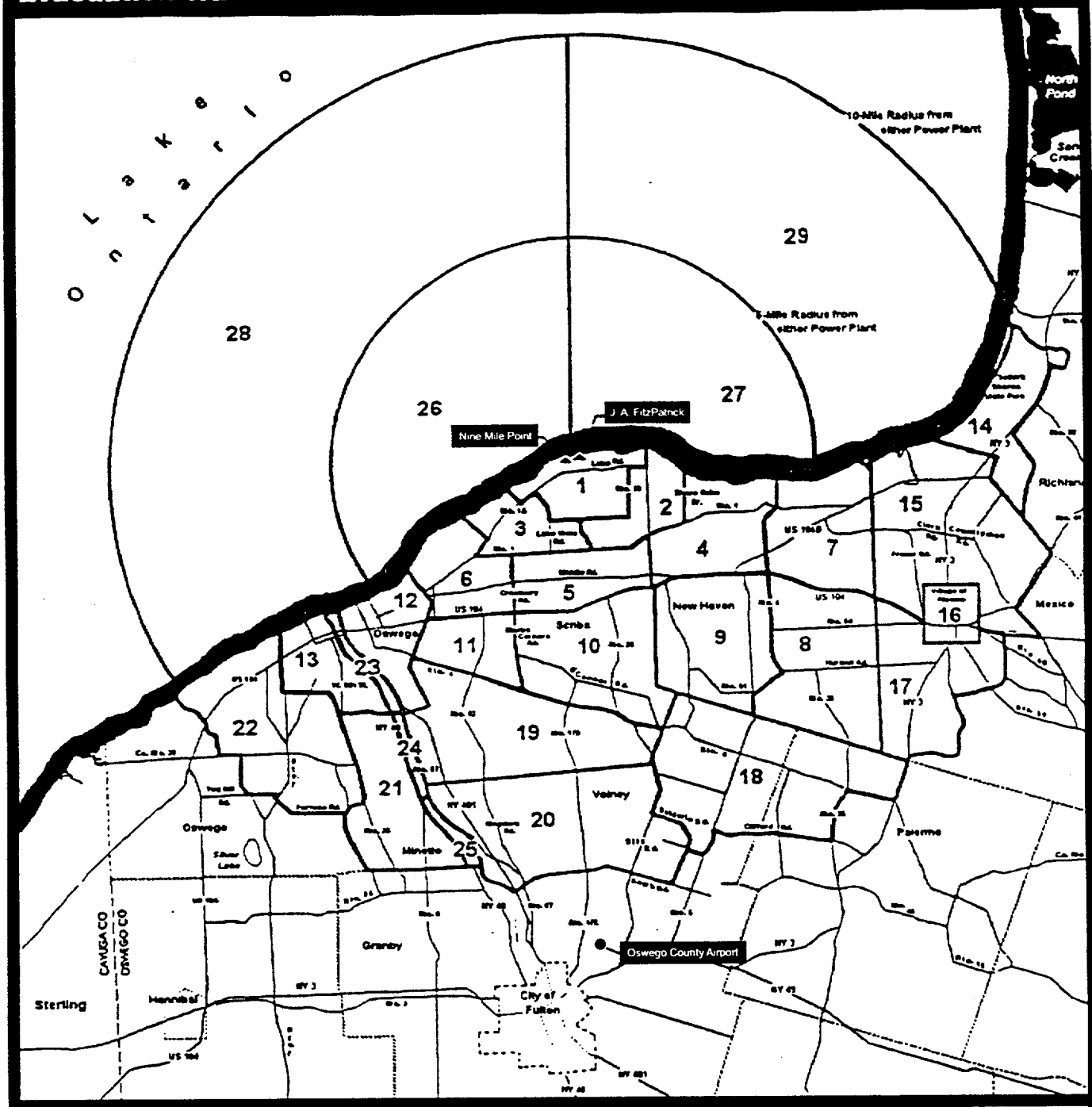
1.2 General Methodology

This update includes the use of a computer modeling technique to estimate evacuation travel time estimates. This model was formulated in 1984 and updated in the 1993 evacuation time estimate report to reflect: the 1990 Census data; changes in assumptions regarding long-term construction worker population at the NMP/JAF site; changes in emergency preparedness procedures employed by Oswego County; and changes in the location of various transient and special facilities populations.

The methodology for developing this update included a review of the inputs and assumptions used in 1993 to determine their continued relevance and accuracy, as well as formulation of reasonable assumptions associated with a special event held at the Oswego County Airport. This included:

- Meetings and contacts with county, local, and NMP/JAF personnel regarding significant changes since 1993 in development in the county, distribution of population, and special facilities/transient population locations;
- Review of the latest update of the Oswego County Radiological Emergency Preparedness Plan (REPP) (i.e., December, 1998), which outlines all procedures undertaken during an evacuation of the NMP/JAF EPZ, as well as updates of the locations and characteristics of various types of populations within the EPZ;

Nine Mile Point / J. A. FitzPatrick
Evacuation Travel Time Estimates



3.0 0 3.0
1.5 miles

Figure 1-1
Generalized Location

- On-site review of applicable evacuation routes and review of assumptions regarding lane width and capacity; and

- Discussions with the Oswego County Sheriff's Department and review of the NYS Health Department Mass Gathering Permit information for the July, 1999 concert at the Oswego County Airport to determine appropriate assumptions for anticipated attendance, trip generation, anticipated time periods for arrival and departure of event goers, and route selection to ingress and egress at the airport site.

With this information, evacuation travel time estimates were generated for a series of cases under an Airport Special Event Scenario, using the computer modeling technique formulated for the 1993 report. Each case was run for adverse and normal weather conditions for permanent residents, transients, and persons in special facilities, as specified in NUREG-0654. Specifically, the following cases were analyzed:

- **Case 1**, consisting of a concurrent evacuation of all populations in the EPZ and all attendees at an Airport Special Event at the peak period of event attendance;

- **Case 2**, consisting of an evacuation of all populations in the EPZ during the course of the early departure periods immediately following the end of an Airport Special Event (i.e., Sunday night), in which it was assumed that a portion of the special event traffic is already on the road network when the EPZ evacuation begins; and

- **Case 3**, consisting of an evacuation of all populations within the EPZ during the day following the end of the Airport Special Event (i.e., Monday daytime), in which a portion of the special event traffic is already on the road network when the EPZ evacuation begins.

Following review of the estimated travel times, an additional case (**Case 4**) was formulated and assessed as a potential measure to mitigate travel time delays resulting from the interaction of EPZ evacuation and Airport Special Event traffic.

1.3 Report Format

Following the introduction in Section 1, Section 2 outlines and reviews the continued applicability of the basic parameters, inputs, and limitations used in the computer model for evacuation travel time estimates in the 1993 report. Section 3 discusses the parameters/assumptions involved with the conduct of an Airport Special Event and their implications to estimating evacuation travel times in the EPZ. Section 4 describes the specific components of each case analyzed and presents estimated travel time estimates. Section 5 compares these estimates with 1993 estimates.

2 EVACUATION TRAVEL TIME ESTIMATION MODEL DESCRIPTION

In order to understand the assumptions used to generate evacuation travel time estimates under an Airport Special Event Scenario, it is necessary to summarize the basic parameters used in the 1993 report. This section discusses the geographic areas on which the modeling approach is based, describes the various populations that are included in the model, and discusses the transportation network designated to move persons out of the 10-mile NMP/JAF EPZ during an evacuation. A full discussion of the approach used in the 1993 report in presented in Appendix B.

2.1 Sectors, Emergency Response Planning Areas, and Traffic Zones

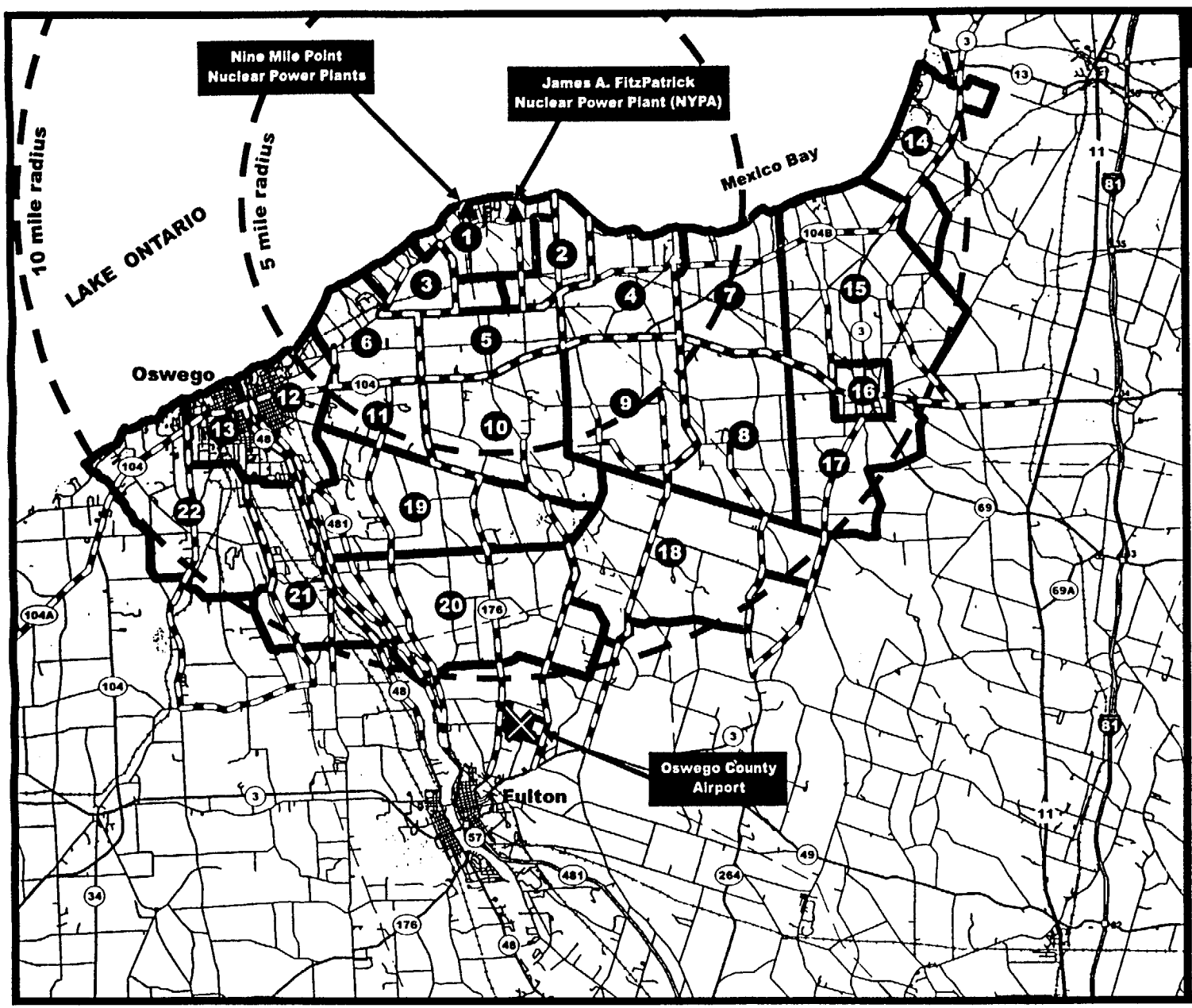
2.1.1 Sectors

In order to allow for the estimate and actions to address various evacuation scenarios, the NMP/JAF EPZ described in Section 1 is subdivided into various types of smaller geographic areas. As discussed in Appendix 4 of NUREG-0654, the EPZ is first subdivided into areas referred to as Sectors. These are defined by first delineating areas within approximately two-, five-, and 10-mile radii from the NMP/JAF site. These radii areas are further subdivided into 90-degree quadrants along north-south and east-west axes.

2.1.2 Emergency Response Planning Areas

Sectors are further comprised of smaller units called Emergency Response Planning Areas (ERPAs), which generally follow political and/or physical boundaries. An ERPA is the fundamental planning area identified in the Oswego County REPP. Under the REPP, each ERPA as a unit follows a specific protective response action in the event of an incident at the NMP/JAF site requiring an evacuation. While identification of evacuation travel time estimates by Sector provide a characterization of the time period necessary to clear the 10-mile EPZ during an incident at the NMP/JAF site, in practice, identification of these estimates by ERPA provide the most critical information in formulating procedures necessary to address a given evacuation scenario. Therefore, this report provides evacuation time estimates by ERPA to characterize an Airport Special Event Scenario.

ERPAs used in the 1993 evacuation travel time estimation report and in the current Oswego County REPP are depicted in Figure 2-1. In total, there are 29 designated ERPAs in the NMP/JAF EPZ. However, it should be noted that the figure and subsequent modeling includes only 22 of these areas (i.e., ERPA Nos. 1 through 22). The remaining ERPAs represent over-water areas. Specifically, ERPA Nos. 23, 24, and 25 are defined as areas within the EPZ along the Oswego River, while ERPA Nos. 18, 19, 26, and 27 include areas over Lake Ontario.



Nine Mile Point / J. A. FitzPatrick Evacuation Travel Time Estimates

Figure 2-1
Emergency Response Planning Areas (ERPAs) and Evacuation Routes

LEGEND

- Nuclear Power Plant Location
- Emergency Response Planning Area Designation
- Emergency Response Planning Area Boundary
- Evacuation Routes

2.0 0 2.0
1.0 miles

PR

Rev. No. 6

As previously discussed in Section 1, the Oswego County Airport is not located within the EPZ, and thus not located within any of the ERPAs. The nearest ERPA in proximity to the airport is ERPA No. 20, whose southern boundary is located roughly 1.5 miles north of the facility.

2.1.3 Traffic Zones

For modeling purposes, ERPAs are further subdivided into traffic zones. These zones represent population clusters in particular geographic areas, which follow specified evacuation routes leaving the EPZ. In the model, each traffic zone is assigned a primary evacuation route for each mode of travel emanating from that zone. Traffic zone boundaries in the 1993 model were developed to minimize the amount of cross traffic required to access a zone's primary evacuation routes. The primary evacuation routes are depicted in Figure 2-1. It should be noted that individual traffic zones within each ERPA were not displayed to permit readability of the map.

2.2 Populations

The evacuation travel time model used in the 1993 report identified three primary population groups in the NMP/JAF EPZ, as required in NUREG-0654. These population groups include permanent residents, transients, and persons in special facilities. The following sections discuss the characteristics of each population, methods used to estimate these populations in the 1993 report, and rationale used to determine whether these estimates are still reasonable for use in this update for an Airport Special Event Scenario.

2.2.1 Permanent Resident Population

Permanent residents, as defined in Appendix 4 of NUREG-0654, are those persons who reside in the EPZ, including schoolchildren, but excluding persons residing in institutions identified as special facilities in the Oswego County REPP (see Section 2.2.3). Data derived from the 1990 decennial Census of Population, adjusted to exclude institutional population was used for the 1993 report. Specifically, these data were disaggregated to block group data, corresponding to appropriate ERPAs and traffic zones. This was further broken down to households with and without automobiles. This yielded an estimate of 36,450 persons with autos, 3280 persons without autos, or a total of 39,730 permanent residents in the EPZ.

Based upon discussions with NMP/JAF and county/local officials, it was concluded that it was reasonable to continue to use the 1990 Census data as the basis for identifying existing resident population, given that this provides the most detailed breakdown available at this time. The 2000 Census data at the block will likely not be completed for public use until roughly 2002.

2.2.2 Transient Population

The transient population includes employees not residing in the EPZ, people staying at hotels/motels in the EPZ, and visitors to parks and recreational areas within the EPZ. In the 1993 report, the Oswego County Emergency Management Office (EMO) inventoried parks and recreational facilities, such as beaches and campgrounds. Hotel/motel estimates were developed from data from the Oswego Accommodations Guide, using a two person per room estimate for rooms located in the EPZ. Employment within the EPZ was estimated using New York State Department of Labor Employment Statistics.

These estimates yielded a total transient population of 19,005 persons within the EPZ. Following a review of additional background data on transient facilities and discussions with county/local officials, it was determined that no major changes have occurred since 1993 that would require revising this estimate in the model. There have been no major shifts in county employment (e.g., plant openings/closings), or development of any major motels/hotels or recreational facilities that would cause a significant shift in the 1993 estimates.

2.2.3 Special Facilities Population

Special facilities residents include persons in hospitals and other health care facilities, nursing homes, schools (including public and private, day care, nursery, elementary, middle, and high school), universities (i.e., SUNY Oswego), day camps, and correctional facilities. Population in these facilities was estimated at 15,586 in the EPZ in the 1993 report.

The Oswego County EMO maintains inventories of various types of special facilities. EMO officials and the REPP identified some small changes to the inventory of special facilities since 1993, including:

- Expansion of available County Correctional facility beds from 96 to 150; and
- Opening of the Seneca Hill Nursing Facility, a 120-bed facility, on NYS Rt. 481.

Further review of the inventory indicated some concurrent decreases of special facility populations, specifically lower summer student population at SUNY Oswego and the closing of some smaller day care facilities and nursing homes. Therefore, it was determined that the 1993 estimate of special facilities population in the EPZ is still reasonable for modeling purposes.

2.3 Transportation Facilities

As with population estimates used in the 1993 model, the 1993 road network/evacuation route assumptions (e.g., number of lanes, highway capacity, etc.) were reviewed to determine if any significant changes have occurred that would have implications on the modeling results. This was

achieved through site reconnaissance on May 18 and June 9, 1999 and through contacts with local/county and state officials. The only identified road projects included reconstruction/repaving projects without increases in capacity. The most recent in the network in the vicinity of the EPZ included the repaving and striping of NYS Rt. 49 through the Town of Hastings, although this road is not within the EPZ. Therefore, it was concluded that the 1993 assumption for the roadway network was sufficient for use in this update.

2.4 Limitations of the Model Related to an Airport Special Event Scenario

The 1993 model used to generate evacuation travel time estimates exhibits some limitations for the development of an Airport Special Event Scenario. These limitations required some adjustments to the typical application of the model. First, because the Oswego County Airport is actually located outside the 10-mile EPZ, it is not possible to specifically assign special event traffic to the roadway network in the model, because the model operates by assigning blocks of traffic to a specific traffic zone within an ERPA. However, given the proximity of the airport to the EPZ, it is obvious that the occurrence of a concurrent evacuation of the NMP/JAF site and the airport would result in impacts to the travel time estimates.

In order to overcome this limitation, it was necessary to create a new traffic zone within the closest ERPA to the airport, in this case ERPA No. 20. All event-related traffic was assigned on applicable roadway links within this newly created zone and designated as transient population. This resulted in an approach that approximates the interaction of evacuation traffic with special event traffic movements. However, use of this technique created some inordinately high evacuation time estimates for ERPA No. 20, because the model assumes that the special event population is in this area, when in reality, it has already cleared the 10-mile EPZ.

Secondly, the traffic assignment process for special event traffic may somewhat overestimate the negative implications of an evacuation occurring at the same time as a special event evacuation or typical departure after its end. This is because the 1993 model uses a "static" assignment process, which assumes a concurrent loading of the entire network; the distribution over time of vehicle trips progressively feeding the network is not addressed. However, comparison of this technique at other sites indicates an almost 97% correspondence between static and dynamic approaches was determined to still be appropriate (see Appendix B).

3 AIRPORT SPECIAL EVENT SCENARIO ASSUMPTIONS

This section describes the basic assumptions that were used to characterize an Airport Special Event Scenario. As stated in Section 1, these assumptions were based upon the event procedures to be implemented for a two-day concert planned in July 1999. However, similar procedures and parameters would be used for other similarly sized and staged events at the Oswego County Airport.

The parameters discussed in the following sections were derived from meeting with the representatives of the Oswego County Sheriff's, meetings/discussions with NMP/JAF, county, and local officials, and review of information contained within the Mass Gathering Permit application submitted by the concert promoter for the July 1999 concert.

3.1 General Overview

The Airport Special Event Scenario involves the conduct of a two-day venue (i.e., Saturday 7:30 PM to Sunday, 11:30 PM) with parking and camping facilities provided on the airport site. In order to facilitate early attendees at the event, the gates will open on Friday, 12:00 noon. The gates will remain open through Friday evening and all day Saturday to accept event goers. The gates will close roughly one half hour before the official start of the event (Saturday, 7:00 PM). From this point until 11:00 PM on Sunday, the gates will be closed for entry/exit except for emergency departure of event goers.

3.2 Attendance and Trip Generation Assumptions

The information contained within the Mass Gathering Permit application for the July 1999 concert event states that the airport will accommodate approximately 65,000 attendees over the two-day event. Notwithstanding, based upon discussions with NMP/JAF and local/county officials, the total attendance that is assumed for this scenario is 100,000 persons. This reflects information on similar events conducted in similarly sized communities in other east coast states. Use of this attendance figure also assumes that a portion of event-goers will not camp on the airport site, but will seek appropriate campsites/lodging in other nearby locations.

Vehicle occupancy rates for this scenario was assumed to average 3.5 persons per vehicle. This rate is consistent with other special event scenarios included in the 1993 evacuation travel time estimates (i.e., for events such as "Harborfest" and "Classic Weekend"). This rate would yield a trip generation assumption of 28,571 vehicles entering and leaving the area for the event.

3.3 Ingress/Egress Assumptions

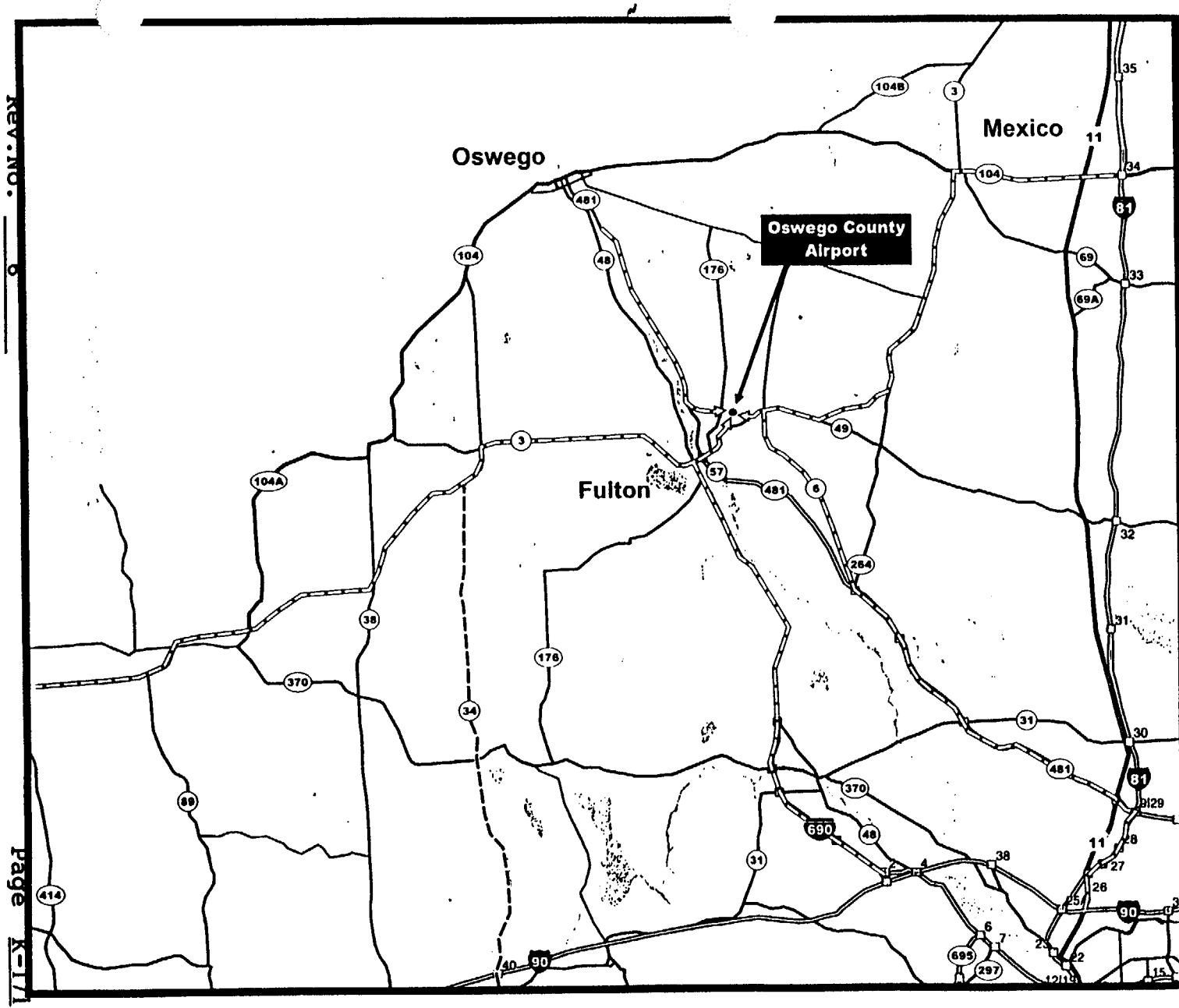
Figure 3-1 depicts the Oswego County Sheriff's Department suggested regional access routes to and from the Oswego County Airport under this scenario. The suggested routes include:

- A route from the north on I-81 south, to Exit 34 (Rt. 104), then proceeding west along NYS Rt. 104 to NYS Rt. 3, then continuing along Rt. 3 to the airport;
- A route from Oswego south along Rt. 481 and 57 to the airport;
- A route from I-90 to Exit 36 (I-81 North), to NYS Rt.481, then north on Rt. 481, to County Rt. 6, then proceeding north along Rt. 6 to Rt. 3, then Rt. 3 to the airport (note; on Friday evening, this route would shift to I-690, then north along NYS Rt. 48 to Rt. 3 in Fulton); and
- A route from the west along Rt. 104 to Rt. 3, then east along Rt. 3 to the airport.

In addition to these routes, one additional route is available from the I-90 at Exit 40 (Weedsport), then north along NYS Rt. 34 to Rt. 3, then east on Rt.3 to the airport. Overall, the Sheriff's Department is discouraging use of this route, yet traffic will not be manually detoured.

While suggested routes to and from the regional road network would be similar for ingress and egress to the Oswego County Airport Facility, access points immediately around the airport would vary for ingress before and egress after the special event (see Figures 3-2 and 3-3). Ingress to the airport would be routed to a single access gate to be located on Howard Road to facilitate payment of admission fees and ticket taking. After the end of the event or during an emergency evacuation, several access points would be utilized, including the main airport gate, Howard Road, Calkins Road, Muckey Road, Baldwin Road, and Weller Road.

Given the nature of the event, an assumption of the progression of traffic into and out of the airport over a five-day period was developed in conjunction with the County Sheriff's Department, based upon information provided by the planned July 1999 event, coupled with information developed for similar events in other east coast communities. These traffic flow assumptions are presented in Tables 3-1 and 3-2. As is shown, the peak ingress period is projected to be in the period between late Friday evening and early Saturday morning. The peak egress period is projected to be between Monday morning and Monday afternoon.



Nine Mile Point / J. A. FitzPatrick Evacuation Travel Time Estimates

Figure 3-1
Suggested Travel Routes to Special Event at Oswego County Airport

LEGEND

Suggested Route

Available, but Discouraged Route

3.0 0 3.0
1.5 miles

PB

Nine Mile Point / J. A. FitzPatrick
Evacuation Travel Time Estimates

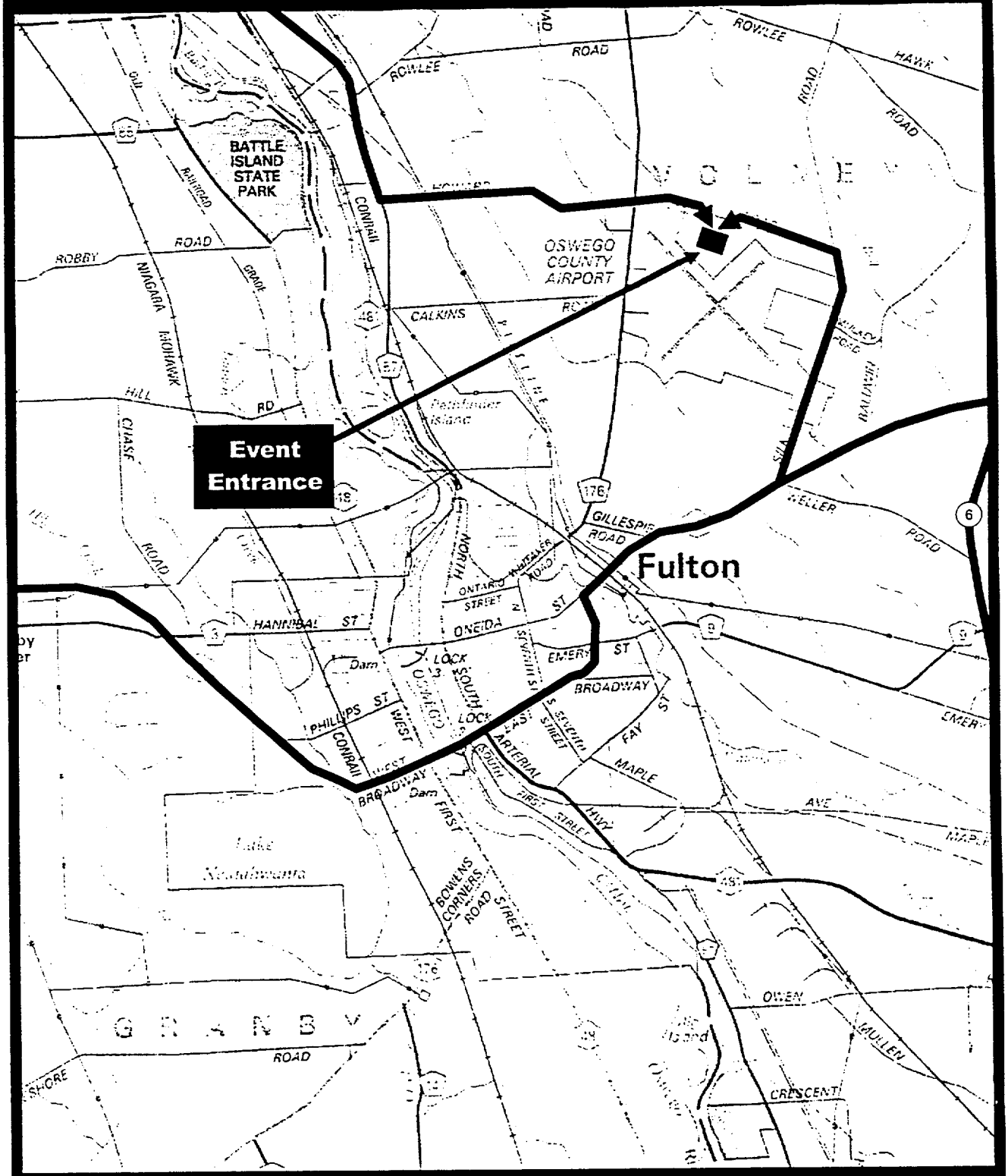


Figure 3-2
Ingress Routes to Oswego County Airport During Events

Nine Mile Point / J. A. FitzPatrick
Evacuation Travel Time Estimates

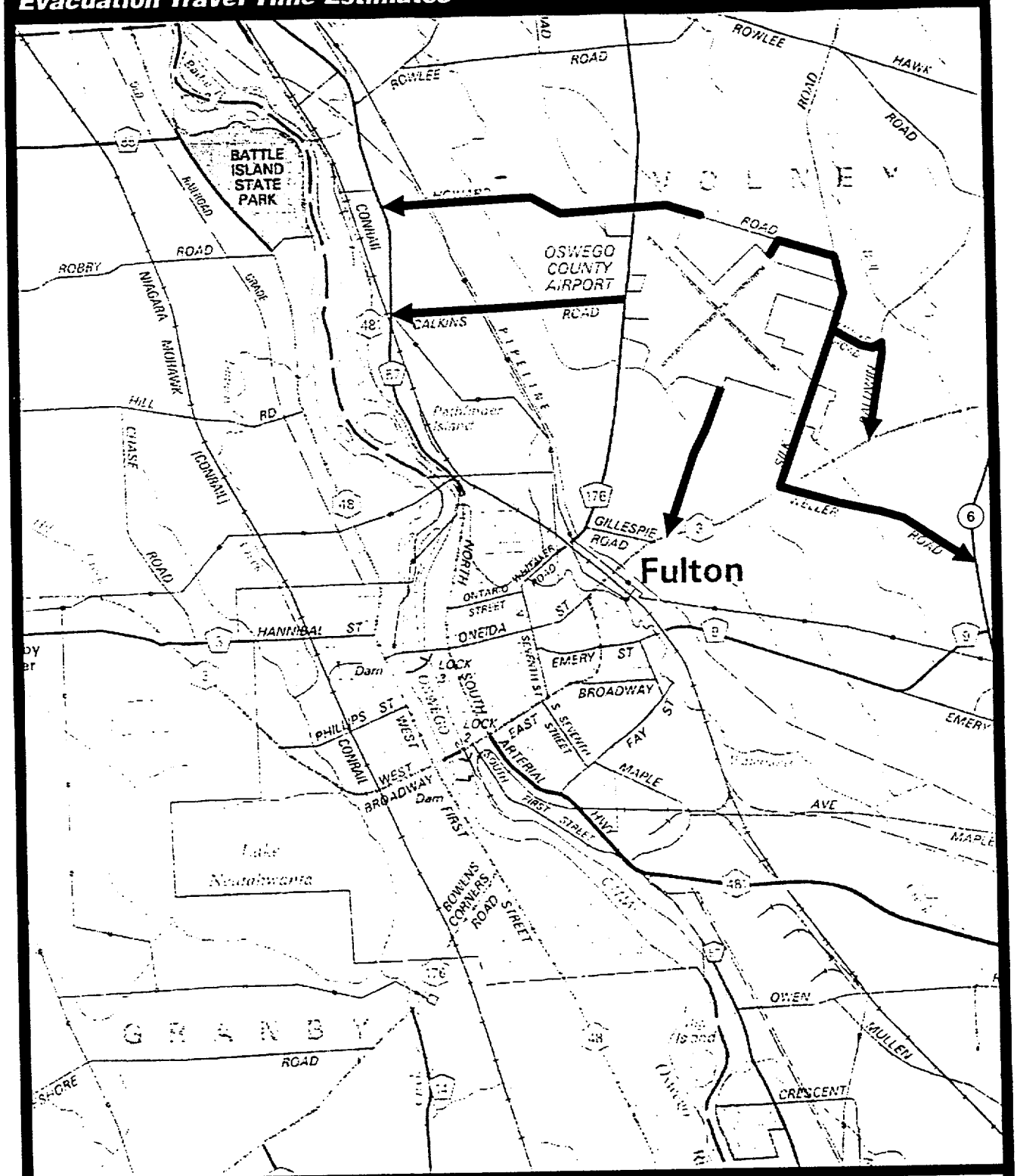


Figure 3-3
Egress Routes from Oswego County Airport During Events

Table 3-1
Ingress Distribution Assumptions

Time Period	Number of Auto Trips	Percent of Total
Thursday, 11 PM – Friday, 5 AM	1,429	5%
Friday, 5 AM – Friday, 5 PM	2,857	10%
Friday, 5 PM – Saturday, 1 AM	14,285	50%
Saturday, 1 AM – Saturday, 8 AM	1,429	5%
Saturday, 8 AM – Saturday, 12 Noon	5,714	20%
Saturday 12 Noon – Saturday, 7 PM	2,857	10%
Total	**28,571**	**100%**

Table 3-2
Egress Distribution Assumptions

Time Period	Number of Auto Trips	Percent of Total
Sunday, 11 PM – Monday, 5 AM	10,000	35%
Monday, 5 AM – Monday, 8 AM	1,429	5%
Monday, 8 AM – Monday 5 PM	17,142	60%
Total	**28,571**	**100%**

4 ANALYSIS OF EVACUATION TRAVEL TIMES

This section presents the evacuation travel time estimates for an Airport Special Event Scenario under the three cases described in Section 1.2. As discussed in Section 2.4, for each of the cases, the Airport Special Event traffic was assigned to a newly created traffic zone in ERPA No. 20, and distributed between two designated evacuation routes that pass the Oswego County Airport. These include Calkins Road and Howard to Rt. 57, which pass to the west of the airport and Silk Road, which passes the airport on the east.

Each case includes a series of runs corresponding to potential conditions/time periods in the NMP/JAF EPZ as follows:

- **Nighttime**, when most persons in the general population are in their residences, institutions have minimal staff, and relatively few businesses are operating;
- **Summer Weekend/Holidays**, during which it is assumed that recreational activities predominate, reflected in increased camp attendance and recreational facility usage;
- **Evenings**, which is distinguished from nighttime conditions because of increased staffing levels at institutional facilities and increased activities for the general population (e.g., shopping, entertainment); and
- **Weekday, School-out-of-Session**, which can be characterized as "normal" workday traffic patterns, except for the fact that school-based trips would not occur, replaced by an increase in recreational activities by school children.

For each case described below, evacuation travel time estimates are summarized in terms of the percentage of population being able to clear the 10-mile EPZ. Full runs of individual travel time estimates from each ERPA are presented in Appendix A.

4.1 Case 1: Concurrent Evacuation of EPZ and Airport Special Event

This case consists of a full evacuation of the NMP/JAF EPZ and a concurrent evacuation of the Airport Special Event during its peak attendance (i.e., between Saturday, 7:00 PM and Sunday, 11:00 PM). This event could be the result of simultaneous occurrence of nuclear incident at the NMP/JAF site and a general emergency at the Airport (e.g., fire, explosion) or a general evacuation of the 10-mile EPZ and adjoining areas in the event of a significant nuclear incident.

Figures 4-1, 4-2, and 4-3 illustrate the estimated evacuation travel times for this case under three separate potential times that this type of case could occur (i.e., Evening, Nighttime, and Summer/Holiday Weekend). It is clear that this case would result in the greatest evacuation times to clear the 10-mile EPZ. For example, under an evening timeframe during adverse weather,

Figure 4-1
Case 1 - 100% Evacuation - Evening

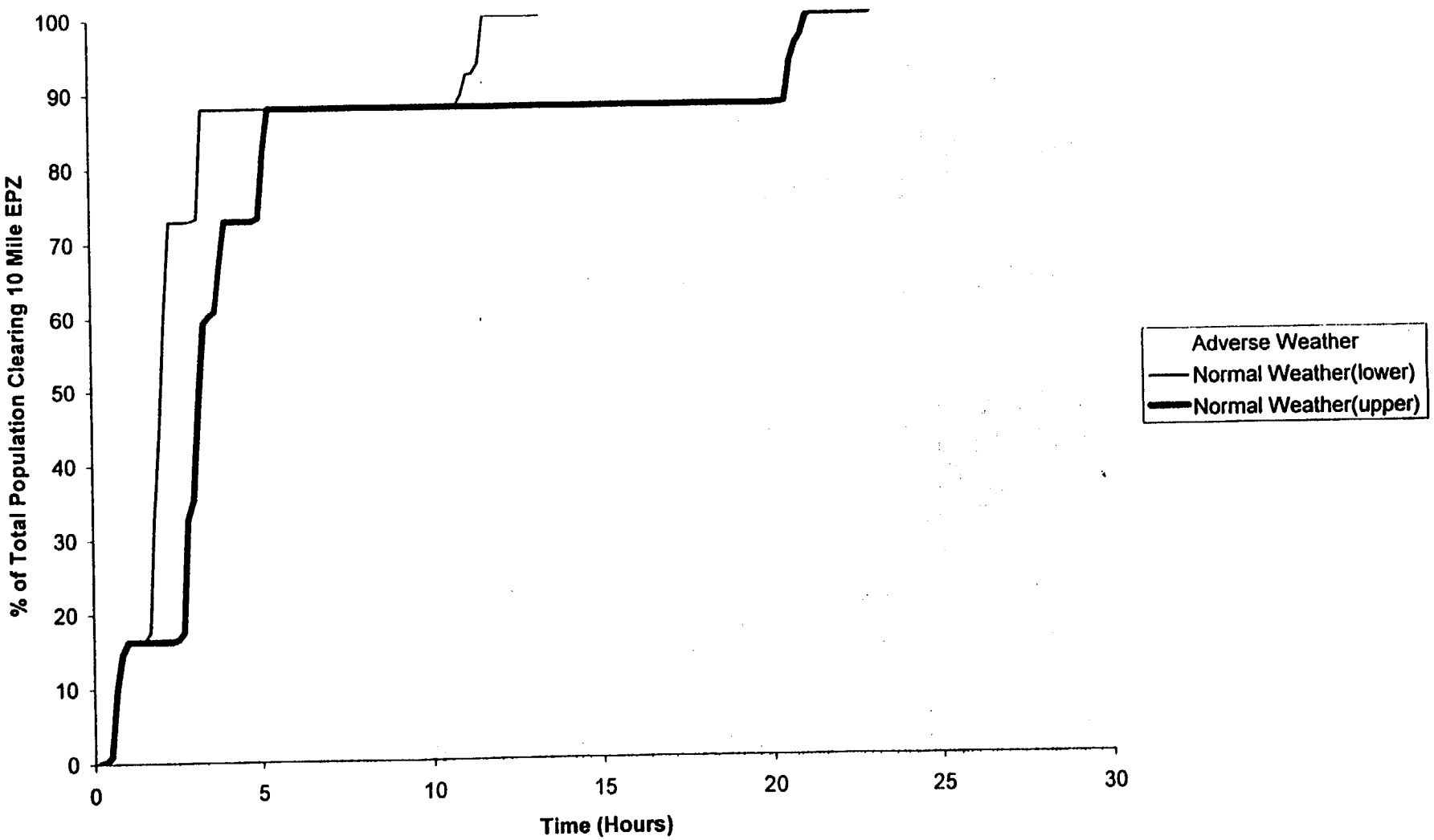


Figure 4-2
Case 1 - 100% Evacuation - Nighttime

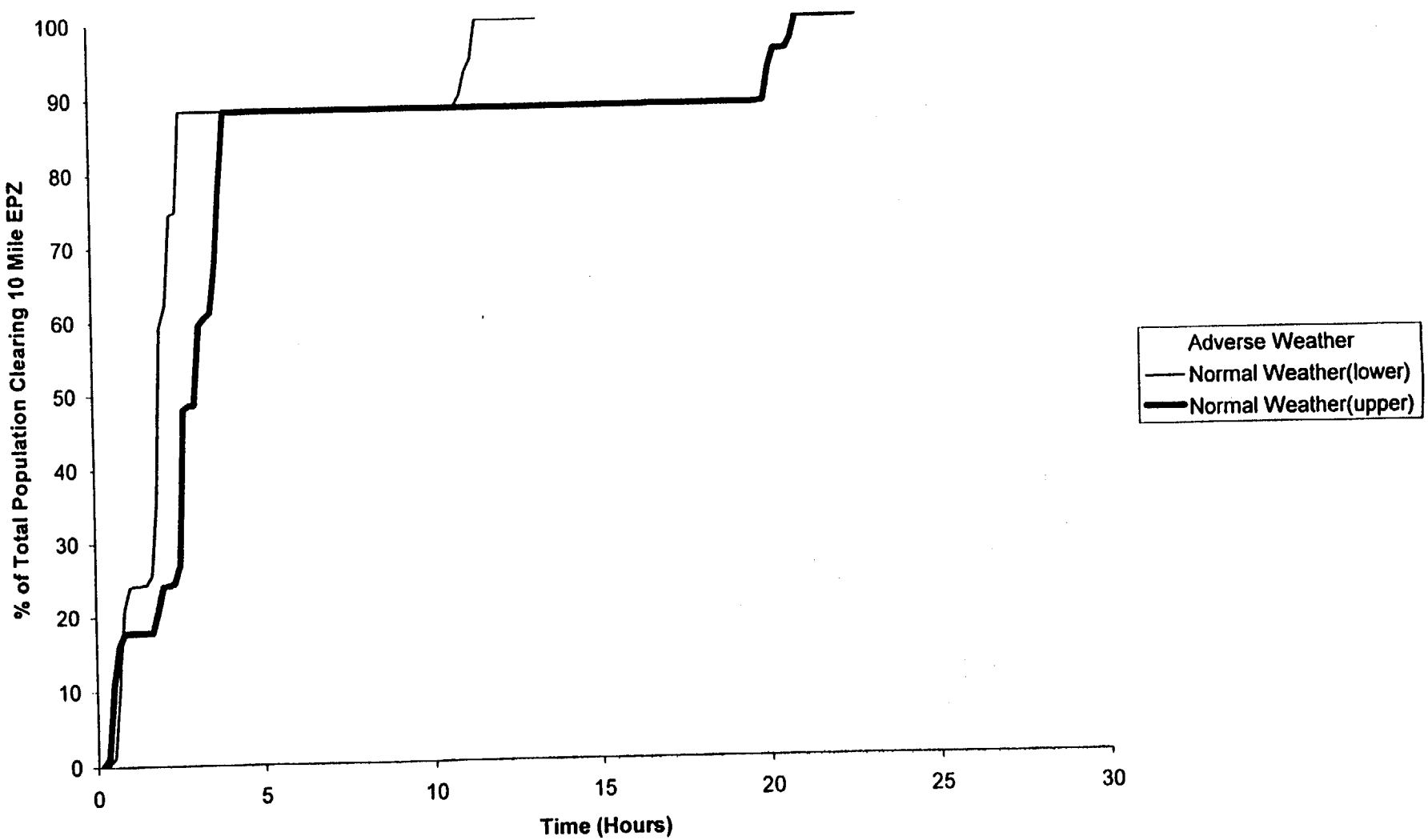
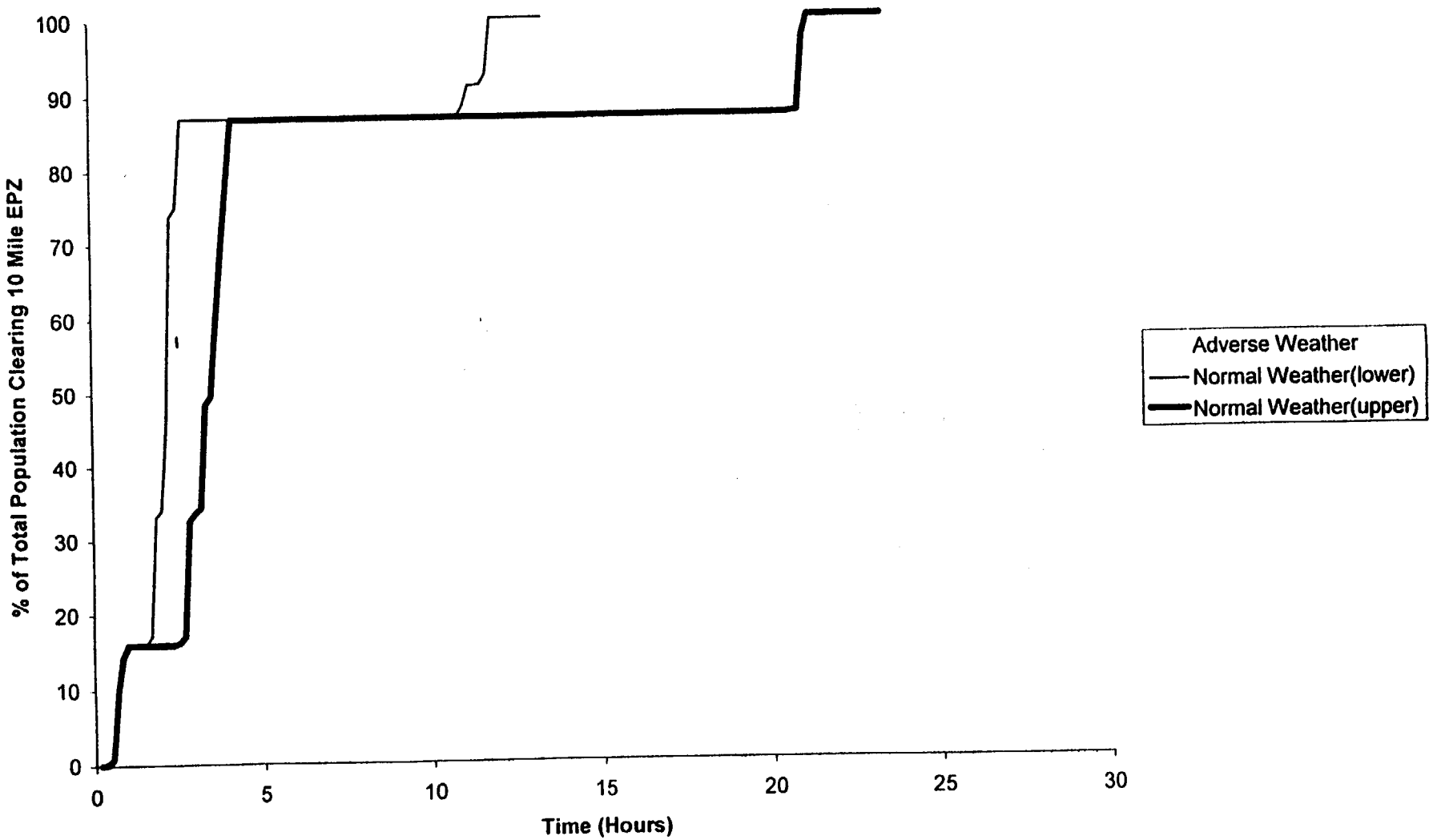


Figure 4-3
Case 1 - 100% Evacuation - Summer/Holiday Weekend



evacuation of roughly 85% of the total EPZ population would occur within 7 hours of the event. However, the last 15% of the EPZ population would require as much as 28 hours to clear the EPZ.

4.2 Case 2: Evacuation of the EPZ Immediately After the End of Airport Special Event

This case consists of a full evacuation of the NMP/JAF EPZ during the period immediately following the end of an Airport Special Event (i.e., between Sunday, 11:00 PM and Monday, 8:00 AM). This case assumes that the Airport Special Event has begun its typical exit procedures discussed in Section 3 and that 40% of event traffic is already on the road network (based upon the assumptions in Table 3-2) when the nuclear incident occurs.

Figures 4-4 and 4-5 illustrate the estimated evacuation travel times for this case under two separate potential times that this type of case could occur (i.e., Nighttime and Weekday, School-out-of-Session). While the least severe among the three cases examined, this case still results in some significantly extended evacuation travel times. Under the School-out-of-Session timeframe, it would take in excess of 14 hours to clear the 10-mile EPZ.

4.3 Case 3: Evacuation of the EPZ the Day Following the End of the Airport Special Event

This case consists of a full evacuation of the NMP/JAF EPZ during the period of the day after the end of an Airport Special Event (i.e., between Monday, 8:00 AM and Monday, 5:00 PM). This case assumes that 40% of event traffic have already exited and cleared from the area over the previous nine-hour period. During this period, the 60% remaining event traffic would be proceeding on the road network (based upon the assumptions in Table 3-2) when the nuclear incident occurs.

Figures 4-6 and 4-7 illustrate the estimated evacuation travel times for this case under two separate potential times that this type of case could occur (i.e., Evening and Weekday, School-out-of-Session). This case would also result in significant time being expended to totally clear the EPZ, although not as great as Case 1. For example, for the evening time frame under adverse weather conditions, over 90% of the population would clear the EPZ in roughly 7 hours, but the balance of the population would require as much as 17 hours.

4.4 Case 4: Potential Re-Route of EPZ Evacuation Pattern

In recognition of the potential implications of the evacuation travel time estimates for three cases examined, a fourth case was formulated to assess whether the effects of concurrent evacuations of the EPZ and an Airport Special Event could be mitigated through selective re-directing of

Figure 4-4
Case 2 - 40% on Road - Nighttime

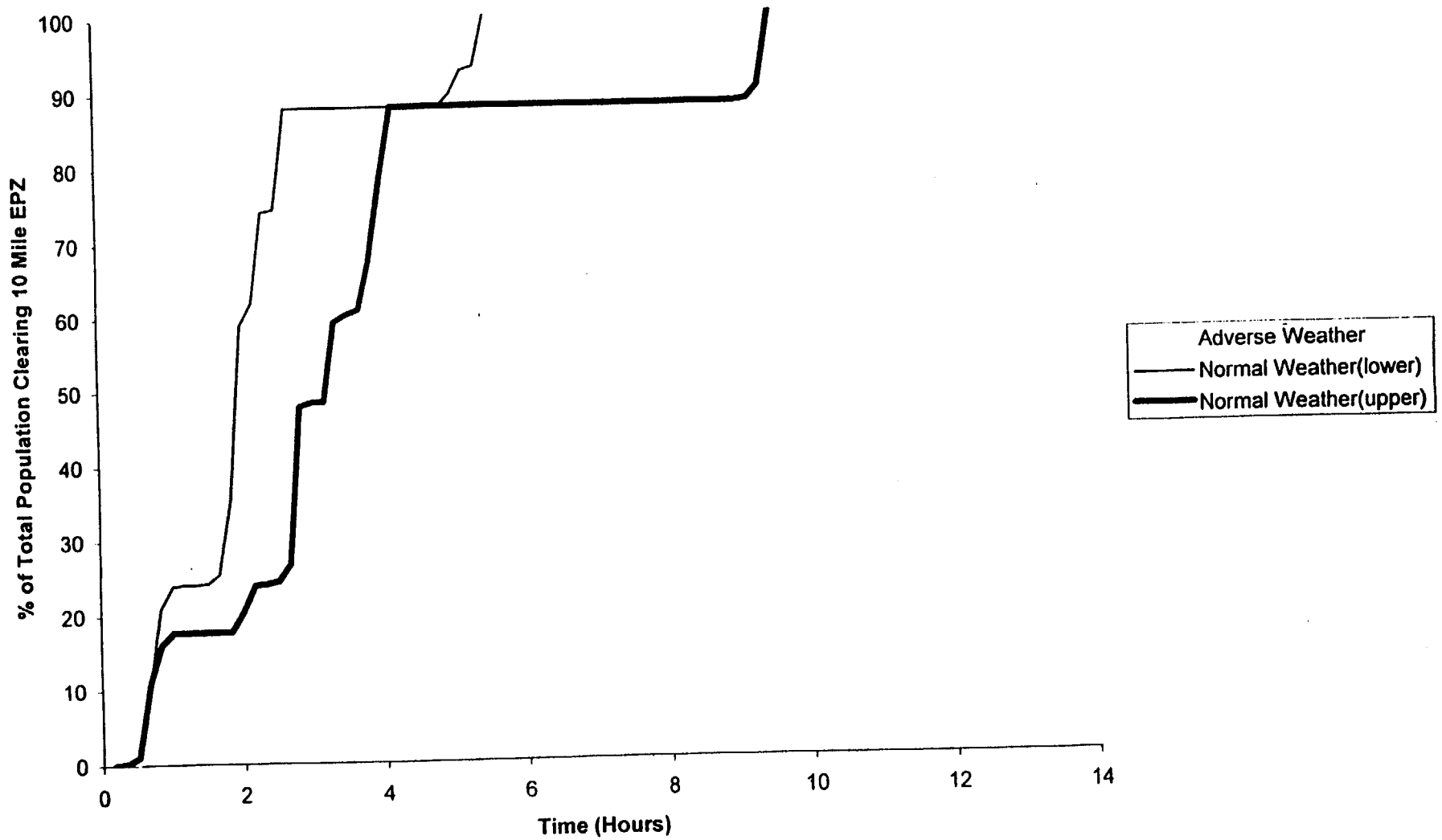


Figure 4-5
Case 2 - 40% on Road - School-Out-of-Session

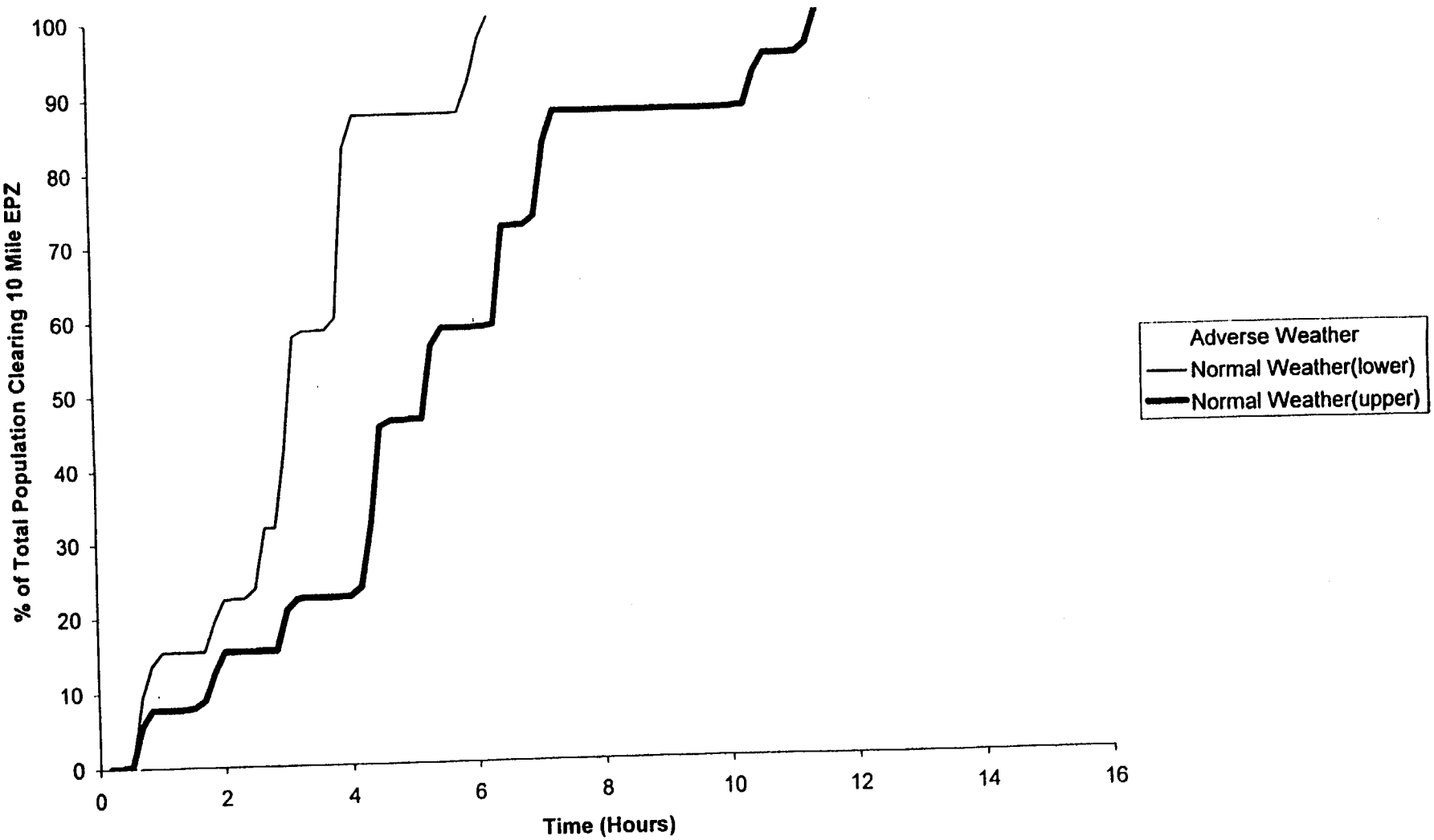


Figure 4-6
Case 3 - 60% on Road - Evening

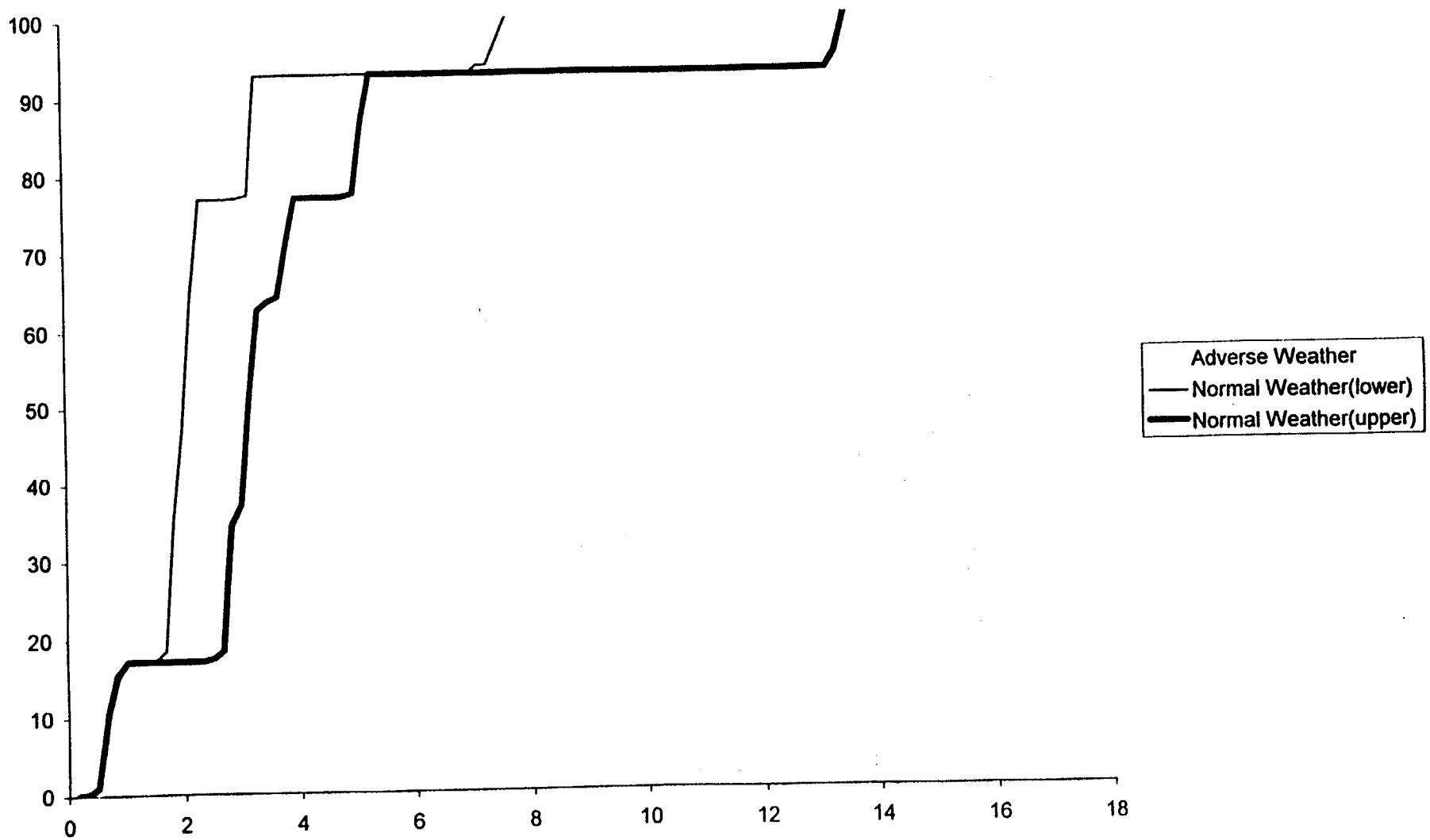
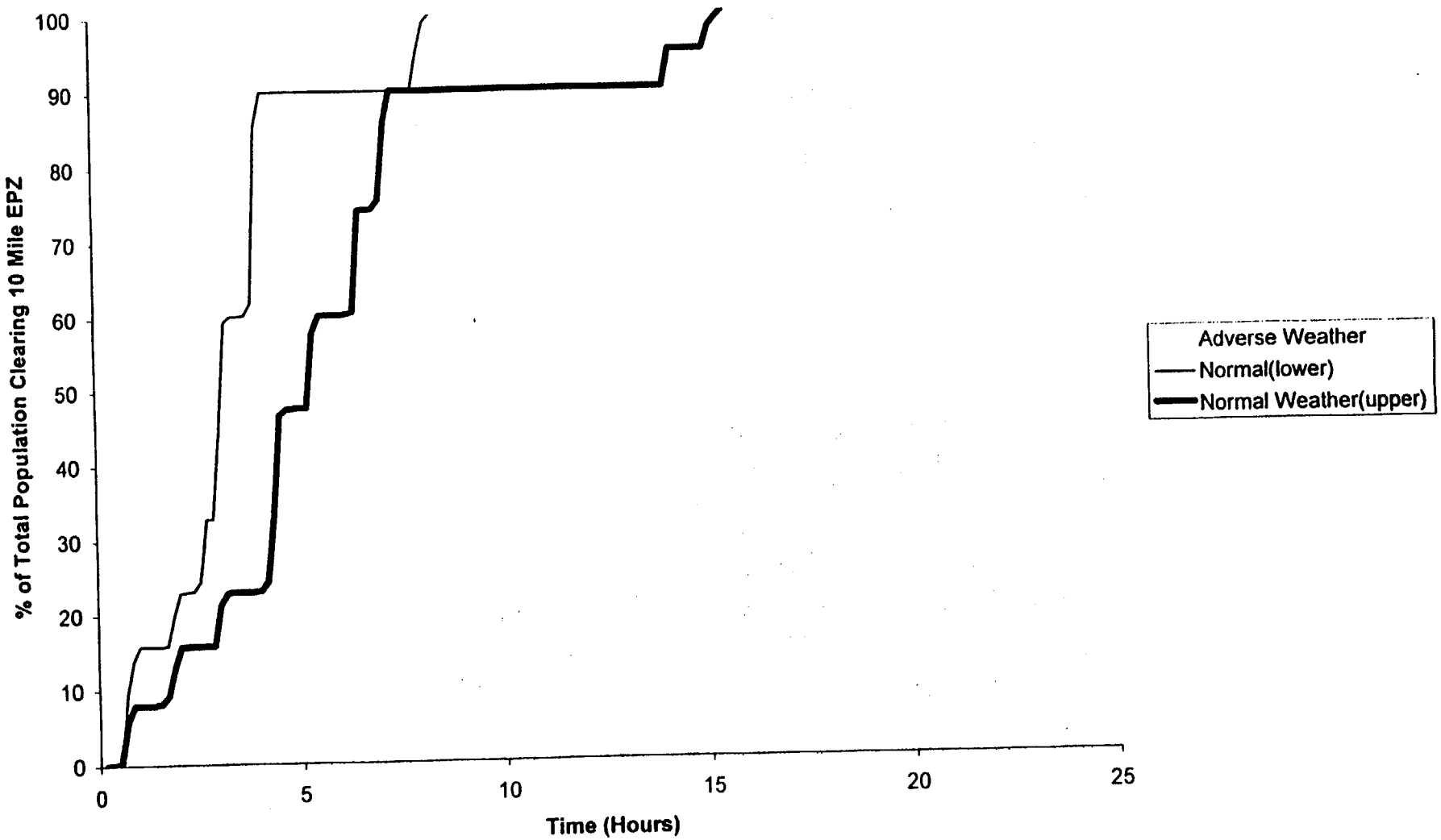
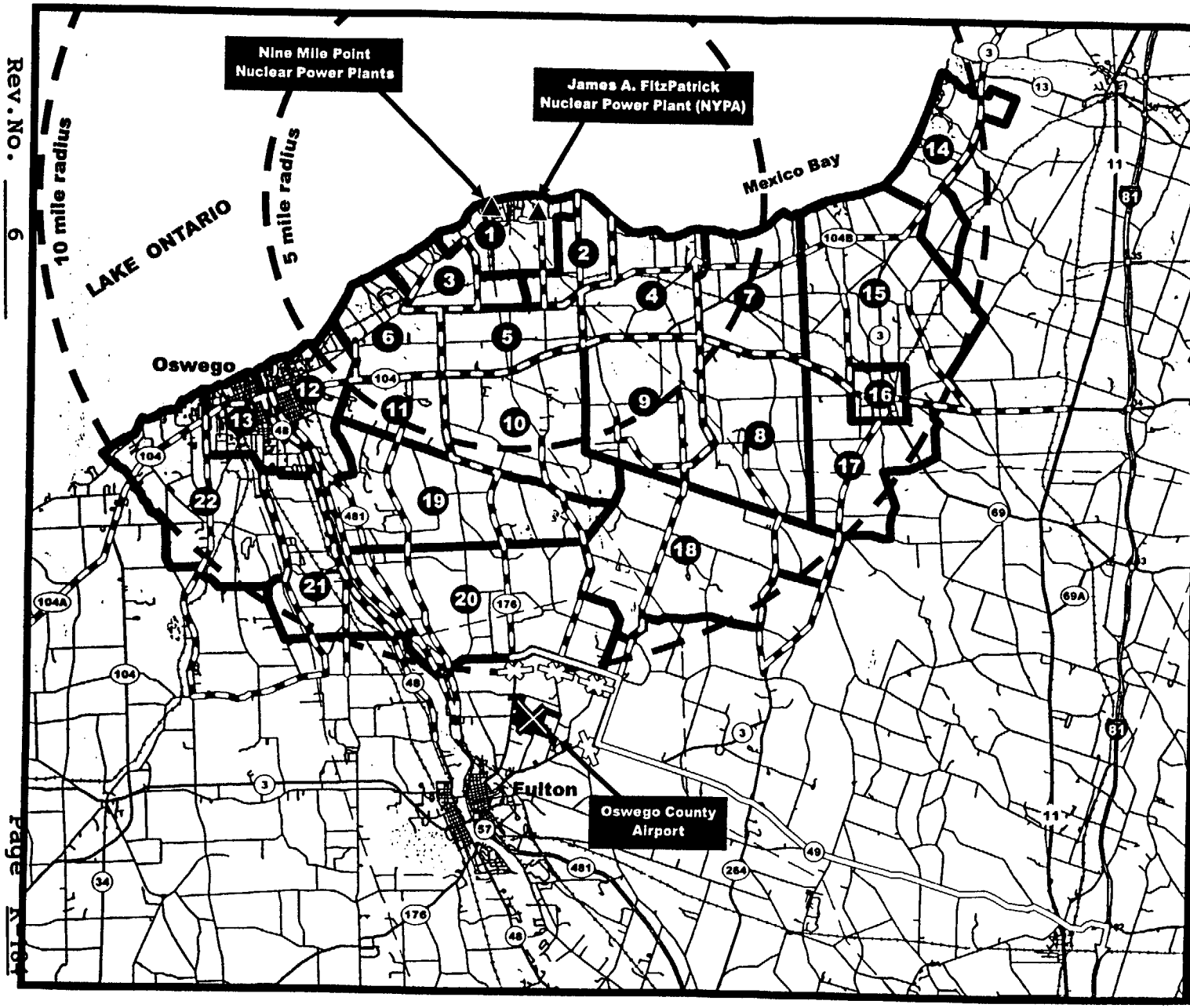


Figure 4-7
Case 3 - 60% on Road - School-out-of-Session





Nine Mile Point / J. A. FitzPatrick Evacuation Travel Time Estimates

Figure 4-7A
Re-Routed Evacuation Routes

LEGEND

- Nuclear Power Plant Location
- Emergency Response Planning Area Designation
- Emergency Response Planning Area Boundary
- Evacuation Routes
- Re-Routed Evacuation Route
- Police Roadblock/ Re-Route

2.0 1.0 0 2.0 miles

PB

evacuation routes out of the EPZ. The intent of such an approach would be to segregate EPZ and Airport Event traffic to the greatest extent possible.

The assumptions used in the formulation of this case are depicted in Figure 4-7A. As is shown, four designated evacuation routes (Rt. 176, Silk Road, Rt. 6, and Rt. 264) would be re-directed to east along Rt. 3 and Rt. 49 through the positioning of police roadblocks at key locations as follows:

- Rt. 176 and Rowlee Road;
- Silk Road and Rowlee/Hawk Roads;
- Baldwin and Hawk Roads;
- Rt. 6 and Rt. 3; and
- Rt. 264 and Rt. 49.

The Rt. 49 corridor is particularly suited for a re-route of EPZ evacuation traffic, given that it has recently been repaved and striped. It provides a direct connection to I-81 south, where traffic could then be directed to staging areas in Syracuse. This would allow Airport Special Event traffic more flexibility in route selection and flow.

Figures 4-8, 4-9, and 4-10 depict the evacuation travel time estimates of Case 1 (100% Evacuation of both EPZ and Airport Special Event) using the Rt. 49 re-route to segregate the two types of traffic. As is shown, for all time periods examined (i.e., Evening, Nighttime, and Summer/Holiday Weekend) the EPZ could be almost 100% cleared in roughly 6 to 7 hours.

4.5 Estimate of Critical Bottlenecks

One of the key factors used to determine where to place traffic control and emergency personnel and where to specify key backup routes is information from the computer assignment model that identifies critical bottlenecks along each evacuation route in the network. These links represent the locations of potential maximum delays. Figure 4-11 depicts the critical bottlenecks under Case 1 and is generally characteristic of all cases examined. Not surprisingly, these bottlenecks are primarily centered where evacuation routes feed into areas around the Oswego County Airport during an Airport Special Event Scenario.

Figure 4-8
Case 4 - 100% Evacuation - Re-Route - Evening

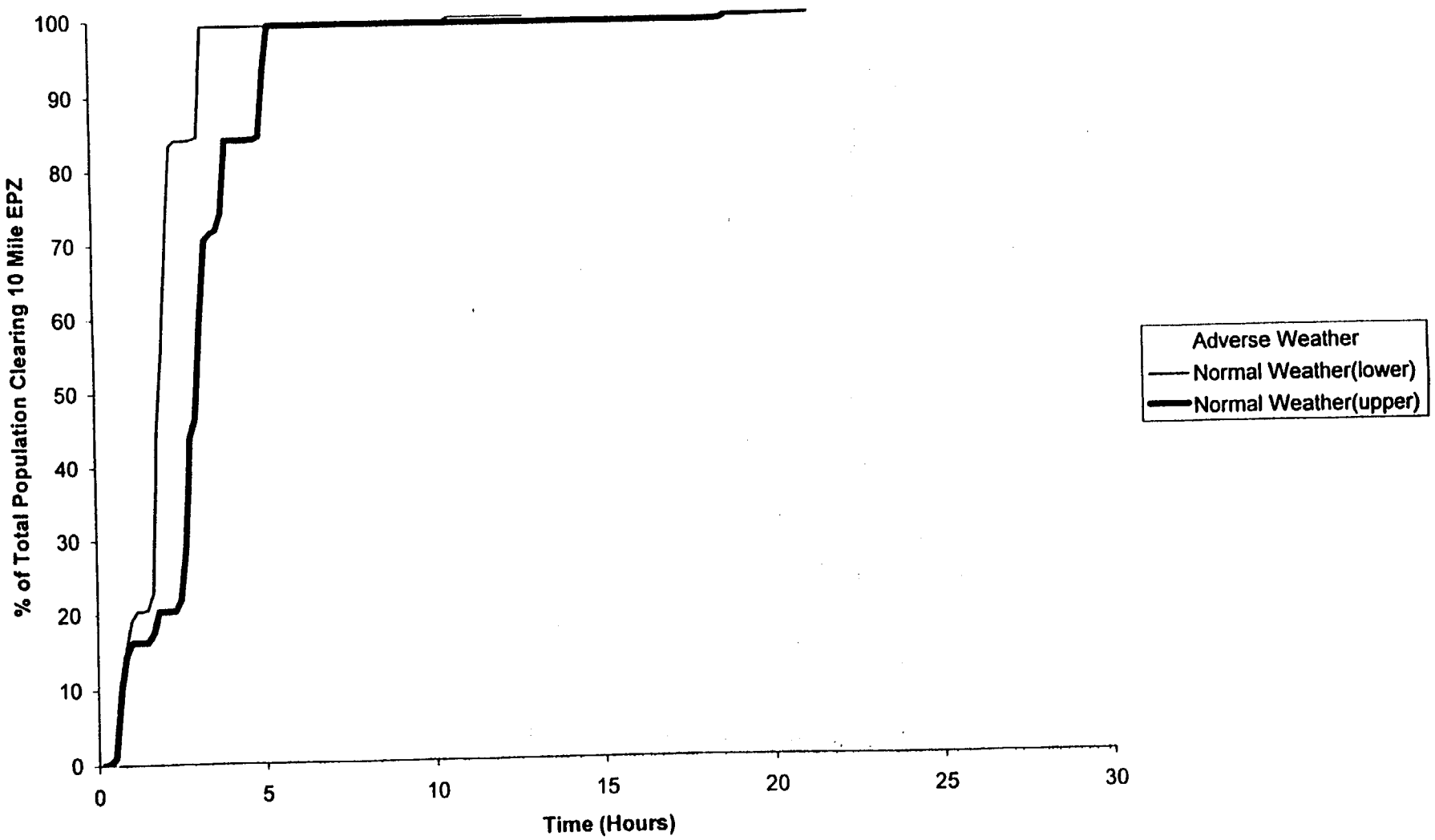


Figure 4-9
Case 4 - 100% Evacuation - Re-Route - Nighttime

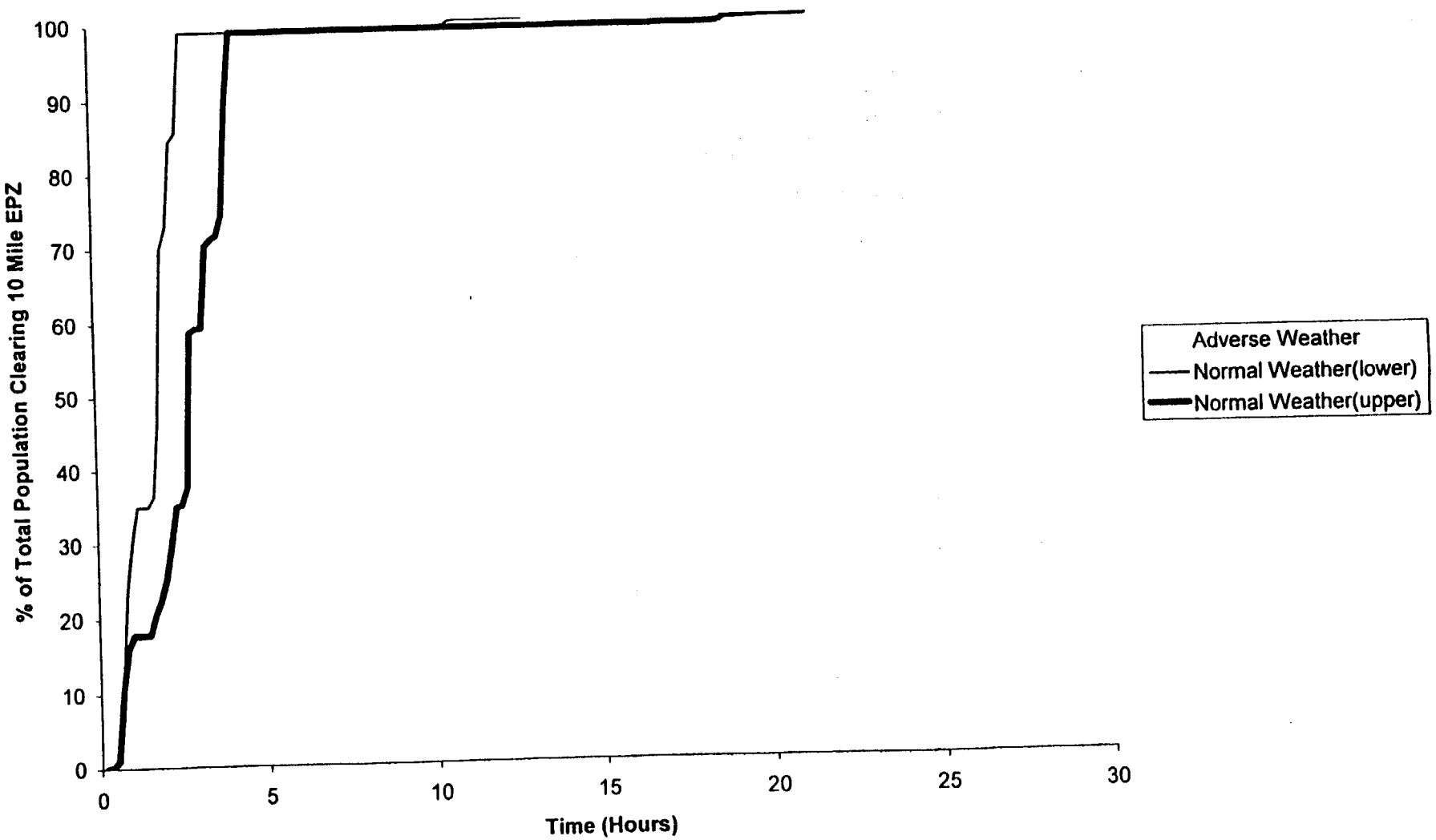
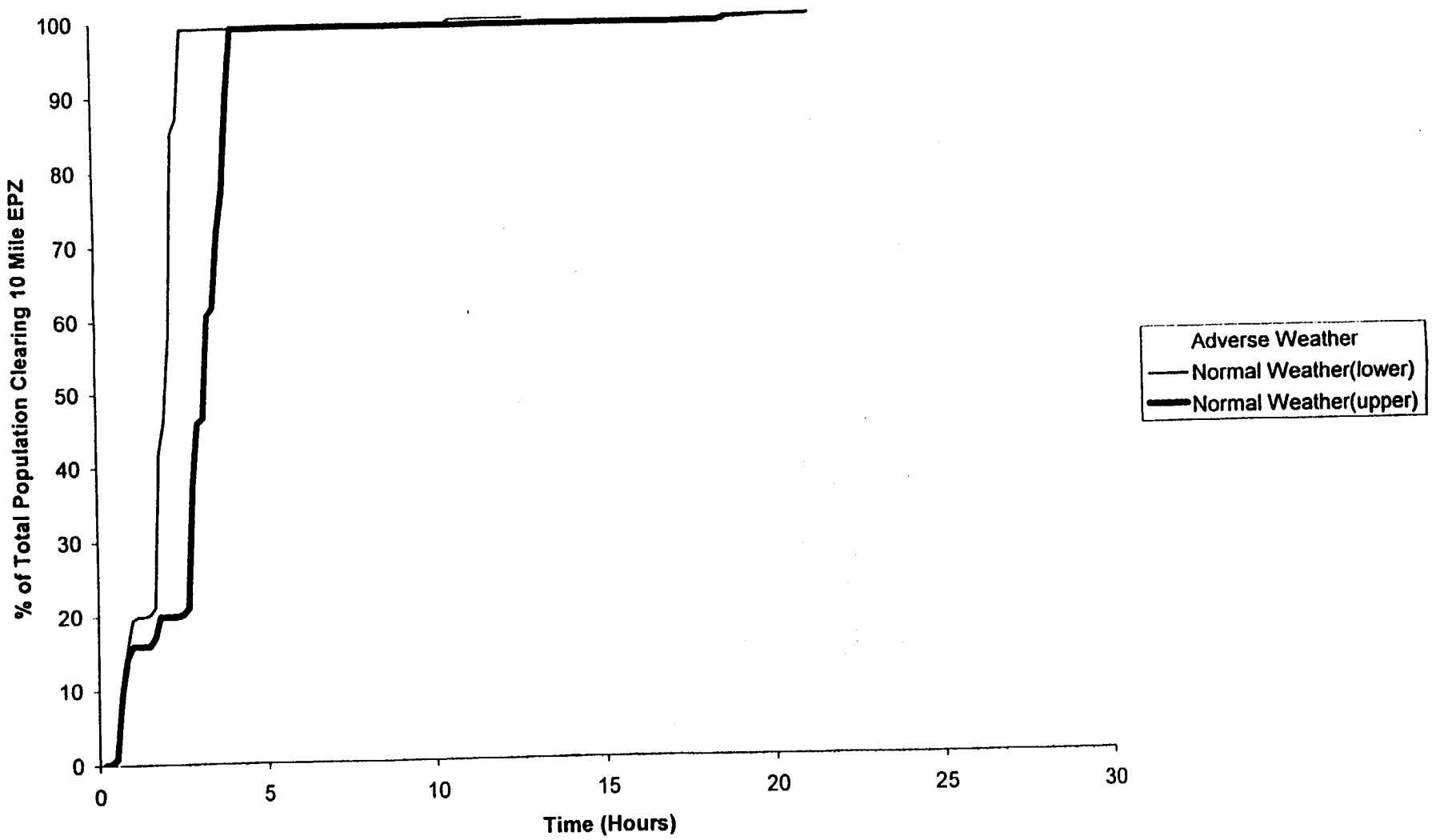
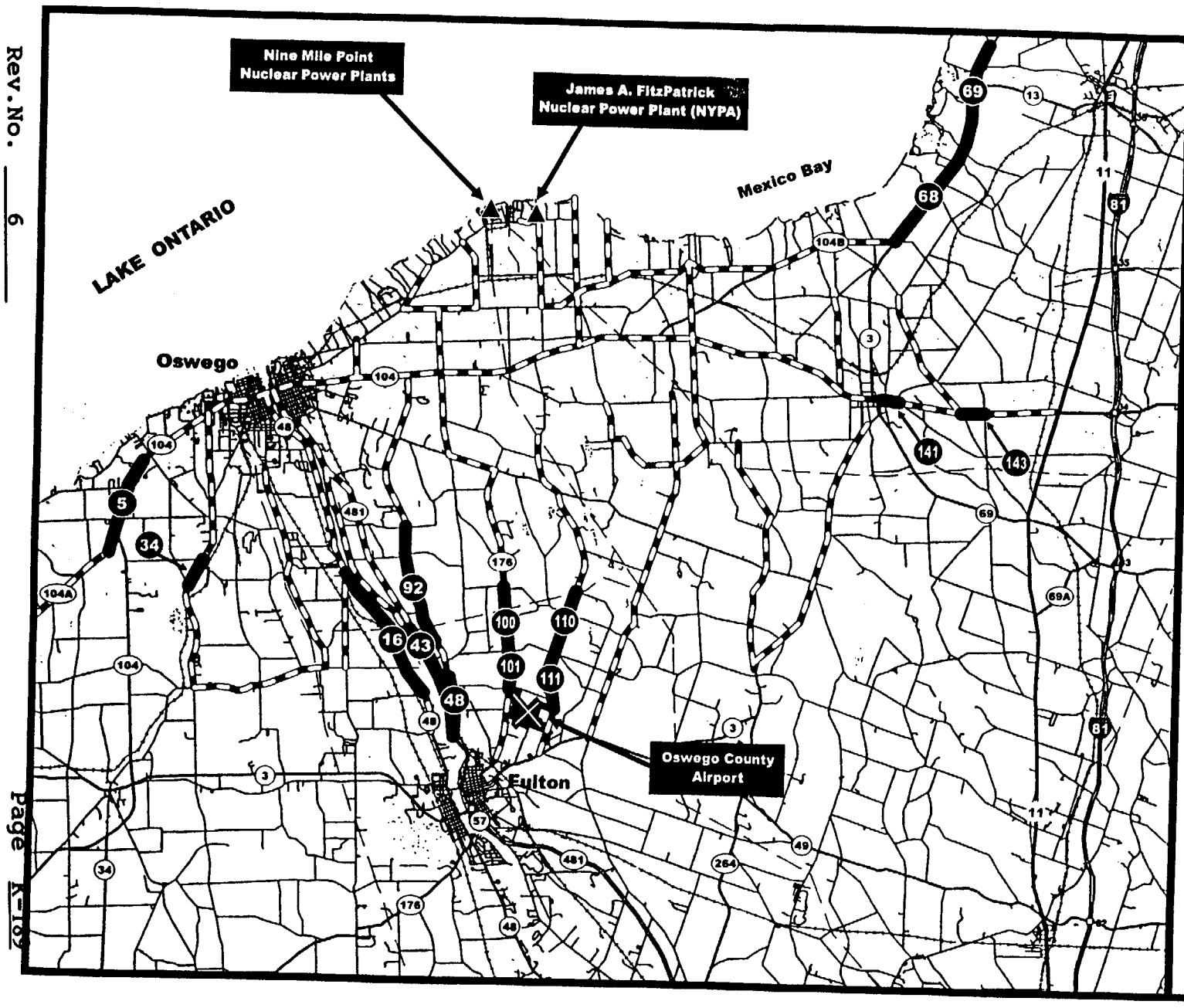


Figure 4-10
Case 4 - 100% Evacuation - Re-Route - Summer/Holiday Weekend





Nine Mile Point / J. A. FitzPatrick Evacuation Travel Time Estimates

Figure 4-11
Critical Bottlenecks
Case 1 - 100% Evacuation of EPZ and Airport Event.

LEGEND

- ▲ Nuclear Power Plant Location
- (68) Evacuation Route Link Designation
- Evacuation Route Link Experiencing Critical Bottleneck
- Evacuation Routes

2.0 1.0 0 2.0 miles

PB

APPENDIX A

EVACUATION TRAVEL TIMES BY EMERGENCY RESPONSE PLANNING AREA

EVACUATION TRAVEL TIMES
BY EMERGENCY RESPONSE PLANNING AREAS

This appendix includes evacuation travel time estimates by ERPA for a simultaneous full-EPZ evacuation during a special event at the Oswego County Airport. Evacuation travel time estimates are presented for the following scenarios, weather conditions, and population groups:

- Scenarios

School-not-in Session
Weekend/Holiday Summer
Evening
Nighttime

- Weather Conditions

Normal
Adverse

- Population Groups

Resident Population with Autos
Resident Population without Autos
Special Facilities Population
Transient Population

A total of 20 tables are included in this appendix. A range of values depict the lower and upper bound limits of the evacuation times for normal weather and dry roadway conditions to a light rain which results in wet pavement. Evacuation travel time estimates for adverse weather approximate travel conditions during severe hail storms or thunderstorms.

A suggested approach to read the table in this appendix is outlined below:

Step 1 Determine the appropriate case and scenario (i.e., 100% Evacuation-Evening).

Step 2 Determine the approximate weather condition:

Lower bound normal weather conditions – dry pavement.
Upper bound normal weather conditions – wet pavement.
Adverse weather conditions – pavement conditions during a thunderstorm/hailstorm.

Step 3 For lower bound normal weather ETTE tables, read the left of the two columns to interpret ETTEs by population group for each ERPA and/or the entire EPZ.

For upper bound normal weather ETTE tables, read the right of the two columns to interpret ETTEs by population group for each ERPA and/or the entire EPZ.

Adverse weather ETTEs are documented on separate tables for each scenario.

A possible evacuation scenario is detailed as follows:

A full EPZ evacuation scenario has been ordered on a Saturday at 6:00 PM in July. An evacuation of a special event at the Oswego County Airport is also occurring. The weather conditions are observed to be poor (heavy rain, thunderstorm, hailstorm, or heavy fog) and the

forecast is that these weather conditions will continue over the next two days. (See Table A-1 for ETTEs).-

Q. How long will it take for the permanent resident population with autos to:

- Fully evacuate ERPA 5? A. 26:20

Q. How long will it take for the permanent resident population without autos to:

- Fully evacuate ERPA 16? A. 1:30

Q. How long will it take for the special facilities population to:

- Fully evacuate ERPA 4? A. 2:00
- Fully evacuate the EPZ? A. 4:10 (Multiple wave evacuation substantially increase special facility evacuation times.)

Q. How long will it take for the transient population to:

- Fully evacuate ERPA 4? A. 1:50 (Transient population can evacuate more quickly than permanent resident population in the same ERPA. This typically occurs when the transient population is located in a traffic zone closer to the EPZ boundary).
- Fully evacuate ERPA 14? A. 3:20 (Transient population and permanent resident population typically require the same time to evacuate an ERPA when the population dispersion of each is similar throughout the ERPA.
- Fully evacuate ERPA 22? A. 6:20

NOTES FOR EVACUATION TRAVEL TIME ESTIMATES BY ERPA

NORMAL WEATHER

1. The evacuation travel time ranges presented in this table are based on operations strategies indicated in the evacuation implementation procedures.

   Lower bound evacuation travel times (shorter times) can be anticipated when:

   a. Unexpected long-term capacity restrictions on key highway links owing to incidents such as accidents, vehicle breakdowns, and highway construction, do not occur.

   b. A high state of operational readiness (traffic control officers mobilized, traffic control devices operational, al buses stationed to begin their initial runs) is attained.

   c. An informed and cooperative public follow directions as instructed.

   d. Dry roadway conditions exist.

   Upper bound evacuation travel times (longer times) are representative of a situation where:

   a. Capacity restrictions adversely affect traffic flow, but not to the point where a breakdown in traffic flow would result.

   b. A low state of operations readiness results from minimal mobilization of the emergency workforce.

   c. A low degree of cooperation from the public occurs.

   d. A light rain results in wet pavement.

2. The evacuation travel time ranges are indicated as hours: minutes, and include 20 minutes of public preparation time.

3. The population subgroups indicated in this table are:

   a. Resident population (with and without automobiles).

   b. Special facilities (schools, colleges, nursing homes, hospitals, other health care facilities, resident facilities such as group homes, convents, and monasteries).

   c. Transient (employees, visitors to parks, resident and day camps, hotels, and motels).

4. Gaps in this table indicate that there is no special facility or transient population in the given ERPA.

5. The evacuation travel time ranges presented in the table assume a simultaneous evacuation of the entire EPZ. The evacuation travel time for any individual ERPA is a staged evacuation and will not exceed the travel time range indicated in this table.

6. All times have been rounded to the nearest 10 minutes.

7. Special facility evacuation travel times include time for multi-wave trips to evacuate the population which requires transport by ambulance.

NOTES FOR EVACUATION TRAVEL TIME ESTIMATES BY ERPA

ADVERSE WEATHER

1. The evacuation travel time ranges presented in this table are based on operational strategies indicated in the evacuation implementation procedures.
2. The evacuation travel time ranges are indicated as hours: minutes, and include 20 minutes of public preparation time.
3. Adverse weather conditions are considered to be a slippery roadway surface and/or reduced visibility (e.g., due to fog, heavy rain, or a severe thunderstorm which may create traffic disruptions as a result of downed trees or powerlines).
4. The population subgroups indicated in this table are:
   a. Resident population (with and without automobiles).
   b. Special facilities (schools, colleges, nursing homes, hospitals, other health care facilities, resident facilities such as group homes, convents, and monasteries).
   c. Transient (employees, visitors to parks, resident and day camps, hotels, and motels).
5. Gaps in the table indicate that there is no special facility or transient population in the given ERPA.
6. The evacuation travel time ranges presented in the table assume a simultaneous evacuation of the entire EPZ. The evacuation travel time for any individual ERPA is a staged evacuation and will not exceed the travel time range indicated in this table.
7. All times have been rounded to the nearest 10 minutes.
8. Special facility evacuation travel times include time for multi-wave trips to evacuate the population which requires transport by ambulance.

TABLE A-1

CASE 1 – 100% EVACUATION – EVENING

ADVERSE WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	26:20	26:20		26:20
2	26:20	26:10		
3	25:50	25:50		
4	3:30	3:30	2:00	1:50
5	26:20	26:10		
6	25:40	4:40		25:40
7	3:30	1:40		3:30
8	1:50	0:40		
9	1:40	1:30		
10	26:20	25:20		25:40
11	4:40	4:30		
12	4:50	4:40	3:50	4:50
13	6:20	6:30	4:10	6:20
14	3:20	3:00		3:20
15	3:20	2:00		3:20
16	1:40	1:30		
17	1:40	1:30		
18	1:40	1:20		
19	26:10	26:10		
20*	26:10	26:10		28:40
21	3:10	3:00		
22	6:20	6:10	6:20	6:20

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-2

CASE 1 – 100% EVACUATION – EVENING

NORMAL WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	11:30 – 21:10	11:30 – 21:10		11:30 – 21:10
2	11:10 – 21:10	10:50 – 20:50		
3	11:30 – 20:40	11:30 – 20:40		
4	1:50 – 2:50	1:50 – 2:50	1:10 – 1:10	1:00 – 1:00
5	11:30 – 21:10	11:00 – 21:00		
6	11:30 – 20:40	2:10 – 3:50		11:30 – 20:40
7	1:50 – 2:50	0:30 – 0:30		1:50 – 2:50
8	0:50 – 0:50	0:40 – 0:40		
9	0:50 – 0:50	0:40 – 0:40		
10	11:30 – 21:10	11:10 – 20:20		11:30 – 20:40
11	2:10 – 3:50	2:10 – 3:40		
12	2:20 – 3:50	2:10 – 3:40	2:20 – 3:10	2:20 – 3:50
13	3:20 – 5:10	3:20 – 5:10	2:10 – 3:30	3:20 – 5:10
14	1:40 – 2:50	1:30 – 2:30		1:40 – 2:50
15	1:40 – 2:50	1:00 – 1:00		1:40 – 2:50
16	0:40 – 0:40	0:20 – 0:20		
17	0:40 – 0:40	0:50 – 0:50		
18	0:40 – 0:40	0:30 – 0:30		
19	11:30 –21:00	11:30 – 21:00		
20*	11:30 – 21:00	11:20 – 21:00		14:00 – 23:30
21	1:40 – 2:40	1:30 – 2:30		
22	3:20 – 5:10	3:00 – 5:00	3:10 – 5:10	3:20 – 5:10

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-3
CASE 1 – 100% EVACUATION – NIGHTTIME
ADVERSE WEATHER
EVACUATION TRAVEL TIME SUMMARY
IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	26:20	26:20		26:20
2	26:10	26:00		
3	25:20	25:20		
4	2:30	2:30	1:20	1:10
5	26:10	26:10		
6	25:20	4:40		25:20
7	2:30	1:40		
8	1:50	0:40		
9	0:50	0:40		
10	26:10	25:00		
11	4:40	4:30		
12	4:50	4:40	20:20	4:50
13	5:00	5:00	23:20	5:00
14	2:20	2:10		2:20
15	2:20	2:00		2:20
16	1:40	1:30		
17	1:40	1:30		
18	0:40	0:30		
19	26:00	26:00		
20*	26:00	26:00		28:30
21	3:10	3:00		
22	5:00	4:40	4:50	5:00

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-4

CASE 1 – 100% EVACUATION – NIGHTTIME

NORMAL WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	11:20 – 21:10	11:20 – 21:10		11:20 – 21:10
2	11:00 – 21:10	10:50 – 20:50		
3	11:20 – 20:20	11:20 – 20:20		
4	1:00 – 2:10	0:50 – 2:00	1:10 – 1:10	1:00 – 1:00
5	11:20 – 21:00	11:00 – 21:00		
6	11:20 – 20:20	2:10 – 3:50		11:20 – 20:20
7	0:50 – 2:00	0:30 – 0:30		
8	0:50 – 0:50	0:40 – 0:40		
9	0:50 – 0:50	0:40 – 0:40		
10	11:20 – 21:00	11:00 – 20:00		
11	2:10 – 3:50	2:10 – 3:40		
12	2:20 – 3:50	2:10 – 3:40	13:30 – 16:40	2:20 – 3:50
13	2:30 – 4:00	2:40 – 4:10	16:10 – 19:20	2:30 – 4:00
14	0:40 – 2:00	0:30 – 1:40		0:40 – 2:00
15	0:40 – 2:00	1:00 – 1:00		0:40 – 2:00
16	0:40 – 0:40	0:20 – 0:20		
17	0:40 – 0:40	0:50 – 0:50		
18	0:40 – 0:40	0:30 – 0:30		
19	11:20 – 20:50	11:20 – 20:50		
20*	11:20 – 20:50	11:10 – 21:00		13:50 – 23:30
21	1:40 – 2:40	1:30 – 2:30		
22	2:40 – 4:00	2:20 – 3:50	2:30 – 4:00	2:40 – 4:00

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-5

CASE 1 – 100% EVACUATION – SUMMER/HOLIDAY WEEKEND

ADVERSE WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	26:20	26:20		26:20
2	26:20	26:00		
3	26:10	26:10		
4	3:30	3:30	2:00	1:50
5	26:10	26:10		
6	26:10	4:40		26:10
7	3:30	1:40		3:30
8	1:50	0:40		
9	1:40	1:30		
10	26:10	25:40		26:00
11	4:40	4:30		
12	4:50	4:40	20:50	4:50
13	5:00	5:00	23:50	5:00
14	3:20	3:00		3:20
15	3:20	2:00		3:20
16	1:40	1:30		
17	1:40	1:30		
18	1:40	1:20		
19	26:00	26:00		
20*	26:00	26:00		28:30
21	3:10	3:00		
22	5:00	4:40	4:50	5:00

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-6

CASE 1 – 100% EVACUATION – SUMMER/HOLIDAY WEEKEND

NORMAL WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	11:40 – 21:10	11:40 – 21:10		11:40 – 21:10
2	11:10 – 21:10	10:50 – 20:50		
3	11:40 – 21:00	11:40 – 21:00		
4	1:50 – 2:50	1:50 – 2:50	1:10 – 1:10	1:00 – 1:00
5	11:40 – 21:00	11:00 – 21:00		
6	11:40 – 21:00	2:10 – 3:50		11:40 – 21:00
7	1:50 – 2:50	0:30 – 0:30		1:50 – 2:50
8	0:50 – 0:50	0:40 – 0:40		
9	0:50 – 0:50	0:40 – 0:40		
10	11:40 – 21:00	11:20 – 20:40		11:40 – 21:00
11	2:10 – 3:50	2:10 – 3:40		
12	2:20 – 3:50	2:10 – 3:40	13:50 – 17:10	2:20 – 3:50
13	2:30 – 4:00	2:40 – 4:10	16:30 – 19:50	2:30 – 4:00
14	1:40 – 2:50	1:30 – 2:30		1:40 – 2:50
15	1:40 – 2:50	1:00 – 1:00		1:40 – 2:50
16	0:40 – 0:40	0:20 – 0:20		
17	0:40 – 0:40	0:50 – 0:50		
18	0:40 – 0:40	0:30 – 0:30		
19	11:40 – 21:00	11:40 – 21:00		
20*	11:40 – 21:00	11:30 – 21:00		14:10 – 23:30
21	1:40 – 2: 40	1:30 – 2:30		
22	2:40 – 4:00	2:20 – 3:50	2:30 – 4:00	2:40 – 4:00

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-7
CASE 2 – 40% EVACUATION –NIGHTTIME
ADVERSE WEATHER
EVACUATION TRAVEL TIME SUMMARY
IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	11:50	11:50		11:50
2	11:40	11:30		
3	11:50	11:50		
4	2:30	2:30	1:20	1:10
5	11:40	11:40		
6	11:50	4:40		11:50
7	2:30	1:40		
8	1:50	0:40		
9	0:50	0:40		
10	11:40	11:20		
11	4:40	4:30		
12	4:50	4:40	15:00	4:50
13	5:00	5:00	18:00	5:00
14	2:20	2:10		2:20
15	2:20	2:00		2:20
16	1:40	1:30		
17	1:40	1:30		
18	0:40	0:30		
19	11:40	11:40		
20*	11:40	11:30		11:10
21	3:10	3:00		
22	5:00	4:40	4:50	5:00

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-8
CASE 2 – 40% EVACUATION –NIGHTTIME
NORMAL WEATHER
EVACUATION TRAVEL TIME SUMMARY
IN HOURS AND MINUTES

ERPA No:	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	5:30 – 9:30	5:30 – 9:30		5:30 – 9:30
2	5:10 – 9:30	4:50 – 9:10		
3	5:30 – 9:30	5:30 – 9:30		
4	1:00 – 2:10	0:50 – 2:00	1:10 – 1:10	1:00 – 1:00
5	5:30 – 9:30	5:00 – 9:20		
6	5:30 – 9:30	2:10 – 3:50		5:30 – 9:30
7	0:50 – 2:00	0:30 – 0:30		
8	0:50 – 0:50	0:40 – 0:40		
9	0:50 – 0:50	0:40 – 0:40		
10	5:30 – 9:30	5:10 – 9:10		
11	2:10 – 3:50	2:10 – 3:40		
12	2:20 – 3:50	2:10 – 3:40	10:30 – 12:30	2:20 – 3:50
13	2:30 – 4:00	2:40 – 4:10	13:10 – 15:10	2:30 – 4:00
14	0:40 – 2:00	0:30 – 1:40		0:40 – 2:00
15	0:40 – 2:00	1:00 – 1:00		0:40 – 2:00
16	0:40 – 0:40	0:20 – 0:20		
17	0:40 – 0:40	0:50 – 0:50		
18	0:40 – 0:40	0:30 – 0:30		
19	5:20 – 9:20	5:20 – 9:20		
20*	5:20 – 9:20	5:10 – 9:20		4:50 – 8:50
21	1:40 – 2:40	1:30 – 2:30		
22	2:40 – 4:00	2:20 – 3:50	2:30 – 4:00	2:40 – 4:00

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-9

CASE 2 – 40% EVACUATION – SCHOOL OUT-OF-SESSION

ADVERSE WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	14:20	14:20		14:20
2	14:10	14:00		14:10
3	13:00	13:00		
4	3:50	3:40	2:20	3:50
5	14:10	14:10		13:00
6	13:00	8:40		13:00
7	3:40	2:10		3:40
8	2:20	1:40		2:20
9	2:00	2:00		2:00
10	14:10	12:40		14:10
11	8:50	8:40		8:50
12	8:50	8:40	18:30	8:50
13	8:00	8:00	21:30	8:00
14	3:40	3:10		3:40
15	3:40	2:30		3:40
16	2:10	2:00	1:30	2:10
17	2:00	2:00		1:40
18	2:00	1:40		2:00
19	14:00	14:00		12:50
20*	14:00	14:00		14:00
21	5:00	5:00	1:40	5:00
22	8:00	7:40	7:50	7:50

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-10

CASE 2 – 40% EVACUATION – SCHOOL OUT-OF-SESSION

NORMAL WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No:	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	6:10 – 11:30	6:10 – 11:30		6:10 – 11:30
2	6:10 – 11:30	6:00 – 11:10		6:10 – 11:30
3	6:00 – 10:30	6:00 – 10:30		
4	2:00 – 3:10	1:50 – 3:00	1:10 – 2:00	2:00 – 3:10
5	6:10 – 11:30	6:00 – 11:20		6:00 – 10:30
6	6:00 – 10:30	3:50 – 7:00		6:00 – 10:30
7	1:50 – 3:00	0:40 – 1:50		1:50 – 3:00
8	0:50 – 2:00	0:40 – 0:40		0:50 – 2:00
9	0:50 – 1:40	0:40 – 1:40		0:50 – 1:40
10	6:10 – 11:20	5:40 – 10:10		6:10 – 11:20
11	4:00 – 7:10	3:50 – 7:00		4:00 – 7:10
12	4:00 – 7:10	3:50 – 7:00	12:30 – 15:20	4:00 – 7:10
13	4:00 – 6:30	4:00 – 6:30	15:10 – 18:00	4:00 – 6:30
14	1:50 – 3:00	1:40 – 2:40		1:50 – 3:00
15	1:50 – 3:00	1:00 – 2:10		1:50 – 3:00
16	0:40 – 1:50	0:20 – 1:40	0:40 – 0:40	0:40 – 1:50
17	0:40 – 1:40	0:50 – 1:40		0:40 – 0:40
18	0:40 – 1:40	0:30 – 1:20		0:40 – 1:40
19	6:00 – 11:20	6:00 – 11:20		5:50 – 10:20
20*	6:00 – 11:20	6:00 – 11:20		6:00 – 11:20
21	2:30 – 4:10	2:20 – 4:00	0:40 – 0:40	2:30 – 4:10
22	4:00 – 6:30	3:40 – 6:10	4:00 – 6:20	4:00 – 6:20

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-11
CASE 3 – 60% EVACUATION – EVENING
ADVERSE WEATHER
EVACUATION TRAVEL TIME SUMMARY
IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	16:40	16:40		16:40
2	16:40	16:20		3:30
3	16:40	16:40		
4	3:30	3:30	2:00	1:50
5	16:40	16:30		
6	16:40	4:40		16:40
7	3:30	1:40		3:30
8	1:50	0:40		
9	1:40	1:30		
10	16:40	16:20		16:40
11	4:40	4:30		
12	4:50	4:40	3:50	4:50
13	6:20	6:30	4:10	6:20
14	3:20	3:00		3:20
15	3:20	2:00		3:20
16	1:40	1:30		
17	1:40	1:30		
18	1:40	1:20		
19	16:30	16:30		
20*	16:30	16:30		16:00
21	3:10	3:00		
22	6:20	6:10	6:20	6:20

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-12

CASE 3 – 60% EVACUATION – EVENING

NORMAL WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No:	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	7:40 – 13:30	7:40 – 13:30		7:40 – 13:30
2	7:10 – 13:30	7:00 – 13:10		
3	7:40 – 13:30	7:40 – 13:30		
4	1:50 – 2:50	1:50 – 2:50	1:10 – 1:10	1:00 – 1:00
5	7:40 – 13:30	7:00 – 13:20		
6	7:40 – 13:30	2:10 – 3:50		7:40 – 13:30
7	1:50 – 2:50	0:30 – 0:30		1:50 – 2:50
8	0:50 – 0:50	0:40 – 0:40		
9	0:50 – 0:50	0:40 – 0:40		
10	7:40 – 13:30	7:20 – 13:00		7:40 – 13:30
11	2:10 – 3:50	2:10 – 3:40		
12	2:20 – 3:50	2:10 – 3:40	2:20 – 3:10	2:20 – 3:50
13	3:20 – 5:10	3:20 – 5:10	2:10 – 3:30	3:20 – 5:10
14	1:40 – 2:50	1:30 – 2:30		1:40 – 2:50
15	1:40 – 2:50	1:00 – 1:00		1:40 – 2:50
16	0:40 – 0:40	0:20 – 0:20		
17	0:40 – 0:40	0:50 – 0:50		
18	0:40 – 0:40	0:30 – 0:30		
19	7:30 – 13:20	7:30 – 13:20		
20*	7:30 – 13:20	7:20 – 13:20		7:00 – 12:50
21	1:40 – 2:40	1:30 – 2:30		
22	3:20 – 5:10	3:00 – 5:00	3:10 – 5:10	3:20 – 5:10

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-13

CASE 3 – 60% EVACUATION – SCHOOL OUT-OF-SESSION

ADVERSE WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	19:10	19:10		19:10
2	19:00	18:50		19:00
3	17:40	17:40		
4	3:50	3:40	2:20	3:50
5	19:00	19:00		17:30
6	17:30	8:40		17:30
7	3:40	2:10		3:40
8	2:20	1:40		2:20
9	2:00	2:00		2:00
10	19:00	17:10		19:00
11	8:50	8:40		8:50
12	8:50	8:40	20:20	8:50
13	8:00	8:00	23:20	8:00
14	3:40	3:10		3:40
15	3:40	2:30		3:40
16	2:10	2:00	1:30	2:10
17	2:00	2:00		1:40
18	2:00	1:40		2:00
19	18:50	18:50		17:20
20*	18:50	18:50		18:50
21	5:00	5:00	1:40	5:00
22	8:00	7:40	7:50	7:50

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-14

CASE 3 – 60% EVACUATION – SCHOOL OUT-OF-SESSION

NORMAL WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No:	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	8:10 – 15:20	8:10 – 15:20		8:10 – 15:20
2	8:10 – 15:20	7:50 – 15:00		8:10 – 15:20
3	8:00 – 14:10	8:00 – 14:10		
4	2:00 – 3:10	1:50 – 3:00	1:10 – 2:00	2:00 – 3:10
5	8:10 – 15:20	8:00 – 15:10		8:00 – 14:10
6	8:00 – 14:10	3:50 – 7:00		8:00 – 14:10
7	1:50 – 3:00	0:40 – 1:50		1:50 – 3:00
8	0:50 – 2:00	0:40 – 0:40		0:50 – 2:00
9	0:50 – 1:40	0:40 – 1:40		0:50 – 1:40
10	8:10 – 15:20	7:40 – 13:50		8:10 – 15:20
11	4:00 – 7:10	3:50 – 7:00		4:00 – 7:10
12	4:00 – 7:10	3:50 – 7:00	13:30 – 16:40	4:00 – 7:10
13	4:00 – 6:30	4:00 – 6:30	16:10 – 19:20	4:00 – 6:30
14	1:50 – 3:00	1:40 – 2:40		1:50 – 3:00
15	1:50 – 3:00	1:00 – 2:10		1:50 – 3:00
16	0:40 – 1:50	0:20 – 1:40	0:40 – 0:40	0:40 – 1:50
17	0:40 – 1:40	0:50 – 1:40		0:40 – 0:40
18	0:40 – 1:40	0:30 – 1:20		0:40 – 1:40
19	8:00 – 15:10	8:00 – 15:10		7:50 – 14:00
20*	8:00 – 15:10	8:00 – 15:10		8:00 – 15:10
21	2:30 – 4:10	2:20 – 4:00	0:40 – 0:40	2:30 – 4:10
22	4:00 – 6:30	3:40 – 6:10	4:00 – 6:20	4:00 – 6:20

*Assumed ERPA where all airport special event traffic initially assigned as transients.

TABLE A-15

CASE 4 – 100% EVACUATION – EASTERN RE-ROUTE EVENING ADVERSE WEATHER EVACUATION TRAVEL TIME SUMMARY IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	3:30	3:30		3:30
2	3:40	1:50		
3	3:10	3:10		
4	3:30	3:30	1:50	1:40
5	3:10	2:00		
6	4:40	4:40		3:10
7	3:30	1:40		3:30
8	1:50	0:40		
9	1:40	1:30		
10	3:10	2:40		3:10
11	4:40	4:30		
12	4:50	4:40	3:50	4:50
13	6:20	6:30	4:10	6:20
14	3:20	3:00		3:20
15	3:20	2:00		
16	1:40	1:30		
17	1:40	1:30		
18	1:30	1:20		
19	4:40	4:40		
20*	4:30	24:50		27:10
21	3:10	3:00		
22	6:20	6:10	6:20	6:20

*Assumed ERPA where all concert traffic initially assigned as transients. Does not reflect actual travel
times for the existing ERPA population.

TABLE A-16

CASE 4 – 100% EVACUATION – EASTERN RE-ROUTE EVENING

NORMAL WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	1:50 – 3:00	1:50 – 3:00		1:50 – 3:00
2	2:00 – 3:00	0:50 – 1:30		
3	1:40 – 2:40	1:40 – 2:40		
4	1:50 – 2:50	1:50 – 2:50	1:00 – 1:00	0:50 – 0:50
5	1:40 – 2:30	0:50 – 1:40		
6	2:20 – 3:50	2:10 – 3:50		1:40 – 2:40
7	1:50 – 2:50	0:30 – 0:30		1:50 – 2:50
8	0:50 – 0:50	0:40 – 0:40		
9	0:40 – 0:40	0:40 – 0:40		
10	1:40 – 2:30	1:20 – 2:10		1:40 – 2:30
11	2:20 – 3:50	2:10 – 3:40		
12	2:20 – 4:00	2:10 – 3:50	2:20 – 3:10	2:20 – 4:00
13	3:20 – 5:10	3:20 – 5:10	2:10 – 3:30	3:20 – 5:10
14	1:40 – 2:50	1:30 – 2:30		1:40 – 2:50
15	1:40 – 2:50	1:00 – 1:00		1:40 – 2:50
16	0:40 – 0:40	0:20 – 0:20		
17	0:40 – 0:40	0:50 – 0:50		
18	0:40 – 0:40	0:30 – 0:30		
19	2:20 – 3:50	2:20 – 3:50		
20*	2:10 – 3:40	10:20 – 19:50		13:00 – 22:20
21	1:40 – 2:40	1:30 – 2:30		
22	3:20 – 5:10	3:00 – 5:00	3:10 – 5:10	3:20 – 5:10

*Assumed ERPA where all concert traffic initially assigned as transients. Does not reflect actual travel
times for the existing ERPA population.

TABLE A-17

CASE 4 – 100% EVACUATION – EASTERN RE-ROUTE NIGHTTIME ADVERSE WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	2:40	2:40		2:40
2	2:40	1:50		
3	2:40	2:40		
4	2:30	2:30	1:10	1:00
5	2:40	2:00		
6	4:40	4:40		2:40
7	2:30	1:40		
8	1:50	0:40		
9	0:50	0:40		
10	2:40	2:20		
11	4:40	4:30		
12	4:50	4:40	20:20	4:50
13	5:00	5:00	23:20	5:00
14	2:20	2:10		2:20
15	2:20	2:00		2:20
16	1:40	1:30		
17	1:40	1:30		
18	0:40	0:30		
19	4:40	4:40		
20*	4:30	24:50		27:10
21	3:10	3:00		
22	5:00	4:40	4:50	5:00

*Assumed ERPA where all concert traffic initially assigned as transients. Does not reflect actual travel
times for the existing ERPA population.

TABLE A-18

CASE 4 – 100% EVACUATION – EASTERN RE-ROUTE NIGHTTIME

NORMAL WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No:	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	1:10 – 2:10	1:10 – 2:10		1:10– 2:10
2	1:10 – 2:10	0:50 – 1:30		
3	1:10 – 2:20	1:10 – 2:20		
4	1:00 – 2:10	0:50 – 2:00	1:00 – 1:00	0:50 – 0:50
5	1:00 – 2:10	0:50 – 1:40		
6	2:20 – 3:50	2:10 – 3:50		1:10 – 2:20
7	0:50 – 2:00	0:30 – 0:30		
8	0:50 – 0:50	0:40 – 0:40		
9	0:40 – 0:40	0:40 – 0:40		
10	1:00 – 2:10	0:30 – 1:50		
11	2:20 – 3:50	2:10 – 3:40		
12	2:20 – 4:00	2:10 – 3:50	13:30 – 16:40	2:20 – 4:00
13	2:30 – 4:00	2:40 – 4:10	16:10 – 19:20	2:30 – 4:00
14	0:40 – 2:00	0:30 – 1:40		0:40 – 2:00
15	0:40 – 2:00	1:00 – 1:00		0:40 – 2:00
16	0:40 – 0:40	0:20 – 0:20		
17	0:40 – 0:40	0:50 – 0:50		
18	0:40 – 0:40	0:30 – 0:30		
19	2:20 – 3:50	2:20 – 3:50		
20*	2:10 – 3:40	10:20 – 19:50		13:00 – 22:20
21	1:40 – 2:40	1:30 – 2:30		
22	2:40 – 4:00	2:20 – 3:50	2:30 – 4:00	2:40 – 4:00

*Assumed ERPA where all concert traffic initially assigned as transients. Does not reflect actual travel times for the existing ERPA population.

TABLE A-19

CASE 4 – 100% EVACUATION – EASTERN RE-ROUTE

SUMMER/HOLIDAY WEEKEND

ADVERSE WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	3:30	3:30		3:30
2	3:40	1:50		
3	3:30	3:30		
4	3:30	3:30	1:50	1:40
5	3:30	2:00		
6	4:40	4:40		3:30
7	3:30	1:40		3:30
8	1:50	0:40		
9	1:40	1:30		
10	3:30	3:10		3:30
11	4:40	4:30		
12	4:50	4:40	20:50	4:50
13	5:00	5:00	23:50	5:00
14	3:20	3:00		3:20
15	3:20	2:00		3:20
16	1:40	1:30		
17	1:40	1:30		
18	1:30	1:20		
19	4:40	4:40		
20*	4:30	24:50		27:10
21	3:10	3:00		
22	5:00	4:40	4:50	5:00

*Assumed ERPA where all concert traffic initially assigned as transients. Does not reflect actual travel
times for the existing ERPA population.

TABLE A-20

CASE 4 – 100% EVACUATION – EASTERN RE-ROUTE

SUMMER/HOLIDAY WEEKEND

NORMAL WEATHER

EVACUATION TRAVEL TIME SUMMARY

IN HOURS AND MINUTES

ERPA No.	Population Category			
	General Population With Auto (Hrs:Mins)	General Population Without Auto (Hrs:Mins)	Special Facilities (Hrs:Mins)	Transients (Hrs:Mins)
1	1:50 – 3:00	1:50 – 3:00		1:50 – 3:00
2	2:00 – 3:00	0:50 – 1:30		
3	1:50 – 2:50	1:50 – 2:50		
4	1:50 – 2:50	1:50 – 2:50	1:00 – 1:00	0:50 – 0:50
5	1:50 – 2:50	0:50 – 1:40		
6	2:20 – 3:50	2:10 – 3:50		1:50 – 2:50
7	1:50 – 2:50	0:30 – 0:30		1:50 – 2:50
8	0:50 – 0:50	0:40 – 0:40		
9	0:40 – 0:40	0:40 – 0:40		
10	1:50 – 2:50	1:30 – 2:30		1:50 – 2:50
11	2:20 – 3:50	2:10 – 3:40		
12	2:20 – 4:00	2:10 – 3:50	13:50 – 17:10	2:20 – 4:00
13	2:30 – 4:00	2:40 – 4:10	16:30 – 19:50	2:30 – 4:00
14	1:40 – 2:50	1:30 – 2:30		1:40 – 2:50
15	1:40 – 2:50	1:00 – 1:00		1:40 – 2:50
16	0:40 – 0:40	0:20 – 0:20		
17	0:40 – 0:40	0:50 – 0:50		
18	0:40 – 0:40	0:30 – 0:30		
19	2:20 – 3:50	2:20 – 3:50		
20*	2:10 – 3:40	10:20 – 19:50		13:00 – 22:20
21	1:40 – 2:40	1:30 – 2:30		
22	2:40 – 4:00	2:20 – 3:50	2:30 – 4:00	2:40 – 4:00

*Assumed ERPA where all concert traffic initially assigned as transients. Does not reflect actual travel
times for the existing ERPA population.

APPENDIX B

METHODOLOGY TO ESTIMATE ROADWAY TRAVEL TIMES DURING AN EVACUATION

METHODOLOGY TO ESTIMATE ROADWAY TRAVEL TIMES DURING AN EVACUATION

A. Introduction

This Appendix describes the traffic engineering computer model used to estimate roadway travel times during an evacuation of the JAF/NMP EPZ. The model used in this study has also been applied to the Indian Point (New York), Three Mile Island (Pennsylvania), and Salem/Hope Creek (New Jersey and Delaware) Emergency Planning Zones. To evaluate the computer model used in the aforementioned studies, a separate analysis was conducted using a different model for the purpose of comparing results. The Indian Point EPZ was selected for the comparative study because of the diverse characteristics of its roadway network and population density.

As described later in this Appendix, the comparative study showed that both models provide quite similar estimates of evacuation travel time. Thus, it is concluded that the model used to estimate travel times for the JAF/NMP EPZ can be applied with a high degree of confidence.

The remaining sections of this Appendix discuss the traffic assignment process used for the JAF/NMP EPZ, present the detailed results of the comparative study; and summarize the conclusions drawn from the comparison of traffic models.

B. Static Traffic Assignment Process

1. Inputs

The static traffic assignment process developed to estimate roadway travel times during an evacuation requires three basic types of input. The first type relates to the characteristics of the evacuation roadway network, which is comprised of one-directional links, each having its own attributes. The links are described in terms of their capability to accommodate evacuating traffic (evacuation capacity), length, and free-flow speed (speed limit).

The second type of input required for this assignment process is zonal vehicle trip generation data. The EPZ is disaggregated into traffic zones, and the numbers of trips by each vehicle type (e.g., autos, buses, ambulances) are estimated in terms of passenger car equivalents (PCE's) for each traffic zone. Buses are weighted as the equivalent of two passenger cars in this analysis. In addition, a terminal time for all trip types for each traffic zone is input.

The third input type used in the static assignment process is evacuation path data. Evacuation routes are designated fixed paths extending from the traffic zones to the Sector boundary via specific roadways. Separate paths are developed for each trip type and are expressed in terms of connecting link numbers. Destinations (e.g., reception centers) are defined for each traffic zone and input for the purpose of determining the number of vehicles and passengers expected at each destination. Average vehicle occupancies are used to estimate the number of passengers arriving in vehicles at the destination.

2. Static Assignment Algorithm

A computer program was written to process the above input data and compute roadway travel times for each trip type by traffic zone. A flow chart of the static traffic assignment computer program is included at the end of this Appendix.

Initially, the program calculates the total vehicular demand volume (in PCE's) on each link in the network by aggregating the vehicle trips generated by each traffic zone along the evacuation path. Implicit in this assignment is the assumption that all vehicles from all zones using a given evacuation route are on each link along the designated route concurrently. The assignment process is thus considered "static", because the spatial movement of vehicles across the network is not explicitly recognized as a function of time.

For each link in the network, three additional computations are performed. First, the free-flow speed is calculated as the quotient of the link length and the free flow speed. Second, the total vehicular demand volume is divided by the hourly evacuation capacity (for the appropriate weather condition) of the link to obtain the volume/capacity (V/C) relationship for the link. Finally, the evacuation speed or delay time is computed for each link, depending on whether the V/C ratio is less than or greater than 1.0, respectively. The formula contained in the Federal Highway Administration Traffic Assignment Manual, August 1973, was adopted and modified as follows for use in computing the speed at which evacuees will travel when capacity exceeds demand.

$$\text{Evacuation Speed} = \frac{\text{Free-Flow Speed}}{0.25 \left(\frac{\text{Demand}}{\text{Capacity}}\right)^4 + 1} \quad \text{(for demand} < \text{capacity)}$$

Following these calculations, the model computes the roadway travel time for each traffic zone's evacuation route (or routes since some buses and special vehicles had separate routes) by scanning the links comprising the evacuation route to determine maximum V/C ratio along the route.

When the hourly evacuation capacity exceeds the total demand volume (V/C ratio less than 1.0) for all links along the route, the link evacuation speeds are used to compute link travel time, and the travel times for each link along the path are summed to obtain the traffic zone-to-Sector boundary roadway travel time for the route.

When the total demand volume exceeds the hourly evacuation capacity (V/C ratio greater than 1.0) along any link of a traffic zone's evacuation route, the roadway travel time is represented by the maximum link delay time incurred along the route. Link delay time is calculated as the volume/capacity ratio in hours for each link along the route. The link with the maximum V/C ratio is identified as the bottleneck link for the evacuation route for use in future planning. Other links along the route where the V/C ratio exceeds 1.0 are also identified for planning purposes.

The roadway travel time as determined above is added to the terminal time and the free-flow travel time for each zone trip type to determine the total roadway evacuation travel time. The total roadway evacuation travel time resulting from this analysis represents the time for the last vehicle in the zone to clear the Sector.

3. Outputs

The computer program developed for the static assignment process provides five basic reports which are used in the evacuation planning process. The reports are described below:

a. Summary of link statistics: link number, description, length, free-flow speed and time, vehicular demand volume, evacuation capacity, and volume/capacity ratio.

b. Summary of traffic zone statistics: number of trips, evacuation route, destination, terminal time, free-flow travel time, roadway travel time, total evacuation time, and bottleneck link; for each trip type, sorted in ascending order by total evacuation time.

c. Summary of all bottleneck links and the traffic zones which are routed over them.

d. Summary of all destinations and the estimated number of vehicles (by type) and passengers assigned to each.

e. Distribution of the percent of the total population evacuated as a function of time.

C. Comparison of Static and Dynamic Traffic Assignment Processes

Because of the importance of the assignment process in the overall procedure to estimate evacuation travel times, it was decided to evaluate the static traffic assignment model used in the evacuation planning process. Travel times estimated by the static model were compared with times estimated by a state-of-the-art dynamic traffic assignment model.

The dynamic assignment model used in the comparative analysis is an offspring of the TRANSYT model* presently included in the Federal Highway Administration computer program batteries. The model employs principles of flow continuity and flow dynamics to move traffic on each link in the network towards its ultimate destination. Traffic flow representation changes with time to reflect changes in demand and roadway conditions. Traffic movement on each link in the network is constrained by roadway geometrics, control devices, and other vehicles present on the roadway.

Various types of test routes were selected for this comparison and were located in Rockland and Westchester Counties in the Indian Point EPZ in New York State. Input requirements for both models were basically identical with one exception, which relates to the time varying nature of vehicles entering the evacuation network. The static assignment process assumed a concurrent loading of the entire network; the distribution over time of vehicle trips feeding the network was not addressed by the static model. However, because of the time dependent nature of the dynamic simulation model, it was possible to input trip generation data which varied with time at each load point in the network. This time-based distribution curve used in the comparison of assignment processes was provided by the New York State Office of Disaster Preparedness.

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* The dynamic evacuation model, named DYNEV, was provided by KLD Associates, Inc.

Separate comparative analyses and evaluations of the static and dynamic model results were made using Level of Service D and Level of Service E evacuation capacities. Table I-1 presents a comparison of the percent of total vehicles (in PCEs) evacuated for each route by time in the test network. The comparison was made between the static and dynamic assignment results when one or the other reached a time period when the total vehicles traveling the evacuation route had cleared the EPZ boundary. In all cases, the static assignment evacuation reached 100 percent completion either before or at the same time as the dynamic assignment evacuation. The percentages enclosed by parentheses in Table I-1 correspond to static and dynamic evacuation roadway travel times using Level of Service D capacities. Percentages without parentheses correspond to static and dynamic evacuation roadway travel times estimated using Level of Service E capacities.

Examination of Table I-1 shows a 97 percent correlation between the two assignment model results on an aggregate basis for the sample Indian Point roadway network east of the Hudson River in Westchester County. That is, at the time that the static assignment estimated complete evacuation of vehicles beyond the EPZ, the dynamic assignment estimated 97 percent of the vehicles would have cleared the EPZ. On the west side of the Hudson River near Indian Point, where both Levels of Service E and D were analyzed by both models, the two model results were 99 percent and 98 percent, respectively. Overall, for the entire test evacuation network, comparison of the static and dynamic assignment results at Level of Service E indicated a 99 percent correlation. In other words, when the static model estimated the network would be cleared (total vehicle evacuation), the dynamic model estimated 99 percent of the vehicles would have cleared the EPZ boundary. The dynamic assignment results indicated that complete evacuation of all vehicles beyond the EPZ boundary would occur 15 minutes later than the static assignment estimate at Level of Service E.

In addition to the evacuation times generated by each assignment technique, the location of bottlenecks by each methodology was compared. The critical bottleneck links identified by the static model were identified in the dynamic assignment results as well. The dynamic assignment produced the percent of vehicles topped at each link during the evacuation. This statistic was used as a measure of the congestion level on each link. For the identified bottleneck links, the average percentage of stops as indicated by the dynamic mode output was roughly 45 percent higher than on non-critical links, indicating that an increase in congestion was appropriately simulated by the static model on the critical links.

D. Conclusions

The results of the comparative analysis presented in this Appendix indicate that the static traffic assignment model can be applied to highway networks to estimate evacuation roadway travel times with a high degree of confidence.

Under almost identical circumstances, the static assignment model results have proven comparable with those produced by a state-of-the art, complex dynamic assignment model, which simulates the evacuation process within the framework of time. Roadway travel times were estimated and congested roadways identified with a high degree of correlation using the less complex static assignment methodology. A close correlation between assignment procedures exists for varying roadway types, weather conditions, and loading characteristics. Thus the use of the static assignment model to estimate evacuation travel times in the JAF/NMP EPZ is appropriate.

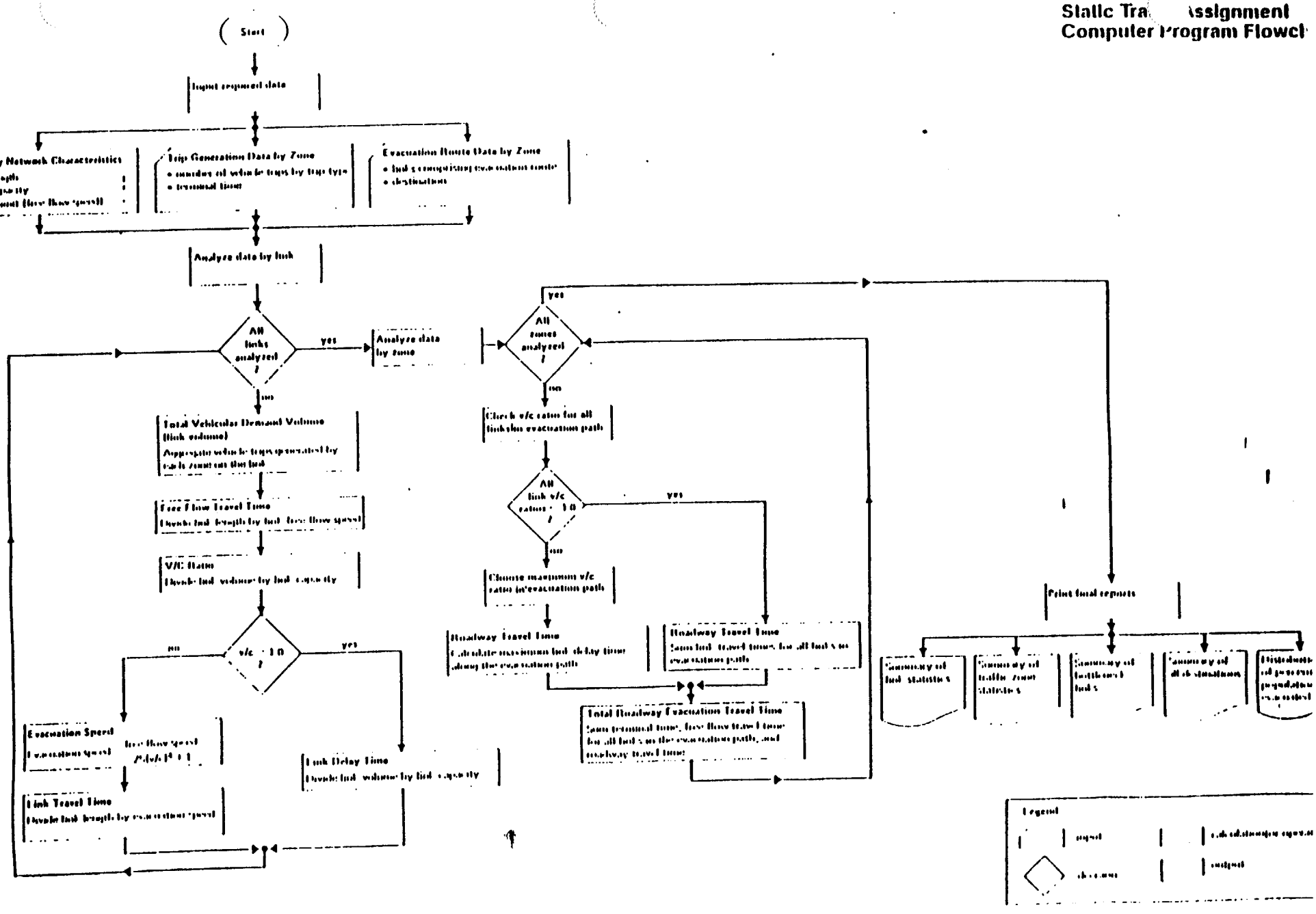
TABLE I-1

COMPARISON OF STATIC AND DYNAMIC ASSIGNMENT RESULTS

Evacuation Route	Total Vehicles Using Evacuation Route	Traffic Assignment Methodology	Percent of Total Vehicles Evacuated During the Following Time Period*																
			0:45 1:00	1:45 2:00	2:00 2:15	2:15 2:30	2:30 2:45	2:45 3:00	3:00 3:15	3:15 3:30	3:30 3:45	3:45 4:00	4:15 4:30	4:30 4:45	5:30 5:45	5:45 6:00	6:00 6:15	6:15 6:30	7:15 7:30
East of River (Westchester County)																			
Route 6	4,360	Static	–	–	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–
		Dynamic	–	–	–	–	–	–	–	–	–	84	–	100	–	–	–	–	–
Route 120	5	Static	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Dynamic	33	–	–	100	–	–	–	–	–	–	–	–	–	–	–	–	–
Route 9A	8,690	Static	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	–	–
		Dynamic	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	–	–
Taconic Parkway	5,155	Static	–	–	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Dynamic	–	–	92	–	–	–	100	–	–	–	–	–	–	–	–	–	–
Amawalk Road	2,575	Static	–	–	–	–	–	100	–	–	–	–	–	–	–	–	–	–	–
		Dynamic	–	–	–	–	–	89	–	100	–	–	–	–	–	–	–	–	–
Total East Routes	20,785	Static	–	–	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–
		Dynamic	–	–	–	–	–	–	–	–	–	97	–	100	–	–	–	–	–
West of River (Rockland County)																			
Palisades Parkway	8,655	Static	–	–	–	–	–	–	–	–	100	–	–	–	–	(100)	–	–	–
		Dynamic	–	–	–	–	–	–	–	–	97	100	–	–	–	(97)	–	(100)	–
Route 9W	3,850	Static	–	–	–	–	–	–	–	–	–	–	100	–	–	–	–	(100)	–
		Dynamic	–	–	–	–	–	–	–	–	–	–	99	100	–	–	–	(87)	(100)
Route 303	3,310	Static	–	100	–	–	(100)	–	–	–	–	–	–	–	–	–	–	–	–
		Dynamic	–	98	–	–	(90)	100	(100)	–	–	–	–	–	–	–	–	–	–
Route 45	1,920	Static	–	–	–	100	–	–	–	–	(100)	–	–	–	–	–	–	–	–
		Dynamic	–	–	–	98	–	100	–	–	(100)	–	–	–	–	–	–	–	–
Little Tor Road	3,025	Static	–	–	–	–	–	–	–	–	100	–	–	–	(100)	–	–	–	–
		Dynamic	–	–	–	–	–	–	–	–	99	100	–	–	(95)	–	(100)	–	–
Route 304	3,655	Static	–	–	–	100	–	–	–	–	–	(100)	–	–	–	–	–	–	–
		Dynamic	–	–	–	99	–	100	–	–	–	(100)	–	–	–	–	–	–	–
Total West Routes	24,415	Static	–	–	–	–	–	–	–	–	–	–	100	–	–	–	–	(100)	–
		Dynamic	–	–	–	–	–	–	–	–	–	–	99	100	–	–	–	(98)	(100)
Total Network Routes	45,200	Static	–	–	–	–	–	–	–	–	–	–	100	–	–	–	–	–	–
		Dynamic	–	–	–	–	–	–	–	–	–	–	99	100	–	–	–	–	–

* Note: Numbers enclosed by parentheses represent the percent of total vehicles along a route evacuated during the time period using Level of Service D capacities.

Numbers not enclosed by parentheses represent the percent of total vehicles along a route evacuated during the time period using Level of Service E capacities.


Start
Input required data
Roadway Network Characteristics
Trip Generation Data by Zone
Evacuation Route Data by Zone
Analyze data by link
All links analyzed ?
yes
no
Analyze data by zone
Total Vehicular Demand Volume (link volume)
Free Flow Travel Time
V/C Ratio
v/c > 1.0 ?
Evacuation Speed
Link Travel Time
Link Delay Time
All zones analyzed ?
Check v/c ratio for all links on evacuation path
All link v/c ratios < 1.0 ?
Choose maximum v/c ratio in evacuation path
Roadway Travel Time
Total Roadway Evacuation Travel Time
Print final reports
Summary of link statistics
Summary of traffic zone statistics
Summary of critical links
Legend

CONTROLLED COPY # 34

ENTERGY NUCLEAR NORTHEAST
JAMES A. FITZPATRICK NUCLEAR POWER PLANT

EMERGENCY PLAN VOLUME 1

PROCEDURE NO.: APPENDIX L

TITLE: NUREG-0654/FEMA-REP-1 CROSS REFERENCE*

PORC REVIEW: Meeting No. N/A Date N/A

Approved By: _____
Emergency Planning Coordinator

EFFECTIVE DATE: April 30, 2001

PERIODIC REVIEW DUE DATE: April 2002

Rev. No. 11

APPENDIX L

NUREG-0654/FEMA-REP-1 CROSS REFERENCE*

PURPOSE: Appendix L provides a cross reference for locating NUREG-0654 planning standards within the James A. FitzPatrick Emergency Plan. This cross reference will facilitate timeliness in reviewing which sections of the JAF Emergency Plan satisfy applicable planning standards established in NUREG-0654.

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
A.1.a	Overall response organization identification - State, Local, Federal and Private Organizations	Section 5.4.2 Section 5.4.3 Section 5.5.1 Section 5.5.2 Section 5.6
A.1.b	Organizational concept of operations	Section 5.2 Section 5.3 Section 5.4 Section 5.5 Section 5.6
A.1.c	Organizational interrelationships - block diagram	Figure 5.1 Figure 5.2 Figure 5.3 Figure 5.4 Figure 5.5
A.1.d	Identification of individual in charge	Section 5.3.1 Section 5.4.1 Appendix B
A.1.e	24-hour response capability (including communications)	Section 5.1 Section 5.2 Section 5.3 Section 5.4.1 Section 6.5.1 Section 6.5.4 Section 7.2.4
A.2.a	Specification of functions and responsibilities of key individuals	N/A*
A.2.b	Legal basis for authority	N/A*

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
A.3	Written agreements referring to concept of operations	Section 5.4 Section 6.1.2 Section 6.5.3 Section 6.5.4 Section 8.4.2 Appendix C
A.4	Provisions for 24-hour operations/continuity of resources	Section 5.3 Section 5.4 Section 5.6
B.1	Onsite Emergency Organization	Section 5.2 Figure 5.2 Section 5.3 Figure 5.4 Table 5.1
B.2	Designation of Emergency Coordinator	Section 5.3.1 Appendix B
B.3	Emergency Coordinator - line of succession	Section 5.3.1 Section 9.1 Appendix B
B.4	Functional responsibilities of Emergency Coordinator	Section 5.3.1
B.5	Titles and major tasks of emergency positions	Section 5.1 Table 5.1 Section 5.2 Section 5.3 Section 5.4
B.6	Interfaces between and among emergency organizations - block diagram	Figure 5.1 Figure 5.4 Figure 5.5
B.7	Augmentation of plant staff	Section 5.3 Figure 5.4 Figure 5.5 Appendix F
B.7.a	Logistics support	Section 5.6 Section 9.2
B.7.b	Technical support	Section 9.2 Figure 5.5 Figure 9.1
B.7.c	Management interface with governmental authorities	Section 5.4 Section 5.5

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
B.7.d	Release of information to news media	Section 5.3.11 Section 9.2.2.c.1 Appendix H
B.8	Contractor and private organization assistance/ staff augmentation	Section 5.4.2 Section 5.4.3 Appendix C Appendix F
B.9	Emergency services provided by local agencies	Section 5.4.2 Section 6.5.3 Section 6.5.4 Appendix C
C.1.a	Incorporation of Federal response capability into Plan - request for assistance	Section 5.3.1 Section 5.5.2 Section 6.1.2
C.1.b	Federal resources expected	Section 5.5.2 Appendix C
C.1.c	Resources to support Federal response	Appendix N
C.2.a	Offsite EOF representative	N/A*
C.2.b	Licensee representative at offsite locations	Section 5.3.12
C.3	Identification of radiological laboratories	Section 5.4.3 Section 6.2.2.2 Section 7.3.1 Section 7.3.2
C.4	Identification of organizations to provide assistance	Section 5.4.3 Appendix C Appendix F
D.1	Establishment of emergency classification/emergency action level scheme	Section 4.1
D.2	Initiating conditions for postulated accidents in FSAR	Section 4.1 Section 4.2
D.3	State/local emergency classification scheme	N/A*
D.4	Offsite procedures providing emergency actions	N/A*

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
E.1	Procedures to describe notification of response organizations	Section 6.1
E.2	Establishment of personnel alerting, notifying, and mobilizing procedures	Section 6.1.1
E.3	Contents of initial emergency messages from Licensee	Section 6.1.2
E.4.a-n	Contents of follow-up messages from Licensee	Section 6.1.2
E.5	Offsite system to disseminate message information to the public	N/A*
E.6	Establishment of means to notify public in EPZ	Section 7.2.8
E.7	Provisions for written messages to notify the public	Section 5.3.11 Appendix H
F.1.a	24-hour primary and backup provision for notification and activation of local emergency network	Section 7.2.3 Section 7.2.4.1 Section 7.2.5
F.1.b	Primary and backup communications with contiguous State/local governments	Section 6.1.2 Section 7.2.3 Section 7.2.4.1
F.1.c	Primary and backup communications with Federal organizations	Section 6.1.2 Section 7.2.3 Section 7.2.4.2 Section 7.2.4.3
F.1.d	Primary and backup communications between nuclear facility, State/local EOCs and radiological monitoring teams	Section 7.2.3 Section 7.2.4.1 Section 7.2.4.2 Section 7.2.5
F.1.e	Primary and backup alerting of emergency personnel	Section 6.1.1 Section 6.1.2

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
F.1.f	Provision for communication by Licensee to NRC, EOF, and radiation monitoring team	Section 6.1.2 Section 7.2.3 Section 7.2.4.2 Section 7.2.4.3 Section 7.2.5
F.2	Primary and backup communications link to medical support facilities	Section 6.5.3 Section 6.5.4 Section 7.2.3 Section 7.2.5
F.3	Periodic testing of communications system	Section 8.5 Figure 8.2
G.1.a-d	Coordinated periodic dissemination of information to the public	Section 8.6.1 Section 8.6.2 Appendix H
G.2	Provisions for public information program	Section 8.6.1 Section 8.6.4 Appendix H
G.3.a	Physical location for use by news media	Section 7.1.6 Appendix H
G.3.b	Space for news media at EOF	Section 7.1.5
G.4.a	Designation of spokesperson	Section 5.3.11 Section 9.1 Appendix H
G.4.b	Exchange of information among spokespersons	Section 7.1.6 Appendix H
G.4.c	Coordinated arrangements for dealing with rumors	Section 7.1.6 Section 8.6.3 Appendix H
G.5	Annual coordinated programs for the news media	Section 8.6.4 Appendix H
H.1	Establishment of TSC and OSC	Section 7.1.2 Section 7.1.3 Section 7.1.4
H.2	Establishment of EOF for Licensee emergency activities	Section 7.1.5
H.3	Establishment of EOC for response functions	N/A*

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
H.4	Provisions for timely activation and staffing of facilities	Section 5.2 Section 5.3 Section 6.1.1 Section 7.1
H.5.a	Identification of geophysical phenomena monitors	Section 7.3.3.3 Section 7.3.3.7
H.5.b	Identification of radiological monitors	Section 6.5.2 Section 7.3.3.1 Section 7.3.3.8
H.5.c	Identification of process monitors	Section 7.3.3.9
H.5.d	Identification of fire detectors	Section 7.3.3.2
H.6.a	Acquisition of data from geophysical phenomena monitors	Section 7.3.3.3 Section 7.3.3.7
H.6.b	Acquisition of data from radiological monitors	Section 6.5.1 Section 7.3.3.1 Section 7.3.3.4 Section 7.3.3.5 Section 7.3.3.6
H.6.c	Acquisition of data from laboratory facilities	Section 7.3.1 Section 7.3.2
H.7	Provisions for offsite monitoring equipment	Section 6.2.2.2 Section 7.3.3.8
H.8	Provisions for meteorological instrumentation and procedures	Section 7.3.3.7
H.9	Provisions for onsite Operations Support Center	Section 7.1.3
H.10	Provisions to inspect, inventory, and operationally check equipment	Section 8.5
H.11	Identification of emergency equipment	Appendix I

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
H.12	Establishment of central point for receipt/analysis of field monitoring data	Section 7.1.5 Section 7.3.2
I.1	Identification of plant system and effluent values characteristic of off-normal conditions	Section 4.1
I.2	Onsite capability to provide initial values and assessment throughout accident	Section 7.3.3.1
I.3.a	Establishment of methods and techniques to determine source term of releases	Section 7.3.3.1
I.3.b	Establishment of methods and techniques to determine magnitude of releases	Section 6.2.3
I.4	Establishment of relationship between effluent monitor readings and exposures	Section 7.3.3.1
I.5	Capability to acquire and evaluate meteorological information	Section 7.3.3.7
I.6	Methodology for determining release rate/projected doses	Section 6.2.3
I.7	Capability and resources for field monitoring within EPZ	Section 6.2.2.2 Section 6.2.3.3 Section 7.3.3.4 Section 7.3.3.5 Section 7.3.3.6 Section 7.3.3.8
I.8	Provisions for methods, equipment and expertise to make rapid assessments of radiological hazards	Section 6.2.2 Section 6.2.3 Section 7.3.3.8
I.9	Capability to detect and measure radioiodine concentration in EPZ as low as 1E-7 μCi/cc	Section 6.2.2.2

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
I.10	Establishment of means for relating measured parameters to dose rates	Section 6.2.3
I.11	Arrangements to track airborne plume using Federal and State resources	N/A*
J.1.a-d	Means to warn onsite individuals in controlled areas	Section 6.4.1
J.2	Provisions for evacuation routes and transportation for onsite individuals	Section 6.4.1.2
J.3	Provisions for radiological monitoring of people evacuated from site	Section 6.4.1.2 Section 7.4.4 Section 7.6
J.4	Provisions for decontamination facility for onsite personnel	Section 6.4.1.2 Section 7.4.4 Section 7.6
J.5	Provisions for onsite accountability	Section 6.4.1.3
J.6.a	Provisions for respiratory protection	Section 6.4.1.4
J.6.b	Provisions for protective clothing	Section 6.4.1.4
J.6.c	Provisions for radioprotective drugs	Section 6.4.1.4 Section 6.4.2.3
J.7	Mechanism for recommending protective actions to State and local authorities	Section 4.1 Section 5.3.1 Section 6.4.2 Figure 4.1
J.8	Inclusion of evacuation time estimates in Licensee's plan	Appendix K
J.9	State/local capability for implementing protective measures	N/A*

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
J.10.a	Inclusion of maps showing evacuation routes, monitoring locations, and relocation centers	Figure 6.2 Figure 6.9 Figure 7.2 Figure 7.3 Figure 7.4 Figure 7.6
J.10.b	Inclusion of maps showing population distribution around the facility	Figure 2.4 Figure 6.3 Appendix K
J.10.c	Means for notifying all segments of the population	Section 7.2.8 Appendix H
J.10.d-l	State/local plans to implement various protective measures	N/A*
J.10.m	Basis for choice of recommended protective actions	Section 6.4.2
J.11	State protective measures for ingestion pathway	N/A*
J.12	State/local plans for registration and monitoring of evacuees	N/A*
K.1.a-g	Establishment of onsite exposure guidelines consistent with EPA PAGs	Section 6.4.1 Section 6.5.1 Figure 6.1
K.2	Onsite radiation protection program to be implemented during emergencies	Section 5.3.1 Section 5.3.8 Section 6.4.1.4 Section 6.5.1
K.3.a-b	Provisions for 24-hour capability to determine emergency personnel doses	Section 6.5.1
K.4	State/local decision chain for authorizing exposures in excess of EPA PAGs	N/A*
K.5.a	Specification of action levels for decontamination	Section 6.5.2
K.5.b	Means for radiological decontamination of emergency personnel	Section 6.5.2 Section 7.6

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
K.6.a	Provisions for area access control	Section 6.4.1
K.6.b	Provisions for drinking water and food contamination control	Section 6.4.1
K.6.c	Criteria for permitting return of areas to normal use	Section 6.4.1
K.7	Provisions for decontaminating relocated onsite personnel	Section 6.4.1.2 Section 7.4.4 Section 7.6
L.1	Arrangements for local and backup hospital and medical services	Section 6.5.3 Section 6.5.4 Appendix C
L.2	Provision for onsite first aid capability	Section 7.5
L.3	State listing of medical support facilities	N/A*
L.4	Arrangements for transport of victims of radiological accidents	Section 6.5.3
M.1	Development of plans for reentry and recovery	Section 9.4
M.2	Listing of individuals filling positions in recovery organization	Section 9.1 Section 9.2 Figure 9.1
M.3	Means to inform organization that recovery is initiated	Section 9.0 Section 9.1
M.4	Establishment of method to estimate total population exposure	Section 9.3
N.1.a	Provisions for periodic exercises	Section 8.3 Figure 8.2
N.1.b	Provisions for exercise critique/varied scenarios	Section 8.3
N.2.a-e	Provisions for drills	Section 8.3 Figure 8.2

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
N.3.a-f	Description of components of drills and exercises	Section 8.3 Figure 8.2
N.4	Provisions for observers/ critiques	Section 8.3 Figure 8.2
N.5	Provisions for exercise corrective actions	Section 8.3 Figure 8.2
O.1.a	Provisions for site specific training for offsite emergency organizations	Section 8.2 Figure 8.1
O.1.b	Provisions for training mutual aid organizations	N/A*
O.2	Onsite training program/ practical drills	Section 8.2 Figure 8.1
O.3	Training for Licensee first aid teams	Section 8.2 Figure 8.1
O.4.a-j	Training and retraining programs for personnel implementing response plan	Section 8.2 Figure 8.1
O.5	Initial training and retraining of personnel	Figure 8.1
P.1	Training of individuals responsible for the planning effort	Section 8.1 Section 8.2 Section 8.3 Figure 8.1
P.2	Identification of individual responsible for planning	Section 8.1
P.3	Designation of Emergency Planning Coordinator	Section 8.1
P.4	Annual update of plan and agreements	Section 8.4.1
P.5	Distribution of approved plans	Section 8.4.1
P.6	Detailed listing of support plans	Appendix J
P.7	Procedures required to implement the plan	Appendix A

* N/A - Not applicable

NUREG-0654 Section	Evaluation Criteria	JAFNPP EMERGENCY PLAN
P.8	Plan table of contents/ cross reference	Appendix L Table of Contents
P.9	Annual independent review of emergency preparedness program	Section 8.4.3
P.10	Quarterly update of telephone numbers	Section 8.5
EALs were developed in accordance with NUMARC/NESP-007, Methodology for Development of Emergency Action Levels. The EALs have been removed from the NUREG-0654 Cross Reference.		

* N/A - Not applicable

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ENTERGY NUCLEAR NORTHEAST
JAMES A. FITZPATRICK NUCLEAR POWER PLANT

EMERGENCY PLAN VOLUME 1

PROCEDURE NO.: APPENDIX N

TITLE: TYPICAL FEDERAL SUPPORT RESOURCES*

PORC REVIEW: Meeting No. N/A Date N/A

APPROVED BY: _____
Emergency Planning Coordinator

EFFECTIVE DATE: April 30, 2001

PERIODIC REVIEW DUE DATE: April 2002

Rev. No.: 12

APPENDIX B

TYPICAL FEDERAL SUPPORT RESOURCES*

Table of Contents

	RESOURCE LISTING	PAGE
1.	AIRFIELDS	N-1
2.	COMMAND POSTS	N-1
3.	TELEPHONE SYSTEMS	N-2
4.	RADIO FREQUENCIES	N-3

APPENDIX N

TYPICAL FEDERAL SUPPORT RESOURCES*

1. AIRFIELDS

a. County Airport
1200 Brooks Avenue
Rochester, NY 14624
Tel. 716/464-6001

b. Oswego County Airport
RD. #2 Co. Rt. 176
Fulton, NY 13069
Tel. 315/591-9130

c. Oneida County Airport
Terminal Building
Oriskany, NY 13424
Tel. 315/736-4171

d. Syracuse Hancock International Airport
Hancock Field
Syracuse, NY 13212
Tel. 315/454-3263 (Commissioner of Aviation)
Tel. 315/455-3800 (Air Traffic Control)

e. Watertown International Airport
RD. #2
Dexter, NY 13634
Tel. 315/639-3809
Fax: 315/639-6247

2. COMMAND POST

a. JAFNPP Emergency Operations Facility
Co. Rt. 176 and Airport Rd.
RD. #2 Box 656A
Fulton, NY 13069
Tel. 315/593-5700

b. JAFNPP Technical Support Center
JAFNPP
Lake Road East
P.O. Box 110
Lycoming, NY 13093
Tel. 315/342-3840

c. Joint News Center
Co. Rt. 176 and Airport Rd.
RD. #2 Box 656A
Fulton, NY 13069
Tel. 315-592-3700

d. New York State Emergency Operations Center
New York State Emergency management Office
Public Security Building, State Campus
Albany, NY 12232
Tel. 518/457-2200

e. Oswego County Emergency Operations Center
Oswego County Office Building Annex
200 North Second Street
Fulton, NY 13069
Tel. 315/591-9150

3. TELEPHONE SYSTEMS IN PLANT VICINITY

a. ALLTEL New York, Inc.
108 South 2nd St.
Fulton, NY 13069
Tel. 800/542-6204 (Repair)

b. Verizon
Syracuse, NY
Tel. 315/890-7711 (Repair)

c. AT&T
Albany, NY
Tel. 800/222-0400
800/222-3000 (Repair)
Fax: 518/432-4599

4. RADIO FREQUENCIES

ORGANIZATION/FUNCTION		FREQUENCY
a.	JAFNPP Security Force	153.635
b.	JAFNPP Radiological Survey Teams	153.560
c.	Oswego County Sheriff / Police agencies 39 Churchill Road, Oswego, NY	155.250 155.370 155.130 155.490
d.	E-911 Center 39 Churchill Road, Oswego, NY	Truck Radio 800 MgHz System 46.220 46.220
e.	Oswego County Highway Department Airport Road, Town of Scriba, NY	45.920 155.340 155.280 155.220
f.	Nine Mile Point Nuclear Stations Rad	37.900
	Offsite Administration B/U Rad	451.575 456.575 452.750 457.750