NUS-3521

R.E. GINNA NUCLEAR POWER PLANT

PRELIMINARY EVACUATION TIME ESTIMATES

Prepared for

ROCHESTER GAS AND ELECTRIC CORPORATION

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1.0 INTRODUCTION AND SUMMARY

This report was prepared in response to a generic letter from the NRC Emergency Preparedness Task Group to Rochester Gas and Electric Corporation, dated November 29, 1979. The NRC letter requests a preliminary estimate of the time required to implement an evacuation of ten sectors around the Robert E. Ginna Nuclear Power Station.

Although no standard methods for making such estimates are currently recommended by the NRC, the approach utilized in this report is similar to those for other evacuation studies. NUS conducted an on-site investigation by interviewing local officials, driving sample routes, and tabulating the results. Where two or more estimates were obtained, the longest (i.e., most conservative) time was used. In addition, NUS performed an analysis of evacuation times from the various sectors, using the information and techniques obtained from the 1965 Highway Capacity Manual.

A summary of the estimates obtained from both local officials and the statistical analysis is presented in Table 1-1. A composite map of the area around the station is presented in Figure 1-1. The 2-, 5-, and 10-mile sectors within the Emergency Planning Zone (EPZ), population centers, and evacuation routes are marked on this figure.

The NRC letter requested estimates for the EPZ in a 10-mile radius divided into ten geometric sectors around the plant. Since the station is on the southern shore of Lake Ontario, the southern sectors were enlarged slightly to include all the land population within the southern five sectors. Evacuation of the northern (lake) sectors were estimated by the U.S. Coast Guard.

Time constraints precluded local officials from reviewing these preliminary statistical estimates. They will, however, be given

the opportunity to comment on them in the near future. However, note that the statistical estimates are in general agreement with estimates given to us by local officials. In all cases local officials estimated notification, evacuation, and confirmation times without the aid of a formal written plan.

The estimates given in this study are preliminary and include several realistic but simplifying assumptions regarding demography, evacuation routes, capacities, and traffic control. In addition, the notification and confirmation time estimates were not subject to a rigorous systematic approach. These estimates are realistic and sufficient to demonstrate overall trends, times, and problem areas according to the NRC's stated immediate goals for January 31, 1980. A more detailed and exhaustive evaluation is possible under less severe time constraints.

TABLE 1 EVACUATION TIME ESTIMATES BY SECTOR

SECTOR	POPULATION		STATISTICAL ESTIMATES (hours - minutes)								LOCAL OFFICIAL'S ESTIMATES (hours - minutes)							
			Fair Weather				Adverse Weather				Fair Weather				Adverse Weather			
	Private Transport	Public Transport	Notification	Evacuation	Confirmation (b)	Total	Notification	Evacuation	Confirmation (a)	Total	Notification	Evacuation	Confirmation	Total	Notification	Evacuation	Confirmation	Total
(a) Land																		
2 Mile																		
180°S	781	86	2-20	0-39	0-45	3-44	2-20	1-00	1-30	5-50	2-0	2-0	0-45	4-45	4	4	1-30	9-30
5 Mile																		
90°SE	3,952	435	2-20	1-32	1-00	4-52	2-20	1-57	2-00	6-17	2-0	3-15	1-0	6-15	2	6-30	2-0	10-30
90°SW (Webster)	3,952	435	2-20	1-32	3-00	6-52	2-20	1-57	6-00	10-17	2-0	2-45	3-0	7-45	4-0	5-30	6-0	15-30
10 Mile																		
90°SE	6.532	712	2-20	1-54	2-15	6-29	2-20	2-16	4-30	9-06	2-0	5-0	2-15	9-15	4-0	10-00	4-30	18-30
90°SW (Webster)	30,702	1,283	2-20	5-12	6-00	13-32	2-20	6-24	12-00	20-44	4-30	6-0	6-0	16-30	9-0	12-0	12-0	33-00
TOTAL (Land)	45,919	2,951																
Lake (c)																		
2 Mile	(d)		N/A (e)				N/A											
180°N											4-0	0-30	1-0	5-30	6-0	0-45	1-30	8-15
5 Mile			N/A				N/A											
90°NW											1-30	0-30	0-15	2-15	2-45	0-45	0-23	3-53
90°NE											1-30	0-30	0-15	2-15	2-45	0-45	0-23	
10 Mile			N/A				N/A											
90°NW											1-30	0-30	0-30	2-30	2-15	0-45	0-45	3-45
90°NE											1-30	0-30	0-30		2-15	0-45	0-45	
Total (Lake)														10-15				15-53

(a) Land estimates assume the outer sectors are evacuated simultaneously with the inner sectors.
(b) No correlation methodology available. Estimates given by local officials.
(c) Because notification in the lake is achieved with two 40-foot cruisers and a helicopter (2 helicopters at the 10 mile sector), notification is done on a sector-by-sector basis so times for each sector must be totaled.
(d) Unpredictable. See Land and Lake Use, Section 2.1.
(e) Not applicable. U.S. Coast Guard estimates assume a 10 mph speed for private boats and civilian straight-line navigation.

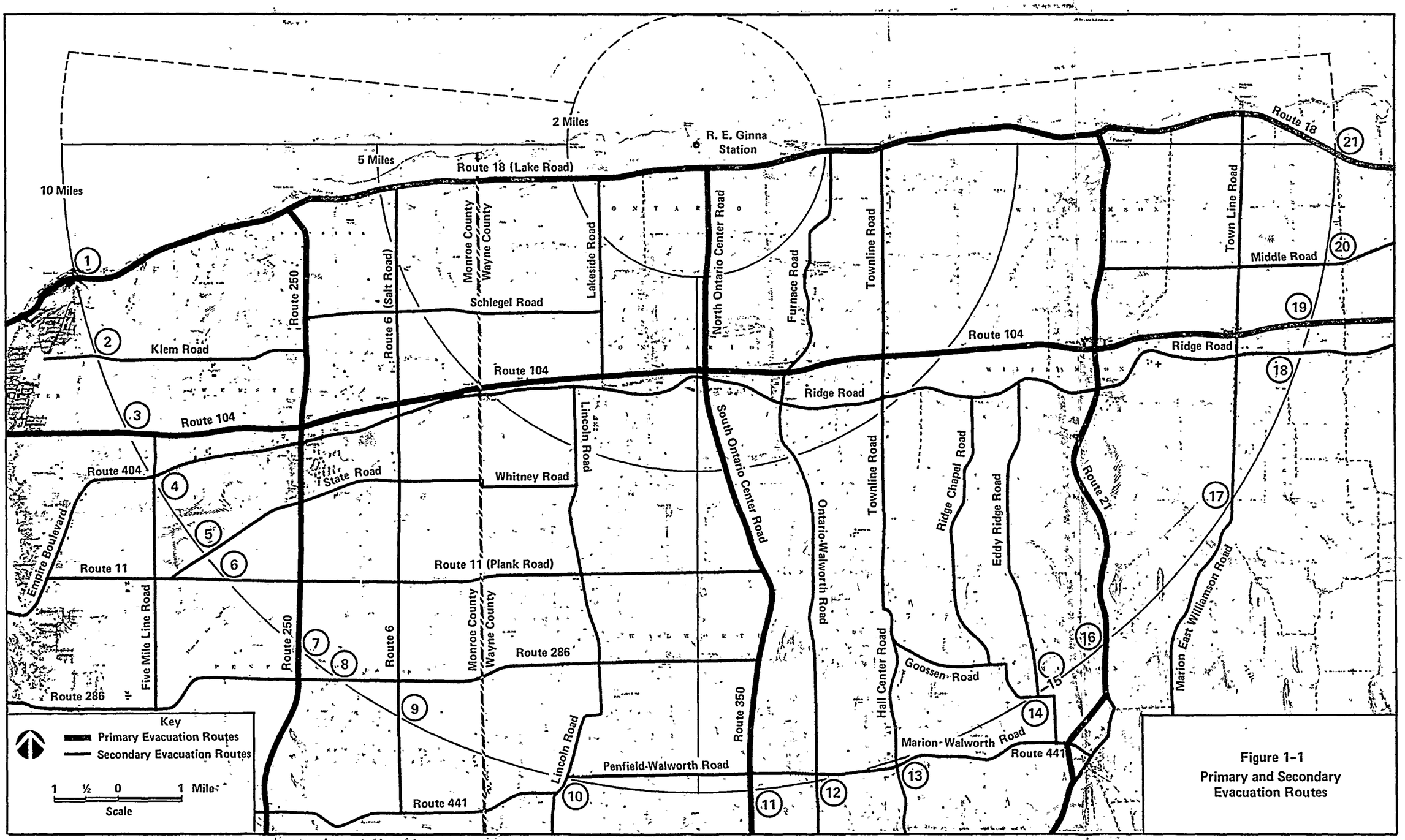

Figure 1-1
Primary and Secondary Evacuation Routes

2.0 THE 10-MILE EMERGENCY PLANNING ZONE

2.1 Land and Lake Use

The Ginna site itself is of relatively low relief. The entire 10-mile EPZ is located on lake plain, flat-to-rolling and contains numerous short streams that flow northward directly into Lake Ontario. The land rises slowly at 80 feet per mile.

The 2-mile 180-degree land sector of the site is completely within the Town of Ontario.* About 30.6 percent of the town is used to produce fruit and field crops. Some 59.5 percent of the land is either unproductive (bogs, wetlands, brush, and agricultural reserve) or forested. Only 1.6 percent is in permanent pasture. The remaining fraction is divided for many specialized uses, primarily residential and business. 1.7 percent is used for public and recreational areas.

The area within ten to twelve miles of the site is rural and suburban. In the 19th Century, the area was primarily agricultural. When the Erie Canal, which runs east-west about fifteen miles south of the reactor, was a primary transportation link, villages developed on its banks.

The shoreline near the Ginna site is high and rocky and has no anchorage areas or inlets; thus, it discourages swimming and boating. Sodus Bay, 15 miles east, is a major harbor and boating area for small craft. The Genesee River enters the lake 16 miles west of the site, and the Oswego River, 45 miles east. Both have large boat facilities.

2.2 Meteorology

The climate of the Town of Ontario (which makes up the entire 2-mile land sector and most of the 5-mile land sector) is

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* In New York State, a town is the equivalent of a township. School districts are separate political entities. The smallest urban unit is called a village.

moderated by Lake Ontario. The lake keeps the air temperature cooler in the spring and warmer in the fall than inland air temperatures. Frost-free days from spring to autumn (i.e., 150 to 180 days) result in a growing season that is the longest in New York State. The site is near the mean path of many cyclonic-wind systems, which cross North America at a frequency of about ten per month and result in substantial tropospheric mixing.

January and February are the coldest months, the average temperature being 24° to 26°F; July is the warmest with an average temperature of 69° to 73°F. The annual mean temperature is about 48°F.

Annual precipitation (rain, snow, sleet, and hail) for the region is about 32 inches and averages 31 to 37 inches at various Wayne County sites.

Adverse Weather--For the purposes of these estimates, the operative definition of adverse weather is heavy snowfall. Most townships in the 20-mile radius have their roads cleared within 4 hours. Main roads are cleared first, and county offices of disaster preparedness (ODP) have the authority to direct snow removal in am emergency situation. In an emergency, snow removal equipment and crews from towns outside the 10-mile EPZ are available.

2.3 Site Location

The R. E. Ginna Nuclear Power Plant Unit No. 1 is in the northwest corner of Wayne County, New York, on a 338-acre site. The reactor site is halfway between the eastern and western boundaries of the symmetrical 25-square-mile Town of Ontario. This location, on the south shore of Lake Ontario, is about twenty miles ENE of the center of Rochester, New York, and 45 miles WSW of Oswego, New York, at longitude 77° 18.5' W and latitude 43° 16.7' N. Figure 2-1 shows the counties and the larger cities and towns within 50 miles of the site for general reference.

2.4 Emergency Planning Zone Sectors

A 10-mile radial Emergency Planning Zone (EPZ), with the R. E. Ginna station at its center, divides into approximately one 180-degree land sector and one 180-degree water sector, Lake Ontario. U.S. Geological Survey maps and interviews with local officials indicate that there are no islands in the 180-degree lake sector. For the purposes of estimating evacuation times on land, the southern 180-degree land sector includes points of land that protrude north of an east-west line through the plant and bisecting the EPZ (e.g., Pultneyville and Fairbanks Point). Therefore, all land evacuation time estimates are given as a unit, and all Lake Ontario evacuation estimates are given as another unit for simplicity. (See Table 1-1 and the following descriptions.)

Each sector is delineated according to a format set by the NRC, which requested estimates for ten sectors, assuming simultaneous evacuation of each sector. In this report, each sector is identified by distance, angle, and direction. The sectors are as follows:

A. Land Sectors

1. 2 Miles

180° South (population 867)

The 2-mile radial sector (i.e., 0 to 2 miles) has been divided into two 180-degree sectors in this report to adapt to the land/water EPZ at R. E. Ginna. The southern 180-degree sector is mostly land, and the northern 180-degree sector is mostly Lake Ontario. Therefore, for estimating purposes, all shoreline sectors have been included in the southern 180-degree sectors (land). This land sector is a rural setting

within the Town of Ontario with no important population centers. Part of Ontario-on-the-Lake and all of Bear Creek, small residential communities, fall within this sector.

2. 5 Miles

a. 90° Southeast (population 4,387)

This land sector (i.e., 2 to 5 miles) consists of the towns of Ontario and Williamson in Wayne County. It includes the communities of Ontario, Ontario Center, and Furnaceville.

b. 90° Southwest (population 4,387)

This sector consists of portions of the towns of Ontario in Wayne County and the Town of Webster in Monroe County. Small population centers include Fruitland, Union Hill, Lakeside, and Ontario-on-the-Lake.

3. 10 Miles

a. 90° Southeast (population 7,244)

Between 5 and 10 miles, this sector consists of portions of the towns of Williamson, a small western portion of Sodus, Marion, and Walworth. Villages and small population centers include Pultneyville, Holland Cove, East Williamson, Williamson, and Walworth.

b. 90° Southwest (population 31,983)

The Village of Webster (population 5,034) and the surrounding population is the most significant aspect of this sector (5 to 10 miles) and

the highest population center of the entire EPZ. Most of this increased population density occurs within Monroe County. This sector consists of the towns of Webster and Penfield. Other population areas include Forest Lawn, Webster Park (a recreational park frequented in summers), and West Webster.

B. Lake Sectors

There are no distinguishing topographical features for the lake sectors. Separate estimates are given according to the NRC and defined by distance, angle, and direction. All lake evacuation estimates were provided by the U.S. Coast Guard. (See Table 1-1, "Evacuation Time Estimates by Sector.")

2.5 Population Within the EPZ

The land portion of the EPZ includes portions of two neighboring counties: Wayne County and Monroe County. Wayne County contributes the largest land area to the EPZ and Monroe County contributes the highest concentration of housing. (See Figure 1-1.) The highest concentration of people occurs between the 5 and 10-mile limit in the southwest sector in and around the Village of Webster, which has a 1970 population of 5,037.

The populations at 2 and 5 miles are quite low and appear to have started decreasing slightly in 1975. Census figures for all of Wayne County suggest that the population grew only by 2,790 from 1970 to 1975 (79,404 to 82,194). It is likely that most of that growth occurred in the southern end of the county outside the EPZ where the larger villages occur. Even so, 1977 census figures indicate a county-wide decrease from 82,194 to 81,700 in 1977. The estimated 1980 population for the entire land-area EPZ in 2, 5, and 10-mile 180-degree sectors are as follows:

o	0 to 2 miles	=	867
o	2 to 5 miles	=	8,774
o	5 to 10 miles	=	39,227
o	0 to 10 miles (total EPZ)		48,868

These populations are given by sector in Section 2.4 and are consistent with the NRC Staff estimates for this time period.*

The population density of Wayne County in 1970 was 131 persons per square mile. The Monroe County density was 1,055 persons per square mile; however, that figure includes the City of Rochester. For the State of New York, the average population density was 380 persons per square mile, and for the City of New York, the density was 70,000 per square mile.

Villages and populated areas that are cut by the 10-mile radius, such as the Forest Lawn area and the western portion of the Town of Webster in Monroe County, are included in the statistical evacuation time estimates, and in the estimates of principal local officials.

2.6 Roads and Highways

The road network of the EPZ is basically a grid system that generally allows uncomplicated egress from within the EPZ to outside the EPZ. Moreover, the grid system is balanced in relation to the R. E. Ginna station. For instance, two main routes completely cross the EPZ in an east-west direction:

- Federal Highway 104, which travels through the 5-mile arc, and
- State Highway 18, which travels through the 2-mile arc.

To complete the balanced layout, there are three main evacuation routes providing egress south out of the EPZ:

* RGE FES reference.

- State Highway 350 runs through the middle of all three arcs, thus linking with east-west highways,
- State Highway 21 runs through the 10-mile arc on the east, and
- State Highway 250 runs through the 10-mile arc on the west.

Because of their layout, the five routes listed here are designated as primary evacuation routes in Figure 1-1. Several other routes lead directly out of the EPZ.

2.7 Special Facilities*

Special facilities are defined as hospitals and nursing homes. Schools are treated in Section 2.8. There are no hospitals withinthe 10-mile EPZ; however, there is one 72-bed nursing home in the Town of Webster. The Maplewood Nursing Home has conducted daytime fire drills. During such drills the total nursing home population has been brought outside within 7 minutes. The director of the Maplewood Nursing Home estimates that at night he could have all of his patients outside the 10-mile radius and into another nursing home within 2 hours.

2.8 Schools

There are portions of four school districts within the 10-mile EPZ:

- Wayne Central 3,000 students/52 bus fleet
- Williamson 1,500 students/18 bus fleet
- Marion (one school) 690 students/12 bus fleet
- Webster 7,430 students/60 bus fleet

In all estimating categories for both fair and adverse weather, school district officials' evacuation time estimates were lower than the evacuation estimates for the general population. There are no schools within the 2-mile radius of the R. E. Ginna Station.

*Webster Park, approximately 2.5 miles northwest of the Village of Webster, can be cleared by park staff without difficulty, according to local officials.

Because the school districts are working with a controlled population, notification time, mobilization time, and confirmation time are not problems as they are with the general population. The schools are acquainted with fire drills and have an orderly means for accounting for children on a class-by-class and teacher-by-teacher basis. Confirmation would consist of the normal last check of rooms made during fire drills. The only difference to the fire-drill procedure is the loading of students onto buses and the time delay in waiting for the buses to arrive. There are no schools within the 2-mile radius of the Ginna Station. The detailed evacuation time estimates made by the school officials appear in Table 1-1. The scenario in which students are at home rather than at school is incorporated in the statistical estimate for the general population.

The designation of sectors had no bearing for school officials because superintendents whose districts were within the EPZ merely estimated the time it would take to evacuate their entire school population and bring those people outside the 10-mile limit. Marion Central School, which is just inside the 10-mile limit, is the exception to this rule. In the Marion School District only Marion Central School would be evacuated.

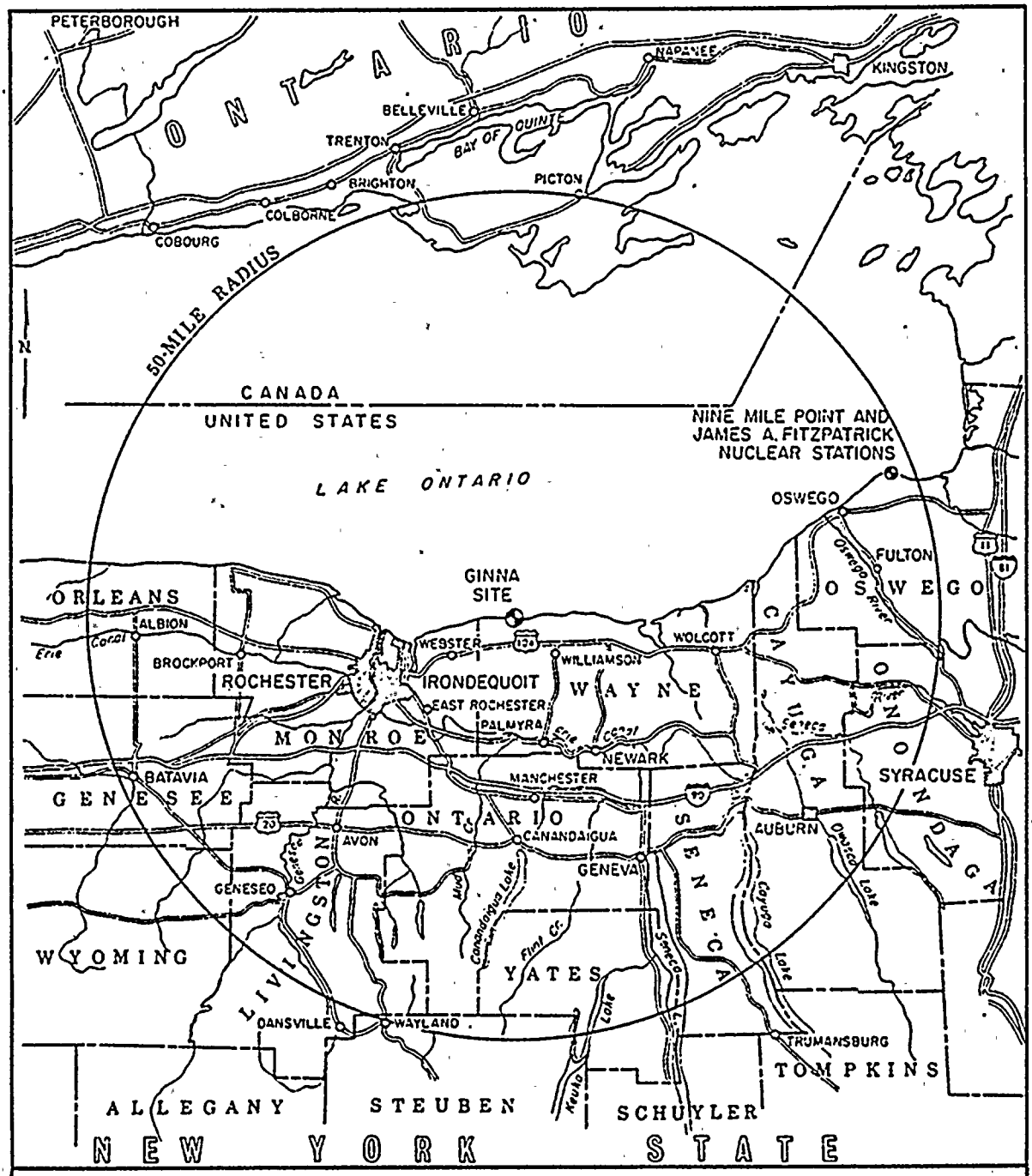


FIGURE 2-1

LOCATION OF THE R. E. GINNA NUCLEAR POWER PLANT

3.0 METHODOLOGY

The description of the methodology employed in this report is in two parts: one for evacuation estimates obtained through interviews with principal local officials, and one for estimates obtained by statistical means using census population data, New York road capacity data, and information from pertinent studies.

3.1 Interview Estimates

Interviews with more than 12 state and county principal officials representing school districts, police, political entities, and disaster preparedness units in both Wayne and Monroe Counties indicated that as yet there are no existing written evacuation plans for the newly defined 10-mile EPZ. For the most part, each interview was conducted by two NUS representatives with a representative of RG&E present. Each official was asked what he would do if he were given the order to evacuate the people in the area under his authority to a point of his choosing beyond a 10-mile limit from the R. E. Ginna station. He was told not to include plans that might be put into effect in the future. The question was asked on this basis: "What would you do if you got the order to evacuate now?"

The question was then broken down for each interviewee into the format requested by the NRC. Each interviewee was asked for the time it would take to notify, evacuate, and confirm the evacuation of people under his responsibility. He was further asked to estimate the time of each of these evacuation steps for each sector, and finally asked to make the estimate for fair weather and adverse weather. Maps were available in each interview for clarification.

In estimating the three steps of evacuation separately, the following definitions were used:

Notification - This includes the time it takes for a given population to receive the announcement of a general evacuation and to hear instructions for evacuation from local officials. This is achieved with radio, telephone calls, and loudspeakers on mobile units.

Evacuation - This step also includes what is typically called mobilization, the readying of persons for departure. This includes that percentage of the population that returns home from work before evacuating. It is the time it takes for one population to vacate one sector.

Confirmation - This is the time it takes for local officials, state and local police mostly, to ensure that the given population has evacuated.

With this approach, each official used his knowledge of the area in his charge, and his awareness of the abilities of the people under his authority. This includes both those persons implementing his evacuation orders and the general public following them. In every case, principal state and local officials were asked to make their estimates without the advantage of a plan, and in most cases, they had no previous notice that the EPZ is being redefined out to 10 miles, thus making them part of the EPZ for the first time. However, it was apparent that there is a high degree of cooperation among state and local officials.

For each step of the general evacuation process (notification, mobilization and evacuation, and confirmation), the highest estimate was used to develop the total time; thus a total represents the categorical estimates of more than one principal local official. For instance, in Wayne County, three different sources supplied evacuation time estimates (not counting school

officials). Student population estimates are less than the general evacuation time estimates in all affected schools in both counties. School evacuations are treated in more detail in Section 2.8.

Lake Evacuation - as on land lake evacuation is a three step process. However, the initial notification time for the 2 mile radius is 4 hours because the U.S. Coast Guard requires from 2 hours to 2 hours and 30 minutes to get two 40-foot cruisers on scene within the 2-mile radius. The cruisers would come from Oswego (2 to 2.5 hours) and Rochester (0.5 hour). After approximately four hours a helicopter would be on the scene from Detroit. Notification times at the 10-mile sector are minimized by the addition of a second helicopter from the U.S. Coast Guard or from Canada.

3.2 Statistical Estimates

Pertinent census data and highway capacity information were given to NUS by the New York Office of Disaster Preparedness. Some of these data were based on the 1965 Highway Capacity Manual. This information was used to produce preliminary statistical estimates of evacuation times from the various sectors.

A fixed notification time of two hours plus a response time of twenty minutes was used in all cases. In order to simplify the statistical estimate, the area around the station was divided into eight evaluation regions.

Population of the subdivided regions of EPZ

As shown in Fig. 3-1, the EPZ has been subdivided into eight regions: A, B, C, D, E, F, G, and H. The population of each region was assumed to be uniformly distributed except the Webster Town and Webster Village area. Region A covers the population within a two-mile radius from the plant. Region B covers the region between two to five miles from the station. Region C is Webster Village. Region D is Webster Town excluding the Village. The rest of the population between five to ten miles from the station is evenly distributed into four regions, E, F, G, and H. This assumption tends to distribute more people then it should be to the populous Webster area. This is conservative since the analysis demonstrates that the Webster area has the most limited highway capacity.

Buses

All people without a car are assumed to use buses to evacuate. Percentage of people without car is obtained from a summary of census data.[1] Twenty persons are assigned to each bus to allow the likelihood that some buses will depart without waiting to fill up. The number of buses required for each region is listed in Table 3-1. It is assumed that people who need transportation will be picked up at a nearby fire station, their homes, or other convenient places.

Cars

It is assumed that number of cars will be the same as the number of households. The number of people per household is obtained from Reference 1.

Evacuation Routes

Evacuation routes were chosen based on their ability to efficiently carry evacuating vehicles outside the EPZ. They are listed in Table 3-2 and shown in Figure 1-1.

Highway Capacities

Level D capacity, which reflects a realistic estimate of road capacity, was used for Highway 104, Route 350, Route 21, and Route 250. The formula for calculating this capacity is given by:[3]

$$Cap_D = Cap_B \times 1.5 \times \frac{1}{\text{PSD Factor}}$$

where

Cap_B = B level capacity (conservative measure of capacity given in published highway statistics).

1.5 = a factor based on a 50/50 split of the highway lane movement.

Cap_D = D level capacity.

PSD Factor = Passing sight distance.

The capacities of the other routes are assumed to be 550 and 400 vehicles per hour for flat and hilly terrain respectively. These numbers reflect a conservatively low estimate of the traffic flow capacities for secondary roads such as these in the R. E. Ginna EPZ.

Adverse Weather

For adverse weather conditions it is assumed that the highway capacity is reduced to 80% of its normal capacity.

Evacuation Time

The Evacuation Time is a total of three separate components:

They are:

1. Two-hour Notification and Mobilization Time - this is the theoretical elapsed time from initial accident discovery to public notification. Two-hour notification and mobilization time is used for each zone. (2)

2. Twenty-minute Public Preparation Time is allowed for the public to react to and comprehend the evacuation notification and guidance. This is the theoretical elapsed time between public notification to evacuate and the initial vehicle movement on the evacuation routes. It is not presumed that all the public will be prepared to evacuate in twenty-minutes - only that the evacuation movement will begin in twenty-minutes. Twenty-minutes public preparation time is used for each zone.(2)

3. Highway Movement Time varies depending on vehicle volumes and highway capacities. It is comprised of two factors:

   a. Initial Movement Time - thirty-minutes is assumed.(2)

   b. Capacity Time is the time for all the vehicles assigned to an evacuation route from all zones to pass the bottleneck capacity point on the evacuation route.

The Capacity Time together with the Initial Movement Time represents the time for all the vehicles to drive the evacuation route and safely leave the EPZ.

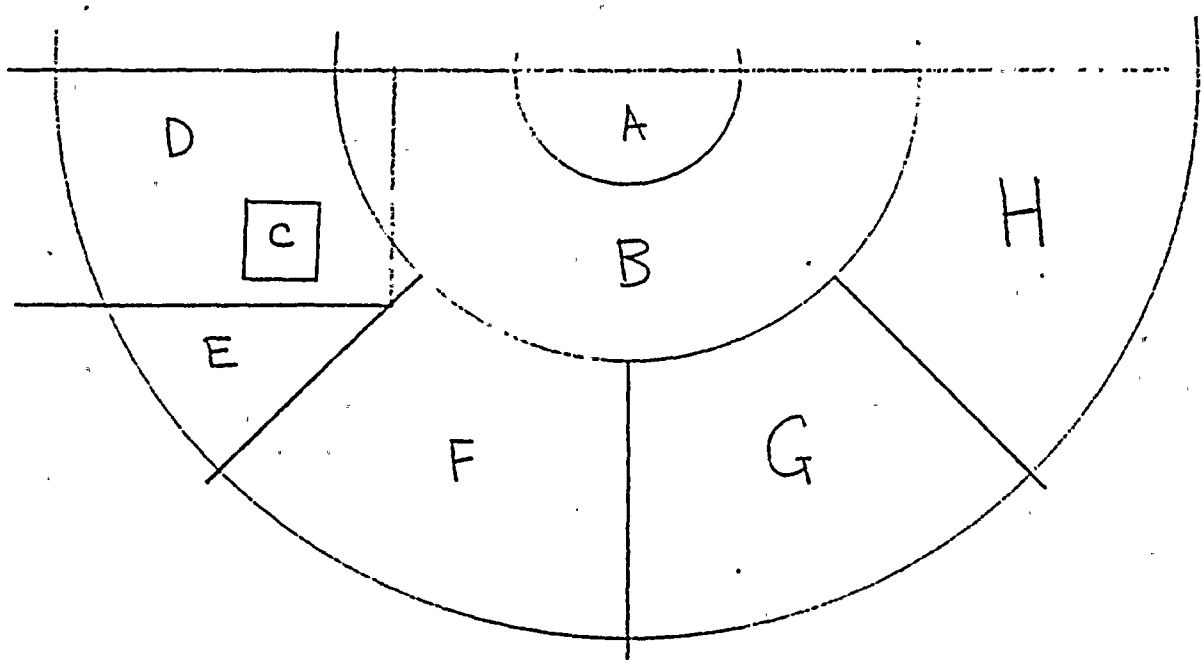
The calculated evacuation time for population within 2, 5, and 10-mile radius are listed in Summary table (Table 1-1).

The evacuation will be started at the same time for both the inner and the outer circle. Therefore, the overall evacuation time is the same as the longest time listed among the five different sectors in the Table 1-1.

A Comparison with EPA Evacuation Study

Evacuation experience in the United States for the period from 1959 to 1973 is summarized in a report published by the U.S. Environmental Protection Agency (EPA).[5] The report provides data on 64 evacuation events, most of which were in response to hazards from transportation accidents, floods or hurricanes. The Reactor Safety Study (RSS)[11] found that the three different effective speeds of evacuation were derived from the EPA data corresponding to different causes of evacuation. And the study concluded that the evacuation times from the transportation accident were more appropriate for the evaluation of evacuation times in reactor accidents. Table 3-3 presents the collected data for transportation accidents. The distribution of evacuation speeds was represented by three discrete effective speeds: 0, 1.2, and 7.0 mph with probabilities of 30 percent, 40 percent and 30 percent respectively.

From the 1.2 mph data, a simple estimate for an evacuation of a 10-mile radius is 8 hours 20 minutes. This is within the same range of the statistical estimates summarized in Table 1-1. (See also Table from Reference 11.)



		Population
A.	within two-mile radius	867
B.	between two to five mile radius	8773
C.	Webster Village	5037
D.	Webster*	19,702
E.	¼ (Population between five to ten mile radius - population of Webster Town)	3622
F.	¼ (Population between five to ten mile radius - population of Webster Town)	3622
G.	¼ (Population between five to ten mile radius - population of Webster Town)	3622
H.	¼ (Population between five to ten mile radius - population of Webster Town)	3622

*(Town less Village)

FIGURE 3-1

POPULATION DISTRIBUTION

Table 3-1

NUMBER OF CARS AND BUSES TO BE EVACUATED

Region	Population	% People Without Car		Number of Bus (20/Bus)	Number of People With Car	Number Per Household	Number of Cars per Number of Households With Car
A	867	(9.9%)	86	5	781	3.3	237
B	8773	(9.9%)	869	44	7904	3.3	2395
C	5037	(5.4%)	272	14	4765	3.6	1324
D	19702	(2.8%)	552	28	19150	3.2	5984
E	3622	(2.8%)	101	5	3521	3.1	1136
F	3622	(9.9%)	356	18	3266	3.3	990
G	3622	(9.9%)	356	18	3266	3.3	990
H	3622	(9.9%)	356	18	3266	3.3	990

TABLE 3-2

EVACUATION ROUTE

Figure Ref. No.	
Monroe County	
1.	Route 18 (Lake Road) West
2.	Klem Road
3.	Route 104 West
4.	Route 404 West (Empire Boulevard)
5.	State Road
6.	Route 11 (Plank Road)
7.	Route 250
8.	Route 286
9.	Route 6 (Salt Road)
Wayne County	
10.	Lincoln Road
11.	Route 350 (Ontario Center Road)
12.	Walworth - Ontario Road
13.	Hall Center Road
14.	Ridge Chapel Road and Goosen Road
15.	Eddy Ridge Road
16.	Route 21
17.	East Town Line Road
18.	Ridge Road
19.	Route 104 East
20.	Middle Road
21.	Route 18 (Lake Road) East

TABLE 3-3

BASIC EVACUATION DATA - TRANSPORTATION

Event Number	Location and Date	Type of Area Evacuated	Area Evacuated (sq. miles)	Number of Persons Evacuated	Distance Evacuated (Miles)	Evacuation Period (hrs)	Population Density (number per sq. mile)	Road and Conditions[a]	Weather	Time of Day	Evacuation Plans[b]	Remarks
12	Downington, PA; 2/5/73	Suburban	0.25	700 of 800	1.0	2.0	3200	Dry S	Cloudy	Night	PU	Private vehicles
16	Creve Coeur, MO; 8/1/61	Rural residential; suburban; urban	15	7,500	12	1.0	500	Dry S	Fog	Night	Pu	Private vehicles
18	Chadbourne, NC; 1/13/68	Suburban	0.5	350	1.0	5.0	700	Dry S	Cloudy	Dusk Night	NP	Private vehicles
33	Wetanka, OK; 4/4/69	Rural residential	3	2,000	25	8	667	Dry S	Cloudy	Day	PU	Private vehicles
34	Louisville, KY; 3/19/72	Urban	0.35	4,000	1	3	11,400	Wet U	Rain	Day	Pu	Private vehicles; chlorine barge; no chlorine releas
35	Urbana, OH; 8/13/63	Suburban	3.1	4,000	0.75	3.5	1,300	Dry S	Clear	Dawn	N.D.	Private vehicles
36	Baton Rouge, LA; 8/65	Urban	8	150,000	30	2.0	19,000	Dry U, EU	Clear	Day	PU	Private vehicles chlorine barge; no chlorine releas
38	Morgan City, LA; 1/19/73	Urban	1.8	3,000 of 3,300	2	4	1,800	Ice U	Snow	Day	PU	Private vehicles; chlorine barge; no chlorine releas
39	Texarkana, TX; 8/27/67	Suburban	9.0	5,000	3	4	550	Dry U	Clear	Night	NP	Private vehicles
44	Glendora, MS; 9/11/69	Rural farming; rural residential suburban urban	1,200	35,000	20	4	29	Dry S	Cloudy	Night	P	Private vehicles

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

(b) Key: P - plan available (not used);
PU - plan used
NP - no plan
N.D. - no data

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5.0 PRINCIPAL LOCAL OFFICIALS

1. Director, Wayne County Office of Disaster Preparedness
2. Sheriff, Wayne County
3. Superintendent of Schools, Wayne Central School District
4. Superintendent of Schools, Marion School District
5. Superintendent of Schools, Williamson School District
6. Superintendent of Schools, Webster School District
7. Director, Lake District Office of Disaster Preparedness (New York State local office)
8. New York Office of Disaster Preparedness, Nuclear Civil Protection Planning Section
9. Chief of Police, Town of Webster
10. Supervisor, Town of Webster
11. U.S. Coast Guard, Buffalo District
12. Director, Maplewood Nursing Home
13. Planner, Wayne County Planning Commission
14. Emergency Preparedness Coordinator, Monroe County