NUCLEAR REGULATORY COMMISSION

In the Matter of:

ENRICO FERMI ATOMIC POWER PLANT,	)	DOCKET NO. 50-341
UNIT 2	)	

DATE: April 1, 1982 PAGES: 398 thru 511

AT: Monroe, Michigan

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of:

ENRICO FERMI ATOMIC POWER PLANT, : Docket No. 50-341

UNIT 2

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Monroe City Council Chambers,
City Hall
120 East First Street
Monroe, Michigan

Thursday, April 1, 1982

Evidentiary hearing in the above-entitled matter was resumed, pursuant to adjournment, at 9:00 a.m.

BEFORE:

GARY L. MILHOLLIN, Esq., Chairman
Administrative Judge
Atomic Safety and Licensing Board
1815 Jefferson Avenue
Madison, Wisconsin 53711

DR. PETER A. MORRIS, Member
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

DR. DAVID R. SCHINK, Member
Administrative Judge
Department of Oceanography
Texas A & M University
College, Texas 77840

APPEARANCES:

On behalf of the Applicant, Detroit Edison Company:

HARRY H. VOIGT, Esq.
L. CHARLES LANDGRAF, Esq.
LeBoeuf, Lamb, Leiby & MacRae
Washington, D.C.

On behalf of the Intervenor, Citizens for Employment and Energy:

DAVID HOWELL, Esq.
3239 Woodward Avenue
Berkley, Michigan 48072

On behalf of the NRC Staff:

COLLEEN P. WOODHEAD, Staff Counsel
DANIEL SWANSON, Staff Counsel
LESTER KINTNER, Project Manager
SPENCE PERRY, Assistant General Counsel from
Federal Emergency Management Agency
Office of Executive Legal Director
United States Nuclear Regulatory Commission
Washington, D.C.

I N D E X

P R O C E E D I N G S

CHAIRMAN MILHOLLIN: The hearing will come to order. We are now ready to take up Contention 8.

Mr. Voigt, are you ready with your first witness?

MR. VOIGT: Yes, sir. At this time Detroit Edison will call to the witness stand Ms. Evelyn Madsen and Messrs. Hungerford, Kanen and Nelson.

Whereupon,

EVELYN F. MADSEN

called as a witness by Counsel for the Applicant, having first been duly sworn by the Chairman, was examined and testified as follows:

and Whereupon,

ANDREW C. KANEN

called as a witness by Counsel for the Applicant, having first been duly sworn by the Chairman, was examined and testified as follows:

and Whereupon,

HERBERT EUGENE HUNGERFORD

called as a witness by Counsel for the Applicant, having first been duly sworn by the Chairman, was examined and testified as follows:

and Whereupon,

ROGER A. NELSON

called as a witness by Counsel for the Applicant, having first

been duly sworn by the Chairman, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. VOIGT:

Q Ms. Madsen, would you state your full name and business address, please?

A (WITNESS MADSEN) My name is Evelyn F. Madsen. My business address is 2000 Second Avenue; Detroit, Michigan.

Q Ms. Madsen, did you previously prepare and file written testimony in this proceeding?

A (WITNESS MADSEN) Yes.

Q I show you a copy of a document consisting of a cover with 16 pages of text, five tables and eight figures including Figure 8A, 8B and 8C. I ask you if that is your prepared testimony?

A (WITNESS MADSEN) Yes, it is.

Q I now show you a copy of a document consisting of three pages, that are entitled "Professional Qualifications, Evelyn F. Madsen," and is that a copy of your professional qualifications as presented in this proceeding?

A (WITNESS MADSEN) Yes, it is.

Q Do you have any corrections to make in either of these documents?

A (WITNESS MADSEN) There's a correction to be made in the testimony.

Q Would you please read that into the record?

A (WITNESS MADSEN) Page 12 and 13, beginning with line 24 should read: "2.24 mph (1m/sec.) causing the plume to spread," crossing out the phrase "and an inversion condition exists that assumes very poor dispersion."

Then continuing with: "causing the plume to spread horizontally over the ground in a 22.5 degree sector." And cross out the remainder of the sentence.

MR. VOIGT: Mr. Chairman, let the record reflect that the copies supplied to the court reporter, to be bound into the record, contain the correction that Ms. Madsen has just made.

BY MR. VOIGT:

Q Do you have any other corrections to make to either your testimony or your professional qualifications?

A (WITNESS MADSEN) No.

Q Are those documents true and correct?

A (WITNESS MADSEN) Yes, they are.

MR. VOIGT: Mr. Chairman, the record should reflect that there has been placed in the hearing room a large aerial photograph.

BY MR. VOIGT:

Q Ms. Madsen, referring to Exhibit three in your prepared testimony -- I'm sorry, that is figure three. Is figure three a scaled down and photographic version of the same map which has not been set up in the hearing room?

A (WITNESS MADSEN) Yes, it is.

Q Dr. Hungerford, would you give your full name and your business address?

A (WITNESS HUNGERFORD) I'm Herbert Eugene Hungerford. My business address is Purdue University, West Lafayette, Indiana. I'm a consultant for Detroit Edison.

Q Show you a copy of a two page document headed "Professional Qualifications, Herbert Eugene Hngerford." Ask you if that is a copy of your professional qualifications produced and submitted in this proceeding?

A (WITNESS HUNGERFORD) Yes, it is.

Q Do you have any corrections to that document sir?

A (WITNESS HUNGERFORD) I do not.

Q Is that document true and correct?

A (WITNESS HUNGERFORD) That document is true and correct.

Q Mr. Kanen, would you state your full name and business address?

A (WITNESS KANEN) Andrew Kanen, 1500 Planning Research Drive, in McClain, Virginia.

Q Mr. Kanen, have you previously prepared and submitted your professional qualifications during this proceeding?

A (WITNESS KANEN) Yes. I have.

Q Show you a document consisting of three pages bearing the heading "Professional qualifications, Andrew C. Kanen," and ask you if that is a copy of your professional qualifications

submitted?

A (WITNESS KANEN) It is.

Q Do you have any corrections to that document, sir?

A (WITNESS KANEN) No, I do not.

Q And is that document true and correct?

A Yes, it is.

Q Mr. Nelson, would you state your name and business address?

A (WITNESS NELSON) My name is Roger Nelson, 5990 South Syracuse; Inglewood, Colorado.

Q Mr. Nelson, I show you a copy of a document headed "Professional Qualifications, Roger A. Nelson," and ask you if that is a copy of your professional qualifications previously submitted in this proceeding?

A (WITNESS NELSON) It is.

Q Do you have any corrections to your professional qualifications, sir?

A (WITNESS NELSON) My professional affiliation is with PLT Engineering, and the business address is as I just stated.

Q And with those changes, sir, are you professional qualifications true and correct?

A (WITNESS NELSON) They are.

Q Mr. Kanen, have you had an opportunity to review the prepared testimony submitted by Ms. Madsen in this proceeding?

A (WITNESS KANEN) Yes, I have.

Q Directing your attention to that portion of the prepared testimony, beginning on page two, appearing under the heading of Evacuation Time Estimates, do you adopt that portion of the testimony as your testimony in this proceeding?

A (WITNESS KANEN) Yes, I do.

Q Have you had an opportunity to review the prepared testimony submitted by Ms. Madsen in this proceeding, Mr. Hungerford?

A (WITNESS HUNGERFORD) I have.

Q Referring to that portion of the testimony on page 211, under the heading of Radiological Dose Evaluation, do you adopt that portion of the testimony as your testimony in this proceeding?

A (WITNESS HUNGERFORD) I do.

MR. VOIGT: Mr. Chairman, I would ask that the testimony and professional qualifications we just identified, and sworn to by the four witnesses, be admitted in evidence and bound into the record as if read.

CHAIRMAN MILHOLLIN: It will be so admitted and bound.

(Document being inserted into the record.)

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:

THE DETROIT EDISON COMPANY Enrico Fermi Atomic Power Plant Unit 2	)))	Docket # 50-341

TESTIMONY OF

EVELYN F. MADSEN

on

INTERVENOR'S CONTENTION 8

March, 1982

TESTIMONY OF
EVELYN F. MADSEN
ENVIRONMENTAL LICENSING ENGINEER-FERMI 2
THE DETROIT EDISON COMPANY
ON INTERVENOR'S CONTENTION 8

My name is Evelyn F. Madsen and I am the Environmental Licensing Engineer for the Fermi 2 Project for The Detroit Edison Company ("Edison"). My business address is 2000 Second Avenue, Detroit, Michigan 48226.

I have been requested to respond to Intervenor's Contention 8 which alleges:

> CEE is concerned over whether there is a feasible escape route for the residents of the Stony Point area which is adjacent to the Fermi 2 site. The only road leading to and from the area, Pointe Aux Peaux, lies very close to the reactor site. In case of an accident the residents would have to travel toward the accident before they could move away from it.

Edison believes that the road system as it presently exists is adequate to evacuate the residents of Stony Point on a timely basis. This opinion is based on:

- Evacuation studies conducted for Stony Point;
- Installation of a siren system and the use of the Emergency Broadcast System (EBS), as a general warning system, including events at Fermi 2;
- Radiation dose evaluations of the residents of Stony Point during evacuation based on a highly incredible event at Fermi 2;
- The Protective Action Guidelines set forth by the EPA and endorsed by the NRC and FEMA for protection of the health and safety of the public.

I. Evacuation Time Estimates

The residential community of Stony Point is situated on the shore of Lake Erie in Monroe County, approximately one mile south of the Enrico Fermi Atomic Power Plant (Figure 1). The geographic extent and the local street system in the community is illustrated in Figure 2; Figure 3 is an aerial photograph of the area taken in October, 1981.

It is estimated that there are approximately 1400 residents in Stony Point based on the 1980 Advance U. S. Census Report for the area. An independent analysis was conducted to test the Advance Census information against detailed electric meter records available from Detroit Edison. This analysis indicated that the population estimates from the two independent data sources (U. S. 1980 Advance Census and Detroit Edison meter records) were consistently within two or three percentage points for the several areas analyzed.

On the basis of actual site visits to Stony Point and examinations of detailed area maps, the distribution of the area population by sector within the community has been estimated. The greatest population concentration is in the area west of Dewey Drive between Venice and Shady Lane (Figure 4).

Based on available U. S. Census data for Monroe County, the total automobile fleet in Stony Point is estimated at 738. It is expected that during an evacuation not all cars will be used or be available. On the average, at least one

car per dwelling unit can be expected to be used during an evacuation. In larger households, especially households with multiple wage-earners, the number of cars used may be greater than one per dwelling unit. Based on average family size and total car availablity, it is estimated that as many as 600 autos may be used during an evacuation (Figure 5).

One of the fundamental principles of transportation system management involves the design and application of traffic engineering techniques that support and reinforce the natural tendencies of people using the system. This principle is of major importance in the event of an evacuation during a potentially health threatening situation and must guide the selection and designation of evacuation routes. The most desirable evacuation routes are those routes that people would normally select in rapidly leaving an area. Changes to this "natural" route pattern should only be made if significant risks exist in following such natural routes. Such risks may exist if 1) the natural route induces traffic well in excess of the route's capacity, resulting in traffic congestion and lengthy delays to evacuees in traffic queues; and 2) the natural route carries the evacuees into the actual or projected area of the radiation plume.

There are significant differences in traffic control requirements along "natural" evacuation routes and along routes that are not natural to the evacuees. Along natural routes police officers offer guidance at key locations which

will expedite the flow of traffic. Along routes that are not perceived by the public as logical exit routes, police officer control will be essential. For example, the diversion of traffic from a major route onto a secondary street will require barricades and police officer presence, and even then some public resistance to the diversion may be encountered.

The major road facilities recommended as the evacuation routes in the Stony Point Community are shown in Figure 6. All traffic is channeled into Pointe Aux Peaux Road which is the normal entrance and exit facility for Stony Point.

The evacuation process must be viewed as a dynamic process (comprised of a series of actions by the individual residents), rather than discrete and simultaneous actions by the entire population. This dynamic process can be effectively reflected through a joint probability analysis technique. The factors that influence the departure rate of evacuees, more fully described in a report entitled "Evacuation Time Estimate"[1], include:

- Alerting and notification of the area residents
- Area workers leaving their place of work to return home
- Area workers traveling home
- Area residents preparing to leave home

On weekends, when few people are at work, the impact of some of these factors will be minimal. The estimated rate of evacuee departure following initiation of a general

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1/ Evacuation Time Estimate, Enrico Fermi Atomic Power Plant Unit 2; PRC Voorhees, March 1982

emergency for both an average weekday and a weekend are listed in Table 1.

The departure rate has two effects on the total time required to evacuate an area: 1) it determines the overall time required for everyone to leave the area, and 2) it determines the extent of the traffic congestion that may occur on the road systems, and thus, the time that evacuees may spend in traffic queues on various parts of the evacuation routes.

In addition to the departure rate, roadway capacity is a key factor in determing evacuation time. The capacity of Pointe Aux Peaux Road is estimated at 1200 vehicles per hour on the outbound lane. This estimate is based on average vehicle headways* of three seconds and reflects an operating speed of 15 to 20 miles per hour. On Lakeshore and Dewey Drive the average operating speed is estimated to be about 10 miles per hour with average vehicle headways about four seconds. A conservative estimate of capacity for these streets is 900 vehicles per hour outbound.

A detailed analysis of traffic flow on Lakeshore, Dewey Drive, and Pointe Aux Peaux Road, conducted with the aid of a computer simulation program, indicates that no significant traffic congestion would occur during an evacuation on either a weekday or a weekend day. On an average weekday the point of maximum traffic would occur about one hour and fifteen minutes following the initiation

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* Headway is the spacing between vehicles, and is a measure of the time lapse between one vehicle and a successive vehicle passing a given point.

of the siren system and EBS at the intersection of Dewey Drive and Pointe Aux Peaux Road. During a 15 minute period a total of 180 cars would be expected to arrive at this intersection. The exit capacity along Pointe Aux Peaux Road during that same 15 minute period is 300 and well in excess of the arriving vehicles.

On a weekend day the point of maximum traffic is the same as for the weekday, but with more autos arriving within a 15 minute period. The maximum 15 minute auto arrivals on a weekend is estimated to be 252 and thus still below the 15 minute capacity of 300.

Without any significant traffic delays, as illustrated by the preceeding paragraphs, the entire population of Stony Point can evacuate on an average weekday and be at or near the North Dixie Highway, west of the plant, within two and one-half hours from initiation of the sirens and EBS. The travel time of individual evacuees, measured from the southern tip of Stony Point to North Dixie Highway, is conservatively estimated to be 12 minutes.

On a weekend the individual travel time would be the same as noted above. Since more area residents can be expected to be at home on a weekend they would be able to depart more rapidly. The total evacuation time for the entire area population on a weekend is estimated to be one hour and forty-five minutes.

During adverse weather conditions, such as snow or icy road conditions, drivers would adjust normal driving

behavior in two ways: (1) operating speed would be reduced, and (2) separation (or headways) between vehicles would be increased. Adjustments in operating speed would be more significant when normal speeds are relatively high, i.e., in excess of 20 miles per hour. At speeds below 20 miles per hour the most significant driver adjustment to adverse weather conditions would be increased distance between vehicles.

For the evacuation from Stony Point, relatively low operating speeds were assumed during normal weather conditions (about 10 miles per hour on side streets and 15 to 20 miles per hour on Pointe Aux Peaux Road). Little reduction in operating speed would be expected during inclement weather, but headways are estimated to increase by as much as 50 per cent. Such a change in headways has a major impact on the maximum utilization (capacity) of the roadway. The capacity effects are as follows:

Roadway	Normal Conditions	Adverse Conditions
Pointe Aux Peaux Road	1200 vph*	800 vph
Side streets	900 vph	600 vph

During any 15 minute interval the number of vehicles that can exit along the sidestreets and Pointe Aux Peaux Road are 150 and 200 respectively.

On Lakeshore and Dewey Drive the maximum expected 15 minute vehicle arrivals is 128 on an average weekday and thus within the capacity limits of those streets during

*Vehicles per hour

adverse weather conditions. On Pointe Aux Peaux Road the maximum expected vehicle arrivals during one 15 minute period is 203 on an average weekday and thus at the capacity of that facility during adverse weather conditions.

These data indicate that during a fifteen minute period, approximately one hour following the initiation of the siren system and EBS, there would likely be some congestion at the intersection of Dewey Drive and Pointe Aux Peaux Road, but such congestion would not exist for more than about 15 minutes. No congestion would be expected to exist on Lakeshore and Dewey Drive.

In the event that adverse weather conditions existed on a weekend, the level of congestion would increase because of the more rapid departure rate of the area residents. Congestion of about 15 minute duration would likely occur at the intersection of Lakeview and Shady Lane at Dewey Drive. Similar congestion would be expected at the intersection of Dewey Drive and Pointe Aux Peaux Road.

The overall evacuation time for the entire population will not be affected by this temporary congestion. The travel time to exit from Stony Point for those residents that encounter the congestion would be increased by an estimated maximum of five to seven minutes. The evacuation times for normal and adverse conditions are summarized in Table 2.

II. Notification System

Edison will be installing a siren system within ten miles around the Fermi 2 plant that will provide for notification to the residents within of a radiological emergency within fifteen minutes of the system's activation. In concept, the siren system will be owned and activated by the local County officials as a general warning system for all emergencies, including natural disasters. Upon activation, residents in the area will tune to the EBS for instructions concerning the type of emergency and resultant actions.

In the event of a radiological emergency at Fermi 2, instructions would be given to either "shelter" (e.g., stay indoors), or to evacuate to predetermined reception points and congregate care centers. For radiological emergencies, the system would be activated upon orders of the Governor pursuant to authority conferred by State law, Michigan Compiled Laws, Public Acts of 1976, No. 390.

Information brochures are published annually under the joint auspices of the Emergency Services Division, Michigan Department of State Police; Monroe County Office of Civil Preparedness; Wayne County Emergency Preparedness Office; and Edison, primarily to inform the public of actions it should take when the siren system is activated. These actions will initially include tuning to the local EBS radio or television stations to receive further instructions.

According to present plans, the community of Stony Point will be more than adequately covered by the siren placed as shown on Figure 4. This will provide the residents of the area with prompt notification of any natural disasters, as well as radiological emergencies at Fermi 2 that may require a protective action. It should be noted that the evacuation time estimates discussed previously are based on time after initiation of the siren system and receipt of instructions.

III. Radiological Dose Evaluation

Thus far, we have discussed the time required to evacuate the Stony Point area and the siren system that will provide prompt notification to the residents. An additional evaluation was performed to determine the radiation exposure to the residents of Stony Point in the unlikely event of a release occurring concurrently with an evacuation action.

In order to discuss the possibility of the residents of Stony Point receiving a radiation dose as a result of a release at the Fermi 2 plant, it was necessary to postulate a hypothetical accident at the plant which would result in radiation being released into the environment. The scenario selected for this analysis is beyond that of a design basis accident and assumes the highly unlikely and improbable event of a core meltdown. The scenario is assumed to occur without technical justification and is developed solely for the purpose of creating an evacuation situation to make assessments of radiation dose to the residents in the Stony Point area and along various evacuation routes.

As stated earlier, the scenario is initiated by a core melt creating an increase in the reactor vessel pressure sufficient to cause radioactive steam leakage into the primary containment and from there into the reactor building or secondary containment. Once in the secondary containment, release to the atmosphere is

through the standby gas treatment system (SGTS) which automatically activates at high radioactivity levels. The SGTS exhausts the radioactive material through a series of filters that effectively remove iodine at 99% efficiency. The radioactivity released to the atmosphere is assumed to be 100% of the noble gases since the nobles are not removed by the filter system. Noble gases, such as xenon and krypton, are not absorbed by the SGTS, but are chemically inert and also have relatively short half-lives (anywhere from several minutes to several days).

The scenario is developed over a period of eight (8) hours, the time assumed for the SGTS to purge completely the volume of the secondary containment. The purge of radioactivity is assumed to progress on a linear basis, although, in fact, due to recycling, radioactivity will decline exponentially. Radioactive decay is applied over the eight (8) hours to the noble gases released.

The meteorological conditions assumed for plume characteristics are highly conservative. The scenario was designed to assume that the wind is blowing from the N/NNE placing the downwind direction of the plume directly S/SSW over Stony Pointe for the eight (8) hour period of the release. In addition, the wind speed is assumed to be 2.24 mph (1 m/sec.) and an inversion condition exists that assumes very poor dispersion causing the plume to spread

horizontally over the ground in a 25° sector, -- much like a layer of fog.

Conditions of this nature are not prevalent at the Fermi 2 site. Since 1974, when meteorological data has been collected, the predominant wind direction is away from Stony Point, S/SW to N/NE, at average wind speeds of 8 to 10 mph. Data indicates that the wind blows toward Stony Point less than five (5%) per cent of the time.

Nine locations were selected in and around the Stony Point area for the asessment of radiation doses resulting from the radioactive plume. These "dose points" are shown on Figure 7 and Table 3.

Evacuation routes were selected in the area that were a combination of transversing the plume as well as requiring travel near the centerline. In addition to the existing routes along Pointe Aux Peaux Road, non-existent southern routes that would require road construction through wetlands were examined. These routes are shown in Figure 8 (A) (B) and (C) and listed in Table 4. For the purposes of this study, the evacuation route included the streets within the Stony Point area and Pointe Aux Peaux Road, to North Dixie Highway.

Calculations of radiation doses were made at the various dose points listed in Table 3 using standard techniques developed by the nuclear community and

by the Nuclear Regulatory Commission. Dose rates in the radioactive plume are highest along the plume centerline and decrease rapidly as one moves away from the centerline. At the plume edges the radiation levels drop to negligible values. Fifteen isotopes of krypton, xenon, and iodine were selected as contributors to the dose in the plume. At each dose point calculations were made for each isotope, and the results were then summed to yield the total dose. Table 3 summarizes the dose received by persons at each dose point, assuming no evacuation and that persons remaining at the dose locations would receive doses for the eight-hour duration of the plume.

Radiation doses during evacuation were calculated by averaging the dose rates along various segments of the evacuation routes and time-integrating the results with the motion along the routes. The total doses received by the evacuees were determined by adding their doses received during evacuation to those received before evacuation. Table 4 presents the results of the evacuation dose calculations, showing the doses received by people who evacuate in two and one-half hours.

IV. Summary and Conclusions

As indicated from the results in Tables 3 and 4, evacuation reduces the dose to the individual and would be preferred to nonevacuation. Both the evacuation time estimate and the dose evaluation assume that Stony Point can be evacuated within two hours and thirty minutes. Any differences that may exist initially in time between reaction to the notification system and actually leaving the residence would be insignificant since everyone is out of the area within the same overall time frame.

The Environmental Protection Agency has issued protective actions in its report entitled "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents", EPA-520/1-75-001, revised June, 1979. These protective action guidelines (PAG) are shown in Table 5 and are recommended for use by the NRC and FEMA during nuclear incidents. A review of the results in Table 4 show that the total dose received prior to and during evacuation would be within the range of 1 to 5 rem (1000 to 5000 mrem) stated for protective actions resulting in evacuation requirements. The results of the studies conducted clearly indicate that the postulated, highly incredible accident scenario would result in doses to the residents in Stony Point that under realistic evacuation conditions would fall within the range of accepted protective actions.

In reviewing the results, an obvious conclusion can be drawn that Pointe Aux Peaux Road is a reasonable and reliable exit route from Stony Point since the doses received by those leaving via the non-existent routes are higher than those for all but one Stony Point route. Thus, there is little to be gained by attempting to construct new routes through wetlands for the purpose of an evacuation that is highly unlikely to occur and that results in dose rates that are within the protective action guidelines.

Table 1

Time after Initiation of Notification System	Percent of Population Ready to Evacuate (weekday)	Percent of Population Ready to Evacuate (Sunday)
0:00 - 0:15	--	--
0:15 - 0:30	--	--
0:30 - 0:45	6%	10%
0:45 - 1:00	23%	39%
1:00 - 1:15	35%	49%
1:15 - 1:30	21%	2%
1:30 - 1:45	7%	--
1:45 - 2:00	4%	--
2:00 - 2:15	4%	--
	100%	100%

Table 2

SUMMARY OF

EVACUATION TIMES FOR STONY POINT

EVACUATION CONDITION	ESTIMATED TIME TO EVACUATE ENTIRE STONY POINT POPULATION	ESTIMATED MAXIMUM TRAVEL TIME FOR INDIVIDUAL FAMILIES
Normal weather, weekday	2-1/2 hours	12 minutes
Normal weather, weekend	1-3/4 hours	12 minutes
Adverse weather, weekday	2-1/2 hours	15 minutes
Adverse weather, weekend	1-3/4 hours	19 minutes

TABLE 3

DOSE POINT LOCATIONS AND DOSE EVALUATIONS FOR THE POSTULATED SCENARIO

DOSE POINT NO.	LOCATION	TOTAL DOSE (0 to 8hr) (MREMS) NO EVACUATION
1	Pointe Aux Peaux Road at Lake Erie (Eastern end)	1,180.
2	Pointe Aux Peaux Road at Dewey St.	17,800.
3	Dewey St. at Parkview Road	19,900.
4	Western end of Parkview Road	8,350.
5	Stony Point	8,660.
6	Pointe Aux Peaux Rd. at Lagoona Boulevard	1.3
7	Pointe Aux Peaux Rd. at Brest Road	0.0
8	Pointe Aux Peaux Rd. at North Dixie Highway	0.0
9	Brest Road at its junction with Brest Bay	0.0

Figure 1
Regional Location

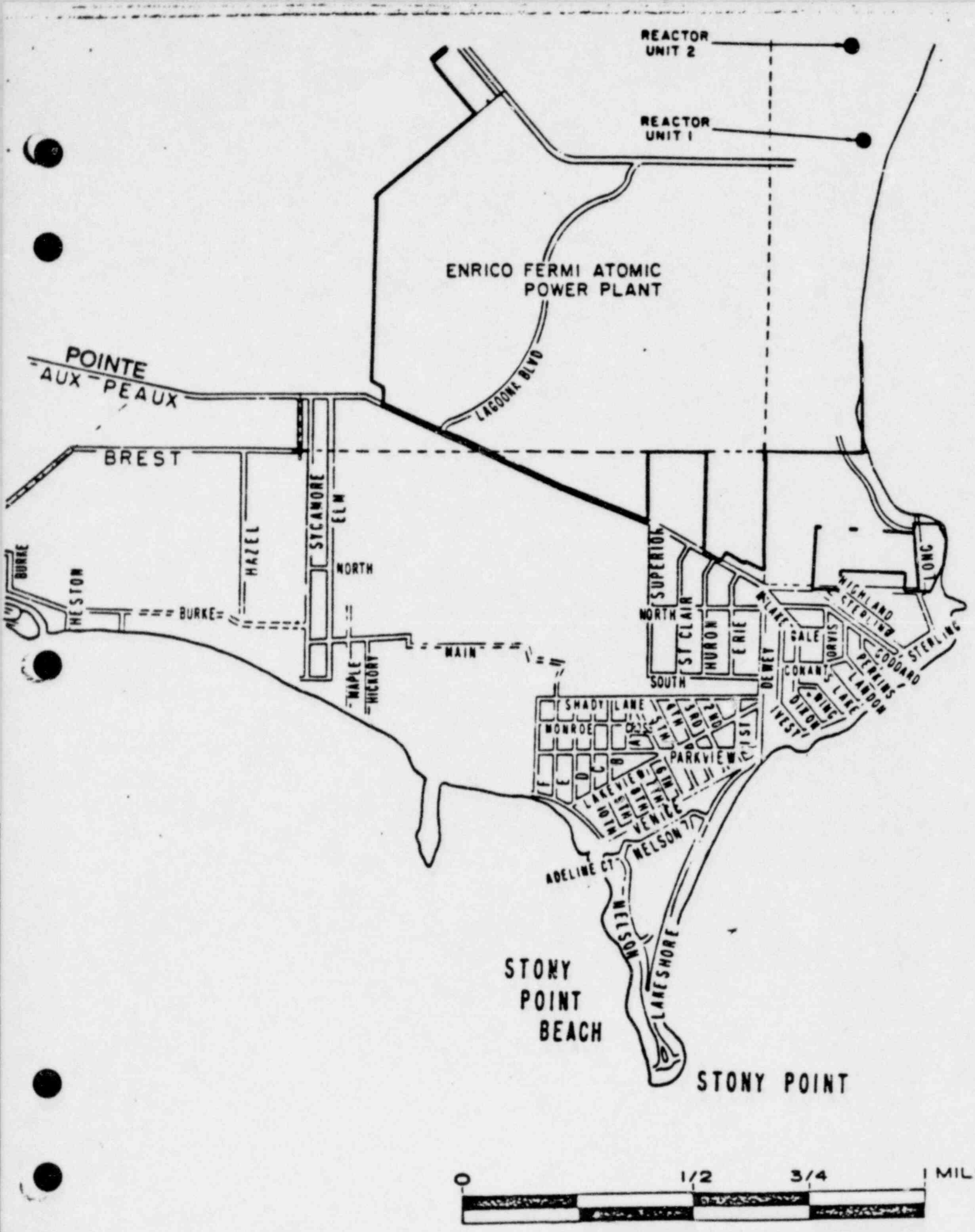
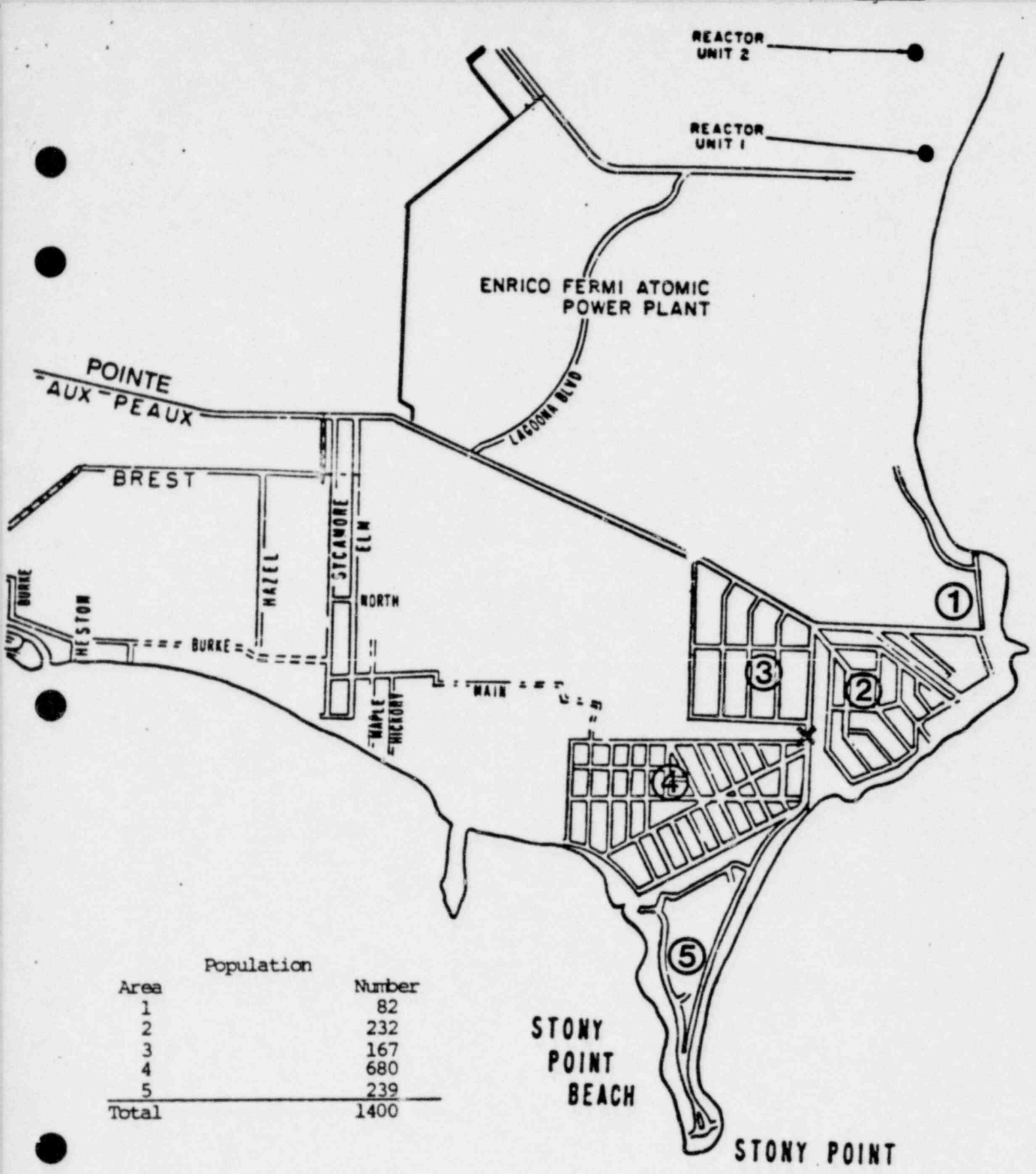


Figure 2
Street System in Stony Point



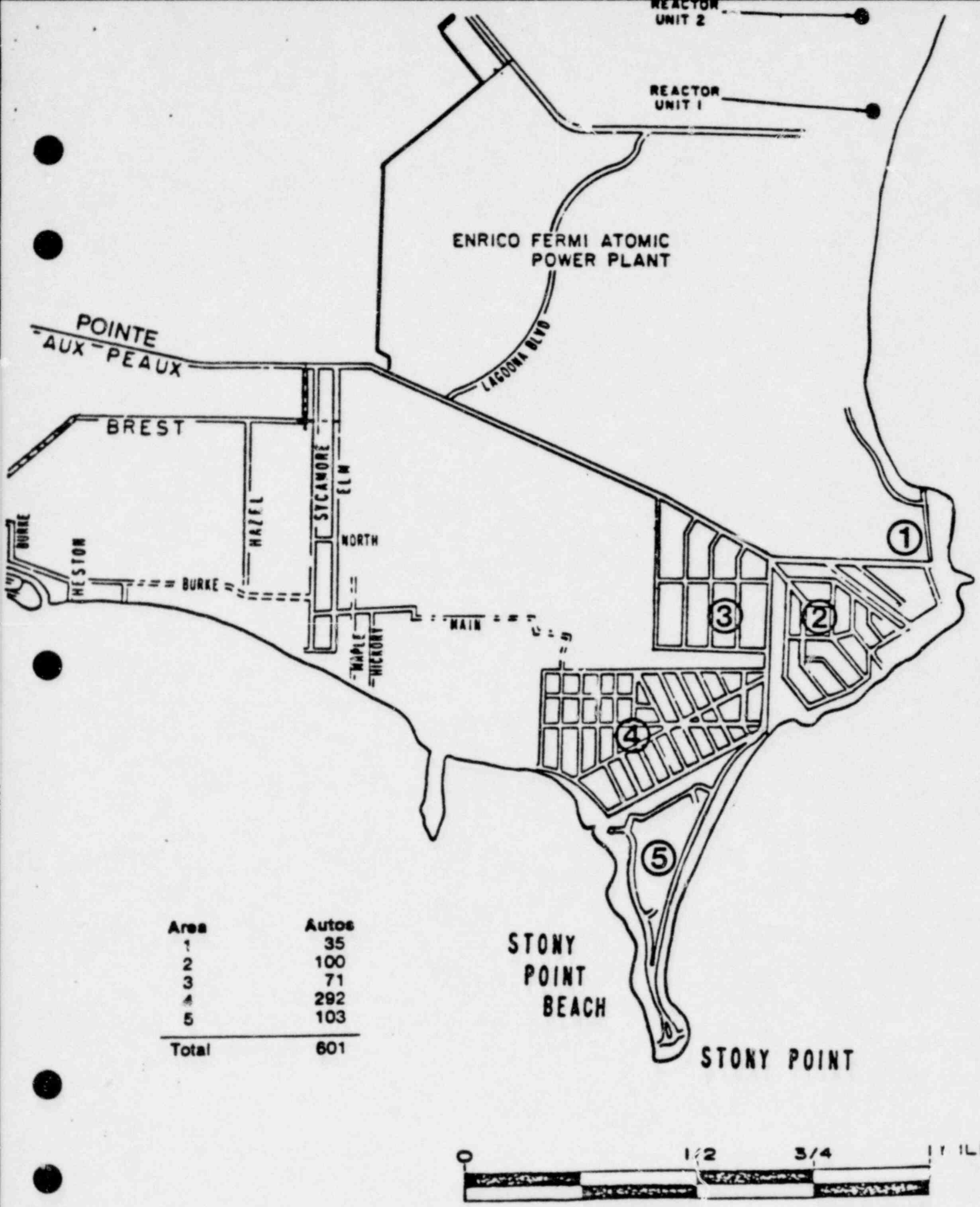
Population

Area	Number
1	82
2	232
3	167
4	680
5	239
Total	1400

X Siren Location

0 1/2 3/4 1 MILE

Figure 4
Population



Area	Autos
1	35
2	100
3	71
4	292
5	103
Total	601

Figure 5
Estimated Autos
Used in an Evacuation

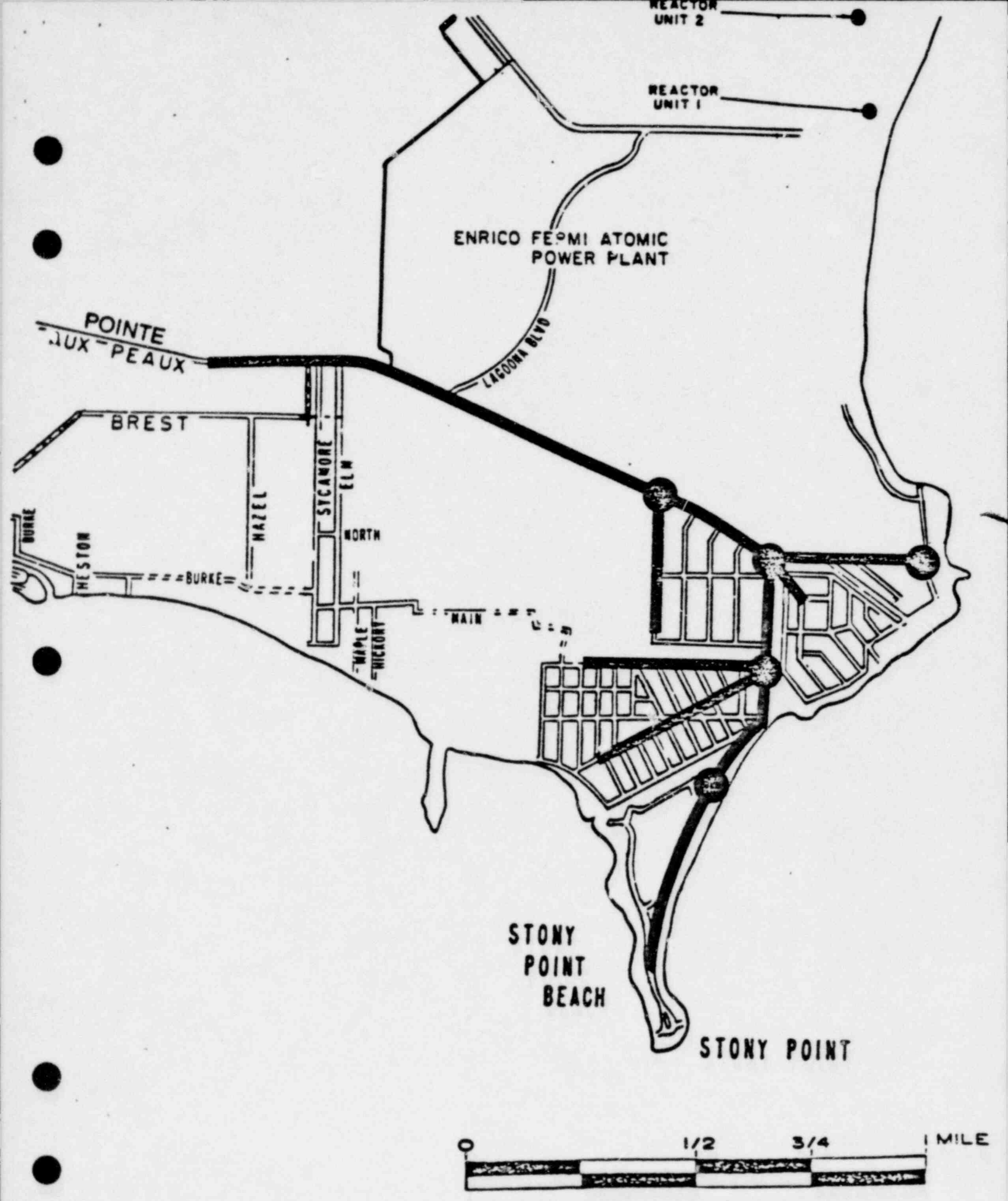


Figure 6
Major Evacuation Routes
and Key Intersections

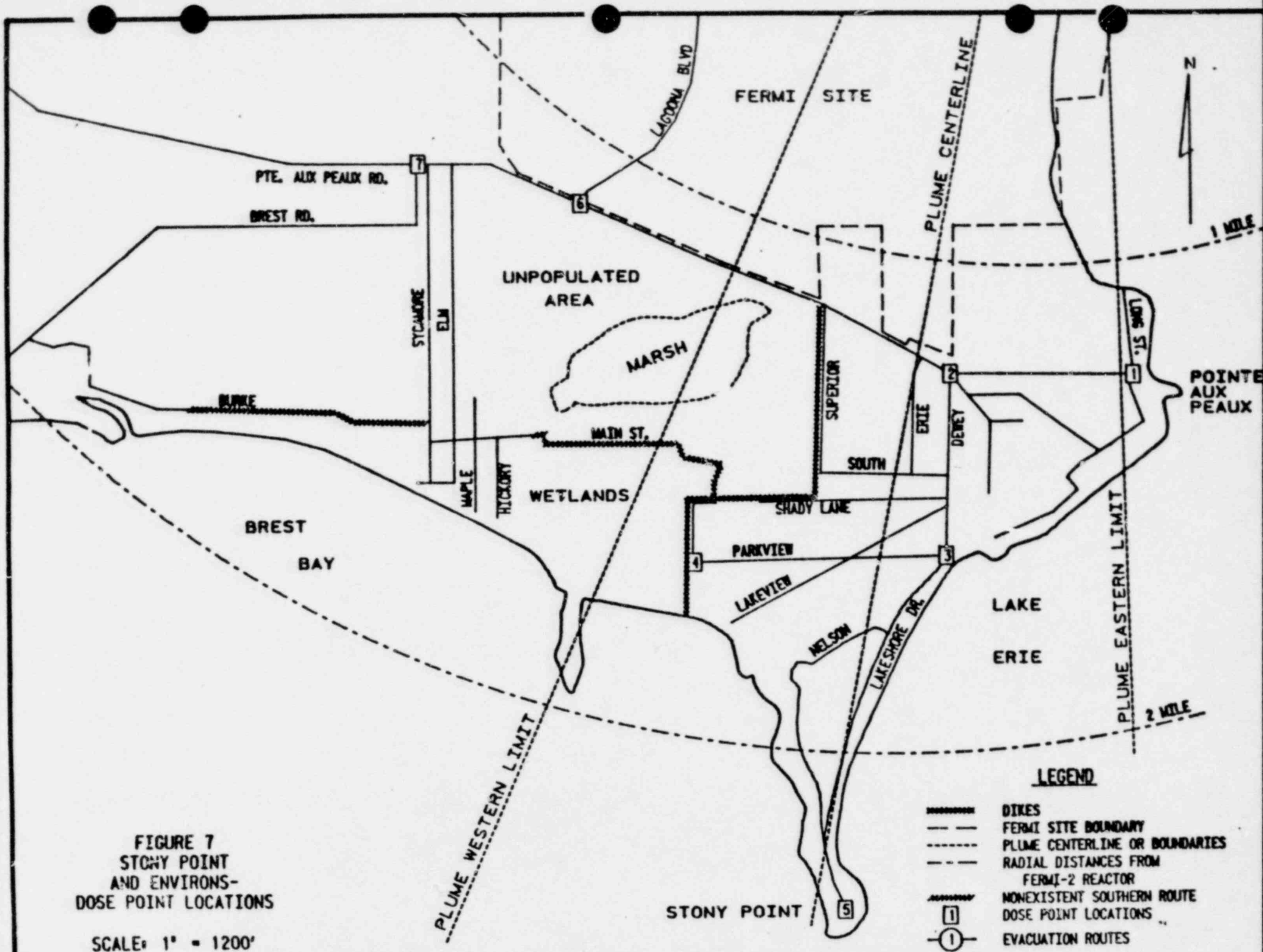


FIGURE 7
STONY POINT
AND ENVIRONS-
DOSE POINT LOCATIONS

SCALE: 1" = 1200'

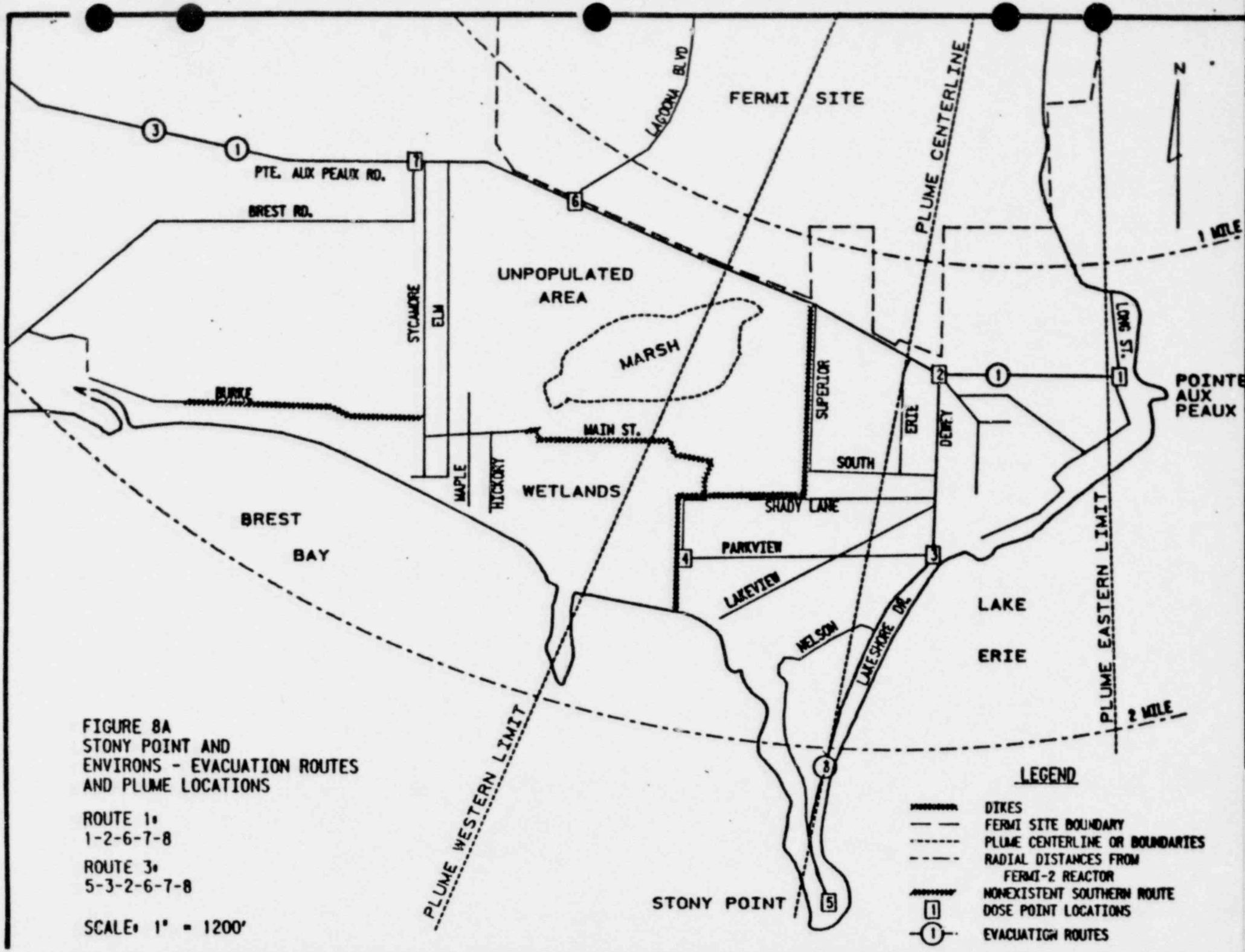


FIGURE 8A
STONY POINT AND
ENVIRONS - EVACUATION ROUTES
AND PLUME LOCATIONS

ROUTE 1:
1-2-6-7-8

ROUTE 3:
5-3-2-6-7-8

SCALE: 1" = 1200'

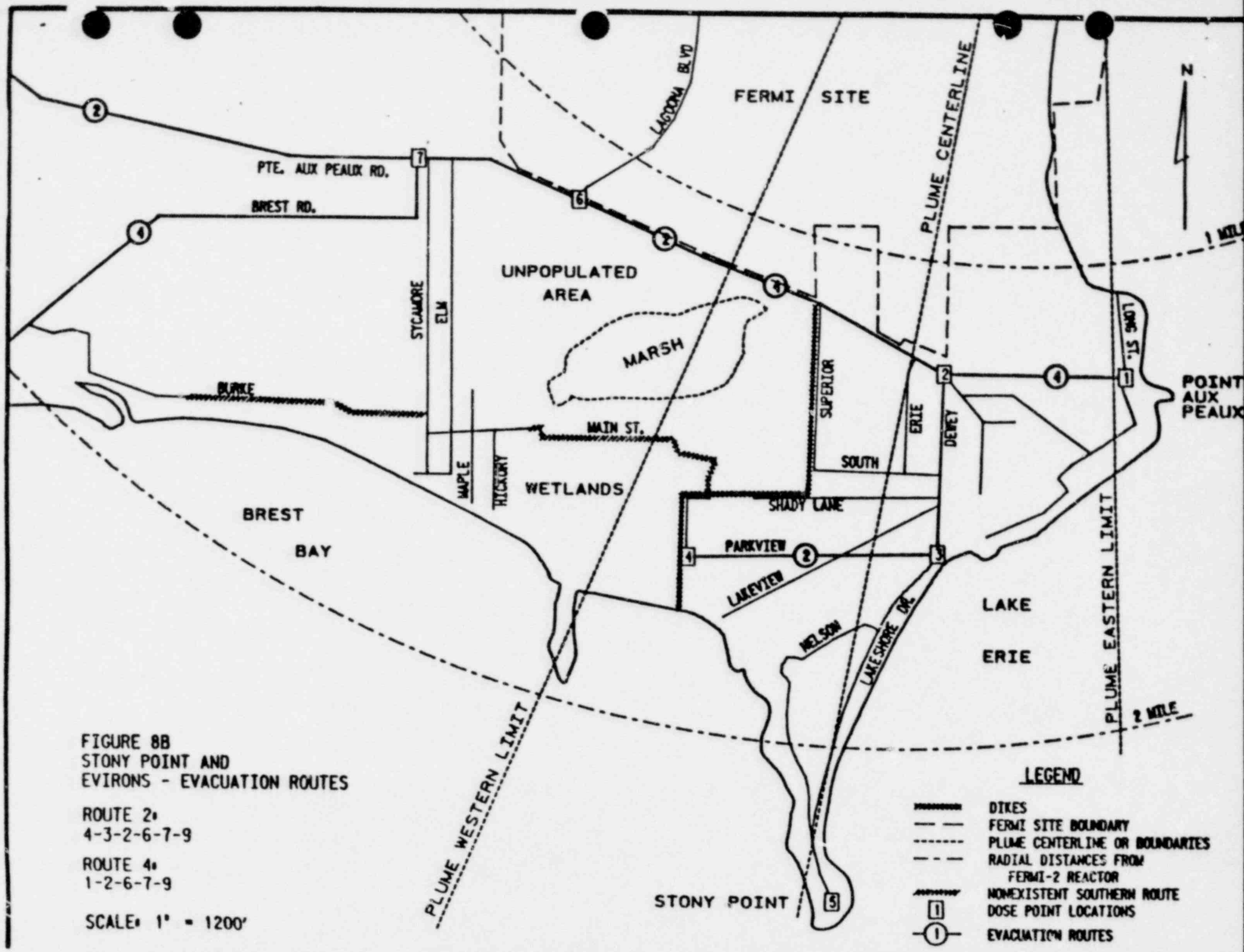


FIGURE 8B
STONY POINT AND
EVIRONS - EVACUATION ROUTES

ROUTE 2:
4-3-2-6-7-9

ROUTE 4:
1-2-6-7-9

SCALE: 1" = 1200'

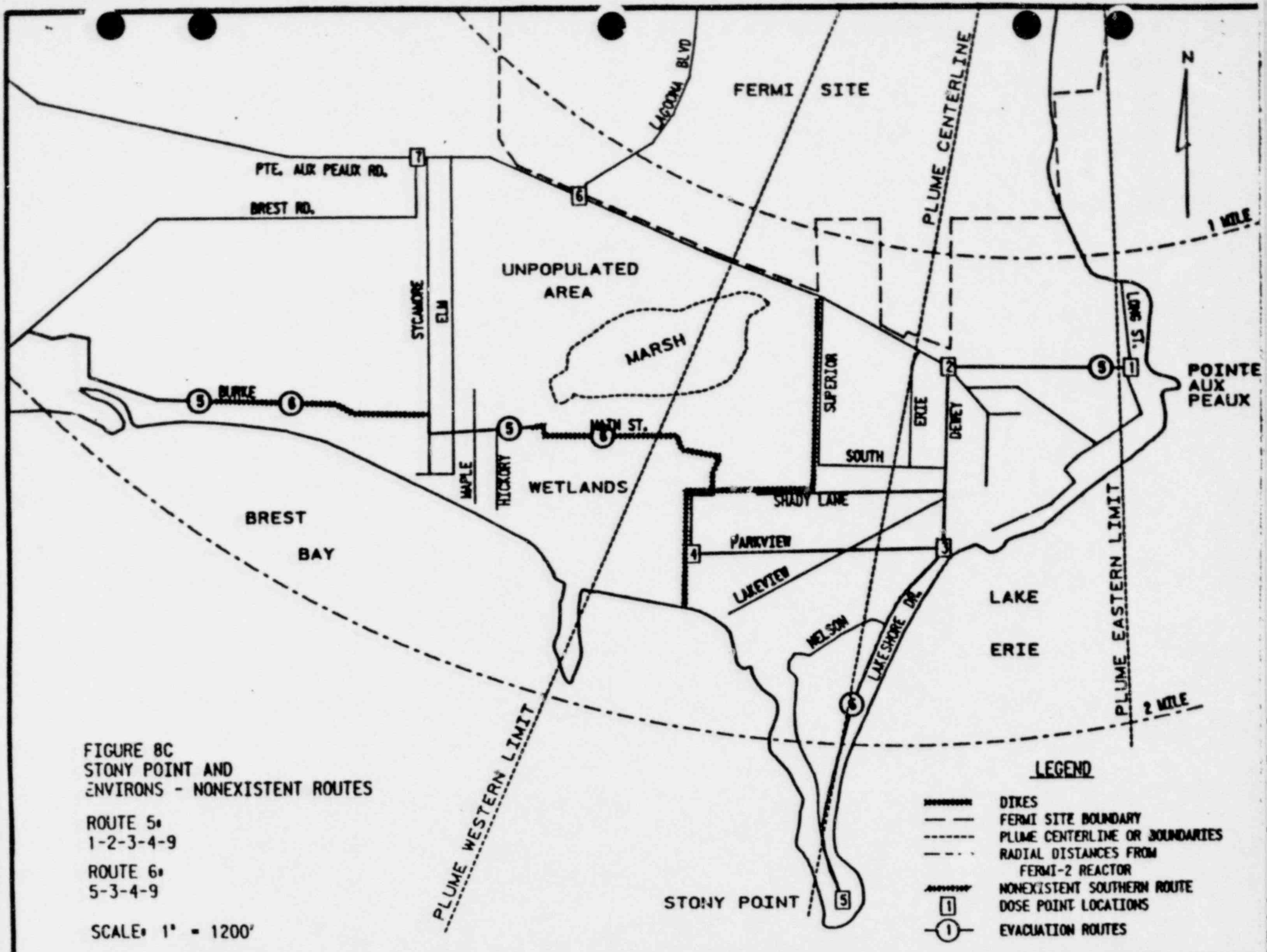


FIGURE 8C
STONY POINT AND
ENVIRONS - NONEXISTENT ROUTES

ROUTE 5:
1-2-3-4-9

ROUTE 6:
5-3-4-9

SCALE: 1" = 1200'

PROFESSIONAL QUALIFICATIONS

EVELYN F. MADSEN
ENVIRONMENTAL LICENSING ENGINEER
ENRICO FERMI 2 PROJECT
THE DETROIT EDISON COMPANY

My name is Evelyn F. Madsen and I am the Environmental Licensing Engineer for the Enrico Fermi 2 Project. My business address is 2000 Second Avenue, Detroit, Michigan 48226.

I received a Bachelor of Science degree in Chemistry from New Jersey College for Women, Rutgers University, New Brunswick, New Jersey in 1951.

I have been associated with the Fermi 2 Project since January 1973, when, as Environmental and Land Use Coordinator, I became responsible for all Federal, State, and local permits and licenses necessary to construct and operate Fermi 2. My areas of responsiblity involve those areas of the plant environs that are affected by plant operation. In August, 1978 I became Environmental Licensing Engineer for Fermi 2; however, my basic responsibilities remained the same.

Since 1973, I have been responsible for the contents and filing of the Environmental Report for the Operating License for Fermi 2. This also includes the responses to any NRC and other agency questions, comments and concerns. The Final Environmental Impact Statement for the Operating License for Fermi 2 was issued by the NRC in September, 1981.

In addition to the above, I am responsible for plant effluent water quality, acquatic and terrestrial studies, meteorological programs, offsite environmental radiological monitoring, and the radiological effluent technical specifications for normal plant operation.

I am also responsible for licensing the Radiological Emergency Response Plan pursuant to 10 CFR 50 Appendix E which includes the basic plan and its implementing procedures; the evacuation time estimates for the 10-mile EPZ that are required of the Applicant by the NRC; the prompt notification system; the meteorology and lake breeze modeling; and the offsite accident dose assessment methodology - both manual and computerized. The evacuation time and dose assessment evaluations for Stony Point were done under my direction.

From 1964 to 1972, while employed by Atomic Power Development Associates, Inc., I was associated with the Fermi 1 fast breeder reactor as a Senior Technical Writer/Editor responsible for writing and publishing documents related to the design, operation, and licensing of Fermi 1. During 1972, I was under contract to Edison to assist in the preparation of the Environmental Report for the Construction Permit for Fermi 2, including the responses to various comments required for issuance by the NRC of the Final Environmental Impact Statement in July, 1972.

From 1959 to 1963 I was employed by American Machine and Foundry Co. (AMF) as a Senior Research Chemist in their Stamford, Connecticut, research laboratories. While employed by AMF, I was responsible for consumer acceptance testing of the various AMF products prior to their marketing.

From 1951 to 1958 I was employed by American Cyanamid Co. initially as a research chemist at the Stamford, Connecticut research laboratories and as an Assistant to the Technical Director of the Refinery Chemicals Division in the New York sales and marketing office.

I presently belong to the American Nuclear Society and, since 1978, have been the Edison representative on the Atomic Industrial Forum's Committee for the Environment and Committee on Radiological Effluent Technical Specifications. In 1980 I was appointed representative for Edison on the KMC, Inc. Coordinating Group for Emergency Planning - a group of about 26 utilities that exchange information on Emergency Planning requirements and implementation.

PROFESSIONAL QUALIFICATIONS
HERBERT EUGENE HUNGERFORD
PROFESSOR OF NUCLEAR ENGINEERING
SCHOOL OF NUCLEAR ENGINEERING, PURDUE UNIVERSITY

My name is Herbert Eugene Hungeford, and I am a Professor of Nuclear Engineering at Purdue University, West Lafayette, Indiana 47907.

I received a Bachelor of Science degree in Physics from Trinity College, Hartford, Connecticut, in 1941; a Master of Science degree in Physics from the University of Alabama, in 1950; and a Doctorate in Nuclear Engineering from Purdue University in 1964.

From 1950 to 1954, I served as an experimental physicist at Oak Ridge National Laboratory associated with the Buck Shielding Facility and swimming pool reactor. I was in charge of all radiation flux density and dose rate measurements. From 1955 to 1962, I was associated with Atomic Power Development Associates, Inc. as Head, Shielding and Health Physics. With a staff of six, I was responsible for the design of all shielding, the design of the health physics laboratories and facilities, and development of all health physics procedures for the Fermi 1 fast breeder reactor.

From 1963 to present, I have been associated with the School of Nuclear Engineering at Purdue University and have specialized in teaching radiation shielding to undergraduate and graduate students. Over the years I have been major professor for 11 doctoral candidates and 20 masters candidates.

Since 1965, I have also served as a private consultant to various companies in the general field of radiation shielding. During the summer of 1981, as a consultant to Detroit Edison, I investigated the consequences of a radiological release on the residents of Stony Point which included an assessment of the dose received while evacuating.

I have authored or co-authored over 100 technical reports, journal articles, and book chapters. I am a member of the American Nuclear Society, the Health Physics Society, American Physical Society, Sigmi Xi and others. I am included in Who's Who in the World, Who's Who in America, and Who's Who in the Atom.

PROFESSIONAL QUALIFICATIONS

ANDREW C. KANEN
VICE PRESIDENT
PRC VOORHEES

My name is Andrew C. Kanen, and I am a Vice President in the firm of PRC Voorhees. My business address is 1500 Planning Research Drive, McLean, Virginia 22102.

I have been retained by Detroit Edison to conduct an evacuation time evaluation for the residents of the Stony Point area in connection with Edison's development of comprehensive emergency planning.

I received a Bachelor of Science degree from the University of Toronto, Ontario, Canada and a Masters of Science degree from the Georgia Institute of Technology.

Prior to my position with PRC Voorhees, I was a regional manager for InterBase Incorporated Group from 1976 to 1977. From 1972 to 1976 I was Vice President for Traffic Planning Associates, Inc. From 1969 to 1972 I held the position of Senior Transportation Planner for Peat, Marwick, Mitchell & Co. (U. S.). From 1967 to 1969 I was Senior Transportation Planner for Peat, Marwick, Kates & Co. (U.K.) and from 1965 to 1967 I was a Transportation Planner for Traffic Research Corporation (Canada). From 1959 to 1963 I was employed as Assistant County Engineer for Welland County, Ontario, Canada.

My experience in the areas of transportation and emergency planning include:

<u>Emergency Management Planning</u>. Responsible for the emergency planning activities of the firm. Directed the nuclear power plant

evacuation studies and mass notification studies at the Susquehanna Steam Electric Station and Beaver Valley Power Station in Pennsylvania; at the North Perry Power Plant in Ohio; North Anna and Surry Plants in Virginia; and the Enrico Fermi 2 Station in Michigan. Also assumed responsibility for the independent evacuation time assessments conducted for the Federal Emergency management Agency at the Seabrook Plant in New Hampshire and Zion Nuclear Power Plant in Illinois.

In addition to evacuation planning studies, directed the Overall preparedness plan development at the North Perry Power Plant, Diablo Canyon, and provided planning assistance in connection with the Enrico Fermi 2 offsite plan.

Transportation and Urban Planning. Directed the transportation plan development for the new town of Milton Keynes (U.K.) in which a town plan was developed to accommodate a population of 250,000 within a three-decade development period. The recommended transportation plan allowed for major variations in development densities, highrise development, and employment concentration to assure that future development aspirations within the community would not be unrealistically constrained by the transportation infrastructure.

Also directed the transportaion plan development of a new town in Round Rock, Texas. As technical director of the Liverpool Conurbation Study, developed and applied transportation/land use simulation techniques in assessing alternative urban development options for an urban region adjacent to Toronto, and included transportation, municipal services, regional government, and land use planning.

Partic'pated in the evaluation of the 1900 Km Trunk B road system to determine a priority road construction program as part of an update of Nigeria's Five Year National Plan.

Played a major role in a study to identify the relative importance of various economic, social, and environmental parameters in the development of a multimodal transportation corridor from the Southeast Atlantic Coast to Kansas City.

Directed a study for Middle Georgia Planning and Development Commission directed towards the development of a regional accessibility plan. The recommended plan and funding program were adopted by the State and incorporated in the statewide implementation program.

Transit Planning. Conducted several transit station area impact studies in Atlanta, Georgia, for both government agencies and prive developers.

Prepared Transit Development Plans for several cities in Georgia. These studies included potential market analyses, management organization, system ownership alternatives, and systems operation and planning.

Traffic Operations and Site Planning. Conducted site access and traffic impact studies for the R. J. Reynolds Industries, Inc. planned world headquarters offices in Winston-Salem. Also developed Site Transportation Plans for numerous major commercial centers and multiuse developments, including Coca Cola and Southern Bell Telephone Company.

My professional affiliations include: the Association of Professional Engineers of Ontario; Society of Sigma Xi; and the Institute of Transportation Engineers. I am a registered Professional Engineer in the State of New Hampshire.

PROFESSIONAL QUALIFICIATIONS

ROGER A. NELSON
SENIOR TECHNICAL MANAGER
CERTIFIED CONSULTING METEOROLOGIST
CAMP DRESSER & MCKEE INC.

My name is Roger A. Nelson and I am Senior Technical Manager and Certified Consulting Meteorologist for Camp Dresser & McKee, Inc. (CDM). My business address is 11455 West 48th Avenue, Wheat Ridge, Colorado 80033.

From 1973 to the present, I have been associated with the meteorological program at the Fermi 2 site. This association included system design, installation of the 60-meter tower, data acquisition and analysis, operation and maintenance, and quality assurance. In addition, I have provided various studies for the site such as the meteorological section for the Final Safety Analysis Report and Environmental Report, comparison studies of the data from the 150-meter and 60-meter towers, a 10-year correlation study of the 60-meter tower data, control room ventilation studies, data analysis for compliance with 10 CFR 50, Appendix I, puff advection modeling for the radiological effluent technical specifications, and most recently, a study to determine the thermal internal boundry layer at the site for lake breeze modeling.

I was awarded a Bachelor of Science degree in Physics from New Mexico Institute of Mining and Technology, Socorro, New Mexico in 1971 followed by a Master of Science degree in Physics from New Mexico Institute of Mining and Technology in 1973. I have completed coursework towrd a Ph.D. in Atmospheric Physics and am currently enrolled in a Doctoral program at

Colorado School of Mines - Applied Nuclear Physics. I am certified by the American Meteorological Society as Consulting Meteorologist No. 471.

From January, 1980 to present I have been the Operations Manager - Environmental Sciences Division for CDM. In this position, my responsibilities include the overal performance for the Air Quality, Biology, Geotechnical, and Permitting Departments. I am also the Project Manager for selected high technology air quality, meteorological, and radiolgoical programs.

From December 1977 to January 1980, I was Manager of CDM's Atmospheric Sciences Department, responsible for the overall performance on all atmospheric related studies. As such, I managed a 12-staff group solely devoted to meteorological and air quality monitoring, as well as air quality modeling. My responsibilities also included all data processing and numerical analysis performed in the Denver office of the Environmental Sciences Division. In addition, I was the Project manager for major studies in the atmospheric sciences.

From August, 1976 to December, 1977, I was CDM's Senior Atmospheric Scientist responsible for air quality and meteorological systems design and operation, atmospheric diffusion modeling, data analysis and interpretation, and overall air quality and meteorological program operation. I was also the Project manager for meteorological and air quality monitoring studies with the responsibility for overall performance on radiological and health physics related programs.

From April, 1975 to August, 1976, I was employed by EG&G Environmental Consultants, Denver, Colorado, with the responsiblity for scientific aspects of air quality and meteorological project operations, atmospheric diffusion modeling, data analysis and interpretation, and regulatory agency interface for clients.

From February, 1974 to April, 1975, I worked for EG&G, Inc., Albuquerque, New Mexico, as a scientist with the responsibility for air quality and meteorological systems design and operation, data analysis, field program data acquisition, and computer programming.

My professional affiliations include the Air Pollution Control Association and the American Meteorological Society.

I have authored or co-authored over 29 papers and reports in the areas of meteorology, physics, and air quality.

MR. VOIGT: Mr. Chairman, at this time I would like the Board's permission to address a brief series of additional direct questions to Ms. Madsen. The purpose of these questions is to address a few points that were brought up by persons making limited appearances, which we believe may be relevant to Contention 8.

CHAIRMAN MILHOLLIN: Very well. Mr. Voigt, are you planning to refer to the limited appearances which you have in mind during your questions?

MR. VOIGT: Oh, yes, sir.

CHAIRMAN MILHOLLIN: Very well.

BY MR. VOIGT:

Q Ms. Madsen, yesterday morning Mr. Eckhardt made a limited appearance and at Transcript Page 221 he made the following statement, beginning at line 19--

CHAIRMAN MILHOLLIN: --Just a minute, could you let us find that?

MR. VOIGT: Sure.

CHAIRMAN MILHOLLIN: Give us the citation, please?

MR. VOIGT: It's Transcript Page 221, beginning at line 19.

BY MR. VOIGT:

Q "In the testimony of Evelyn Madsen, Docket 50-341, page nine, Notification System, lines six, seven and eight, at no time has the County of Monroe accepted the said siren system be in-

stalled within the 10-mile EPZ by Detroit Edison Enrico Fermi Atomic Power Plant, Unit 2, and at no time has the County of Monroe said they would use the system as a general warning system for all emergencies including natural disaster." Could you respond to that statement by Mr. Eckhardt?

A (WITNESS MADSEN) Detroit Edison is presently designing and engineering a prompt notification system which is primarily based upon the siren for the 10-Mile EPZ within Monroe and Wayne County, as required by regulation. We have had preliminary discussions with local groups and it has always been our intention to continue with these discussions until the system is in satisfactory -- accepted by everyone.

Q What about Mr. Eckhardt's statement that the county has not said that it would use the system as a general warning system? Do you have any response to that?

A (WITNESS MADSEN) That is true. We are proposing the usage -- and warning systems -- they will be available in the community, and we do have national disaster in this area. They have not been accepted as such by the county.

T2-1
RJ-sw

Q Now, in the limited appearance statement presented by Mrs. Bacarella at transcript page 227, she indicated a concern over the loss of power during an emergency and I would ask you, assuming that there were a power failure in the Stony Point area which prevented people from being able to get normal radio or TV reception, how would they be able to gain access to the emergency broadcasting system?

A (WITNESS MADSEN) Well, basically two ways that you can think of. One would be a portable radio and I think most homes do have portable radios available and the other would be if you have an automobile in the family with a radio in it, you can certainly use that because it would be battery operated from the car.

Q Now, in the limited appearance statement presented by Mrs. Eileen Clark, she -- and this is transcript 231, she made reference to the fact that she was hearing impaired and expressed concern over the ability of the notification system to reach handicapped people.

To your knowledge, are there any handicapped residents within the Stony Point area?

A (WITNESS MADSEN) Not to my personal knowledge.

Q What provisions, to your knowledge, exist for dealing with the problems of the handicapped in this area?

A (WITNESS MADSEN) I would like at this time to make reference to the planning done by the local communities and in the Monroe County plan under the warning and next on page D-1-3, there

is a statement concerning how the handicapped will be handled. It carries on through the health and medical annex on page J-1-7. Again, it is mentioned in the fire annex on page I-1-3. So that there are provisions in the Monroe County plan for handling the handicapped.

Q Would you tell the Board briefly what those provisions are?

CHAIRMAN MILHOLLIN: Before you do that, could you identify the plan in a more complete way?

A (WITNESS MADSEN) Yes, I can.

I have a copy here of Appendix 1, Nuclear Facility Procedures to the Monroe County emergency operating plan. This was submitted to FEMA in November of 1981.

CHAIRMAN MILHOLLIN: Has it been approved?

A (WITNESS MADSEN) No, it has not been approved as yet. It is under review.

Under the warning annex, there is an item that states, "Coordinate the warning of persons with special situations such as the elderly, handicappers, et cetera, with the police departments in the effected areas and the County Health and Social Services Department."

CHAIRMAN MILHOLLIN: Could you give us a citation to that statement?

Q (WITNESS MADSEN) All right. The citation to that is Appendix 1, Nuclear Facility Procedures to the Warning Annex.

Item 4.5, page B-1-3. I am reading from an attachment A to Appendix 1, Nuclear Facility Procedures to the Health and Medical Annex, Item 7, under general emergency, page J-1-7, "Ensure that protective actions have been taken to protect persons needing special care. This should be coordinated with Social Services."

I am reading Appendix 1, Nuclear Facility Procedures to the Fire Annex, Section 4.5, page I-1-3, "Fire personnel will assist immobilized or institutionalized persons leaving their homes or facilities if evacuation is ordered. They will coordinate with the school, Social Services and Health Operations Offices in performing this task.

The health operations officer has the primary responsibility for evacuation of medically imparied persons. The school operations officer has primary responsibility for evacuation of the general public without private means of transportation. Fire personnel will provide support."

MR. VOIGT: That concludes the additional direct examination Mr. Chairman.

The witnesses are now available for cross examination.

CROSS EXAMINATION

BY MR. HOWELL:

Q Unintentionally, but I may be blocking the photograph for some purposes and I will attempt to step aside when I do that.

What is the size of the community known as Stony Point, Mr. Madsen?

A (WITNESS MADSEN) Would you clarify that question?

Q What is Stony Point?

In your report you referred to the community of Stony Point.

CHAIRMAN MILHOLLIN: Your question is: What is the size of Stony Point?

MR. HOWELL: Yes.

BY MR. HOWELL: (Resuming)

Q What is the size of that community, not land mass area. but population-wise?

A (WITNESS MADSEN) Approximately 1,400 people.

Q Okay. And how is that figure determined?

A (WITNESS MADSEN) I would like to refer that question to Mr. Kanen.

A (WITNESS KANEN) The size of the population for the Stony Point area, the population size of the Stony Point area was derived from 1980 census data, primarily.

Q Was there any verification of this census data?

A (WITNESS KANEN) Yes, there was.

Q What was the verification?

(WITNESS KANEN) We compared the enumeration district census data with metering towns that were available from Detroit Edison records and, in addition, we did housing counts in the Stony Point area.

Q Was there any efforts to break the information down into

age groups?

A (WITNESS KANEN) No, there was not.

Q Do you have any idea what the average age of the residents of that community would be?

A (WITNESS KANEN) No.

Q Do you have any idea what the percentage of handicapped or impaired people there are that reside in that community?

A (WITNESS KANEN) No, we do not.

Q Has there been any efforts to determine that?

A (WITNESS KANEN) An effort was made to determine the number of transport dependent population in Stony Point.

Q What was the results of that effort?

A (WITNESS KANEN) We estimated on the basis of 1980 census data that the transport dependent population group at Stony Point would be in the order of 50 to 70 people.

Q Would that be strictly those people with permanent disabilities?

A (WITNESS KANEN) No, this was transport dependent in the context of not having an automobile available.

Q Okay. How about someone that not only doesn't have an automobile, but can't use an automobile if they had it?

A (WITNESS KANEN) That was not separately identified.

Q Other than permanently impaired people, which you did not investigate, what's the possibility in the population of that size of having people that are temporarily under some form of

temporary disability as a result of surgery, hospitalization, disease?

A (WITNESS KANEN) I do not know what percentage.

Q Has there been any efforts to determine that or provide for those people?

A (WITNESS KANEN) Could you rephrase the question?

Q Sure.

A (WITNESS KANEN) Was it two questions or one?

Q It's one question.

Has there been any effort to determine how to provide for those people?

A (WITNESS KANEN) Referring to Mrs. Madsen's testimony, there are provisions in the County plan for dealing with handicapped people.

Q But there has been no effort taken by Detroit Edison, to the best of your knowledge?

A (WITNESS KANEN) To the best of my knowledge.

Q Thank you.

Ms. Madsen, how do you propose that the residents of the area be alerted?

A (WITNESS MADSEN) The residents of the area will be alerted through prompt notification system which at this time is being designed as a siren system.

Q Okay. How will that system be activated?

A (WITNESS MADSEN) The system will be activated by

County officials.

Q What about hearing impaired?

A (WITNESS MADSEN) In the brochures that are published each year annually by Detroit Edison describing evacuation and what one should do during evacuation, there will be a phone number that these people can call or an address to which they can draw up a postcard indicating that they want to be on the list in the Social Services Department as handicapped.

Q But how are they going to receive notification?

They're on a list, that's nice. The Social Department has their name, but how are they going to receive notice?

A (WITNESS MADSEN) I do not have direct knowledge of the procedures that the Social Services Department has.

Q In other --

A (WITNESS MADSEN) The County has plans available and I assume they have procedures available.

Q And in other --

A (WITNESS MADSEN) I do not have any direct knowledge of those procedures.

Q Okay. I'm anticipating your stopping and I apologize for that.

A (WITNESS MADSEN) That's all right.

Q In other words, Detroit Edison has no plans to notify anyone other than people with normal hearing that can hear the sirens?

MR. VOIGT: I object to the form of the question. There is no basis for the assumption that Detroit Edison is going to notify anyone and it is contrary to the testimony of record which indicates that Detroit Edison is going to notify the County and it's up to the County to notify the people.

BY MR. HOWELL: (Resuming)

Q I believe the siren system is being built and maintained by Detroit Edison, isn't it?

A (WITNESS MADSEN) The siren system is being designed and installed by Detroit Edison.

I think at this point in time, perhaps, we should understand how the offsite emergency plan actually operates.

If an emergency were to be declared at the Fermi plant, Detroit Edison has the responsibility to furnish certain types of data to the State and to make recommendations for certain protective actions at certain levels of the emergency.

These actions are then acted upon by the radiological health department within the State of Michigan and the Governor of the State of Michigan is the only individual under such circumstances who can order an evacuation. That is not the responsibility of Detroit Edison.

CHAIRMAN MILHOLLIN: The question to you is whether the Detroit Edison Company has any procedures or plans for notifying persons specifically who do not hear; isn't that your question?

MR. HOWELL: That is my question.

CHAIRMAN MILHOLLIN: And there has been an objection to the question which is overruled, so you may answer the question.

A (WITNESS MADSEN) No.

BY MR. HOWELL: (Resuming)

Q Doesn't that seem somewhat unequitable to you that you are in this day and age you are providing for a rather large segment of the population and you're ignoring the very vulnerable section of the population?

MR. VOIGT: Objection again. There is nothing, no foundation in this record to indicate the premise of this question, which is that Detroit Edison is providing for a large segment of the population.

There is a complete misunderstanding, I believe, on the part of counsel as to whose duty it is to provide notification.

CHAIRMAN MILHOLLIN: I don't think counsel does misunderstand that. I think counsel wants to know whether the witness thinks it is inequitable for Edison not to have a system to notify people who don't hear.

I'm not sure that the witness is an expert on the question of what's equitable. So I'm not sure that the value of the response we're going to hear is going to be very great but, nevertheless, I will let the question be asked and answered.

MR. VOIGT: Let me say, Mr. Chairman, that the questions as you restate them are not objectionable because you leave out the false premise.

CHAIRMAN MILHOLLIN: I don't think that is accurate.

So the witness may answer the question.

A (WITNESS MADSEN) I feel I'm not qualified to answer that question.

BY MR. HOWELL: (Resuming)

Q I'm asking you as a person.

A (WITNESS MADSEN) I believe that if the public is educated as they are to be educated for the plan that there will be provisions for those people who are handicapped to be taken care of in case of an emergency.

Q Whose responsibility do you feel, or whose responsibility according to the plan, is it to educate the public?

A (WITNESS MADSEN) Detroit Edison has a certain amount of responsibility as far as educating the public is concerned and the County Government has a certain amount of responsibility in educating the public.

Q Has Detroit Edison established any plans at this point in order to educate the public?

A (WITNESS MADSEN) We have provided the public with a brochure which is a guide to emergency preparedness.

Q In your testimony, you state that area workers may be at work when evacuation has to occur.

That's a good possibility, isn't it?

A (WITNESS MADSEN) Well, I'll refer that question to Mr. Kanen.

A (WITNESS KANEN) Yes, it is.

Q How would those workers that are outside of the ten mile area become aware that their families had been evacuated?

A (WITNESS KANEN) Maybe the system in the general communication system would generally provide first for those workers that are within the ten mile area. The general dissemination of information of the events in the area would rapidly spread that information beyond the ten mile zone.

End T2

T3
DC/pd

Q Have there been any demographics done that would determine where the bulk of the employers, or the employees that are employed in the area?

A (WITNESS KANEN) No specific demographics have been done in the context of surveying each household in the area.

Q Has there been any general demographics?

A (WITNESS KANEN) Yes, we've looked at the general demographics with the County in terms of the number of people working outside of the area.

Q What percentage would that be?

A (WITNESS KANEN) I do not recall the precise numbers.

Q Ball park?

A (WITNESS KANEN) I believe that on the County as a whole, recognizing that this number has some difference for smaller areas within the County, I believe that that number was in the order of 30 percent.

Q The primary concern of the contention was evacuation.

What would happen if there was an accident that tied up this entire road at this point? How would the residents be able to leave? I'm not sure, but I believe I am pointing to Pointe Aux Peaux just before Lagoona Road -- is that the right name?

What would happen if that intersection, prior to that intersection, that road was completely blocked by an accident? How would people leave the area?

CHAIRMAN MILHOLLIN: For purposes of the record, the record should show the question is, what would happen if Pointe Aux Peaux Road were blocked at a point which is between the intersection of Lagoona Road -- is that right?

A (WITNESS MADSEN) Lagoona Boulevard.

CHAIRMAN MILHOLLIN: And the community of Stony Point; is that your question?

MR. HOWELL: That is correct.

A (WITNESS MADSEN) There are provisions, again in the Monroe County Plan, where accidents or roads blocked to take precedence over anything else during an evacuation.

BY MR. HOWELL: (Resuming)

Q What is the response time for the local police department?

A (WITNESS MADSEN) I do not know.

Q How many personnel can a local police department put on duty at any emergency notice?

A (WITNESS MADSEN) I can't respond to that question.

Q How many local police personnel would be needed to handle the situation?

MR. VOIGT: What situation, your Honor?

MR. HOWELL: This hypothetical accident where we would be evacuating Stony Point.

A (WITNESS KANEN) Could you repeat the question for me?

BY MR. HOWELL: (Resuming)

Q In the event that Stony Point had to be evacuated, how many police personnel would have to be used?

A (WITNESS KANEN) The police personnel that would be essential in order to control traffic would be very minimal on the basis of the estimates we have provided on traffic flow. We suggested that one intersection at Dewey Road and Pointe Aux Peaux Road be controlled by a police officer.

Q Now, I'm injecting into that, we have an accident blocking this road.

CHAIRMAN MILHOLLIN: By this road, you must refer to which road you're talking about.

BY MR. HOWELL: (Resuming)

Q Prior to Lagoona Boulevard.

A (WITNESS KANEN) The plan provides for the -- I'm referring to the County Emergency Plan, to, I believe the County Plan refers as a provision for wrecker vehicles to be called upon to deal with accident situations to clear those areas as expeditiously as possible.

Q Does Detroit Edison have any equipment or will it maintain any equipment in the area to handle that kind of emergency?

A (WITNESS KANEN) I cannot respond to that question.

Q Does Detroit Edison have a plan to cover any kind of emergency that is not handelable by the County?

Anyone?

A (WITNESS MADSEN) Detroit Edison has certain types of vehicles on the site. Exactly what type, other than four-wheel drives, at the time the plan is in operation, I cannot respond to.

Q Does Detroit Edison have a plan to provide equipment for clearing roads in case of accidents?

A (WITNESS MADSEN) Not at the present time.

Q What is the maximum number of police personnel that may be required in this case?

A (WITNESS KANEN) I have not -- we have not made an estimate of the maximum number of police personnel.

Q Has any -- I'm sorry, go ahead.

Has anyone made that estimate to the best of your knowledge?

A (WITNESS KANEN) They have in connection with the EPZ Plan as a total, but not to my knowledge in this particular sub-area.

Q In the EPZ Plan as a total, is the local community able to supply sufficient police officers or police presence to control any situation that could occur?

A (WITNESS KANEN) I cannot respond to that question.

Q In the hypothetical situation that the local police presence was completely involved and we had to bring in police presence from other areas, is there a response time built into the plan for that eventuality?

A (WITNESS MADSEN) Would you clarify that? I assume you

are discussing the County Plan?

Q Let's discuss them together. The County, I assume, you are quite familiar with. You quoted from it when you answered on Direct, and Detroit Edison's Plan.

Does either plan provide for a response time for police presence from other communities?

A (WITNESS MADSEN) I am not familiar enough with the County Plan or the State Plan to reply to that question.

Q Are there any manufacturing facilities within the ten-mile area covered by the plan?

MR. VOIGT: Objection. The contention here is limited to the evacuation of Stony Point. I do not see any connection between that question just posed and the evacuation of Stony Point.

MR. HOWELL: Stony Point is within ten miles.

MR. VOIGT: Sir, there are a number -- your Honor, there are a number of things that are within ten miles, but the fact remains that the contention is limited to a very small geographic area.

CHAIRMAN MILHOLLIN: I assume the question, whether there are manufacturing establishments within the ten mile parameter is connected to the possibility of evacuating Stony Point. If it appears it is not, then the objection will be sustained. For the moment, we will indulge in the presumption that it is and allow the question until it becomes obvious it is not.

MR. HOWELL: Thank you, your Honor.

CHAIRMAN MILHOLLIN: So the question is, are there manufacturing establishments within the ten-mile zone?

MR. HOWELL: That is correct.

A (WITNESS MADSEN) Yes, there is.

BY MR. HOWELL: (Resuming)

Q What type of facilities are there?

A (WITNESS MADSEN) There are -- I don't have that information available at this time.

Q Are there any within the Stony Point community direct?

A (WITNESS MADSEN) No.

Q Do any of the people that live in Stony Point work in any of these manufacturing facilities?

A (WITNESS MADSEN) I cannot answer that.

Q Are any of the manufacturing facilities heavy equipment, stamped, where they use pressers or roll form or any kind of industrial equipment of that nature?

A (WITNESS MADSEN) Possibly.

Q Would an alarm system that is strictly what you hear be sufficient in that area?

MR. VOIGT: I'll object again, Mr. Chairman. She's testified there are no manufacturing facilities in Stony Point. What is the purpose of questioning about these facilities located elsewhere?

MR. HOWELL: Her earlier testimony was that 30 percent

of the workers -- I'm sorry, 70 percent of the workers worked within the ten-mile area of Stony Point. I am concerned with the workers and families that are being evacuated which are at different places at the same time.

CHAIRMAN MILHOLLIN: Permit the question. Hasn't the witness testified that the witness doesn't know whether there are manufacturing establishments within the ten-mile zone?

A (WITNESS MADSEN) I said I did not have that information available.

CHAIRMAN MILHOLLIN: And your question is, what kind of manufacturing establishments are there that she doesn't know about?

MR. HOWELL: The subsequent question which she answered to the affirmative was, were there any facilities that used presses, roll forms, and she said, yes, she believed there was.

A (WITNESS MADSEN) I said possibly.

BY MR. HOWELL: (Resuming)

Q Based on your possibly answer, would a sound system alarm be a good alarm for those workers?

A (WITNESS MADSEN) I cannot speak for what type of warning system the manufacturing plants have internally for their employees.

Q Has any study been conducted by anyone about the percentage of the rate of accidents on the road to the Stony Point area?

A (WITNESS MADSEN) Not that I know of.

Q Are they safe roads, very low accident rates?

A (WITNESS MADSEN) I cannot respond to that.

Q Can anyone respond to it?

We have no indication what the incidents of traffic accidents are on those roads?

A (WITNESS MADSEN) I don't have any idea.

Q What kind of traffic is on those roads?

A (WITNESS KANEN) They tend to be low volume roads. They're categorized as low volume roads in that they are not arterial facilities. We have not taken specific measurements on those roads. Traffic data was available from the Department of Transportation, but I don't recall what the numbers are.

Q Are the roads used for commercial traffic at all?

A (WITNESS KANEN) Pardon me?

Q Are the roads used for commercial vehicles?

A (WITNESS KANEN) They may be.

Q Has anyone taken a survey of the area to see how the homes are heated? We assume they don't all use electric heat.

CHAIRMAN MILHOLLIN: By the area, what area are you referring to?

MR. HOWELL: Stony Point area.

A (WITNESS MADSEN) No, we have not.

BY MR. HOWELL: (Resuming)

Q Would it be illogical to believe that oil might be a

source of heat for some of those homes?

A (WITNESS MADSEN) Not illogical.

Q Would it be logical to believe that?

A (WITNESS MADSEN) It's a possibility.

Q In the highly improbable event that we had an oil truck that slipped over on Pointe Aux Peaux Road just before Lagoona Boulevard and it burst into flames, how long would it take the fire department to get there?

A (WITNESS MADSEN) There is a fire house right down on Pointe Aux Peaux Road, perhaps a quarter of a mile or so from Lake Erie, quarter or half a mile.

Q Does it have a phone truck?

A (WITNESS MADSEN) I can't answer that.

Q Do you know what kind of facility that local fire station has for handling fires?

A (WITNESS MADSEN) I cannot respond to that.

Q The portable radios are available. Every house has a portable radio.

Do you have any statistics to verify that statement?

A (WITNESS MADSEN) I don't believe I made that statement.

Q You said that portable radios would be available in the houses in case of a power failure.

A (WITNESS MADSEN) May I have my statement read back to me?

MR. HOWELL: I can avoid that. It's being transcribed

at this point in time.

CHAIRMAN MILHOLLIN: Ask a direct question which solicits the response which you think is relevant to this subject.

BY MR. HOWELL: (Resuming)

Q How would a handicapped person have access to an automobile radio?

A (WITNESS MADSEN) Handicapped people can drive cars.

Q Do all handicapped people drive cars?

A (WITNESS MADSEN) Not all handicapped people drive cars.

Q Are all people that are handicapped handicapped on a permanent basis?

A (WITNESS MADSEN) I cannot answer that question.

Q When you come out from the hospital with surgery or are contained to bed, are you handicapped?

A (WITNESS MADSEN) Yes.

Q And in this state, in fact, can't you get a temporary handicapped parking permit? If you don't know, you can say that.

A (WITNESS MADSEN) Yes, you can.

Q So you can be temporarily handicapped?

A (WITNESS MADSEN) Yes.

Q And that person isn't going to have access to an automobile, is he?

CHAIRMAN MILHOLLIN: What is the point of this line of

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questioning?

MR. HOWELL: The notifications so they can utilize the evacuation route if the route is, in fact, available to be used.

CHAIRMAN MILHOLLIN: Again, what are you after here? I don't follow your line of questioning.

MR. HOWELL: On Direct, I believe the comment was made that if there was a power failure, that there would always be the availability of portable radios or there were always, the automobile radios would work.

CHAIRMAN MILHOLLIN: So you're asking the witness to what extent a handicapped person would have acc`ss to a battery-operated radio?

MR. HOWELL: What I'm trying to establish is that there are situations where people would not have access to radios.

CHAIRMAN MILHOLLIN: Why don't you ask a direct question which goes to that point rather than trying to define what a handicapped person has or whether handicapped persons can get special arrangements for parking their cars. Just ask a question which is directed to the relationship between handicapped persons and radios.

End T3

Q Is it possible that a person could be without a radio in this area?

A (WITNESS MADSEN) Yes, it is possible.

Q How would they receive instructions at that point?

A (WITNESS MADSEN) I believe that in most neighborhoods neighbors are aware of either -- individuals who are handicapped nearby, or perhaps they should indicate ---they've had some sort of surgery or some kind of whatever -- and I would certainly believe that under those circumstances that people in the neighborhood would make an attempt to notify those individuals, if an emergency should arise.

Q Okay, so the notification will depend on the neighborhood communication lines?

A (WITNESS MADSEN) That's one possibility, yes.

Q What is the information brochure or brochures -- that are published on an annual basis by the emergency service division of the Michigan Department of State Police?

A (WITNESS MADSEN) I have here a copy of a brochure that was published this year.

Q Just explain to me what it is?

CHAIRMAN MILHOLLIN: You'll have to speak up.

WITNESS MADSEN: All right, this is a brochure that is published on an annual basis by the emergency services division of the Michigan Department of State Police, Monroe County Office of Civil Preparedness, Wayne County Emergency Preparedness Office,

and Detroit Edison.

And in it we describe what the emergency preparedness plan is, what is radiation, areas that are designed to assure your safety.

We talk about the emergency planning zone. We present a map with evacuation routes. We indicate how you will be notified in the event of an emergency and the steps to take if you are requested to shelter.

Where the reception centers are located. What you should do if evacuation becomes necessary. What happens when school is in session.

And it gives the name -- these are under reception centers. And it indicates the congregate care centers and special care for the elderly and disabled.

BY MR. HOWELL:

Q I take it, from your comments, it's a very intensive brochure.

A (WITNESS MADSEN) It is designed to educate those people with the 10-mile EPZ what to do in an emergency.

Q How is it distributed?

A (WITNESS MADSEN) It's distributed by direct mail.

Q By who?

A (WITNESS MADSEN) By Detroit Edison.

Q On a yearly basis?

A (WITNESS MADSEN) On an annual basis.

Q Has there been a distribution at this point in time?

A (WITNESS MADSEN) Yes, there has.

Q What is a congregate care center? If I understood you properly.

MR. VOIGT: Mr. Chairman, once again I must object. The Contention that is before the Board concerns the feasible escape route for the residents from Stony Point. Counsel is now wandering far afield from that Contention and asking questions about the general plan for a 10-mile area.

MR. HOWELL: I don't think I'm wandering far afield. I want a definition of a congregate care center and I think that the answer will establish that that's a center that's designed for a specific event of evacuation. And this is--

CHAIRMAN MILHOLLIN: Can you identify the portion of the testimony to which you are referring at this time?

MR. HOWELL: I may have connected that with her testimony, by her oral statement, of using that term at this point in time. And I believe that it may be in the NRC's testimony that I also saw that term.

And I may have inadvertantly put the two terms together, her oral statement and her written statement.

CHAIRMAN MILHOLLIN: I'll sustain the objection.

BY MR. HOWELL:

Q In the event of evacuation are there predetermined locations for the people to go to?

A (WITNESS MADSEN) Yes, there are.

Q That's all I want to ask you on that. What, if there is not evacuation -- there's a term, "shelter?"

A (WITNESS MADSEN) That is correct.

Q That's used when there is not going to be evacuation? Is that correct?

A (WITNESS MADSEN) Would you clarify that, please?

Q Okay, prior determination of evacuation, are there any actions that can be taken to forewarn people that there may eventually be an evacuation?

MR. VOIGT: That's an entirely different question, your honor. It's not a clarification at all.

MR. HOWELL: It's not a clarification. I'm trying to get at it in a different direction. I'll get back to it.

WITNESS MADSEN: Yes, one could recommend shelter in place.

BY MR. HOWELL:

Q Would shelter be a forewarning that evacuation may be forthcoming?

A (WITNES MADSEN) No. The two are not necessarily -- followed in sequence.

Q Okay, now, in the event of evacuation, I believe, that you used the term "plume?" That would be the area of contamination? That's probably not real good, but is that similar terminology?

CHAIRMAN MILHOLLIN: Similar to what?

MR. HOWELL: Well, plume and the area of contimination. Are they -- basically have the same meaning?

WITNESS MADSEN: No, that's not necessarily true.

BY MR. HOWELL:

Q Okay, the plume, then, would cover part of the Stony Point area, but not the whole area, is that correct?

A (WITNESS MADSEN) That's possible.

Q Okay, within that plume, what would there be -- high levels? Low levels? Or would the radiation be equally distributed?

A (WITNESS MADSEN) Mr. Hungerford?

WITNESS HUNGERFORD: The plume would have what we call a center line, which is the exact center of the plume.

I think you probably are aware of smoke coming out of a smokestack. In the center of that -- whatever is coming out would be called the center line. And the extent of the plume would be the edges. And the radiation would be concentrated at the center and fall off rapidly as you approach the edges.

BY MR. HOWELL:

Q Does that center cross any of the roads in the Stony Point area?

A (WITNESS HUNGERFORD) The study that was made shows the plume going over the most populated part of Stony Point and several roads are within the plume area.

Q How about Lagoona Boulevard and Pointe Aux Peaux, is that within the plume area?

A (WITNESS HUNGERFORD) In the plume that was taken for the modeling Lagoona Boulevard was not in the plume area and it -- if we'll refer to the testimony -- let's see, Table three, Table three of the testimony.

CHAIRMAN MILHOLLIN: Mr. Hungerford, this is all covered in the testimony, isn't it?

WITNESS HUNGERFORD: Right. I was just trying to illustrate his point by pointing out a number from the testimony.

JUDGE MORRIS: Is this the plume dimension shown in figure seven?

WITNESS HUNGERFORD: The plume outlined is shown in Figure seven.

CHAIRMAN MILHOLLIN: The location of the plume would depend on the direction of the wind, wouldn't it?

WITNESS HUNGERFORD: Exactly. The plume -- and for the model I took the plume which affected most of the people in Stony Point. There could be a plume that would -- over Brest Road, let's say, and then the people in Stony Point would not be affected very much.

The point I was trying to illustrate by pointing out, dose point number six, Point Aux Peaux Road and Lagoona Boulevard, the total dose is 1.3 millirems, which is about three orders or more of magnitude. By that I mean divided by the order

of a thousand from the doses that are in the Stony Point area. So--.

CHAIRMAN MILHOLLIN: This is all in the testimony, isn't it?

WITNESS HUNGERFORD: It's all in the testimony.

MR. HOWELL: Yes.

CHAIRMAN MILHOLLIN: Why are we asking the witness to simply reiterate what is already in the testimony?

MR. HOWELL: I wasn't quite intending that as the answer, but I don't have any problems with it. You don't have to go any further on that.

WITNESS HUNGERFORD: All right.

BY MR. HOWELL:

Q Was there any study done on the weather conditions in the area?

WITNESS MADSEN: I would like to refer that to Mr. Nelson.

WITNESS NELSON: The meteorological regime area -- is well document.

BY MR. HOWELL:

Q What percentage of the time does the wind come from the north to north, northeast?

A (WITNESS NELSON) As you put both of those 16 degree sectors together it's about five percent.

Q Is the wind from those sectors normally, in storms,

or in calm weather conditions, or what type of weather conditions prevail with that wind?

A (WITNESS NELSON) There is no single meteorological event that occurs with north, northeast winds. It's just full spectrum.

MR. HOWELL: I believe that's all the questions I have. Thank you very much.

MS. WOODHEAD: I have a few clarifying questions beginning with the evacuation time estimates and I would like to ask Mr. Kanen.

BY MS. WOODHEAD:

Q If you could explain or amplify, rather, the time estimates provided in Table one, as to the rather long time consumed by a rather significant part of the population here and actually leaving the residential area? Could you provide the reason that you estimated that perhaps more that 50 percent of the popluation will not be able to leave the area until an hour to an hour and a half in the path, from the time warning?

A (WITNESS KANEN) The basic premise of the time of evacuation presumes several factors that would take place.

One, that there would be some time lag between the actual siren activation and the alert system and the information as to what action the public should take in response to that alert.

We assume some time element of 10 or 15 minutes in that

basis. We also assume that the alert would take place on a week day and that a significant portion of the population might be at work and that the evacuation would be based upon the principle that the family would attempt to unite prior to leaving the area if the workers were within reasonable proximity of Stony Point.

So, a provision was made for workers to return home to collect the family.

End Tk 4

T5-1
RJ:sw

Then some time was allowed for actual preparation of the residents to gather some essential belongings and take their cars and then depart from the area, so that these presumptions provided for a rather conservative estimate of total time to evacuate from the Stony Point area. Actual travel time as stated in the testimony is a relatively, is a smaller component of the total time.

Q All right. Thank you.

Sir, I believe in your testimony you mentioned that you had done a computer study of evacuation time.

In other words, is it correct that you have more data than is printed in your testimony to rely on in your time estimates?

A (WITNESS KANEN) Yes.

Q In your computer compilations, did you estimate the time to evacuate the Stony Point residents without allowing time for workers to return home to collect families?

A (WITNESS KANEN) That condition is essentially reflected in the Sunday evacuation time estimate where it is presumed that most of the people are at home rather than at work and that component was deleted from the analysis.

Q And that event, sir, reading again from Table 1, the maximum time you calculated to evacuate the entire Stony Point area of both a weekend when the workers are at home and in the event the workers did not return home during the week would be approximately an hour and a half; is that right?

A (WITNESS KANEN) Yes.

Q Ms. Madsen, could you tell me approximately how many personnel will be working at the plant after operation begins?

A (WITNESS MADSEN) There will be approximately 500 personnel during normal working hours at the plant in the plant proper and the nuclear operation center which is being built.

Q So the maximum number would be around 500 at the plant at any one time; that would be the maximum work force at the plant?

A (WITNESS MADSEN) That would be the maximum work force, yes.

Q Mr. Kanen, in your time estimates, did you include evacuation of the plant personnel at the time of the emergency when evacuation is decided to be necessary?

A (WITNESS KANEN) The analysis of the workers leaving the plant site indicated to us that those workers would have left and have passed the point of Pointe Aux Peaux/Dixie Road intersection probably well in advance of the time of the residents of the Stony Point have arrived at that location.

Q Why do you assume this?

A (WITNESS KANEN) Because the time to evacuate -- the time for a worker to leave his place of employment would probably take less time than it would for residents to gather some essential belongings and to make sure that the family unit is together. So, therefore, the worker would probably be prepared to evacuate or prepared to leave the site more rapidly.

Q Did you per chance to a worse case analysis and assume that the entire population of the plant personnel and population of Stony Point meet at Pointe Aux Peaux Road attempting to evacuate at the same time?

A (WITNESS KANEN) We did not do an intense calculation of that type, but we do not believe that that point at Dixie Road and Pointe Aux Peaux Road would become a significant traffic restraint, especially when that location is designated as a point to be well under traffic control.

CHAIRMAN MILHOLLIN: I have a question on this point. I won't interrupt you, but did you assume that the workers at the plant would be notified before the residents of Stony Point would be notified?

A (WITNESS KANEN) No, we assume simultaneous notification.

CHAIRMAN MILHOLLIN: Why?

A (WITNESS KANEN) That appeared to us as a more likely time and there would be a simultaneous usage of the road system. One would expect that, perhaps, if there was escalation to the various levels of alert, that the plant workers or the non-essential plant workers would be notified and prepared to leave the site in advance of the general emergency.

So we took the position that there would be only one alert to general emergency alert and notification would be simultaneous.

CHAIRMAN MILHOLLIN: All right

I'm sorry.

Go ahead.

BY MS. WOODHEAD: (Resuming)

Q Now, Ms. Madsen, could you explain the division of responsibilities and duties briefly during an emergency between Detroit Edison and the State?

A (WITNESS MADSEN) Detroit Edison is responsible for classifying the emergency or notifying the State and local jurisdictions of the emergency on a continuous basis and providing them with the necessary information so that they can do calculations on the radiological release data and make recommended protective actions.

The State then, in turn, takes the data tnat Detroit Edison gives them, would do an independent calculation based on the radiological information and make a decision as to whether or not they would accept our recommendation which would then be passed on to the Governor for his approval.

Q Does Detroit Edison have the authority or the ability to initiate the siren warning system?

A (WITNESS MADSEN) I can't answer that question at this time other than to say that we do not have the authority to initiate the siren system. The only person who can do that is local or State jurisdictions based upon the Governor's recommendations.

Q That's fine.

Thank you.

May I have one moment.

CHAIRMAN MILHOLLIN: Just a moment.

Ms. Madsen, just so I can -- we can understand your testimony, is it your testimony that the Governor would have to be consulted before an order could be given to evacuate Stony Point; is that right?

A (WITNESS MADSEN) That is correct, and that is based on Public Act 390 of Michigan Public Law.

CHAIRMAN MILHOLLIN: Based on a Michigan Statute?

A (WITNESS MADSEN) That is correct.

CHAIRMAN MILHOLLIN: Thank you.

BY MS. WOODHEAD: (Resuming)

Q At the time that a problem occurs at the plant, what directives, besides notifying State and local officials, what directives would Detroit Edison give to its own personnel?

A (WITNESS MADSEN) Detroit Edison would at that point in time make a determination of the accident situation and be prepared to gather its non-essential personnel at an assembly point in the plant to be ready to ask them to go home in case they were needed at a later date, and then the essential personnel would stay on the site.

Q And in terms of numbers, could you tell us how many would be essential and how many non-essential?

A (WITNESS MADSEN) That could depend upon the emergency, but I don't think I would care to comment on it any further than

that it would probably depend upon the emergency.

Q All right. Isn't it true that the plant personnel would be notified to evacuate prior to offsite people, persons?

A (WITNESS MADSEN) Yes, this would probably be the case in most instances.

Q And could you explain why?

A (WITNESS MADSEN) Because the situation would probably occur where the decision would be made since we were in an emergency situation; that it would not be necessary for us to maintain those non-essential personnel on the site and, therefore, it would be better if we asked them to return to their homes.

Q Could you give me some estimate of time it might take in your opinion between the time that the Detroit Edison management decides that they should notify the State of some development in the plant and the time the nearby residents are actually notified?

A (WITNESS MADSEN) I would have to base my response on the recent exercise we just had at Fermi on February 1st and 2nd and I believe if I read the FEMA report correctly, it required approximately 45 minutes from the time Detroit Edison made recommendation to evacuate for the State to confirm that and make the same recommendation.

Q All right. Thank you.

CHAIRMAN MILHOLLIN: I'm sorry.

If that's true, then why do you assume that the plant personnel would be notified at the same time as the residents? I

mean if you have to go to the Governor in order to notify the residents and you can notify the plant personnel on your own, why do you assume the notification would occur at the same time?

A (WITNESS KANEN) When I conducted that analysis, I was not aware of the time difference in that notification.

BY MS. WOODHEAD: (Resuming)

Q Well, Mr. Kanen, assuming that there are somewhere between three to five hundred personnel directed to leave the site who are notified rather quickly at the time of decision that a problem has arisen, how would this affect your calculations as to the congestion on Pointe Aux Peaux Road -- strike this.

Let me give you a hypothetical.

The hypothetical is that a State -- an incident has arisen at the plant, the plant personnel, assuming all personnel, are directed to leave the site, the State authorities have been notified and there is an approximate time differential, say, half an hour between the time the plant personnel are notified to leave and the Stony Point residents are notified to evacuate, what difference, if any, would there be in your estimate of the time necessary to evacuate the Stony Point residents?

A (WITNESS KANEN) It would not have any impact on the time estimates provided in the testimony. It would separate even further the potential conflict between onsite personnel traffic conflicting with residential traffic.

Q All right. Thank you.

Ms. Madsen, do personnel from Detroit Edison meet, confer, cooperate at all with the local officials in the development of their emergency plan?

A (WITNESS MADSEN) Yes, we have been doing this all along.

Q Can you explain that a little further, your activity with the local officials?

A (WITNESS MADSEN) Locally, our director of emergency planning meets frequently with the Office of Civil Preparedness, Mr. Eckhardt. He serves on one of the basic committees that they have, planning committees that they have down there and Detroit Edison has supported the emergency services division in actually writing the local plans.

CHAIRMAN MILHOLLIN: You'll have to speak up.

A (WITNESS MADSEN) Sorry.

CHAIRMAN MILHOLLIN: That's all right. I think the reporter got that.

Go ahead.

A (WITNESS MADSEN) And we continue to meet with the local officials on a frequent basis.

BY MS. WOODHEAD: (Resuming)

Q Could you explain a little more about your actual writing or cooperation in writing the local plan?

A (WITNESS MADSEN) Basically, Detroit Edison has a contract with the emergency services division of the State Police who are in charge of all State planning for disasters and the State

Police planners come into the local community and actually work with the local individuals to develop their own plans.

MS. WOODHEAD: Do you have more questions on the subject?

CHAIRMAN MILHOLLIN: No.

BY MS. WOODHEAD: (Resuming)

Q All right. I would like to ask Dr. Hungerford some questions starting with some data in Table 3 which contains -- does calculations in the event no evacuation takes place.

Dr. Hungerford, did you assume that the doses received here would be due to -- strike that.

Are the doses calculated on the assumption that the population -- the persons in these areas are outside their homes?

A (WITNESS HUNGERFORD) Yes. There is no provision taken for the protection of a home or a car so that they represent a conservative number there.

Q All right. In the heading on the right-hand column, it states total dose (0 to 8 hrs), but there is only one figure under each residential area.

Is this a correct heading here, is the dose actually 0 to 8?

A (WITNESS HUNGERFORD) That is a correct heading. At any instance, there will be a dose rate. It's like when you drive your car at 30 miles per hour and you drive for one hour, you go 30 miles. So if the dose rate is so and so over a given time, you will get a total dose.

Q Thank you.

Yes.

Thank you for the clarification.

Now, is this Table 3 a realistic assessment of anticipated doses during an emergency?

A (WITNESS HUNGERFORD) Well, I think you have to realize as stated earlier in the testimony that this is a very exceptional case and there is no justification for the condition. We just assume that it exists without any technical justification at all.

So the probability that this would ever happen is very negligible, so it is a condition developed to show what kind of doses there possibly could be to -- just for the purposes of evaluating doses is for evacuation.

So it's very unusual, most likely if you stick to the accidents that are written up in the safety analysis reports by Detroit Edison, the doses would be less by orders of magnitude by factors of ten, in other words, or more.

End T5

T6
DC/pd

Q In the event that no evacuation occurred for some reason, is it realistic to assume that the residents nearby would stand outside their homes for eight hours?

A (WITNESS HUNGERFORD) It is not reasonable, and there's another thing I might ask my colleague here to comment on. The plume will not be in one direction for eight hours. I'd like to -- maybe Roger could comment on that aspect of that.

MR. NELSON: The persistence for eight hours in a single sector is extremely unlikely.

Q Could you turn to pages 11 and 12 of your testimony. At this place, you are describing a severe accident on which you base those calculations.

Tell me whether or not you assumed that the releases from the plant, radiological releases, began immediately upon the accident, at the first initiation of the accident, do the releases begin to leave the plant; is that your assumption?

A (WITNESS HUNGERFORD) No, it is not my assumption. The scenerio that we have adopted is that at the time of the accident, the radioactive material will be released to the upper reactor building. The high radiation will cause the standby gas treatment system to come on and operate, and it will start pumping out the radioactive gases through a filter system.

It will take, I am told -- maybe somebody else can corroborate that. I am not that familiar with that part of the system, but I am told it will take approximately a half hour for

these gases to go through the filter system before they will be released. So there is a delay time of about 30 minutes or a half hour. Also, the gases which will emanate will be what we call the noble gases, krypton, xenon, mainly, with some iodine. About one percent of the iodine which is released from the reactor. That is a very conservative number. We assume for the purposes of this calculation will also be released.

CHAIRMAN MILHOLLIN: Do you assume notification will occur at the same time as contamination will occur?

A (WITNESS HUNGERFORD) I assume for my calculations that notification occurs 15 minutes after the accident. Now, of course, the evacuation study was done after I had done the main part of my study, the radiological exercise, but I assumed about 15 minutes.

CHAIRMAN MILHOLLIN: My question is, do you assume that the notification occurs at the same time that the contamination begins of the persons notified?

A (WITNESS HUNGERFORD) Could you clarify what you mean by contamination begins?

CHAIRMAN MILHOLLIN: Exposure. Are you assuming they're notified before the exposure of them begins, or after, or at the same time?

A (WITNESS HUNGERFORD) All right, maybe I can do this.

The radioactive gases are held up for about a period of a half hour before they will be eliminated, start eliminating

from the plant.

CHAIRMAN MILHOLLIN: That's an automatic elimination system?

A (WITNESS HUNGERFORD) Sustained by a gas treatment system.

CHAIRMAN MILHOLLIN: Do you know whether it is automatic or not?

A (WITNESS HUNGERFORD) I have not intimate personal knowledge of that system. I can only tell you that I believe it's automatic. Perhaps somebody from Detroit Edison Engineering could answer that question for you.

CHAIRMAN MILHOLLIN: Well, you can answer my question first, and then we'll get to the other one later.

The question is, does notification occur at the time when exposure begins, after it, or before it?

A (WITNESS HUNGERFORD) Okay, let me continue with this scenerio. When the gases leave the plant, they're carried by the wind, and it takes roughly under the assumed wind velocity, about 15 minutes for the people in the Stony Point area to begin receiving exposure. That's taken into consideration in the calculations.

So to get back to your question, the exposure, the actual exposure will begin about a half hour, perhaps, after the Governor is notified.

CHAIRMAN MILHOLLIN: Perhaps I should let the Staff

finish its questions, and then we'll come back to this subject, because I can see we'll have to spend some time on it.

BY MS. WOODHEAD: (Resuming)

Q Ms. Madsen, in relation to Table 5, which explains protective actions under certain circumstances, could you explain briefly how plant personnel postulates possible doses that might be released from the plant when a problem is first encountered in the plant in any system, and how the plant personnel would go about relating their assessments, their concepts of the problem involved to this protective actions guide?

A (WITNESS MADSEN) We have two basic methods of making what is called a projected dose assessment. One is based on the potential release of radioactivity which we can get from monitor readings. The second is based upon an actual release of radioactivity through the stack which is measured by monitors.

The methodology employs a computerized program whereby we are able to calculate projected doses at the various distances from the plant. Also built into this as a guideline for our people is the capability for it to indicate to us at what distance we see the one rem dose.

This information, then, is taken by our plant personnel, and taking into consideration such things as the plant status, the weather, road conditions, present meteorology, and based upon all of these factors, a judgment is made as to what protective

action would be recommended at the time.

Q I am not sure to whom I should address this question, but referring again to the accident postulated on pages 11 and 12, I think perhaps Ms. Madsen might answer this better.

Is this the only accident you can consider in your emergency plan?

A (WITNESS MADSEN) This particular accident is not an accident we were considering in our emergency plan.

Q What accidents did you consider, very briefly, in your emergency plan?

A (WITNESS MADSEN) Very briefly, we have under study right now, loss of coolant accidents, a fuel-handling accident, and a generic-type accident whereby we have a release through an unmonitored release pass.

These three basic scenerios are being looked at at this point in time.

Q Are you considering any less, in other words, less significant accidents?

A (WITNESS MADSEN) No, we are not.

Q So it is true that you are considering three different accidents in your emergency plan?

A (WITNESS MADSEN) Basically, yes.

Q On page 15 of your testimony, I'd like to ask you to clarify the very last part of the second paragraph, beginning with the words, "A review of the results . . . " My primary confusion

here is four lines down where you state that the doses which are possibly to be received during evacuation, are in the range of one to five rem stated for protective actions resulting in evacuation requirements.

If you could, would you clarify for me the phrase, "stated for protective actions resulting in evacuation requirements," and explain how you are referring to the protective actions guide. I simply don't understand your statement there.

A (WITNESS MADSEN) If we look at Table 5 for whole body doses, which is basically what we're calculating in this particular scenerio, you can possibly issue instruction to shelter. Depending on the plant conditions, you might also seek possibly a precautionary evacuation.

When you reach a whole body dose of between one and five, there is a range of doses that one could possibly work between one to five in making a determination as to what type of protective action one should take. Again, depending upon a lot of various input and other factors, evacuation might not be the best thing to do at that point in time. Sheltering might be, but evacuation is a very good possibility. You are between a one and five range.

Q All right, thank you.

Now, could we go on to the next sentence. I don't understand what you mean when you say that the doses that you postulated for evacuation of the Stony Point area, as shown in

Table 4, are within the range of accepted protective action. Let's go back again to Table 5. There, if you look again at the range of one to five for a whole body dose, there is a little bit of ambiguity in the statement made because it says, "Seek shelter as a minimum."

Secondly, it says, "Consider evacuation or may evacuate unless constraints make it impractical.

In this particular case, since we are looking at what would happen during an evacuation, we took the latter and said that we would evacuate at that level because constraints do not make it impractical.

End T6

CHAIRMAN MILHOLLIN: Isn't your testimony just a statement that -- these doses correspond to the middle level of Table five?

WITNESS MADSEN: Essentially that's what it says.

CHAIRMAN MILHOLLIN: That's all it says, isn't it?

WITNESS MADSEN: Yes.

CHAIRMAN MILHOLLIN: All right.

MS. WOODHEAD: Thank you. Staff has no further questions.

CHAIRMAN MILHOLLIN: The Board will have some questions, or possibly there may be some redirect. It may be a good idea to take a break before that occurs. So, we'll take a 10 minute break.

(Recess)

CHAIRMAN MILHOLLIN: The hearing will come to order.

The Board has some questions for the Panel, at the end of which the Applicant may wish to engage in redirect.

EXAMINATION BY THE BOARD"

BY CHAIRMAN MILHOLLIN:

Q First of all, I direct your attention to Table three. This table contains a series of numbers which express the dose which would be received by a person in Stony Point, as I understand the table.

Assuming the following things, assuming they were first of all -- there is no evacuation prepared -- is that right?

A (WITNESS HUNGERFORD) Yes.

Q And assuming that we have release which occurs over an eight hour period--

A (WITNESS HUNGERFORD) --That's correct.

Q And asuming the wind blows in the direction of Stony Point for the entire period?

A (WITNESS HUNGERFORD) That's also correct.

Q And assuming the wind doesn't blow very fast?

A (WITNESS HUNGERFORD) That's also correct.

Q And assuming that all of the people who are involved -- or, all the persons, I should say -- stay outside their houses and cars for the entire time, is that right?

A (WITNESS HUNGERFORD) Yes, you can -- there is no factor put in there for the protection provided by a house or a car.

Q The highest dose that I see on this list of numbers is the number 19,900. That is millirems, is it not?

A (WITNESS HUNGERFORD) That is millirems, yes. I terms of rems it would be 19.9.

Q It would be 19.9 rems or 19,900 millirems, since a millirem is a thousandth of a rem?

A (WITNESS HUNGERFORD) That is correct.

Q Could you explain the effect on the health of an individual -- which would occur -- as a result of receiving this dose?

A (WITNESS HUNGERFORD) There would be no effect.

Q Soyour testimony must be, then, that it doesn't matter whether evacuation occurs?

A (WITNESS HUNGERFORD) The dose is much greater than is allowed to be received according to the 10-CFR regulations. There is provision in the law for a person to get, under emergency conditions, up to 25 rems, which is not counted in his lifetime dose record, which a person at a plant would have in a radiation facility.

Q How does this number, 19.9 rems, correspond to -- or how would you compare it with occupational doses?

A (WITNESS HUNGERFORD) The occupational dose for a person working in any radiation facility is five rems per year. So this would be a little -- about four times that, as you can see.

Q That answers my first question. Thank you. My second question is -- refers to the basis for the assumption about the warning times. And we come back to the question I was asking you a little eariler, I think. In the calculation of these doses, could you state again the assumption you make about the point of time at which the dose begins to occur and the notification occurs?

A (WITNESS HUNGERFORD) Okay, I think perhaps the easiest way to describe it without getting into the scenario, is that the dose -- the people at Stony Point will start receiving the dose approximately one-half hour after the siren.

Q So your testimony is that these numbers assume that notification has occured one-half hour before the dose begins to be received?

A (WITNESS HUNGERFORD) That would be the assumption that was made.

Q So if we assume that, for example, the dose begins to be received a half hour before notification, do the numbers change?

A (WITNESS HUNGERFORD) The dose is received a half hour before notification, the total evacuation -- the total non-evacuation dose would be the same, but the evacuation doses change. They're getting more dose.

Q So the numbers in Table three wouldn't change, but the numbers in Table four would change?

A (WITNESS HUNGERFORD) Right.

Q And so the numbers in Table four assume that the evacuation has begun a half hour before the -- I'm sorry -- the notification occurs a half hour before the dose begins to be received, is that correct?

A (WITNESS HUNGERFORD) Right, and, well, let me just say yes, that's correct.

Q How much would the numbers change if the dose began to be received a half hour before the notification occurred?

A (WITNESS HUNGERFORD) Okay, the column marked "Before Evacuation," middle column, under dose, would be higher at each

beginning point.

Q Because the person would have been there longer before the evacuation begins?

A (WITNESS HUNGERFORD) Right, exactly.

Q How much higher would that be?

A (WITNESS HUNGERFORD) Well, without going back into the calculations, I couldn't say exactly. But for half hour, let's say, in the order of 10 to 20 percent higher.

Q If we assume the dose begins to be received a half hour before notification, and that's an hour difference, is that -- with respect to your assumption?

A (WITNESS HUNGERFORD) That would be an hour difference, then.

Q And how much would the numbers change in the column, in the middle?

A (WITNESS HUNGERFORD) Well, it's -- looking--

Q I realize I'm asking you to make an estimate.

A (WITNESS HUNGERFORD) Yes, let me look at the numbers on Table three, again, before I answer that question.

End of Tk 7

T8-1
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I think my answer would be approximately 12 to 15 percent more for an hour, and that's an estimate only.

Q Would the numbers in the left-hand column change on Table 4?

A (WITNESS HUNGERFORD) They would slightly lower because of the decay of the radioisotopes during -- before you evacuate.

Q Then the total dose would be somewhat higher?

A (WITNESS HUNGERFORD) The total dose would be somewhat higher.

Q Would the increase be in the range of ten percent or greater than now?

A (WITNESS HUNGERFORD) I think, perhaps, if you allow a ball park answer, perhaps ten percent would be okay.

Q Would you say that it would not be 25 percent higher?

A (WITNESS HUNGERFORD) I would think they wouldn't be as high as 25 percent higher.

Q Let's assume that the notification occurred an hour and a half after the dose began to be received, how much higher would they be in your estimate?

A (WITNESS HUNGERFORD) I would say they would approximately be in the range of 15 to 20 percent higher.

Q Can you state for us the basis of your assumptions about the warning time; that is, can you tell us how you would estimate how much time it would take from the beginning of the accident to the time of notification?

Presumably, an operator first observes that something is unusual in the plant, an operator would then observe, perhaps, that radiation is being released.

A (WITNESS HUNGERFORD) I would like Ms. Madsen to respond to that one, if you don't mind.

Q Very well.

Among actions that would be taken, can you just explain the sequence of events which you anticipate would occur?

A (WITNESS MADSEN) What we did in this particular instance was to take an extremely conservative case whereby because of the situation the Governor would react. Immediately, he or his delegate would react immediately and 15 minutes after the siren button would be pushed.

Q After what?

A (WITNESS MADSEN) After the operator had recognized and called in the accident, the emergency.

Q I asked you to take us through the steps beginning with the operator.

A (WITNESS MADSEN) All right. The operator will initially notify the County Government and the State Police. The State Police at Flat Rock Post immediately notifies Lansing, the emergency operation center in Lansing, then that -- at that level of emergency which probably at that point probably would be declared as a general emergency, they would immediately notify the Governor's Office and he could at that point immediately call a

state of disaster and declare an evacuation if he so desired.

Q Would the operator make this telephone call on his own authority?

A (WITNESS MADSEN) The nuclear shift supervisor in the control room becomes the emergency director once the emergency plan is entered into and implemented. Yes, he would.

Q So the shift supervisor is required to make the telephone call without checking with the manager of operations, for example?

A (WITNESS MADSEN) If he is in control at the time, he is authorized to immediately become the emergency director. Yes, he is.

Q How would he determine whether a release occurred?

A (WITNESS MADSEN) How would he determine whether a release occurred?

Q Or was occurring, yes.

A (WITNESS MADSEN) Plant conditions and monitor reading in the control room.

Q The measurement of release would come from what monitors?

A (WITNESS MADSEN) In this particular case, they would come from the standby gas treatment monitors.

Q Where are they located?

A (WITNESS MADSEN) They are located in the ethylene stack from the standby gas treatment.

Q How does the operator tell or the shift supervisor, how

does he know which direction the release is going?

A (WITNESS MADSEN) He has meteorology immediately available to him in the control room from the tower on site.

Q Does he have monitors which tell him what the readings are at distances from the plant?

A (WITNESS MADSEN) He does not have monitors that tell him what the readings are distances from the plant.

Q So he'd make a judgment based on wind data from the stack?

A (WITNESS MADSEN) He would have available to him an emergency response information system which is the computer base system that he could immediately do a dose projection on and make a determination of what the offsite doses would be.

Q What information is put into this calculation?

A (WITNESS MADSEN) The ethylene monitor readings, the meteorological data is available in the system and the capability to calculate a projective dose and to calculate a plume, a meteorological plume projectory.

Q If the plume changes directions over a course of time, how does he know that?

A (WITNESS MADSEN) The model that is presently being developed for this site is site specific and takes into account such items as a lake breeze and any site specifics.

Q Such items as what?

A (WITNESS MADSEN) Pardon.

Q Such items as what?

A (WITNESS MADSEN) Lake breeze.

Q Lake breeze?

A (WITNESS MADSEN) Situation since we are on a lake shore.

Q But if he wanted to know what the radiation level was in Stony Point, how would he find out; that would be a projection?

A (WITNESS MADSEN) That would be a projection, that is correct.

Q If he wanted to know what it was on Dixie Highway, that would be a projection?

A (WITNESS MADSEN) That would be a projection.

Q Do you have procedures for notification of persons higher up than the shift supervisor in such an event?

A (WITNESS MADSEN) Yes, we do.

Q Could you describe those?

A (WITNESS MADSEN) The noficiation procedure is such that the nuclear supervisor will call a duty officer in the power plant and he'll call the plant superintendent if he is not either in his office or if he's on site or at home if he is not.

Q Who is the duty officer?

A (WITNESS MADSEN) That rotates by shift time.

Q Who would be the duty officer, for example, at 3:00 o'clock in the morning?

A (WITNESS MADSEN) That I cannot answer.

Q Would there be anyone at the plant higher up in the

management chain than the shift supervisor at 3:00 o'clock in the morning?

A (WITNESS MADSEN) No, there would not be.

Q According to your procedures, what would the shift supervisor do at 3:00 o'clock in the morning if the shift supervisor discovered or determined that there was a serious question of an emergency?

A (WITNESS MADSEN) The nuclear shift supervisor would notify the plant superintendent. He would --

Q How would he do that, call him at his home?

A (WITNESS MADSEN) He would call him, yes, first at his home. He would have a series of telephone numbers at which he could reach him. He would then notify the duty office and the duty officer then has a call where the superintendent is notified.

Q I see.

Who would -- from what you've said before, the siren would not be used until notification occurred of the County authorities; is that right?

A (WITNESS MADSEN) That is correct.

Q And only they would have the authority to use the siren?

A (WITNESS MADSEN) That is correct.

Q Can you explain the procedures for obtaining that authorization?

A (WITNESS MADSEN) The County's authorization?

Q Yes.

A (WITNESS MADSEN) According to Public Act 390 and the Michigan Emergency Preparedness Plan, the Governor must declare a State disaster upon being notified of an emergency.

Upon declaration of the State disaster, the Michigan Emergency Preparedness Plann goes into effect. At that point in time, the radiological health department becomes the Governor's technical advisor and they receive all of the radiological information and meteorological information from the plant and any protective recommendations that the plant might make.

They then do their own assessment and make recommendations to the Governor and either he or his delegate can then make a recommended protective action. This would come back down to the County level.

Q And then the siren will be turned on?

A (WITNESS MADSEN) That is correct.

Q My next question has to do with the amount of the release you postulate for the dosages which you have calculated in the testimony.

I assume that you must have assumed that there would be a certain quantity of gas available or gas to be released?

A (WITNESS KANEN) Yes. The amount of release is postulated on, first of all, the NRC's Class 9, what they call a Class 9 accident to the Fermi 2 plant and in their F -- F -- is it FSE?

A (WITNESS MADSEN) The Final Environmental Statement.

A (WITNESS KANEN) Final Environmental Statement published last May, 1981, they had a table in there of what is called the core inventory of radioisotopes that are in the core. That inventory was taken and assumptions were made as to how much of that would be released into the building and then out into the gas -- standby gas treatment system.

Q When you say assumptions were made as to the amount which would be released, what kind of an accident do you have in mind?

A (WITNESS KANEN) This accident is a hypothetical core melting accident.

Q Perhaps I can ask it this way.

What percentage of the core inventory did you assume would be released when you calculated the numbers we have in the testimony?

A (WITNESS KANEN) As I recall, and I would have to go back to my own calculations to verify it, a hundred percent of what we call noble gases, the Krypton and the Xenon, 70 percent into the upper building of the iodines, the volatile as we call them and 7 percent of the particulates which are the other isotopes; that if they were released, they would place out all over everything like a dust.

Of the 70 percent of iodines that gets released into the building, one percent of that gets released into the cloud, into the plume.

Q And you say you made these assumptions because they were given to you in the Commission's own documents?

A (WITNESS KANEN) The Commission's own documents a study of them and the study of other accidents of similar types gave me these numbers.

Now, they can vary slightly, but from plant to plant and condition to condition, but I chose those that I thought best fit this particular scenario.

Q Earlier there was testimony to the effect that the Detroit Edison Company had considered three types of accidents in formulating its emergency plan.

Do you recall that testimony?

A (WITNESS MADSEN) Yes.

Q Were those three accidents, were they more or less severe than the accidents which you have postulated in coming up with the numbers in your testimony?

A (WITNESS MADSEN) Basically, the three scenarios that we are looking at and developing can lead you into such a scenario as we have here. We could carry through to a core melt situation, should it happen, so we would be able to handle all accident situations.

Q Well, it does appear to be a little confusing when you have based the numbers in your testimony on one type of accident and then you've said that your emergency plan is based on three other types of accidents.

My question is why don't you use the same types of accidents?

Do you understand my question?

A (WITNESS MADSEN) I understand your question, yes.

The accidents that we will be able to handle in the emergency plan were really covered the entire spectrum of accidents and which would include a partial core melting situation.

Now, this -- we chose a very highly incredible accident and to be very conservative in the calculations.

Q I'd like to ask Mr. Hungerford also to respond to that question.

Is that your understanding?

A (WITNESS HUNGERFORD) Yes, essentially, I have the same opinion as Ms. Madsen. This accident is not considered in the final environmental statement -- rather the final safety analysis report of Detroit Edison Company as it was considered as I believe. I'm not a spokesman for the company, and I hope somebody from the company can back me up on this, but it is not considered in the final safety analysis report. This goes beyond and so this kind of an accident is a very, very improbable accident, but also a very, very severe accident, more severe than you would expect under any realistic condition. This is a very unrealistic condition we have described in this accident.

Q If you postulated an accident in which there were a greated amount of release, then the number of doses, of course,

would be greater, would they not?

A (WITNESS HUNGERFORD) Yes, they would.

Q And the reason you did not postulate a more severe accident was the greater release.

Would you tell us why that is again?

A (WITNESS HUNGERFORD) In other words, I assume that you're asking why didn't they assume that a hundred percent of everything gets into --

Q No, that's not what I'm asking you. I'm just asking you to state again the boundaries of -- I'm asking you to tell us again the limits upon the assumptions which you made with respect to the severity of the accident.

A (WITNESS HUNGERFORD) Okay.

Q I think you've told us percentages of various types of isotopes have been released.

I guess I'm asking whether you think it's worthwhile to presume a more severe release.

A (WITNESS HUNGERFORD) All right. Let me try to reason, perhaps, out why I chose those numbers.

Q Yes. That's what I'm asking you.

A (WITNESS HUNGERFORD) Okay. The gases are not normally -- the noble gases are not normally soluable in the material of the core once they're released from the fuel. So they will automatically come out into the atmosphere of the building and then be pumped out through the gas systems to the outside.

The volatiles are -- the iodines will combines with things in the water and the impurities to that not all of them will come out. That's why I chose 70 percent of the iodines instead of a hundred percent being released.

A certain percentage and that number, of course, is arguable but, of course, it's a number that I chose or assumed.

The particulates would have a tendency to remain behind with the water. So only a small fraction, and I chose 70 percent, would get out and those that get out, none will get through the reactor filter system into the radioactive plume.

Does that help you?

Q I notice that you did not calculate the dose which would occur if the Pointe Aux Peaux Road were widened?

A (WITNESS HUNGERFORD) If the Pointe Aux Peaux Road were widened to carry more traffic?

Q Yes.

A (WITNESS HUNGERFORD) That would result in the first column on Table 4.

Let's say that the -- and I'll have to defer, perhaps, or get cooperation from Mr. Kanen here.

In the during evacuation column, if the column -- if the road were widened so that, let's say, twice as many vehicles could go down the road and also assuming that there was provisions made to handle that increased volume at the intersection of Pointe Aux Peaux Road and Dixie Highway, then I think you could expect

that the evacuation doses in that column would be cut by approximately a factor of two.

Perhaps, you'd like Mr. Kanen to also reply to this.

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A (WITNESS KANEN) The reduction by the factor of two is predicated upon the fact that there is now double capacity of the road being widened. The evacuation scenerio that we have described in the testimony does not reflect a capacity problem on any of the treatment within the Stony Point or the Pointe Aux Peaux Road. So it is only during capacity conditions that there would be a time savings associated with road widening. The actual time savings would be very moderate under the conditions we have assumed, and this would impact in terms of the effect of the road widening on this dose calculation in this first column.

Q Are you assuming the absence of accidents when you make that statement?

A (WITNESS KANEN) Even in the event of accidents, the operation of Pointe Aux Peaux Road is presumed to be a normal rule of the road kind of operation, so that in case an accident occurred, one, traffic would, in all probability, be able to either go around an accident condition or alternatively, if the road was blocked in its entirety, that provision exists in the plant for wreckers to come to the scene and alleviate the traffic.

We do not have the specifics of time to calculate what that time would be, but the widening of the road would not necessarily have an impact on that.

Q Even in the case of an accident, you would say?

A (WITNESS KANEN) If the accident is postulated to cross or to block the entire road, it would block how many lanes -- if

it blocks one lane -- if it blocks two lanes on a widened road or if it blocks all three lanes.

Q So it depends on the accident?

A (WITNESS KANEN) It depends on the accident.

Q All right. The next question I have is concerning flooding.

Does the Pointe Aux Peaux Road become flooded?

A (WITNESS MADSEN) According to the flood plane map of the area issued by HUD Pointe Aux Peaux Road is not flooded on the 100-year flood condition. I do have that available if you care to look at it.

Q Thank you very much.

Those are all the questions I have. I think the other Board Members might have some questions.

BY JUDGE MORRIS:

Q Dr. Hungerford, I'd like to learn a little bit more about how you did get those calculations. You mentioned that you used a computer program which was developed by or used by NRC and others.

Did you use the CRAC Code, for example?

A (WITNESS HUNGERFORD) No, I didn't have that available to me at the time.

Q What did you use?

A (WITNESS HUNGERFORD) I developed my own program.

Q Have you run similar calculations and have been able to

sort of benchmark your program with others?

A (WITNESS HUNGERFORD) No, I have not. Remember, I am a consultant and I don't have 100 percent time to devote to that. I just have not done that.

Q I'm looking for some, if you'll pardon the analogy, quality assurance on your calculation, if you could.

A (WITNESS HUNGERFORD) Okay. My quality assurance is I always back up a computer calculation by hand calculation and the reasonableness of the answer. I've been in this game for 30-odd years, and I think I know by now what is a reasonable number.

Q You did tell us the percentage of inventories, and you mentioned seven percent of solids. I think my recollection is correct that for part 100 calculations of site suitability, one percent solids was used; is that your recollection?

A (WITNESS HUNGERFORD) I believe that is, so this calculation is quite conservative. However, in the plume, the particulates are not present, so it doesn't really make much difference. The only place where the particulates contribute is by the direct radiation from the plant to the people, and that radiation is very, very low compared to what is in the plume. So you could just dismiss that.

Q In assuming these fractions of release from the core, do you assume an instantaneous release to the building volume?

A (WITNESS HUNGERFORD) I made that very conservative assumption, yes.

Q And what would be the real situation?

A (WITNESS HUNGERFORD) I think you would have to do a study of the escape pass from the reactor to the upper building.

Q Would this happen over seconds, minutes, hours?

A (WITNESS HUNGERFORD) I would say minutes, probably.

Q Ten or --

A (WITNESS HUNGERFORD) Oh, from let's say five to ten minutes. Don't hold me to that because I have not made a study of the escape pass.

Q So it would not really affect your ultimate calculation?

A (WITNESS HUNGERFORD) It would not affect my ultimate calculation.

Q Did you do any sort of parametric study other than, you're back to the envelope check at the computer program?

A (WITNESS HUNGERFORD) Could you elaborate a little bit?

Q Yes. Did you vary wind speeds, vary directions, plume widths, plume --

A (WITNESS HUNGERFORD) I did vary wind speeds and plume widths.

Q Did you do a plume meander at all?

A (WITNESS HUNGERFORD) Yes. The effect of plume meander, let's say over two sectors, would roughly, very roughly, have the effect of dividing the doses by a factor of two.

Q I'd like to ask a little bit about the evacuation of Mr. Kanen.

Is there more than one route from the Fermi Plant itself? I gather that the Lagoona Road is one, the egress road. Are there others?

A (WITNESS KANEN) This is from Dixie Road to Pointe Aux Peaux, or to Stony Point?

Q No, exit the plant proper.

A (WITNESS KANEN) There is one exit road which I believe is called Fermi Drive. That goes almost due west or northwest from the plant to Dixie Road. I'm not sure I have the name correct on that.

A (WITNESS MADSEN) It is Enrico Fermi Drive.

Q So if the employees of the plant, the workers, were to evacuate the site, they would have a choice of two routes of egress?

A (WITNESS HUNGERFORD) They would have a choice of two. One would not expect them to use the Lagoona Road. You would expect them to use the Enrico Fermi Drive directly towards Dixie Road.

Q So if there was a point of congestion of coincidence of plant workers and evacuation from Stony Point, it would be over on the Dixie Highway where Lagoona Road comes in?

A (WITNESS HUNGERFORD) If any such conflict were to occur, it would be on Dixie Highway, that's correct.

Q If there were an evacuation of the off-site people, what total region would be involved; if the plume were heading in

one direction, would only the people in that direction be evacuated?

A (WITNESS HUNGERFORD) The extent of the evacuation would be probably dictated by the County or by the Governor as Ms. Madsen has indicated.

Q Is there anything in the County Plan, as you know it, Mrs. Madsen, that would selectively evacuate people, or is there some basic region that would be evacuated once a disaster was declared by the Governor?

A (WITNESS MADSEN) The Division of Radiological Health follows the same EPA protective action guides as does the company. For the most part, they will follow, depending upon the distance that you would reach a protective action level, they would probably suggest, recommend something like full evacuation within two or three miles of the plant, and then sheltering or evacuation in a downwind direction.

Q So that initial evacuation would be a complete sort of circular region, two to three miles radius?

A (WITNESS MADSEN) Two to three miles radius of the plant.

Q You mentioned the HUD hundred-year flood.

Do they calculate a thousand-year flood?

A (WITNESS MADSEN) No, not to my knowledge.

Q Well, I don't think it's frivolous because in other natural phenomenon, larger periods of time are frequently

considered. For example, in earthquakes.

A (WITNESS MADSEN) That s true.

Q So what I would really like to have a feeling for is in the hundred-year flood, am I one inch below Pointe Aux Peaux Road or am I 16 feet below it?

A (WITNESS MADSEN) That, I cannot respond to.

Q Do you have any feeling at all about how high the one-hundred-year flood is? What would happen to the Stony Point region itself, for example?

A (WITNESS MADSEN) The Stony Point region itself, during the one-hundred-year flood, would flood. There are dikes built around the region that were put in by the Corps of Engineers back in 1973 when Lake Erie lake levels were extremely high.

Q That's all, Mr. Chairman.

BY CHAIRMAN MILHOLLIN:

Q Mr. Eckhardt in his limited appearance statement, mentioned that the County has not accepted the siren system.

Have you had any conversations with him before this hearing on the acceptance of the siren system?

A (WITNESS MADSEN) I personally have not. I am aware of a meeting that was held on the 2nd of October in which the concept was presented to many local jurisdictions, and I'd like to turn this over to Mr. Kanen since he was at that meeting.

Q Does there appear to be some problem with having the local authorities accept the siren system?

A (WITNESS KANEN) Not that I'm aware of.

Q Can you imagine any reason why he made the point that the County has not accepted the system?

A (WITNESS KANEN) The siren system is currently under design and final locations are determined, so I would assume that would be a basis for making such a statement.

Q But you're not aware of any sticking point in negotiations between Fermi and the County on the siren system?

A (WITNESS KANEN) Not that I am aware of, no.

Q Let me ask Mr. Nelson what the probability would be of a lower wind speed in the plant vicinity, lower than was hypothesized in the accident scenerio?

A (WITNESS NELSON: The probability is reasonable that there might be lower wind speeds, but to have lower wind speeds attendant with persistent wind direction at the same time is very unlikely, extremely unlikely.

Q Let me ask Dr. Hungerford what his parameter analysis showed with respect to dosages in the area at lower wind speeds?

A (WITNESS HUNGERFORD) They would be somewhat higher depending on what wind speed would be chosen. Of course, the wind speed chosen is a very low one already.

Q Well, let's suppose it was something nearly dead calm.

A (WITNESS HUNGERFORD) Okay, that's a very -- if I -- perhaps Mr. Nelson could respond to this. In a dead calm, the plume could quite likely just go straight up and not go anywhere.

But if it did plume out, of course, it would be quite awhile before it would reach the site, and it would be perhaps worse than the so-called meandering plume as far as -- maybe I shouldn't have used the word "worse." It would have less radiation in it than a meandering plume because it would have to cover more area.

Perhaps Mr. Nelson could respond to this point.

A (WITNESS NELSON) The model calculations that were performed are based upon a gaussian projection, and the concentrations that are predicted are inversely proportional to wind speed, thus, if you have the wind speed, you would double the dosage, approximately.

Keep in mind that wind speeds of a meter per second and below are generally not associated with persistent conditions. They're meandering conditions, and the plume width and height generally, as well, will be much larger resulting in a lower concentration.

Q What would that kind of meteorological condition do to the slope of the hot line as a function of distance from the plant?

A (WITNESS NELSON) Will you define hot line? Center line?

Q Yes, I mean center line.

A (WITNESS NELSON) Would you define slope?

Q I'm talking about the gradient of radiation exposure and intensity as a function of distance from the plant.

A (WITNESS NELSON) By lowering the wind speed conditions

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in general, that would only occur during more unstable types of situations, thus, the gradient would increase. The rate of decrease would increase.

Q So the farther you were from the plant, the safer you would be, and that safety would increase substantially as you moved away from the plant?

A (WITNESS NELSON) Correct.

Q Could we say conversely that the degree of exposure would rise rapidly as you approach the plant?

A (WITNESS NELSON) That's correct, as well.

Q Now, in the testimony prepared, one of the conclusions that we come to under the conditions of this accident scenerio, in particular Table 4, was that there was very little advantage in alternate evacuation routes because the increase in exposure from following existing routes would be minimal compared to the exposure following a nonexistent route which did not require you to approach the plant.

Now, under those conditions that we have just described, would that still be true?

A (WITNESS NELSON) That is correct.

End T9

Q I don't understand your answer.

A (WITNESS NELSON) Well, imagine, if you will, a wedge spreading out from the plant, itself. The primary dose traversing across the plume, close to the source, occurs at a higher rate for a shorter duration of time.

Further away the traverse time is lengthened as the plume is wider, and the concentrations are reduced. So approximately the same dose is emitted during the traverse of that plume in either direction.

Q Are you taking into account the decay -- radio isotopes -- in the length of time?

A (WITNESS NELSON) I ignored that. I think that's relatively secondary.

Q Could we have Dr. Hungerford speak on that?

A (WITNESS HUNGERFORD) In my study I took into account the decay of radio isotopes for all time involved.

Q Yes, and under the conditions which we just hypothesized I would visualize the distribution of radio activity around the plant to be something rather egg shaped if we looked at a particular exposure -- contour -- and not as a wedge, but with the lesser wind conditions and the radiance as you approach the plant, would you not get a higher exposure from traveling toward the plant than if you traveled laterally?

A (WITNESS HUNGERFORD) Yes. If you -- under the conditions that you surmise, I think that you are correct.

Q Do you have any feeling at all, from your wind speed parametric study, as to just how substantial that difference would be?

A (WITNESS HUNGERFORD) Ah, well, I think that -- well, in the first place it depends on what wind speed you assumed. And I think the dose, the total dose at any location, would be inversely proportional to the, um, wind speed.

Q Does that mean if wind speed was zero it would be infinite?

A (WITNESS HUNGERFORD) Well, obviously you can't take that model down to zero, because the plume wouldn't get there in the first place -- zero.

Q Then you assume some latteral diffusivity that's superimposed on the invective terms of the model?

A (WITNESS HUNGERFORD) It would be -- I think what you are trying to get at is in the event that the radiation is diffusing more on a molecular basis rather than the motion of the wind, is that what you're getting at?

Q Well, in all of the models that I've seen, in the transported materials, there is both -- diffusive terms and invective terms. And the diffusive term does not disappear when the invective term disappears necessarily. They change the magnitude of it, but it is still there.

A (WITNESS HUNGERFORD) Okay, I would assume that for this particular case -- I'm going to let Roger, here, also answer

this, that the diffusive term normally will -- meteorological conditions will be much smaller by perhaps order of magnitude than the convective term.

WITNESS NELSON: Yes -- essentially correct. The model that was used for this analysis is much more simplistic than the one that you are conceptually describing. The invective term is the mean wind transport and the diffusion terms are based upon curves derived by underworks supported by the old AEC.

The diffusivities, if you will, are parameterized and one selects those diffusivities based upon knowledge of the meteorological conditions.

There is nothing in between two sets of diffusivities. There is A or there is B or there is C. There is -- if you continued between -- for the model that was used for this analysis.

BY JUDGE SCHINK:

Q Do you know what the diffusivity values of the low wind speed were?

A (WITNESS NELSON) I could not quote them without looking at references.

Q Do you know how they behave if the wind speed drops?

A (WITNESS NELSON) They are assumed to remain constant, irregardless of wind speed.

Q So then you could devise a model with a zero wind speed, you'd apply zero wind speed to your model and develop--

A (WITNESS NELSON) --Right, in the outbreak -- is dif-

fusive analysis based upon -- indicate -- concentration.

Q I can't believe that's true. You have -- your plume won't spread unless there is some diffusivity in your model?

A (WITNESS NELSON) That's correct.

Q And the diffusivity stays -- it's a function of the spread of these materials -- the function of time independent of wind speed?

A (WITNESS NELSON) That's correct, and the concentration -- results are inversely proportional to wind speed. Imagine, if you will, a stack releasing one ball every second. If the wind is blowing at two meters per second across that stack, then there will be one ball every two meters.

If the wind is blowing at one meter per second across that stack there would be one ball every meter. Extrapolating that down to zero wind speeds there would be an infinite number of balls per meter.

Q Would the balls spread with time? That's the only thing that you have to calculate?

A (WITNESS NELSON) In horizontal that's correct. In the vertical and horizontal laterally across the plume and conversely across the plume, there is no -- implicit dispersion along the axis of this mean invective current.

Q So, you have no feeling, then, for the steepness of this gradient, zero wind condition?

A (WITNESS NELSON) Gradient is not very large. In a very

calm situation general terminology is called low wind speed inversion, sometimes known as plume meander conditions.

The transport speed is very very low, as you say, but the lateral dispersal characteristics are much larger, and -- much larger than what was assumed in this model.

So, conditions of the model are for a given set of conditions. You're postulating meteorological event, although it is rare, certainly could happen and could lead to higher concentrations.

The gradient will be large or significant, but the doses that would be received by traveling into the plume first, before going away from the plume, are not that much larger. The gradient is not that long.

WITNESS HUNGERFORD: Could I make a response to that, also?

BY JUDGE SCHINK:

Q Certainly.

A (WITNESS HUNGERFORD) I think mathematically you might describe your condition -- very large around the source, but not going anywhere, so to speak. It drops off to zero very quickly. So you get high gradients. The concentration of the gasses stay right there.

Q I don't think we need to go anything as abstract as a delta function -- you could certainly have gaussion -- symetry -- and the X and Y -- the distribution around the plant would simply re-

present a gaussian distribution with symetry and the X and Y--.

A (WITNESS HUNGERFORD) I might, just for the benefit of -- those not familiar with gaussian functions, it looks like a steep hill, plotted and put on a piece of paper.

Q Let me ask Ms. Madsen, in the computer model which is designed to provide guidance for emergency decisions, you indicated that the operator would have meterological information and information from radiation monitors at the possible exit points from the plant, and would you use these to calculate postulated doses at various points away from the plant? Does that model take into consideration the radiation decay between the plant and arrival at the population exposure points?

A (WITNESS MADSEN) Yes, it would.

Q How does the computer know what the half life is of the radiation that was monitored going out of the plant?

A (WITNESS MADSEN) At this point I would prefer not to get into a detailed discussion concerning this without additional technical help.

Q Is additional technical help available?

A (WITNESS MADSEN) Via telephone, yes.

Q Dr. Hungerford, do you want to say something on the subject?

A (WITNESS HUNGERFORD) I might just respond that we know the isotopic content, the different elements, if you wish, radioactive elements in the gas and they are identified by what is

known as a half life, and if you do the calculation isotope by isotope, assuming a given inventory, the amount of material -- then you can calculate the total dose, adding up all of the individual doses to the individual isotopes.

BY JUDGE SCHINK:

Q Would the end result make a difference, say, whether iodine was included in the release or not included in the release?

A (WITNESS HUNGERFORD) It would. I mean it would be most likely included in the release, since it is one of the things that gets out.

Q And the monitor would assume that it's in the release?

A (WITNESS HUNGERFORD) The monitor--

WITNESS MADSEN: --The monitors that would be available are the type that are capable of measuring noble gases, iodine in particular.

BY JUDGE SCHINK:

Q Do they do a radioactive measurement or do they do an elemental measurement? Do they give chemical speciation or simply determining radiational materials going out of the stack?

A (WITNESS MADSEN) They are determining radiation. We are not separating the noble gases.

BY JUDGE MORRIS:

Q Ms. Madsen, could I just ask a follow-up question on that? When - - you calculate the off-site dosage based on measurement of effluent, do you vary the input of the -- species based

on measurement or is it just standard calculations?

A (WITNESS MADSEN) They can be varied. They can be varied based on actually taking a sample and determining what isotopic energy are in that sample, or they could be based on previous analysis of the sample.

Q Thank you. I think I'll stop there.

BY CHAIRMAN MILHOLLIN:

Q Your testimony, earlier, was the numbers in the table which you constructed to reflect the doses in the event of no evacuation -- yes -- you constructed a table here which expresses numbers which would reflect doses received if there were no evacuation. I believe that's Table three.

A (WITNESS HUNGERFORD) And you said, I believe, that if there were no evacuation and if the worst possible think happened, that you postulated that there would be no health effects whatsoever to the population of Stony Point, is that right?

A (WITNESS HUNGERFORD) There would be no health effect. Let's say observable, right. I am not a genetic biologist, for instance, and I couldn't say what the latent possibilities might be, but there would be no health effect under this dose of visible -- observed -- or whatever you want to call it -- even microscopic, bloodstream or whatever.

Q So you use the word "detectable", would you say that there are no detectable effects?

A (WITNESS HUNGERFORD) I think that would be a good word

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to use.

Q Could you postulate an accident which would have detectable effects on the population of Stony Point?

A (WITNESS HUNGERFORD) I doubt it.

Q So your testimony would be that there is no conceivable accident, or even any inconceivable accident or postulatable accident which would have the health effects on the population of Stony Point?

A I can't conceive of an accident to the Fermi 2 plant that would have any health effects -- and again -- let's put in the word "observable," to the residents of Stony Point.

End of Tk 10

T11-1
RJ:sw

BY JUDGE MORRIS:

Q Dr. Hungerford, are you familiar with what's called Wash 14 Hundred?

A (WITNESS HUNGERFORD) I sure am.

Q And are there not some immediate cancer deaths calculated to result from some of the postulated accident sequences in that study?

A (WITNESS HUNGERFORD) If you do remember -- I think you have to remember that our study is completely different from the study done in Wash 14. Wash 14 study included very large postulations and those -- through the population risk of probability studies.

Q I'd like you to try to answer my question as directly as you can.

A (WITNESS HUNGERFORD) Okay.

Q Were there or were there not early fatalities calculated from certain accident sequences in that study?

A (WITNESS HUNGERFORD) There were in that study there were some postulated calculations done on the risk probability of cancer, right.

Q Well, were there not, in fact, early fatalities calculated?

A (WITNESS HUNGERFORD) Early fatalities.

Q Yes.

A (WITNESS HUNGERFORD) Right.

Q And some of those accident sequences be postulated for boiling water reactor like Fermi 2?

A (WITNESS HUNGERFORD) I would be inclined to say that the conditions for the accidents in the Wash 14 Hundred Study are even much more severe than we can postulate it for our scenario.

Q I'm not talking about probability. I'm talking about postulated accident sequences.

When you calculated consequences of those sequences, isn't it a fact that there are early fatalities?

A (WITNESS HUNGERFORD) Okay. I guess what you're trying to get me to say is that Wash 14 Hundred calculations might possibly be applied to this Stony Point area.

It's true that Wash 14 Hundred Studies do postulate early fatalities. I don't see any real direct connection between those studies and the Stony Point study that we did, though.

Q I didn't say there was. I'm trying to get you to admit that there are accident sequences, however small the probability of them is, that could lead to fatalities at the Stony Point area.

A (WITNESS HUNGERFORD) Well, I guess -- I guess you can't rule out that kind of a -- it's a very small probability, but I guess you can't rule it out. Anything, I guess, is eventually possible.

Q I keep trying to tell you that I don't want to consider probabilities, but there are postulated sequences because the question you were asked earlier is whether or not there were any

credible sequences which could lead to early fatalities in the Stony Point area and I gather that your answer was negative?

A (WITNESS HUNGERFORD) Right.

Q And I want to differentiate between what's credible and not in terms of your judgment of what's probable and my judgment or anyone else's judgment, but for sophisticated studies of the potential effects of reactor accidents, there are credible sequences, according to those who have done the studies that lead to early fatalities?

A (WITNESS HUNGERFORD) I realize that I would have to say, though, that my own view, that it would be an incredible accident that would really affect the Stony Point people.

Q Well, I think from here we go to hair splitting and I don't want to do that.

BY CHAIRMAN MILHOLLIN:

Q Would it be possible for a person with the objective of calculating numbers which are the numbers in this table to work backwards from these numbers to the accident which you postulate?

If you don't understand my question, you can ask me to clarify it.

A (WITNESS HUNGERFORD) Yes, I would like a little clarification of what you're trying to say.

Go ahead. Would you clarify that?

Q Yes.

Suppose a person wanted to come up with results, and I'm

not suggesting that you or anyone else in this room is such a person.

Suppose a person wanted to come up with certain results in terms of dose and the persons were given certain factors to put into an equation. One of the factors was a road which was available for evacuation, one of the factors would be number of automobiles, number of people.

Now, suppose the person wanted to get just the numbers which we get on Table 4 as a result, the question is: Would it be possible to get these numbers by calculating backwards, starting with putting in the variables that I mentioned and deriving a postulated release which I assume would result with these numbers, result in coming up with these numbers?

A (WITNESS HUNGERFORD) I think that it would be possible, but difficult. I believe that you could calculate backwards and arrive at what we would call a source condition that would allow that release, but it would certainly be more difficult than going the other way.

CHAIRMAN MILHOLLIN: Thank you.

Do you have any questions.

JUDGE SCHINK: No.

CHAIRMAN MILHOLLIN: Do you have any?

JUDGE MORRIS: No.

CHAIRMAN MILHOLLIN: About time for lunch.

Are there any matters which anyone would like to bring

up before we break for lunch?

Then in that case, we shall adjourn until 2:00 o'clock.

(Luncheon recess)

CHAIRMAN MILHOLLIN: The hearing will come to order.

At this time are we ready for any possible redirect that there may be?

MR. VOIGT: I have only two points that I would like to clarify, Mr. Chairman.

REDIRECT EXAMINATION

BY MR. VOIGT:

Q Ms. Madsen, reference has been made in the testimony to the assumptions used in Table 3, including the fact that no credit was taken for shouldering, either by automobile or by houses.

Did that seem noncha -- was that same assumption; namely, no credit for shelter one of the assumptions that underlies Table 4 as well?

A (WITNESS MADSEN) Yes, that is true.

Q This morning you were asked a question or questions concerning the elevation of the Pointe Aux Peaux Road with relation to the one hundred year probable flood.

Have you been able to obtain any more precise information on that subject?

A (WITNESS MADSEN) Yes, I have.

Q What is the source of your information?

A (WITNESS MADSEN) Detroit Edison's cryptography section

and our engineering department, they have taken a USGS 7.5 quadrangle and measured the elevation of Pointe Aux Peaux Road and it is approximately 579.9 feet, New York mean tide and the one hundred year floor elevation for Lake Erie shoreline in the area shown on this map which goes from the Raisin River north to Swan Creek is approximately 577 feet.

Q Now, the elevation that you gave for the Pointe Aux Peaux Road, is that the lowest point?

A (WITNESS MADSEN) Yes, that was the lowest point.

CHAIRMAN MILHOLLIN: Could you state the elevation again of the lowest point?

A (WITNESS MADSEN) 579.9 feet.

BY MR. VOIGT: (Resuming)

Q So what is the difference between the lowest points on Pointe Aux Peaux Road and the one hundred year probable flood?

A (WITNESS MADSEN) 2.9 feet.

MR. VOIGT: Thank you.

I have no further questions, Mr. Chairman.

EXAMINATION BY THE BOARD

BY JUDGE SCHINK:

Q Just for reference purposes, could you give us some value for the average elevation of the lake?

A (WITNESS MADSEN) May I ask one of my colleagues in the room?

Q Sure.

A (WITNESS MADSEN) Wally.

A (WITNESS STREET) It's on the map there.

A (WITNESS MADSEN) 568.6. That's low water datum.

A (WITNESS STREET) Low water datum meant the average is about 572.

MR. VOIGT: Let the record show that Mr. Street who previously testified in this proceeding contributed to that answer.

CHAIRMAN MILHOLLIN: The Board has no further questions.

MR. VOIGT: In that event, Mr. Chairman, I would ask that this panel of witnesses be excused.

CHAIRMAN MILHOLLIN: Very well.

The panel is excused.

(Witnesses excused)

CHAIRMAN MILHOLLIN: Mr. Voigt, does this conclude your case on this contention?

MR. VOIGT: Yes, it does, Mr. Chairman.

CHAIRMAN MILHOLLIN: In that event, we're ready for the Intervenor's case on this Contention.

MR. HOWELL: I would call back to the stand from yesterday Mr. Frank Kuron. His testimony was previously bound into the record following page 367 of the transcript of March 31, 1982.

Based on the oral direct that was presented earlier this morning of the Detroit Edison Panel, I would request the opportunity to ask a limited series of questions to Mr. Kuron.

CHAIRMAN MILHOLLIN: Very well.

FRANK KURON,

called as a witness by counsel for the Intervenor, having previously been sworn by the Chairman, was further examined and testified as follows:

DIRECT EXAMINATION

BY MR. HOWELL:

Q Mr. Kuron, what is your position with the County of Monroe?

A I'm a County Commissioner, Monroe County, representing Frenchtown Township. I also sit on the County Civil Preparedness Board.

Q How long have you been on the County Government?

A Past year and a half.

Q To the best of your knowledge, what is the current position of the County Commissioners on acceptance of the siren warning system from Detroit Edison?

A Nothing.

Q They have no position?

A No.

Q They're not opposed to it?

A Never been presented to us.

Q Have they discussed it in their meetings?

A No.

Q Do they have any conditions that they would impose before they would accept it?

A Well, cost is the major item, money.

Q In other words, they're concerned about the maintenance of the system?

A Absolutely.

Q Is there a fire station located in your community?

A Yes, right on the -- near the end of Pointe Aux Peaux Road.

Q I should clarify, for the record, when I said your community, I meant Stony Point Community?

A Right.

Q What kind of station is it?

A It's a do all station, strictly volunteer firemen.

Q Who makes up the voluntary firemen?

A The local people living in the area.

Q Are those local people mainly employed?

A Yes, they are.

Q During the daytime, would they be out in the community?

A Many times.

Q What type of equipment is in that facility?

A There is a couple old pumpers in there, the old fire trucks from the various other stations.

Q What age?

A Pretty old.

Q Do you have any knowledge of the County's evacuation or emergency plan?

A From what I could read and what I hear and participation with the Civil Defense Director, you know, the Committee, the Commission itself, and over the years, I just might say, I have never missed a meeting concerning the evacuation plan.

Q Okay. I'm going to ask you to restrict your answers to my questions.

A Okay. What is it.

Q The question is: Do you have knowledge of the evacuation plan?

A Yes.

Q In what stage of preparation is the plan?

A My estimation is it's still nowhere.

Q If I said that the plant was going to open one year from today, would the plan be ready?

A No way.

MR. HOWELL: I have no further questions at this time. He is available for cross examination.

MR. VOIGT: No questions.

MS. WOODHEAD: The Staff has no questions.

CHAIRMAN MILHOLLIN: Mr. Kuron, you're excused.

A Could I give you -- I heard some discussion about the flood plan and so on and so forth.

Could I offer you this map? It's a HUD map, United States map of the flood plain in that area.

CHAIRMAN MILHOLLIN: There is no question pending, so

you may not offer it.

A I did hear you ask this young lady was the Pointe Aux Peaux in the flood plain.

In fact, the council had just directed several questions in that direction which I thought the answers were false.

CHAIRMAN MILHOLLIN: Well, there is no question posed to you, so I'm afraid you're not liberated to answer them.

A Okay. Thank you.

(Witness excused)

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T12
DC-pd

CHAIRMAN MILHOLLIN: I assume this concludes the Intervenor's case on this contention?

MR. HOWELL: That is correct, your Honor.

CHAIRMAN MILHOLLIN: So we are now ready for the Staff's case, which I understand will not be presented until tomorrow morning.

MS. WOODHEAD: That is correct. We are still waiting on two witnesses.

CHAIRMAN MILHOLLIN: We, therefore, have some time this afternoon available to us. Are there any matters which any party would advance for discussion during this time which we have available?

I might suggest to you that it could be fruitful for the parties to meet for the purpose of discussing the schedule for proposed findings.

If you do meet and do arrive at an agreed-upon schedule, the Board would consider it.

MR. VOIGT: Mr. Chairman, the Applicants have under consideration a possibility of recalling Mr. Street to the stand very briefly. I had not anticipated that we would be done quite this soon this afternoon, therefore, I was thinking about doing it tomorrow morning. However, if the Board would wish to grant a recess of, let's say, 15 minutes at this point, I think we could then come back and present Mr. Street this afternoon.

CHAIRMAN MILHOLLIN: I take it that Mr. Street would be

the only witness who would fall into this category, that is, you have no other witnesses whom you wish to recall?

MR. VOIGT: To the best of my knowledge at the present time, that is correct. I might say that the purpose of recalling Mr. Street would be to clarify some questions that were, or the facts with respect to some questions that were asked by Judge Schink yesterday afternoon about Redheads.

Just a moment.

(Discussion off the record.)

Very well, we shall adjourn for 15 minutes, and at the end of that adjournment, we will receive additional testimony.

MR. VOIGT: Thank you very much, your Honor.

(Recess.)

CHAIRMAN MILHOLLIN: Mr. Voigt, you may proceed.

MR. VOIGT: Thank you, Mr. Chairman.

At this time, Detroit Edison will recall to the witness stand, Mr. Walter M. Street.

Whereupon,

WALTER M. STREET,

called as a witness by counsel for the Applicant, having previously been duly sworn by the Chairman, was further examined and testified as follows:

REDIRECT EXAMINATION

BY MR. VOIGT:

Q Mr. Street, are you the same Walter M. Street who was

sworn as a witness and testified yesterday?

A Yes, I am.

Q Mr. Street, I direct your attention to a portion of yesterday's transcript beginning at page 391 and extending through page 393, and I ask you, sir, whether you've had an opportunity to review that portion of the transcript?

A Yes, I have.

Q I'd like to ask you some further questions concerning that subject, Mr. Street. At transcript, 391, there is a reference to the fact that Mr. Kuron displayed some concrete anchors to the Licensing Board.

Could you explain, sir, what kind of concrete anchor Mr. Kuron displayed to the Licensing Board and whether there is another kind of concrete anchor, as well?

A Yes. The kind of anchor displayed to the Board was a self-drilling shell type anchor. Phillips Redhead makes one, brand name of that type of anchor that we have used commonly at the plant.

The other type of concrete anchor used quite often is a wedge-type anchor. This is quite a bit different in appearance and installation than the shell-type anchor. The wedge anchor is a long bolt with a wedge and with two, one or two movable parts at the end that spread apart to wedge the bolt into a hole. The shell anchor here presented is a self-drilling shell anchor. It has teeth on the end of it and serrations on the side, actually

make it act as its own drill. So each anchor drills its own hole to the perfect size of the anchor. The anchor is then removed, the wedge inserted, and the anchor driven back into the hole. This action expands the shell against the side of the hole, and the friction holds the shell in place.

Sometime after that, then a bolt can be inserted into the shell and by pulling on the bolt or by torqueing the bolt to a certain level, you can determine whether the shell will hold its weld or not.

Q Did there come a time, sir, when the Detroit Edison Company instituted a program for the re-examination of shell anchors already installed at the Enrico Fermi Unit 2 Plant?

A Yes, we did.

Q What led to the institution of that program of re-examination, sir?

A Early in 1972, the NRC INE Branch -- excuse me, '79, early 1979, the INE Branch issued Bulletin 7902 on extension anchors used in concrete. As a result of this bulletin, we joined a users' group with 16 other utilities headed by Teledyne Engineering Company. Teledyne conducted a series of tests on the anchors designed to show their capability for various loading conditions. There were various anchors and various loading conditions.

One of the anchors that they tested was the Phillips self-drilling shell anchor. One of the loading conditions it was

tested under was the cyclic loads. There were various levels of cyclic loads for various amounts of, number of cycles. It demonstrated the anchor's capability of withstanding cyclic loads without vibrating loose, and the anchors were properly installed.

It also demonstrated that the anchors had a higher load capacity for dynamic loading than they did for static loading.

In order to provide our specific response to Bulletin 7902, we conducted an inspection of all of the pipe hangers, Class 1 pipe hangers in the plant that used those shell anchors. We had a checklist of things that we looked at on the anchors to insure that they were installed properly so that we could be assured that they would function as those tested by Teledyne Engineering. This testing consisted of looking at one bolt for each eighth plate that was installed, similar to what you'd do in checking structural bolts. If you found any problem with one bolt, you'd check 100 percent of the bolts in that attachment.

The results were then reported to INE Granch in our response to Bulletin 7902.

MR. VOIGT: I have no further questions, Mr. Chairman.

BOARD EXAMINATION

BY JUDGE SCHINK:

Q Approximately what fraction of the time did you find trouble with the anchors?

A I don't have the exact percentage. I know that the only, on the few places where we did find they didn't pass our

inspection checklist, that the problem was that the shell was not driven in all the way. It was a matter of driving the shell in the rest of the way. It was a relatively low percentage. I don't have the exact figure.

MR. VOIGT: If there are no further questions by the Board or the other parties, I would ask that Mr. Street once again be excused.

CHAIRMAN MILHOLLIN: You're excused.

(Witness excused.)

MR. VOIGT: As previously indicated, Mr. Chairman, that is the only additional material that the Applicant presently intends or wishes to present.

CHAIRMAN MILHOLLIN: Then the only remaining item for us to consider is the Staff testimony which will be presented in the morning.

How much cross examination will the CEE conduct, can you give us an estimate of the time?

MR. HOWELL: I don't believe it will be extensive, probably a half an hour in total.

CHAIRMAN MILHOLLIN: Very well. There being nothing further before the Board, we will therefore adjourn until 9:00 o'clock tomorrow morning.

(Whereupon, proceedings in the above-entitled matter adjourned until Friday, April 2, 1982, at 9:00 a.m.)

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NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

Administrative Judge Gary Milhollin, Chairman

in the matter of: ENRICO FERMI ATOMIC POWER PLANT, UNIT 2

Date of Proceeding: Thursday, April 1, 1982

Docket Number: 50-341

Place of Proceeding: City Hall
Monroe, Michigan

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

RAMONA W. JACKSON

Official Reporter (Typed)

Ramona W. Jackson

Official Reporter (Signature)

DOLORES CRABTREE

Official Reporter (Typed)

Dolores Crabtree

Official Reporter (Signature)

Philip A. Liburdi

PHILIP A. LIBURDI

Official Reporter (Typed)

Philip A. Liburdi

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