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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY	)	Docket No. 50-289
	)	(Restart)
(Three Mile Island Nuclear Station, Unit No. 1)	)	
	)	

LICENSEE'S TESTIMONY OF ROBERT E. ROGAN, GEORGE J. GIANGI AND ALEXIS TSAGGARIS ON THE ADEQUACY OF ONSITE EMERGENCY PREPAREDNESS AT THREE MILE ISLAND, UNIT 1

Volume 1 -- Testimony

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Volume 1 -- Testimony

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Outline

This testimony deals with the adequacy of onsite emergency preparedness at Three Mile Island, Unit 1. It addresses short-term action item 3 and long-term action item 4 from the Commission's August 9, 1979 "Order and Notice of Hearing," Board Question 4, and the onsite emergency planning contentions raised by intervening parties in this proceeding. In addition, this testimony demonstrates Licensee's compliance with the Commission's recently revised emergency planning regulations (45 Fed. Reg. 55402-13 (August 9, 1980)) and with the guidance set forth in NUREG-0654 (Rev. 1, November, 1980).

I. Introduction. The witnesses are identified, their involvement with emergency preparedness at TMI is described, the purposes and organization of the testimony are explained, and the guidance used in developing the TMI-1 Emergency Plan is set forth.

II. Development of the TMI-1 Emergency Plan. The historical development of the initial and three revisions to the Emergency Plan is described. The coordination between the Emergency Plan, on the one hand, and other TMI programs, the state emergency plan, the five county emergency plans, and local emergency preparedness, on the other hand, is explained. The status of NRC and FFMA reviews is set forth.

III. Overview -- Concept of Operations. The division of responsibility between onsite and offsite emergency planning is explained. Licensee's emergency preparedness program at TMI,

including the distinction between the Emergency Plan and the Implementing Document, is described. Major elements of the Emergency Plan are summarized through a hypothetical application of the Emergency Plan to a small break loss-of-coolant accident.

IV. Organization and Coordination. There are three parts to this section. The first part describes the various emergency organizations, both onsite and offsite; the letter of agreement between Licensee and certain offsite agencies are discussed in this part. The second part describes the onsite and offsite emergency response facilities. And, the third part describes the communication links between the various emergency response facilities.

V. Initial Accident Assessment. The information necessary to assess an emergency condition at TMI is described. The classification of accidents is explained, including a definition of protective action guides and an analysis of Licensee's emergency action levels. The monitoring and assessment of radiation releases is described. This discussion includes an evaluation of ARAC, Licensee's REMP, and real-time offsite monitoring devices that can be remotely read onsite.

VI. Initial Accident Notification. The initial calls to Dauphin County and PEMA are identified. The reason why the other four risk counties are not called, except in a General Emergency, is explained. The role of BRP in this communication scheme is summarized. Public dissemination of information is described.

VII. Onsite Emergency Response. The mobilization of Licensee's emergency organizations and the onsite equipment available to assist in responding to an emergency is summarized.

VIII. Offsite Emergency Response. This section demonstrates the coordination between Licensee's onsite emergency plan and the offsite emergency response plans. The plume exposure pathway EPZ and the ingestion exposure pathway EPZ for the TMI site are identified. The geographic extent of the plume exposure pathway EPZ is justified in terms of the functions necessary for an adequate offsite response, including public education, early warning, notification to the public about the emergency, and protective action options.

IX. Maintaining Emergency Preparedness. Licensee's program to maintain an adequate state of emergency preparedness at TMI is described. This program consists of training, drills and exercises, and annual audits and reviews of the Emergency Plan.

I. Introduction

Q.1 Please state your name and business address.

A.1 (Witness Rogan): My name is Robert E. Rogan. I am the Manager-Emergency Preparedness for GPU Nuclear, Post Office Box 480, Middletown, Pennsylvania 17057.

(Witness Giangi): My name is George J. Giangi. I am the Supervisor-Emergency Preparedness at Three Mile Island, Post Office Box 480, Middletown, Pennsylvania 17057.

(Witness Tsaggaris): My name is Alexis Tsaggaris. I am a Vice President of Energy Consultants, Inc., 121 Seventh Street, Pittsburgh, Pennsylvania 15222.

Q.2 Have you prepared a statement of professional qualifications?

A.2 We each have prepared a statement of professional qualifications, attached to this testimony as Appendix A.

Q.3 Describe your involvement with emergency preparedness at Three Mile Island.

A.3 (Witness Rogan): I have held the title of Manager-Emergency Preparedness for GPU Nuclear since October 1, 1980. In that position I am generally responsible for emergency preparedness activities at both Three Mile Island ("TMI")[1] and Oyster Creek. With respect

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1 A list of abbreviations used in this testimony is included as Appendix B.

to TMI, I have reviewed and supervised the preparation of Revision 3 to Licensee's Emergency Plan. Currently, I am supervising the preparation of the Emergency Plan Implementing Procedures ("EPIP's") that will be submitted to the NRC on March 1, 1981.

(Witness Giangi): I was appointed Emergency Planning Coordinator at TMI on February 8, 1980. In November, 1980, I became Supervisor-Emergency Preparedness at TMI. In these positions I was directly responsible for the preparation of Revisions 2 and 3 to Licensee's Emergency Plan, and the accompanying EPIP's. In addition, I am responsible for conducting the necessary emergency drills and exercises, assuring that an adequate Emergency Plan training program is implemented, and periodically checking that necessary emergency equipment is properly calibrated and maintained.

(Witness Tsaggaris): Between 1976 and 1977 I held the title Supervisor of Training at TMI. In that position I was responsible for conducting the annual series of emergency drills, developing appropriate drill scenarios, and providing necessary documentation, including drill critiques. On the third day after the Unit 2 accident I was recalled to the site

and designated the senior utility representative in Unit 1 responsible for offsite radiological dose assessment, control of the mobile radiological monitoring teams, and communication of information to the Nuclear Regulatory Commission ("NRC") and the Pennsylvania Bureau of Radiation Protection ("BRP") on airborne and liquid radioactive releases. During the summer of 1979 I was appointed Director of Site Emergency Planning and was directly responsible for preparation of the initial version of Licensee's updated Emergency Plan, and Revision 1 to that plan. On December 31, 1979, I left Metropolitan Edison, but have continued my involvement in the TMI emergency preparedness program as a consultant to the company.

Q.4 What is the purpose of your testimony in this proceeding?

A.4 The purpose of our testimony is to describe the status of emergency preparedness at TMI-1, and to demonstrate compliance with the applicable portions of the NRC's rule on emergency planning. 45 Fed. Reg. 55402-13 (August 19, 1980). This testimony also responds to matters covered by: (a) short-term action item 3 and long-term action item 4 of the NRC's August 9, 1979 Order and Notice of Hearing; (b) Licensing Board Question 4; and (c) the onsite

emergency planning contentions raised by intervening parties in this proceeding.

Q.5 Describe the manner in which you have organized your testimony.

A.5 Generally, we have organized our testimony to follow sequentially the events that might unfold during an actual emergency. Following this introductory section of the testimony, there is a background section that addresses development of the TMI-1 Emergency Plan. The third section of this testimony, entitled Overview -- Concept of Operations, is intended to sketch briefly the entire Emergency Plan by tracing a hypothetical accident scenario. The purpose of this overview is to assist in placing in context each individual element of the Emergency Plan; these elements are described in greater detail in succeeding sections of the testimony. The fourth section of the testimony, on organization and coordination, identifies the relevant emergency organizations and their staffing, the various emergency response facilities, and the communication links that tie the various organizations and facilities together. The next four sections of the testimony address initial accident assessment, initial accident notification, onsite emergency

response and offsite emergency response, respectively. The final section of the testimony describes the methods used to maintain an adequate state of emergency preparedness at TMI. These methods include training programs, drills and exercises, and periodic reviews and updates of the Emergency Plan.

Attached to the testimony as Appendix C is a list of the intervenor contentions addressed in the testimony. Although the testimony does not respond to these contentions seriatim, the testimony has been annotated in the left-hand margin to indicate those parts of the testimony that respond to specific contentions.

Q.6 In developing the TMI-1 Emergency Plan, did you rely on guidance provided by the NRC?

A.6 Yes. Initial guidance on revised emergency planning requirements was provided in NRC-sponsored workshops held during August, 1979. The NRC then published interim acceptance criteria in September, 1979. These interim acceptance criteria were explained and elaborated upon in public technical meetings held with the NRC Emergency Planning Task Force in September, 1979. Additional guidance from the NRC

was contained in draft NUREG-0610 (September, 1979) and draft NUREG-0654 (January, 1980). On August 19, 1980, the NRC published in the Federal Register its final emergency planning rule, and in November, 1980, Revision 1 to NUREG-0654 was issued. In addition, specific comments by the NRC Staff on the TMI-1 Emergency Plan have been incorporated in the latest revision (Revision 3) of the plan.

II. Development of the TMI-1 Emergency Plan

Q.7 How was this guidance used in developing the TMI-1 Emergency Plan?

A.7 (Witness Tsaggaris): The NRC Staff conducted several visits to the TMI site during September, 1979. On September 25 and 26, the NRC Emergency Plan Task Force held public meetings with Licensee's representatives at the Liberty Firehouse in Middletown. At these meetings the NRC explained their upgraded requirements for emergency planning and Licensee's representatives described the methods Licensee anticipated using to satisfy these new requirements. On September 27, the public meeting was expanded to include representatives from the Pennsylvania Emergency Management Agency ("PEMA"), BFP, and the five counties of Dauphin, York, Lancaster, Cumberland and Lebanon.

On the basis of these meetings, Licensee prepared its upgraded Emergency Plan. The initial version of the plan was submitted to the NRC in October, 1979, and Revision 1 of the Emergency Plan was submitted in November, 1979.

(Witness Giangi): The NRC "Status Report on the Evaluation of Licensee's Compliance with the NRC Order Dated August 9, 1979" (January 11, 1980) concluded that Revision 1 of the Emergency Plan complied with the NRC's short-term action items 3(a), 3(b), 3(c) and 3(d) (at p. C3-5) and demonstrated reasonable progress toward completion of the NRC's long-term action items 4(a) and 4(b) (at p. D4-1). It was indicated that a test exercise of Licensee's Emergency Plan would be required to comply with short-term action item 3(e).[2]

In January, 1980, the Federal Emergency Management Agency ("FEMA") and NRC jointly issued "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants -- For Interim Use and Comment" (NUREG-0654/FEMA-REP-1). By letter dated April 28, 1980,

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2 These conclusions were reaffirmed in the "Evaulation of Licensee's Compliance with the Short and Long Term Items of Section II of NRC Order dated August 9, 1979" (NUREG-0680, June, 1980) at pp. C3-5 and D4-1.

Licensee was requested to revise its Emergency Plan to meet the new planning standards of NUREG-0654. Licensee submitted Revision 2 of its Emergency Plan in June, 1980, to comply with the guidance in NUREG-0654.

By letter dated September 9, 1980, the NRC requested Licensee to respond to 23 comments on Revision 2 of the Emergency Plan. On November 3 and December 29, 1980, Licensee responded to these comments. After completing its review of the Emergency Plan against NUREG-0654, the NRC wrote to Licensee on November 5, 1980, authorizing implementation of the plan since it "provides a greater margin for public health and safety." In the meantime the NRC had revised its emergency planning criteria and Licensee was preparing Revision 3 of the Emergency Plan to satisfy these new standards (see discussion in the next paragraph). Therefore, on December 10, 1980, Licensee informed the NRC that it intended to implement Revision 3 of the plan on January 2, 1981, at the same time it submitted the revised plan to the NRC.

Revision 3 of the Emergency Plan was developed to satisfy the requirements of the NRC's new emergency

planning rule, which became effective on November 3, 1980, and the additional guidance in Revision 1 to NUREG-0654, also released in November, 1980.

Q.8 Is the TMI-1 Emergency Plan coordinated with other programs at TMI?

A.8 Yes. The TMI Security Plan, Radiation Protection Plan, Fire Protection Program Plan, Emergency Public Information Plan, and Emergency and Abnormal Operating Procedures all have been closely coordinated with the TMI-1 Emergency Plan. Procedures for the previously referenced programs interface with the EPIP's in such areas as site accountability, emergency action levels, and news releases. Further information on the relationship between the Emergency Plan and other programs at TMI is provided at Section 4.2.2.2 of the Emergency Plan.

In addition, a formalized emergency plan training program currently is being developed which coordinates the TMI-1 Emergency Plan and the EPIP's.

Q.9 Has the Commonwealth of Pennsylvania been involved in development of the TMI-1 Emergency Plan?

A.9 Yes. Throughout the planning process Licensee's personnel have met with various state agencies, including PEMA and BRP. This coordinated planning

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EP-15(E)

process began with agreement on organization and communication concepts and continued throughout the detailed planning stage. Items discussed at these meetings -- for example, initial and continuing notification procedures, early warning systems, evacuation time studies, and the specific support role of the BRP -- assured that the proper interface occurred between onsite and offsite emergency planning agencies. In addition, discussions were held on the nature and extent of planning assistance that Licensee would provide to offsite agencies.

Q.10 Have the emergency response plans for the counties of Dauphin, York, Lancaster, Cumberland, and Lebanon been coordinated with the TMI-1 Emergency Plan?

A.10 Yes. Notification procedures, communication systems, resources available, warning systems and the TMI-1 Emergency Plan were discussed during meetings with the various county emergency management directors. These meetings took place at the TMI site, PEMA headquarters, and in the various local emergency operations centers ("EOC's"). Close interface between PEMA and Licensee has assured effective coordination with the five risk counties since PEMA is the lead offsite coordinating agency. NUREG-0654 concepts and terminology have been accepted as the basis for all emergency response plans.

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15(E)

Q.11 Describe Licensee's involvement in the development of municipal emergency response plans.

A.11 As a result of discussions with PEMA and the county emergency management directors, it was determined that the local municipalities were in need of assistance in completing their emergency plans. The county staffs were, for the most part, fully committed to their own planning effort and could not provide the assistance required. As a result, Licensee retained the services of Kline, Knopf & Wojak (government relations consultants) to assist in the planning effort. After initial meetings with PEMA, team members consulted with county emergency management directors to ascertain needs of the local municipalities. Team members visited each of the local municipalities in the plume exposure pathway emergency planning zone ("EPZ") to offer assistance. In most cases, the consulting team assisted by ensuring that local plans followed certain formats and were coordinated with the county planning effort.

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:P-15(E)

Q.12 What is the current status of NRC review of the TMI-1 Emergency Plan?

A.12 In December, 1980, the NRC published "Emergency Preparedness Evaluation for TMI-1" (NUREG-0746). The abstract to that document states in relevant

part: "The Three Mile Island Unit 1 Emergency Plan generally meets the requirements of 10 CFR 50.47b and conforms to the guidance found in NUREG-0654, Revision 1 except for several specific items which are identified." These exceptions and the status of Licensee's corrective actions are shown on Table 1 to this testimony.

Q.13 Do you know the current status of FEMA's review of the emergency response plans for the Commonwealth of Pennsylvania and the five counties of Dauphin, York, Lancaster, Cumberland, and Lebanon?

A.13 (Witness Rogan): On January 6, 1981, FEMA transmitted to the NRC its "Review of Pennsylvania REP Planning Site-Specific to Three Mile Island Nuclear Station." This interim analysis of the state and five risk county emergency response plans concludes that these plans are "in an initial development stage and that this is an inappropriate time within the planning process to attempt to provide conclusive statements on the adequacy of TMI related planning." PEMA has informed me that this review reflects FEMA's evaluation of the general status of emergency planning in the November, 1980 time frame. Since that time, PEMA has advised me that it has undertaken substantial additional work on the emergency plans.

III. Overview -- Concept of Operations

Q.14 Describe the division of responsibility for emergency planning between Licensee and the Commonwealth of Pennsylvania.

A.14 The assignment of planning responsibilities is clearly defined in state and federal regulations. NUREG-0654 details the objectives and criteria necessary to develop complete and comprehensive emergency plans. Specific areas of responsibility are emphasized. In general, Licensee is responsible for all activities which occur onsite while the state and counties are responsible for offsite activities. In order to fulfill its onsite responsibilities, Licensee relies on various offsite agencies, both governmental and private, to provide assistance beyond that available onsite. Similarly, the Commonwealth of Pennsylvania relies on Licensee to provide necessary information on plant status and radiation releases so that the state and county governments can carry out their offsite responsibilities.

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Recognizing the joint nature of their responsibilities, Licensee and the relevant governmental agencies have taken steps to ensure a coordinated response. These steps include coordinated preplanning, redundant communication systems, and

Licensee-conducted training sessions for offsite agencies. Periodic drills test communication links, offsite response of state and county agencies, and coordination among the various agencies.

Q.15 With respect to the onsite responsibilities you referred to, describe the emergency preparedness program at TMI-1.

A.15 The Vice President Nuclear Assurance is responsible for nuclear safety assessment, quality assurance, training and education functions, system laboratories, and emergency preparedness. This Vice President reports to the Executive Vice President, GPU Nuclear. There currently are nine personnel assigned to the Emergency Preparedness Department who are located at TMI, including the Manager-Emergency Preparedness and a site Supervisor-Emergency Preparedness. The Emergency Preparedness Department is charged with overall responsibility for emergency planning and for assuring the maintenance of an appropriate state of emergency preparedness at TMI.

In order to carry out these responsibilities, the TMI Emergency Preparedness Department has developed two separate, but coordinated, documents: the TMI-1 Emergency Plan and the Implementing Document.

Q.16 Please explain further the distinction between the TMI-1 Emergency Plan and the Implementing Document.

A.16 The role of the Emergency Plan is as follows:

Pursuant to 10 C.F.R. §§ 50.54(q) and (u), an operator of a licensed nuclear power plant is required to submit a radiological emergency response plan which meets the standards of 10 C.F.R. § 50.47(b) and Part 50, Appendix E. This emergency plan describes the facility's overall state of emergency preparedness. It is a detailed document which includes, among other matters, organization and communication concepts, emergency action levels, assessment actions, emergency facility details, emergency mobilization and response actions, training, recovery, and letters of agreement with outside agencies. The emergency plan provides the basis for developing additional documents, such as the implementing procedures, training program, and equipment inventories.

The role of the Implementing Document is as follows:

The Implementing Document provides a single source of pertinent and significant information related to emergency preparedness at TMI-1. It contains the procedures that would be required to: (a) ensure the operational readiness of the Emergency Plan, and (b) direct the proper response by emergency personnel.

While the Emergency Plan is a basic reference document, the Implementing Document is actually used by station personnel during an emergency.

The Implementing Document is distributed to those individuals, agencies, organizations, and facilities requiring the immediate availability of such information in an emergency. The detailed EPIP's included in the Implementing Document will, as necessary and appropriate, be used to assess conditions, classify the emergency, make required notifications, provide directions for requesting assistance, and provide step-by-step instructions for initiating protective and corrective actions.

Q.17 What are the basic elements in responding to an emergency at TMI-1 that you considered in developing the Emergency Plan?

A.17 The basic elements in responding to an emergency are:

1. Assessment of plant conditions and classification of the emergency following an accident.

2. Notification of offsite agencies and support groups.

3. Mobilization of the applicable portion of the emergency organizations to cope with the situation and continue accident assessment.

These elements were considered in establishing the TMI-1 emergency response organization, communication

capabilities, need for response facilities and equipment.

Q.18 Assume that there was a small break loss-of-coolant accident ("LOCA") greater than make-up capacity at TMI-1. Briefly describe how the Emergency Plan would be implemented.

A.18 A small break LOCA of this magnitude initially would be indicated by makeup tank level decreasing and makeup flow increasing. Reactor coolant pressure would decrease, the reactor and turbine would trip, and the emergency core cooling system ("ECCS") would initiate. Containment pressure would increase such that the cause of ECCS initiation could be either high containment pressure (4.0 psig or greater) or low reactor coolant pressure (1600 psig or lower).

The control room operators initially would be made aware of the situtation by alarms, instrument readings, or reports. The operators would ensure that the shift foreman and the shift supervisor were immediately informed.

The shift supervisor, when informed of the emergency, is responsible for assessing the emergency (e.g., plant systems and reactor core status, and radiological conditions). He would determine what immediate actions must be taken and ensure that the procedure

for "Loss of RC/RC Pressure (Small Break LOCA) Causing Auto HP Injection" (1202-6B) is implemented. The shift technical advisor would advise and assist the shift supervisor on matters pertaining to the safe and proper operation of the plant with regard to nuclear safety. One step in the follow-up action section of procedure 1202-6B would refer the operator to the EPIP on Site Emergency (1004.3), and direct him to inform the shift supervisor or shift foreman that a Site Emergency action level had been reached.

In this case, the shift supervisor would classify and declare the emergency as a Site Emergency and would implement the applicable EPIP. This would set in motion corrective actions and offsite notifications. We believe that the emergency could be assessed and declared within 10 minutes.

Q.19 After the initial assessment function had been completed, what would happen next?

A.19 The shift supervisor would assume the duties of the Emergency Director and announce to all station personnel over the public address system in Units 1 and 2 that a Site Emergency had been declared in Unit 1 and instruct the onsite emergency organization personnel to report to their stations. All non-essential personnel would be instructed to assemble

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at the respective Unit 1 and Unit 2 warehouses. Initial notifications would be made as follows: (1) Dauphin County EOC; (2) PEMA EOC (staff duty officer); (3) unaffected control room; (4) NRC (Bethesda); (5) Institute of Nuclear Power Operations ("INPO"); (6) Babcock & Wilcox ("B&W"); and (7) American Nuclear Insurers ("ANI").

PEMA would immediately notify BRP and all five counties within the ten mile radius. BRP would confirm the existence of an emergency situation at TMI by activating the Radiological Line to the Unit 1 Emergency Control Center (control room). This line would be manned to maintain continuous communicat on throughout the emergency. Once BRP has verified that all five counties have been notified, it would advise the TMI Emergency Director accordingly.

Parallel to these notifications, the duty section superintendent would be called and informed of the emergency by the Emergency Director (shift supervisor). Callout of duty section personnel required to augment the onsite and offsite emergency organizations would begin.

Q.20 What might Licensee's response be to this situation?

A.20 Upon declaration of a Site Emergency, the entire onsite and offsite emergency organizations would

report to their respective emergency facilities. The onsite emergency facilities include the Emergency Control Center ("ECC"), Technical Support Center ("TSC") and Operations Support Center ("OSC"). The offsite emergency facilities include the Nearsite Emergency Operations Facility ("EOF"), Alternate Emergency Operations Facility ("AEOF"), Environmental Assessment Command Center ("EACC") and Parsippany Technical Functions Center ("TFC").

The ECC, located in the Unit 1 control room and adjacent shift supervisor's office, is the area where the command and control of all site-related emergency efforts and plant operations take place. Key personnel stationed in the ECC would be the Emergency Director, Radiological Assessment Coordinator ("RAC"), Operations Coordinator and the Communicator. Major functions performed in this facility include onsite and offsite radiological assessment, offsite notifications, operational control of the plant and communication of technical data to BRP and NRC.

The TSC, located in proximity to the TMI-1 control room, contains the instrumentation needed to monitor plant status for a safe shutdown of the reactor when the control room is uninhabitable. The key personnel

stationed in the TSC would be the TSC Coordinator and TSC engineers from the various disciplines. The TSC serves as an area outside the control room to accommodate personnel acting in support of the command and control functions by furnishing more in-depth diagnostic and corrective engineering assistance.

The OSC, located at the radiological controls access control point, provides an area in which shift personnel can gather for subsequent assignment to duties in support of emergency operations. Key personnel manning this center would be the OSC Coordinator, Chemistry Coordinator, Radiological Controls Coordinator and Emergency Maintenance Coordinator. The major functions of these personnel are to initially dispatch radiological monitoring teams and to support operations in the areas of chemistry, radiological controls and maintenance.

The EOF, located at the TMI Observation Center, serves as the central point for: (a) providing overall corporate management and direction in responding to an emergency, (b) coordinating administrative and logistical support, (c) interfacing with state and county representatives, and (d)

establishing the basis for long-term recovery efforts. Key personnel located at the EOF would be the Emergency Support Director, Emergency Support Staff, Assistant Environmental Assessment Coordinator, Public Affairs Representative, Emergency Planning Representative, Group Leader Chemistry Support, Technical Support Representative, and NRC and state representatives.

The AEOF, located at the Crawford Station in Middletown, houses key positions of the offsite emergency organizations. Personnel at the AEOF would be the Group Leader Administrative Support, Group Leader Radiological Controls Support, Group Leader Security Support and Maintenance and Construction Manager. Major functions performed at this facility would be security and dosimetry processing of support personnel, maintenance support, call-out of additional support personnel and administrative support. The AEOF also serves as a back-up EOF, should the EOF become uninhabitable.

The EACC, located at Olmsted (Harrisburg International) Airport would be manned by the Environmental Assessment Coordinator ("EAC") and his staff of scientists. The major functions of these

personnel would be to perform and assess all offsite radiological and environmental monitoring.

The TFC, located in Parsippany, New Jersey, is where the Group Leader Technical Support and his staff report. The major functions of these personnel would be to provide technical leadership, guidance, analysis, evaluation and recommendations to the plant staff.

Q.21 What would the offsite response be in this situation?

A.21 Based on the state and county emergency response plans, and our discussions with state and county personnel, the following additional notifications would take place. PEMA would notify BRP and the five risk counties. BRP would immediately call TMI-1 to make an initial radiological assessment and to verify Licensee's call to PEMA. Once the emergency has been assessed, BRP would call PEMA, inform them of plant status, and advise them whether any protective actions need be taken. BRP would then activate its emergency organization and establish an open line of communications with Licensee's RAC located in the ECC.

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Q.22 How would the emergency be closed out?

A.22 In the specific case of the small break LOCA, which was initially classified as a Site Emergency, the emergency would be closed out by shutting down and cooling down the reactor and isolating the leak.

The Emergency Director and Emergency Support Director then have joint responsibility for determining and declaring when the emergency situation is stable and has entered the recovery phase. They would evaluate the status of the emergency by monitoring instruments and reviewing all current and pertinent data available from emergency response and radiological monitoring teams. They would consider the emergency under control and in the recovery phase only when the following general guidelines are met:

1. Radiation levels in all in-plant areas are stable or are decreasing with time.
2. Releases of radioactive materials to the environment from the plant are under control or have ceased.
3. Containment pressure is at normal levels.
4. Reactor plant is stable and in a long-term safe shutdown condition.
5. Any fire, flooding, or similar emergency conditions are controlled or have ceased.

Based or the sequence of events, one of the following would occur:

1. A lower class of emergency might be declared by the Emergency Director and the appropriate procedures would be implemented.

2. The Site Emergency might be closed out, with the concurrence of the Emergency Support Director, provided no recovery operations were required.

3. The Site Emergency might be shifted to a recovery mode by implementing the Recovery Operations Procedure (1004.24).

If the emergency is being reclassified, the NRC, Unit 2 control room, and other organizations as specified in the appropriate EPIP would be notified. BRP is in continuous contact with the TMI site and would be updated as necessary. BRP, in turn, would notify PEMA, who would notify the five risk counties.

If the Recovery Operations Procedure is being implemented, the appropriate organizations would be notified of the closeout of the emergency and that recovery operations are about to begin.

Q.23 Would you briefly describe what would happen if, instead of closing out the emergency, the situation continued to worsen?

A.23 Accident assessment would continue throughout the emergency, and if conditions warrant, the Emergency Director would escalate the emergency to a General Emergency. Notifications would be made to the five risk counties and to other organizations as specified in the EPIP for a General Emergency.

The assessment actions for the General Emergency generally would be the same as for the Site Emergency, with some possible shift of emphasis to greater offsite monitoring and dose projection efforts extending to distances farther from the plant. Additionally, since the projected doses are likely to be much closer to the U.S. Environmental Protection Agency's ("EPA") protective action guides ("PAG's"), greater emphasis would be placed on the assessment of release duration for the purpose of making protective action recommendations.

IV. Organization and Coordination

Q.24 Would you describe Figure 1, Licensee's Onsite Emergency Organization?

A.24 The major functional responsibilties within the onsite emergency organization are vested in the Emergency Director, the Operations Coordinator, the OSC Coordinator, the RAC, the TSC Coordinator, and the Security Coordinator. In addition, the Communicator provides communications support for the onsite emergency organization.

The Vice President TMI-1, Manager TMI-1, or their designated alternate, performs the duties of the Emergency Director. Until his arrival at the site,

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the shift supervisor assumes the duties of the Emergency Director. If the shift supervisor is unavailable or becomes incapacitated for any reason, the shift foreman assumes this position. The Emergency Director has the authority and the responsibility to immediately and unilaterally initiate any emergency action, including providing protective action recommendations to authorities responsible for implementing offsite emergency measures. The Emergency Director must classify and declare the emergency, and ensure that all required notifications are made, including those to offsite emergency response organizations. The Emergency Director implements the TMI Emergency Plan through the use of specific EPIP's, activates necessary portions of the emergency organization, and performs the other functions described in Section 4.5.1.3.1 of the Emergency Plan. The Emergency Director would report to the ECC, and communicate with the Operations Coordinator, TSC Coordinator, RAC and Security Coordinator. He also would communicate with the offsite emergency organization through the EOF.

The Operations Coordinator is responsible for directing operations and operations support activities through the shift supervisor and the OSC

Coordinator. The Operations Coordinator reports to the Emergency Director and works closely with him in assessing plant conditions. He has no direct communication links with onsite or offsite agencies.

The OSC Coordinator is responsible for supporting operations in the areas of maintenance, radiological controls and chemistry. He reports to the Operations Coordinator and has the Emergency Maintenance Coordinator, Radiological Controls Coordinator, and Chemistry Coordinator reporting directly to him.

The RAC is responsible for guiding the Radiological Controls Coordinator and the Radiological Analysis Support Engineers. In addition, he is responsible for coordinating the activities of various emergency response teams. As required, he would direct the OSC Coordinator to dispatch onsite and offsite radiological monitoring teams that would report directly back to him. He would coordinate initial radiological assessment activities, review results, and report findings and make recommendations to the Emergency Director. He would interface with the EAC on radiological and environmental matters. The RAC maintains communications with BRP in order to update them on emergency status.

The TSC Coordinator and his staff of engineers report to the TSC. They are responsible for analyzing current and projected plant status and, through close communication with the Emergency Director via the Communicator, providing technical support, in-depth diagnostic and corrective engineering assistance, and recommendations regarding corrective actions. The specific duties of this group are described in Section 4.5.1.3.2.b of the Emergency Plan.

The TMI site security force operates in accordance with requirements established in the Security Plan and associated procedures. In emergency situations, the security force reports to the Security Coordinator, who, in turn, reports to the Emergency Director. The security force is responsible for personnel accountability, site access control, and plant security.

The Communicator functions as a communication liaison between the Emergency Director and the onsite and offsite emergency organizations. He reports to the ECC (shift supervisor's office) and controls the flow of information across the Operational Line and maintains communication between the TSC and the ECC with an intercom. Designated Communications

Assistants are responsible for maintaining communication with the NRC, making necessary notifications to offsite agencies, and keeping a record (log) of all incoming and outgoing communications.

Additional information on the onsite emergency organization is included in Section 4.5.1.3 of the Emergency Plan.

Q.25 How does each member of the TMI-1 staff know what position he is to fill in the onsite emergency organization?

A.25 A duty roster has been developed to ensure that all positions in the onsite emergency organization are fully staffed. One section of the duty roster is always on call. Each individual on the duty roster is preassigned a position in the onsite organization and is instructed as to what his functions are, where he is to report, and to whom he is to report. Duty roster personnel are responsible for maintaining a working knowledge of the current TMI Emergency Plan, Implementing Document, and other related station programs, plans, and procedures. Individuals generally are assigned positions in the emergency organization which closely parallel their normal everyday duties. Particular assignments are based on

the selection criteria included in Table 8 of the Emergency Plan, training received, and driving distance from residence to the site.

Q.26 When an emergency initially is declared, are there sufficient personnel on-shift to staff the onsite emergency organization?

A.26 Yes. Table 2 of this testimony shows the minimum shift complement of 20 onsite at all times, and the onsite emergency organization positions that they would fill upon declaration of an emergency. This is twice the on-shift complement required by Table B-1 of NUREG-0654 (Rev. 1). Moreover, this on-shift complement is more than adequate to promptly perform the initial accident assessment and notification functions of the emergency organization.

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EP-4(J)(2)
EP-4(J)(3)

In particular, there are adequate personnel so that the Emergency Director (shift supervisor) may assign two control room operators to monitor the plant (CRO #1 and Tagging & Switching CRO), a third control room operator to initiate calls to Dauphin County, PEMA, NRC and the unaffected control room, and additional personnel (chosen from the four auxiliary operators, two radiological controls technicians, and four maintenance personnel available) to conduct onsite and offsite radiological surveys.

EP-4(J)(1)

Q.27 How many people with radiological controls (health physics) training will be available to man the onsite emergency organization?

A.27 Immediately available would be one radiological controls foreman and three radiological controls technicians. The three technicians can be split up to provide radiological monitoring and in-plant radiological controls. Within sixty minutes of the declaration of an emergency, a senior radiological controls engineer would be available to assume the position of RAC, two Radiological Analysis Support Engineers would be available to assist the RAC, and three additional radiological controls technicians would be available. In summary, four people trained in radiological controls would be available initially and ten (six additional) would be available within sixty minutes.

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EP-4(J)(4)

In addition, the EACC can be manned and operational within six hours after declaration of an emergency. The EACC can supply four one-man teams and a two-man mobile monitoring laboratory. This can be augmented by three additional one-man teams, should it become necessary.

Q.28 Would you describe Figure 2, Licensee's Offsite Emergency Support Organization?

A.28 The key elements of the offsite emergency support organization include the Emergency Support Director, Emergency Support Staff, Public Affairs Representative, Emergency Planning Representative, Group Leader Administrative Support, EAC Group Leader Radiological Controls Support, Group Leader Chemistry Support, Group Leader Technical Support, Maintenance and Construction Manager, and Emergency Support Communicator. The offsite emergency support organization provides technical and logistics support in the event of a serious or potentially serious emergency and is staffed by personnel from the normal station and technical support organizations.

The Emergency Support Director is the senior utility management representative at the TMI site. He reports to the EOF and is responsible for directing the offsite emergency support organization, and for providing advice and guidance to the Emergency Director on accident management responsibilities. The Emergency Support Director can monitor communications on the Operational and Radiological Lines, and communicates directly with the Emergency Director on the Emergency Director's line.

The Emergency Support Staff reports to the Emergency Support Director at the EOF and assists the Emergency

Support Director by communicating with the offsite emergency support organization Group Leaders and by providing status reports to the Emergency Support Director.

The Public Affairs Representative reports to the Emergency Support Director from the EOF. He is responsible for implementing the Emergency Public Information Plan, preparing technically accurate news releases, and updating GPU Nuclear management on the status of the emergency.

The Emergency Planning Representative reports to the Emergency Support Director from the EOF. He is responsible for providing information relating to onsite, offsite, and state and local emergency facilities, and communication, personnel and resource capabilities. He also provides advice on the procedural requirements of Licensee's Emergency Plan.

The Group Leader Administrative Support reports to the AEOF. He is responsible for administrative and logistics functions required to support the onsite and offsite emergency organizations. In addition, he is responsible for security processing and badge issuance to personnel requiring site access.

The EAC reports to the EACC and is responsible for the radiological environmental monitoring program ("REMP"). Once the EACC is activated, the EAC assumes control of offsite radiological and environmental monitoring and assessment from the RAC. He communicates with the RAC in the ECC on the Environmental Assessment Line.

The Group Leader Radiological Controls Support reports to the Emergency Support Director from the AEOF. He is responsible for all aspects of radiological controls support to the onsite emergency organization, including thermoluminescent dosimeter ("TLD") issuance, whole body counting, and obtaining additional equipment and personnel as necessary. The Radiological Controls Manpower Support and Personnel Monitoring Coordinators report directly to him.

The Group Leader Chemistry Support reports to the Emergency Support Director at the EOF. He is responsible for all aspects of chemistry support, including the establishment of a chemistry monitoring program and for obtaining additional equipment and personnel as necessary.

The Group Leader Technical Support reports to the Emergency Support Director from the Parsippany TFC.

He is responsible for providing technical leadership, analysis, evaluation and recommendations to the onsite TSC Coordinator with respect to plant conditions, reactor core status, and subsequent plant operations. He communicates with the onsite TSC Coordinator and the Technical Support Representative at the EOF on the Parsippany/TMI Line.

The Maintenance and Construction Manager reports to the Emergency Support Director from the AEOF and is responsible for maintenance support to the onsite and offsite organizations. He provides additional maintenance personnel and equipment as required. The Group Leader Maintenance Support reports to him.

The Emergency Support Communicator reports to the Emergency Support Director at the EOF and is responsible for operation of the communication systems at the EOF and for the coordination of requests for outside assistance. He ensures that the primary and back-up communication systems are activated and operational, and maintains records of communications and status boards.

Additional information on the offsite emergency support organization is located in Section 4.5.1.4 of the Emergency Plan.

Q.29 How do personnel know their assignments in the offsite emergency support organization?

A.29 A duty roster has been developed which assigns personnel to specified positions in the offsite emergency support organization. Emergency responsibilities are assigned on the basis of the selection criteria set forth in Table 8 of the Emergency Plan, the individual's overall experience and training, and his current job position. The offsite personnel become familiar with duty stations and responsibilities by attending periodic training sessions and participating in test exercises and drills. Personnel assigned functional responsibilities in the offsite emergency support organization are expected to maintain a working knowledge of the current TMI Emergency Plan, Implementing Document, and other related station programs, plans, and procedures as may be required to perform their functions.

Q.30 How long would it take to staff the offsite emergency support organization?

A.30 Depending on the emergency classification, all or part of the offsite emergency support organization would be directed to report to predesignated locations. Upon arrival at the emergency response facility, personnel initially would activate

emergency communication systems and computer-based data links; inspect, inventory and place in operation as appropriate the emergency equipment present; and complete all tasks directed by the appropriate procedures. As personnel continue to arrive, the various functional areas would become fully operational and would support the onsite organization. The entire offsite emergency support organization can be fully manned within six hours.

Q.31 Would you describe the basic function of the offsite emergency support organization, noting particularly how those functions differ from the responsibilities of the onsite emergency organization?

A.31 The purpose of the offsite emergency support organization is to provide overall corporate management and direction of emergency response, to provide technical advice and assistance, and to coordinate long-term logistical and administrative support for the onsite emergency response organization and activities. In general, the offsite emergency support organization will:

1. Support the onsite emergency organization in engineering and technical matters with accident analysis, assessment, and technical advice on appropriate corrective actions to stabilize the plant.

2. Provide for environmental monitoring and assessment in support of the onsite emergency organization.

3. Provide liaison and communication with the NRC and appropriate state and county agencies.

4. Provide for the dissemination of information to the public and the news media.

5. Provide security support.

6. Acquire materials, equipment, and services necessitated by the emergency.

7. Provide assistance for reentry operations and post-accident planning.

8. Assign post-accident investigation and review responsibilities.

EP-4(D) These functions need not be accomplished immediately after declaration of an emergency. Rather, they are supplementary to, and in support of, the functions being performed by the onsite emergency organization. This characteristic distinguishes the responsibilities of the offsite emergency support organization from the onsite emergency organization.

Q.32 Would you describe Figure 3, Licensee's Long-Term Recovery Organization?

A.32 A long-term recovery organization has been developed, which would assume command of the emergency response from the onsite and offsite emergency organizations in cases where post-accident conditions either would be complicated or would be expected to extend over a long period of time. The key elements in the GPU Nuclear recovery organization are: the Office of the

President GPU Nuclear, Vice President Administration, Vice President Communications, Vice President Radiological and Environmental Controls, Vice President Maintenance and Construction, Vice President Technical Functions, Vice President Unit Operations, Vice President Nuclear Assurance.

The Office of the President GPU Nuclear is responsible for overall recovery operations. This includes overseeing operations of the various functional groups and ensuring that all activities receive proper analysis and coordination.

The Vice President Administration is responsible for providing the necessary administrative/logistics requirements, such as communications, manpower, transportation, commissary arrangements, accommodations, clerical support, and temporary office space and equipment.

The Vice President Communications is responsible for coordinating the exchange of information with public and governmental agencies.

The Vice President Radiological and Environmental Controls is responsible for establishing policy, coordinating and reviewing radiation and

environmental controls, including in-plant radiological controls management, and monitoring and quantifying the degree of contamination of buildings and personnel.

The Vice President Maintenance and Construction has the responsibility for directing the activities associated with major maintenance tasks and accomplishing field work for major modifications.

The Vice President Technical Functions is responsible for providing engineering support, technical planning and analysis, procedure support, control room technical support, data management, and support relating to licensing requirements.

The Vice President Unit Operations (TMI-1) is responsible for performing all plant operations and maintenance activities, limiting and controlling personnel exposures, terminating or minimizing offsite releases, stabilizing plant conditions, restoring the plant's ability to function normally, and responding to any further emergencies. He is responsible for safely and effectively managing the quantities of radioactive gases, liquids, and solids that might exist during the initial phases of recovery.

The Vice President Nuclear Assurance is responsible for implementing the Quality Assurance Plan, all necessary general employee, technical and recovery management training programs, and for review of the Emergency Plan and Implementing Document to ensure that a high degree of emergency preparedness is maintained for potentially hazardous recovery activities.

Additional information on the long-term recovery organization is located in Section 4.5.1.5 of the Emergency Plan.

Q.33 Identify the major agencies at the state level which would respond in the event of an emergency at TMI and the primary functions they would perform.

A.33 All state-level emergency response agencies have some common responsibilities. Briefly, they are: (a) develop and maintain plans for emergencies; (b) prepare and maintain procedures for rapid dissemination of information, quick assembly of key personnel, and timely acquisition of equipment and other resources; (c) maintain resources inventories; and (d) identify critical functions and activities necessary for adequate operational capability during emergency situations.

With respect to a radiological emergency at TMI, the primary state response agencies and their general responsibilities are:

PEMA -- develop, maintain and coordinate emergency plans; coordinate emergency response; assist local governments.

BRP -- develop and maintain a radiological response plan; provide technical expertise to PEMA and, if requested, TMI; ensure that proper information concerning the incident is given to county and local emergency response agencies; provide guidance for protective actions that might be necessary.

Pennsylvania State Police ("PSP") -- provide law enforcement assistance to the site if requested; assist local law enforcement agencies with traffic control, evacuation warnings and other duties as may be required and requested.

Department of Health -- ensure continuity of medical service; provide support as requested by county emergency medical coordinators.

Department of Agriculture -- develop and maintain a radiological response plan; in coordination with

BRP, provide necessary information on protective actions to be taken by farmers; provide technical advice to PEMA; maintain logs (records) of livestock populations in the vicinity of the facility; assess damage.

Department of Military Affairs -- provide equipment and manpower to support local emergency response efforts.

The Departments of Transportation ("PennDOT"), Education and Public Welfare, the Fish and Game Commission, and the State Fire Commissioner also have certain responsibilities to ensure that proper support is provided to local governments where needed and when requested.

Q.34 Identify the major agencies at the county level which would respond in the event of an emergency at TMI.

A.34 The county emergency management agencies of Dauphin, York, Lancaster, Cumberland, and Lebanon would respond in the event of an emergency at TMI. The emergency response plans for these five counties, as well as letters of agreement with local police, fire and ambulance units, are included as appendices to Licensee's Emergency Plan. Support from the local fire, police and ambulance units would be coordinated

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through the Dauphin County EOC. Personnel from these units are invited to attend training sessions conducted by Licensee, to familiarize themselves with TMI procedures, facilities and equipment. All of the counties have listed in their emergency response plans the specific organizations and resources that would be brought to bear in the event of an emergency.

Q.35 Are there other support agencies that TMI might rely upon in the event of an emergency?

A.35 Arrangements for hospital and medical services for injured or contaminated (overexposed) personnel are provided for by letters of agreement with Radiation Management Corporation ("RMC"), Hershey Medical Center, and local physicians.

RMC provides an emergency medical program to TMI that includes a review of plant procedures, consultation on management of radiation accidents, a radiation emergency medical team, a bioassay laboratory, a medical center equipped for the definitive evaluation and treatment of radiation injuries, annual training for the plant, ambulance and hospital personnel, and conduct of radiation medical emergency drills. In addition, RMC provides facilities and services,

including a radiation chemistry laboratory, exposure evaluation services through a mobile whole body counter, and a special van designed to transport contaminated patients.

RMC is under the direction of a physician, certified in both radiology and nuclear medicine, who is also the Associate Professor of Clinical Radiology at the University of Pennsylvania School of Medicine. The RMC staff is comprised of approximately 150 people skilled in health physics, radiation physics and measurement, radiochemistry, environmental sciences, biology, and ecology.

The Hershey Medical Center receives contaminated/injured personnel in a special area designated the radiation emergency area. The Medical Center has detailed plans and procedures for the decontamination and treatment of contaminated patients. It employs a professional staff consisting of a certified health physicist, a master's level health physicist and radiation protection technologists. The Medical Center has over two hundred radioisotope laboratories, receives thousands of radioactive shipments each year and conducts radiation therapy using Cobalt-60 and a linear accelerator. Thus, the

staff is routinely involved in matters requiring radiological controls.

Q.36 Aside from the agencies described in your responses to Questions 33, 34 and 35, have you identified other groups from which you might seek additional emergency assistance?

A.36 Table 11 of the Emergency Plan lists various groups that the TMI Emergency Preparedness Department has contacted to determine whether such groups have personnel or equipment that could be made available to TMI in the event of a radiological emergency. Some of the groups so listed might be contacted during an emergency only if it appeared that long-term, recovery-type support was necessary. As Table 11 demonstrates, there are multiple sources available to supply the specified personnel and equipment.

Q.37 How has Licensee ensured that the support described in your responses to Questions 33 through 36 will be available if needed?

A.37 A review was made to determine which groups provided support that was deemed necessary for prompt onsite emergency response and which groups merely provided support that might be helpful as part of a long-term, recovery-type effort, but which need not be immediately available. For those groups whose

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support was deemed necessary for prompt onsite emergency response, a further review was conducted to determine whether preexisting contractual arrangements were sufficient to assure the prompt availability of necessary personnel or equipment. Where Licensee did not have appropriate preexisting contractual arrangements, letters of agreement briefly describing manpower and equipment availability and specific response capabilities were sought. Included as Appendix C to the TMI-1 Emergency Plan are such letter agreements from 25 organizations. Telephone numbers for all key support groups are included in an EPIP.

In addition to the letter agreements, local support group participation in Licensee-sponsored training and drills and in actual responses to requests for assistance confirms that necessary support will be available when needed.

For example, pursuant to Licensee's arrangements with RMC, a training session for local emergency medical personnel from offsite organizations was conducted by RMC at TMI on September 10, 1980. This training session was followed by an exercise on September 11. Participation in this training and drill exercise

evidences the willingness of such offsite groups to provide emergency support to TMI.

Licensee has had similar experiences with fire protection organizations. Historically, personnel at TMI have been members of, or otherwise involved in, fire protection organizations and first aid squads in their communities. This relationship has been expanded in the past year or so to include not only TMI-specific training of local fire company personnel, but also training in firefighting sciences that will benefit these companies by permitting them to better serve their communities. For example, a drill was held on October 18, 1980, on Fulling Mill Road in Lower Swatara Township. Emergency preparedness personnel from TMI supervised the planning and coordination of the drill for firefighting and emergency service organizations from the townships of Lower Swatara, Middletown, Hummelstown, Chambers Hill, Highspire, Londonderry and Enhaut. Emergency preparedness personnel also served as safety officers during the exercise, which involved fighting an actual fire, to maximize the safety and protection of the firefighters involved.

In addition to training and drill exercises, there were more than a dozen incidents in 1979 where

offsite medical assistance (ambulance service) was requested and provided to TMI either by Liberty Fire Co. #1 or Londonderry Fire Co. #1. During a fire at TMI on November 6, 1980, five different fire companies responded promptly, three of which were turned away because the fire already was under control.

Q.38 One of the intervenors, ANGRY, has identified what it believes to be various deficiencies in some of the letters of agreement referred to in your last answer. Please respond to each of these alleged deficiencies.

A.38 The various objections of ANGRY to the letters of
EP-4(B) agreement are detailed in ANGRY's answer to interrogatories, dated September 3, 1980, and in its supplemental response of October 1, 1980. Similar objections have been grouped together and our response to each set of objections is presented below.

1. Failure to refer to appropriate legal instruments, such as legislation -- It was never clear to Licensee what emergency preparedness function would be served by including legal references in letters of agreement. Thus, no such references are included in the letters of agreement. The NRC and FEMA have recognized that little purpose

is served by such legal references, and evaluation criterion 3 of planning standard A has been amended in Revision 1 of NUREG-0654 to delete the recommendation that legal references be included in letters of agreement.

2. Failure to include mutually acceptable criteria for implementation -- ANGRY makes this objection with respect to the letters of agreement from PEMA, BRP, the risk counties, and the various police, fire and ambulance organizations. This objection is unwarranted since all offsite governmental emergency response agencies around TMI have accepted the emergency classification system described in Appendix 1 to NUREG-0654 (Rev. 1). Thus, the mutually acceptable criteria for implementation are established without regard to the letters of agreement. Moreover, detailed emergency response plans for PEMA, BRP and the five risk counties are included as appendices to Licensee's Emergency Plan. There is no need for letters of agreement to duplicate information included in these response plans. Similarly, police and firefighting organizations have standard operating procedures which provide guidance for

responding to emergencies. Here too no purpose would be served by duplicating this information in letters of agreement.

3. Failure to obtain binding commitment from the Pennsylvania State Police -- The language used by Commissioner Dunn, and cited by ANGRY, merely states the obvious: that Licensee has no authority to direct offsite governmental agencies to respond to an emergency in any specific manner or with definite amounts of manpower and equipment. The recommendation in NUREG-0654 that letters of agreement be obtained was not intended to require a utility operator to exercise such authority. Rather, such letters demonstrate a utility's contact with relevant government agencies, and the parties' awareness that the utility may call for support from government authorities. Commissioner Dunn's letter certainly establishes these facts. As explained in our response to Question 37, Licensee fully expects the Pennsylvania State Police to respond if their assistance is needed.

4. Failure to obtain letter from Hershey Medical Center -- The August 12, 1980 agreement between

Licensee and Hershey Medical Center is included in Revision 3 to Licensee's Emergency Plan.

5. Specific commitments from GPU related companies -- Table 11 of the Emergency Plan provides supplementary information on the manpower and equipment available from GPU related companies. Moreover, with the reorganization of GPU Nuclear, the executive authority that supervises operations at TMI also supervises nuclear related operations at the other GPU companies and therefore can assure emergency support from such companies.

Q.39 Would you describe Figure 4, Emergency Response Facilities?

A.39 The emergency response facilities are divided into four categories: onsite, offsite-near, offsite-general area, and offsite-out-of-state.

The onsite facilities are as follows:

1. Emergency Control Center ("ECC") is the Unit 1 control room and shift supervisor's office.
2. Technical Support Center ("TSC") is located in the remote shutdown room, in close proximity to the Unit 1 control room.
3. Operations Support Center ("OSC") is located at the radiological controls access control point.

The offsite-near facilities are as follows:

1. Nearsite Emergency Operations Facility ("EOF") is located at the TMI Observation Center, directly east of the site on Route 441.

2. Alternate Emergency Operations Facility ("AEOF") is located at Crawford Station.

3. GPU Nuclear Media Center is located at Crawford Station.

4. Environmental Assessment Command Center ("EACC") is located at the Olmsted Airport.

5. Dauphin County EOC is located in the courthouse in Harrisburg.

The offsite-general area facilities are as follows:

1. Federal EOC is located at Capital City Airport.

2. BRP is located in the Fulton Bank Building in Harrisburg.

3. NRC Region 1 Office is in King of Prussia, Pennsylvania.

4. PEMA EOC is located in the basement of the Transportation and Safety Building in Harrisburg.

5. EOC's for the four risk counties other than Dauphin are located in the respective county courthouses.

The offsite out-of-state facilities are as follows:

1. NRC headquarters are in Bethesda, Maryland.

2. Babcock and Wilcox ("B&W") is located in Lynchburg, Virginia.

3. Parsippany Technical Functions Center ("TFC") is located in Parsippany, New Jersey.

Q.40 Describe the function of Licensee's three onsite emergency response facilities.

A.40 The ECC, located in the Unit 1 control room and adjacent shift supervisor's office, contains communications equipment, emergency radiological controls equipment, status boards, a dose projection microcomputer and offsite area maps. Command and control of all site-related emergency efforts originate from this center.

The TSC, located at the 322' elevation of the control building, below the control room, is an area where engineers can provide technical support and analysis to emergency response personnel in the ECC. The TSC contains access to key plant parameters that may be used in assessing accident conditions. Records, drawings, technical manuals, communication systems and other information sources also are located at the TSC. This technical information and communications equipment available in the TSC enable personnel at the center to provide a high level of technical assistance to those responsible for command and control of emergency efforts.

The OSC, located at the 306' elevation of the control building, is the normal radiological controls access

control point. The OSC contains communications equipment, emergency radiological controls equipment, offsite area maps and status boards. Shift personnel muster in this area for subsequent assignment to duties in support of emergency operations.

Q.41 Describe the function of Licensee's five offsite emergency response facilities.

A.41 The TMI Observation Center fronting on Highway 441, east of the TMI site, will be the EOF. This facility normally is manned as a public education center and is a well built permanent structure with adjacent parking areas. Sufficient area for helicopter landing is available. The EOF will house the key technical groups of the offsite emergency organization. In addition, BRP will send a liaison representative, and the NRC will locate its senior site emergency team at this location.

Crawford Station, located approximately three miles north of the TMI site, serves as the AEOF. Radiological controls equipment, including decontamination supplies, will be located here. The AEOF also serves as a staging area for personnel preparing to go onsite. Offsite administrative and maintenance support activities will be conducted from this location.

The EACC, located in offices at Olmsted Airport, will be made operational concurrent with the EOF. Once operational, the assessment of all offsite radiological and environmental impacts will be done at the EACC. This includes offsite dose calculations, offsite monitoring of radiological releases via all major pathways, receipt and dissemination of all data received from offsite monitoring teams, and implementation of the REMP.

The Parsippany TFC will be located at GPU headquarters in Parsippany, New Jersey. The Group Leader Technical Support and his staff will report to this center. A representative of this group, designated the Technical Support Representative, will be dispatched to the EOF to make recommendations to the Emergency Support Director.

The Media Center, located at Crawford Station, contains equipment and facilities designed to support timely communications and dissemination of information on plant conditions and emergency operations. Commercial facilities will be used to accommodate large press conferences beyond the capacity of the Media Center. Additional information on the Media Center is provided in the Emergency Public

Information Plan for TMI, which is Appendix B to the TMI-1 Emergency Plan.

Q.42 Are the emergency response facilities of the state and county governments depicted in Figure 4?

A.42 Yes. The state EOC, located in the basement of the Transportation and Safety Building in Harrisburg, contains back-up power equipment, communication systems, and necessary supplies to accommodate the various state government agencies that would operate from this EOC. The risk counties also operate EOC's, located in the basements of the respective county courthouses. All have back-up power and the space and equipment needed to ensure a coordinated response to an incident at TMI. BRP operates from its offices in the Fulton Bank Building in downtown Harrisburg. Personnel from BRP also are located at the state EOC and at Licensee's EOF.

Q.43 Are the emergency response facilities of the various federal agencies also shown in Figure 4?

A.43 Yes. The Capital City Airport is the location of the federal EOC. The Airport, located about 10 miles WNW of the site, is owned and operated by the Commonwealth of Pennsylvania. The Department of Energy and EPA would be two of the key federal

agencies to conduct operations from this facility, which was used for a similar purpose during the Unit 2 accident and proved satisfactory. NRC facilities from which assistance or advice would be requested in the event of an accident are the NRC Region I Office in King of Prussia, Pennsylvania and the NRC Headquarters in Bethesda, Maryland.

Q.44 Would you describe generally the communication systems linking the emergency response facilities you have just identified?

A.44 The communication systems to be utilized at the various locations consist of both two-way radios and land-line telephone systems. Reliability is provided through redundancy, alternate communication methods, dedicated systems, and routine use to ensure operational reliability. Information that would flow over these systems is divided into two major categories: operational data and radiological data. This procedure ensures rapid transmission of information directly to key parties having closely related functions, thus eliminating errors associated with second-hand information. The significant networks are the Operational Line, the Radiological Line, the Environmental Assessment Line, the Parsippany/TMI Line, the Parsippany/B&W Line, the NRC

Emergency Notification System ("ENS"), and the NRC Health Physics Network Line ("HPN"). By providing well-defined and dedicated communication links, effective accident management from physically separate control and support centers is achieved.

Q.45 You referred to an "Operational Line". Please describe this network in more detail.

A.45 The Operational Line is a network of dedicated telephone lines with telephones located in the ECC (shift supervisor's office), OSC, TSC, EOF, AEOF and B&W in Lynchburg, Virginia. See Figure 5(a) of this testimony. The Operational Line permits an unimpeded discussion of plant parameters, system status, core conditions, and other pertinent technical data necessary to resolve problems in accident mitigation and to keep all emergency response personnel apprised of current plant conditions. This capability enhances the accident management function and decision making process.

Q.46 You also identified a "Radiological Line". Would you describe this network in more detail?

A.46 The Radiological Line is a dedicated telephone line with telephones located in the ECC (dose assessment area), OSC, EOF, AEOF, and two different areas at

BRP. See Figure 5(b) of this testimony. This line permits the communication of plant radiological dose projections, offsite radiation monitoring results and liquid effluent release data to BRP and other key emergency response personnel.

Q.47 You also referred to the Environmental Assessment, Parsippany/TMI and Parsippany/B&W Lines. Describe these communication links in more detail.

A.47 Each of these dedicated telephone lines provides a capability for a particular type of communication that is anticipated to occur during an emergency.

The Environmental Assessment Line connects the RAC in the ECC (dose assessment area) with the EAC at the EACC (Olmsted Airport) and the Assistant EAC at the EOF. See Figure 5(c) of this testimony. Dose projection information and radiological assessments will be communicated over this line.

The Parsippany/TMI Line connects the TFC with the EOF and the TSC. See Figure 5(d) of this testimony. This allows for a rapid exchange of information among the Group Leader Technical Support in Parsippany, the Technical Support Representative at the EOF, and the onsite TSC Coordinator.

The Parsippany/B&W Line connects the TFC with the B&W technical functions group in Lynchburg, Virginia.

See Figure 5(e) of this testimony. This establishes a reliable channel of communciation for in-depth diagnostic and corrective engineering assistance between the facility operator and the nuclear steam supply system vendor.

Q.48 Please describe the communication links between TMI and PEMA.

A.48 Basically, there are two communication links. The first is the normal telephone land-line link. The alternate in the event of a telephone system failure is the National Warning System ("NAWAS"). NAWAS is a dedicated radio-telephone line designed to provide an immediate means of emergency information flow. The system is tested daily.

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Q.49 Would you also describe the communication links between TMI-1 and Dauphin County?

A.49 Initial contact with the Dauphin County EOC is normally made by telephone. Back-up communications are through a cross-monitoring radio system. This particular system is tested on a weekly basis.

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Q.50 Is it anticipated that TMI would be in direct communication with the other four countries?

A.50 No, except in a General Emergency, in which event Licensee will contact each county in parallel with

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the notification the counties would receive from PEMA.

Q.51 Previously you identified two communication links with the NRC. Please describe these systems in more detail.

A.51 The two communication systems are the NRC Emergency Notification System ("ENS") and the NRC Health Physics Network Line ("HPN").

The ENS hotline is a dedicated telephone system that connects TMI and all other operating reactors with NRC headquarters in Bethesda, Maryland. It is used to report emergencies. The purpose of this line is to provide reliable notification and communication of operational plant data to the NRC. ENS hotline phones are located in the ECC (control room and shift supervisor's office), OSC, TSC, and EOF. See Figure 5(f) of this testimony. Initial notification and communication with the NRC is made with the ENS phone in the ECC. Once NRC representatives arrived in the ECC, they would take over communications on the ENS line. Senior NRC officials reporting to the site can speak with headquarters from the ENS phone at the EOF. The NRC can patch-in the Region I Office on this network.

In the event of a Site or General Emergency, the HPN line will be activated by the NRC operations center in Bethesda, Maryland. This phone is part of a network that includes all nuclear power plants, the NRC regional offices and the NRC operations center in Bethesda. The HPN is a restricted network and is not to be used by non-government employees except to report a significant event when both the ENS and the commercial telephone lines are out of service. This system is dedicated to the transmission of radiological information by NRC personnel on site to NRC personnel in Bethesda and at the regional office. HPN phones are located in the ECC (shift supervisor's office), the EOF, and the NRC resident site inspector's office. See Figure 5(g) of this testimony.

Q.52 Are there additional means available for communications among the various emergency response centers?

A.52 Other communication systems include: Emergency Director's auto-dialer phone, the Pennsylvania Bell system, GPU microwave system, TMI radio frequencies, the inter-control room hotline, the Emergency Director's hotline, the plant paging system, the maintenance and instrumentation phone system, and various plant alarms (i.e., radiation emergency, fire

and reactor building evacuation). Each of these systems is described further in Sections 4.7.5.9 through 4.7.5.18 and Table 18 of the Emergency Plan.

Q.53 In addition to the flow of information across the communication links you have just described, will these communication links also be used to support the decision making process?

A.53 Yes. There are two primary networks of emergency response decision making.

The first is the protective action network. The Emergency Director receives input and data from the RAC and EAC regarding offsite radiation levels and from the Operations Coordinator regarding plant status. Based on this information, the Emergency Director will make protective action recommendations to BRP. After receiving the protective action recommendation from the site and reviewing data from its own monitoring teams, BRP determines if protective action is warranted, and, if so, advises PEMA of the action to be taken. PEMA communicates with the Governor, or his designee, and with the Governor's consent, initiates the protective action.

The second network consists of decisions to be made regarding plant operations during an emergency. Initially, the Emergency Director provides direction

to plant operators responding to an accident. Once the TSC is activated and B&W is contacted, the Emergency Director begins to receive technical recommendations over the Operational Line. When the Parsippany TFC is manned, the Group Leader Technical Support and his staff assume responsibility for providing technical advice on plant operations.

V. Initial Accident Assessment

Q.54 Please describe the basic components of accident assessment.

A.54 The initial step in accident assessment is awareness of a problem. This determination initiates an investigative process intended to define the nature of the problem with sufficient specificity to permit an evaluation of plant status and potential hazards. Simultaneous with this investigative process, as information is developed, the shift supervisor will implement appropriate response procedures. If conditions warrant, the shift supervisor will classify the emergency as an Unusual Event, Alert, Site Emergency or General Emergency and implement the Emergency Plan in accordance with the appropriate implementing procedure.

Q.55 You identified awareness of a problem as the initial step in accident assessment. Are there different types of information that have to be monitored and analyzed to properly perform this step?

A.55 Yes. In order to assess the emergency, the shift supervisor will monitor plant systems by observing: process monitors which display parameters such as pressure, temperature and flow; radiation monitors which display count rates for certain isotopes in effluent release paths; and, if appropriate, fire alarms, meteorological information, and seismic instrumentation. By analyzing the appropriate instruments for the specific emergency and comparing plant conditions with emergency action levels, the shift supervisor will classify the emergency and implement the applicable EPIP.

After initial classification, the accident assessment process would continue throughout the emergency situation. If radiation releases were anticipated or in progress, meteorological instruments would be monitored to predict offsite impact. Each emergency class imposes a different magnitude of assessment effort which would continue until the emergency has been terminated. If conditions warrant, the emergency might be reclassified.

Q.56 What means are used by the plant operators to monitor the status of TMI-1?

A.56 Plant operators utilize installed instrumentation, system display boards, alarms, physical plant tours,

shift turnover procedures, valve lineup procedures, the switching and tagging procedure, and status boards to monitor the plant.

Plant instrumentation that would be used to promptly detect accidents includes that discussed in the TMI Nuclear Station-Unit 1 Final Safety Analysis Report ("FSAR"). Table 7 of the Emergency Plan lists the accidents discussed in the FSAR and the important instrumentation that would be expected to detect each of these accidents; only major, installed equipment is listed.

Q.57 What means are used to monitor radioactive releases?

A.57 A system of radiation monitors is used to measure and record radiation levels at selected locations throughout the plant. Table 9 of the Emergency Plan lists the various monitors in the radiation monitoring system. These monitors have the ability to alarm at predetermined setpoints when higher than normal radiation levels exist in the plant. Data from these monitors are displayed by meters and strip charts in the control room.

:P - 3(C)

Monitors RM-G8, RM-A2, RM-A5, RM-A8, RM-A9, and RM-L7 monitor reactor building gamma levels, reactor

building air, condenser off-gas, station vent, reactor building purge, and liquid effluent releases, respectively. Data from these monitors, in conjunction with meteorological information, is used in accordance with an EPIP to estimate projected offsite radiological doses.

Q.58 How is meteorology monitored at the site?

A.58 Wind speed, direction, dewpoint, temperature at the 33 and 150 foot elevations, and precipitation are continuously monitored via sensors mounted on the meteorology tower located at the north end of the island. These parameters are recorded on strip charts in the meteorology building, and data on wind speed, direction and the difference in temperature at the two monitored levels (atmospheric stability) is displayed in the control room. A computer maintained by Digital Graphics Inc. ("DGI"), Rockville, Maryland, stores the measured parameters in a data file that is updated every four hours. This historical information may be obtained by interrogating the data storage facility (DGI) or the onsite computer located in the meteorology building near the weather tower.

Q.59 The next step you mentioned in the accident assessment process is classification. Has TMI-1 adopted a system for classifying accidents?

A.59 Yes. TMI-1 has adopted the four emergency classes listed in 10 C.F.R. Part 50, Appendix E, Section IV, Paragraph C.

The least severe of the four classes is the "Unusual Event". This classification is appropriate for an event that indicates a potential degradation of the level of safety of the plant. An incident is classified as an Unusual Event only if it is a minor one and no radiological releases are expected. Events in this class are based upon a potential to evolve to a more severe situation rather than an actual public hazard.

The next class is "Alert". This classification indicates an actual or potential substantial degradation of the level of safety of the plant. The Alert class includes emergency situations that are expected to be minor but where it has been deemed prudent to notify and mobilize a greater portion of the onsite and offsite emergency organizations. Events that initiate an Alert are those with the potential of only limited radiological release to the environment.

A "Site Emergency" includes incidents in which actual or likely major failures of plant functions needed

for protection of the public have occurred. Although immediate protective actions are not automatically required, declaration of a Site Emergency sets in motion all onsite and offsite organizations and activities that would be required to perform actions up to and including the evacuation of near-site areas.

The most severe class is the "General Emergency". This classification includes accidents which involve actual or imminent substantial core degradation or melting with potential for large releases of radioactive material and/or loss of reactor building integrity, and other accidents that have large radioactive release potential such as fuel handling and waste gas system accidents.

Q.60 Is this system of accident classification also used by state and county governments?

A.60 Yes. The Commonwealth of Pennsylvania and the five counties of Dauphin, York, Lancaster, Cumberland and Lebanon have adopted the emergency classification system described in 10 C.F.R. Part 50, Appendix E, Section IV, Paragraph C.

This classification system is described in the state and county plans as follows:

1. PEMA -- Section VI, Paragraph A
2. Dauphin County -- Section IX, Paragraphs H and I
3. York County -- Section VII
4. Lancaster County -- Section IV, Paragraph F
5. Cumberland County -- Annex D, Section III
6. Lebanon County -- Part II, Paragraph A and Annex A, Part I, Paragraph C

Q.61 What guidance is provided to the plant operators in classifying an accident?

A.61 The Emergency Director classifies the accident. Two major guides are used in determining the proper emergency classification.

The first method relies on Emergency and Abnormal Operating Procedures, which specifically refer the plant operators to the appropriate EPIP when an action level has been exceeded. This is done by an action step in the procedure.

The second method requires the plant operators to compare plant parameters and conditions to the emergency action levels ("EAL's") identified in the EPIP's. When an action level has been exceeded, the emergency class associated with that action level is declared.

Q.62 What approach was used in specifying EAL's for TMI-1?

A.62 EAL's are predetermined conditions or values that, when exceeded, require implementation of the Emergency Plan.

The TMI-1 EAL's, based on guidance contained in NUREG-0654, Appendix 1, were designed to provide an early readiness status on the part of emergency response personnel and organizations. These levels were not selected so as to infer any immediate need to implement protective actions but rather to ensure that a reasonable amount of time is available to evaluate in-plant readings, initiate onsite and offsite assessment actions (if warranted), and allow for anticipatory actions on the part of onsite and offsite emergency response organizations prior to an actual requirement for implementing protective actions (i.e., to go to a high readiness status).

Quantitatively, the EAL's associated with radiation releases were chosen so that exposure to the assumed whole body dose rate or iodine concentration for one hour would result in accumulating the following fractions of the lower limit protective action guides: Alert = 0.01; Site Emergency = 0.05; General Emergency = 0.10.

Q.63 In your last response you referred to protective action guides. Please explain that term further.

A.63 The concept of protective action guides ("PAG's") is set forth in an EPA publication, "Manual of

Protective Action Guides and Protective Actions for Nuclear Incidents" (EPA-520/1-75-001, September, 1975). Numerical limits for exposure to airborne radioactive materials have been recommended by EPA, and similar limits for exposure due to ingestion of contaminated foodstuffs and water have been recommended by the Food and Drug Administration; these recommendations have been adopted by BRP. Table 3 to this tesimony shows the recommended PAG's.

As defined in Licensee's Emergency Plan, PAG's are the projected radiological dose or dose commitment values to individuals in the general population and to emergency workers that warrant protective action before or after a release of radioactive material. Protective actions would be warranted provided the reduction in individual dose expected to be achieved by carrying out the protective action is not offset by excessive risks to individual safety in taking the protective action. Consistent with EPA guidance, PAG's do not include the dose that has unavoidably occurred prior to the assessment. This definition, however, is not intended to imply that the unavoidable dose received prior to the assessment would be ignored in making protective action recommendations.

EP-7

Q.64 Some of the EAL's listed in the TMI-1 Emergency Plan identify "valid" alarms or count rates as trigger mechanisms. In this context, what is meant by the term "valid"?

A.64 The term "valid" means a confirmed alarm. Abnormal EP-8 situations can be expected to manifest themselves by changes in several measured parameters, alarms or other indicators. Confirmation is accomplished by observing other supporting indications or recorders, by actual sampling, or by ruling out events like instrument malfunctions. Alarms that are expected to activate during instrument checks and calibrations are not considered "valid".

Q.65 Other EAL's identify primary system coolant activity as a trigger mechanism. How would such activity be determined, and what is the basis for the various coolant activities identified in the TMI-1 Emergency Plan?

A.65 The primary coolant system activity is determined by EP - 8 daily gamma spectroscopy analysis and by a radiation monitor on the reactor coolant system letdown line (RM-L1). The greater than 50 uCi/ml but less than 130 uCi/ml criterion is the EAL for an Unusual Event. A level of 50 uCi/ml is higher than any normally expected or previously experienced spike in primary coolant system activity. Any activity greater than this would be a positive indication of fuel damage.

When coolant activity exceeds 130 uCi/ml, an Alert is declared. This value is approximately one half of the Technical Specification limit and would be a positive indication of some cladding failure. When coolant activity exceeds 300 uCi/ml, the Technical Specification limit has been exceeded and a Site Emergency is declared. This activity level is based on limiting the consequences of a postulated accident involving the double-ended rupture of a steam generator tube.

Q.66 Some of the EAL's direct that adverse meteorology be used. Explain why it was decided to use adverse meteorology for these EAL's.

A.66 Adverse meteorology is defined as the five percent probable meteorology. This corresponds to a Pasquill Stability Category F and a wind speed of 1.5 mph. NUREG-0654, Appendix 1, recommends using adverse meteorology in developing EAL's for a Site Emergency. In setting the EAL's for the TMI-1 Emergency Plan, adverse meteorology was used for the Alert and Site Emergency. There are two main advantages of this approach.

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First, by targeting a certain fraction of the EPA PAG's at the exclusion area boundary (see response to Question 62), and then back calculating to a control

room meter indication using adverse meteorology, predetermined trigger points for the emergency classifications were derived. This means that the emergency can be declared merely by checking a meter reading and without calculating actual site meteorology.

Second, this method introduces a certain amount of conservatism into the process. By using precalculated EAL's based on adverse meteorology it is likely that the actual dose, based on actual meteorology, will be less than the dose assumed in the EAL. The X/Q value at the exclusion area boundary for adverse meteorology is 6.8 x 10-4 sec./meter3. The historical, median X/Q value at the TMI exclusion area boundary is 9.0 x 10-5 sec./meter3. Thus, by using adverse meteorology, a conservative factor averaging about 87% is introduced into the precalculated dose assumed in the EAL.

Q.67 You previously have testified as to the means used to monitor radioactive releases. How is that information used to make initial projections of potential offsite doses?

A.67 The radiation monitoring system readings for all
EP-3(C) monitored gaseous effluent release paths are factored
EP-4(I) into combined source release terms for noble gas and

iodine by applying the appropriate ventilation flow rates and meter conversion factors. Offsite whole body dose rates and iodine concentrations are then projected by applying the appropriate meteorological dispersion factor for the exclusion area boundary, 2 mile low population zone, 5 mile, and 10 mile EPZ boundaries, and for any other locations of interest.

An EPIP has been developed which contains the information (e.g., meter conversion factors and meteorological dispersion information) and step-by-step method necessary to determine the projected doses. This procedure provides for manual calculation or use of a microcomputer.

If a release is in progress and the monitor for that release path is either out of service or off scale, a contingency calculation method is provided. This conservative calculation utilizes dose release factors based upon expected source terms for several different types of accidents as described in the FSAR.

Q.68 Once initial projections of potential offsite doses are made, what is done next?

A.68 The results of the initial projection calculations provide information indicating the potentially

EP-3(C)
EP-4(I)

affected areas and expected radiological impact. Using this information, radiation monitoring teams consisting of trained personnel are dispatched under the control of the RAC. Each team procures predesignated communication equipment, a prepared emergency kit, an assigned vehicle and proceeds to a designated monitoring point and reports readings to the RAC. Concurrently, the RAC begins to set up the dose assessment area. A large area map of the plume exposure pathway EPZ is utilized to track the radiation plume, determine the affected areas, and select future offsite monitoring points. Isopleths (depicted on transparent map overlays) are used to determine the geometry and anticipated dispersion characteristics of the plume. The RAC uses additional input from the plant radiation monitoring and meteorological systems in order to update calculations and refine dose projections.

Q.69 Would you describe in more detail the manner of dispatching and communicating with the mobile radiation monitoring teams?

A.69 The RAC dispatches offsite radiation monitoring teams via the OSC Coordinator. These teams will consist of one to two persons per team (one of which is trained in the use of portable radiation monitoring

EP-3(C)
EP-4(I)
EP-18

equipment). When dispatched, the teams will proceed to the processing center, where they will pick up emergency kits containing portable monitoring equipment and portable radios. After an operational check of the equipment, they will pick up an emergency vehicle and proceed to their first monitoring location. They will be controlled by the RAC and report all readings to him. The radiation monitoring teams will transmit on the following assigned frequencies: (a) TMI operations frequency and (b) TMI security frequency.

Once the offsite emergency support organization is manned and the EAC announces his readiness, the responsibility for offsite radiological and environmental assessment will be transferred to the EAC. The decision to transfer responsibility for offsite monitoring will be made by the RAC, who will notify the EAC of this transfer via a dedicated phone line. Additionally, a formal radio announcement at the time of this transfer will be made to all offsite monitoring teams. The RAC will maintain control of the onsite radiation monitoring teams and in-plant radiological controls.

The monitoring teams utilize portable radiation meters to determine whole body exposure rates in

millirem/hour. Portable air samplers and SAM-2 dual channel analyzers are used to determine airborne radioactivity concentrations.

Q.70 How is the information obtained from the mobile radiation monitoring teams used in the assessment process?

A.70 The readings reported by the monitoring teams are compared to the predicted values. Based on the difference in actual versus projected values, the source terms are adjusted and used for further projections. This iterative process is continued in order to determine the actual source release terms as accurately as possible. In addition, the raw field data is forwarded to BRP as soon as it is received in the ECC so that they can use the data to supplement information provided by their field monitoring teams.

EP-3(C)
EP-4(I)
EP-1

The initial readings obtained by the radiation monitoring teams primarily are utilized to confirm whether the predicted values are a good estimate of the magnitude of the release. Large deviations from predicted values may indicate the presence of unmonitored release paths, instrument malfunctions, or overly conservative assumptions as to the extent of radioactive releases.

Q.71 Are you familiar with an information analysis system known as the Atmospheric Release Advisory Capability ("ARAC")?

A.71 Yes. This is a forecasting and dose projection computer model developed by the Lawrence-Livermore Laboratories. It was used by EPA and the TMI Environmental Controls Group during the Unit 2 purge of radioactive Krypton-85 gas. ARAC initially was developed to be used at federal government sites with a potential for radioactive releases. It runs only on one computer system, and involves the transfer of information from a classified computer to an unclassified computer.

EP-3(c)(2)

Q.72 Has Licensee considered using such a system, or its equivalent, at TMI-1?

A.72 The system currently utilized at TMI-1 is known as MIDAS, or the Meteorological Information and Dose Acquisition System. This system provides the following functions: collection and storage of meteorological data, plant effluent data and offsite radiation monitoring data; retrieval and processing of this historical data for effluent reports and environmental dose projections; and remote interrogations for display of results. MIDAS satisfies the Class A model described in NUREG-0654, Appendix 2 (Rev. 1).

EP-3(c)(2)

During the Unit 2 reactor building purge the isopleths produced by MIDAS and ARAC were compared with actual offsite measurements. Although this comparison was not intended to be a model verification experiment, ARAC proved not to be as effective as MIDAS. This was because the MIDAS system can be updated every fifteen minutes whereas ARAC only can be updated once an hour. Consequently, MIDAS provided more current meteorological data that was necessary for correct positioning of field monitoring teams.

Q.73 Is information from Licensee's Radiological Environmental Monitoring Program ("REMP") used during the initial accident assessment process?

A.73 No. A REMP for TMI has been in effect since 1974. The program was expanded after the Unit 2 accident and continues to be upgraded. The REMP is not used in the initial accident assessment process. Rather, the REMP is used to confirm initial assessments, determine overall impact on the environment and assist in determining the total integrated radiation exposure received in offsite areas surrounding the site. The general objectives of the REMP are described in Section 4.7.6.2.1 of the Emergency Plan. Additional information on the REMP is provided in

EP-3(c)
EP-18

"Licensee's Testimony of William E. Riethle in Response to Contention Nos. EP-3(C)(1) & EP-18 and Board Question No. 4 (Offsite Radiological Monitoring)," dated February 9, 1981.

Q.74 Does Licensee have any experience with offsite dose rate meters that can be remotely read onsite or at another appropriate emergency response facility?

A.74 Yes. Licensee has purchased and is installing a real-time environmental level gamma radiation monitoring system (manufactured by Reuter Stokes of Cleveland, Ohio). This system is sensitive to one microrem per hour. The data is sent via radio or telephone links to a central processing unit (to be located at the TMI Environmental Controls Group offices at Olmsted Airport) that interrogates the field sensors on a real-time basis. A portable version of this system has been used at TMI since April, 1980, including use during the purge of the Unit 2 reactor building. Additional information on this system is provided in "Licensee's Testimony of William E. Riethle in Response to Contention Nos. EP-3(C)(1) & EP-18 and Board Question No. 4 (Offsite Radiological Monitoring)," dated February 9, 1981.

Q.75 Do you believe it is necessary to install offsite monitoring devices around TMI that can be remotely read onsite in order to properly assess radioactive releases from TMI during an accident?

A.75 No. The goal in assessing radioactive releases during an accident is to make such assessments

EP-3(C)(1) sufficiently far in advance of the actual release so as to permit time for taking protective action if such measures are warranted. This requires that the assessments be predictive in nature, projecting out in time what the most likely release is anticipated to be. Information useful in this analysis is that given by plant process instrumentation (e.g., reactor coolant system temperature and pressure, reactor building pressure), knowledge as to the status of the various engineered safety systems, radiation effluent monitors, and meteorological instrumentation. As explained above (see responses to Questions 54-58 and 67), Licensee's Emergency Plan uses such information to estimate projected offsite doses from actual and potential releases. The accuracy of these projections is checked by sending mobile radiation monitoring teams to onsite and offsite locations (see responses to Questions 68-70). By considering actual site meteorology, the RAC can dispatch the radiation monitoring teams to the areas of principal interest and obtain prompt information for refining the projected dose calculation.

By comparison, an offsite system of radiation monitoring devices that could be remotely read onsite

would not detect a release until the plume was in the area of the dose rate meter. Thus, the plant operators are likely to know about such a release well before the offsite monitor registers. Moreover, the offsite monitor may not be an accurate real-time estimate of the release if the plume does not pass in proximity to the monitor. Nor are such monitors likely to be any better at confirming the projected dose than the radiation monitoring teams dispatched from the site, which can be positioned to the precise areas of interest.

VI. Initial Accident Notification

Q.76 Assume that the reactor coolant system hot leg temperature exceeds 620°F and the Emergency Director therefore declares an "Alert." How would this information initially be communicated to the state and county governments?

A.76 The Emergency Director would direct the person in the ECC designated as the Communicator (CRO #2) to make initial notifications in accordance with the EPIP for an Alert. This procedure requires the Communicator to contact the following agencies:

EP-1
EP-4(G)
EP-15(B)

1. Dauphin County EOC is contacted by telephone. If contact cannot be made using this method, the Dauphin County radio system is activated. A

brief, non-technical prepared message is read which identifies the caller by name and title, the nuclear station calling, and that an Alert has been declared, including the time of declaration.

2. PEMA is contacted by telephone or by use of the NAWAS back-up system. A brief, non-technical prepared message, similar to the Dauphin County message, is read to the PEMA duty officer, who in turn notifies BRP and the five risk counties. By procedure, BRP calls TMI to verify the incident, receive a radiological assessment of the emergency, and to open a line of communication. If after 30 minutes, verification of notification is not received from BRP, PEMA is again contacted and notified of the situation.

Q.77 Why are the initial communications to PEMA and Dauphin County brief and non-technical?

A.77 During the meetings between state, county and Licensee personnel, it was determined that PEMA and Dauphin County do not require technical information, but rather simple confirmation that an incident has occurred, the classification of the incident and recommendations for any immediate protective action.

EP - 1
EP - 4(G)
EP - 15(B)

BRP, which provides technical support to state and county emergency response organizations, is the first agency to establish continuous contact with the site. The purpose of this contact is to obtain details on the accident and any recommendations that the Licensee might provide. BRP personnel have the technical background to assess the plant operating and radiological information they will be given from TMI. It is BRP's responsibility to evaluate this technical data and relay appropriate information and protective action recommendations to PEMA for dissemination to the counties.

Q.78 Why does Licensee not directly contact the counties of York, Lancaster, Cumberland and Lebanon, except in the case of a General Emergency?

A.78 PEMA's normal operating procedure during any emergency is to maintain communciations with the affected county emergency management agency. This system has been successfully used by PEMA on numerous occasions. It was determined that a similar system should be used in radiological emergencies. This has the advantage of maintaining a consistent chain of command for all emergencies. In addition, the counties are likely to receive information from PEMA as rapidly as they would if contacted by TMI site

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EP-4(G)
EP-15(B)

personnel. Since personnel in the control room would be involved in stabilizing the emergency situation, there would be a wasteful duplication of effort if site personnel were to make additional notifications to the counties.

Q.79 What role does BRP play in this communications scheme?

A.79 When BRP is notified that an emergency condition exists at TMI, BRP contacts the site for technical information. The applicable EPIP contains as Attachment I an "Emergency Status Report" checklist. This report, which summarizes all key plant parameters and information necessary to assess the radiological impact of the emergency, is communicated to BRP. The report includes a description of the emergency, the status of emergency safeguards systems, and information on radiological releases (i.e., source terms, meteorology, anticipated duration of releases, and projected doses). The objective of this initial contact between BRP amd TMI is to verify the incident and establish the necessity for immediate protective actions. It is the responsibility of BRP to alert and advise PEMA of the need to take protective action, the actions to be taken, the geographic area at risk, and pertinent

EP-1
EP-4(E)
EP-4(G)
EP-15(B)

facility conditions that may change the recommendations. PEMA is responsible for passing this information to other state agencies, county and local governments.

Q.80 How are Licensee's emergency response personnel notified of the need to staff the emergency organization?

A.80 Initially, the duty section superintendent is contacted by the Emergency Director (shift supervisor) and plant status is discussed. A Communications Assistant is then assigned to call in the required personnel from the "on-call" duty section and to notify the Public Affairs Representative. This is accomplished by using a card-dialer telephone (located in the shift supervisor's office) to contact each member of the duty section. Cards have been preprogrammed with each duty section member's home telephone and beeper number. An answering service phone, "Code-A-Phone", has been installed in the shift supervisor's office to transmit a prerecorded instructional message to all emergency personnel responding to their beepers. This system can also receive and record messages to verify that the duty section members have responded, thus freeing shift personnel to attend to other matters.

Q.81 At this stage of the emergency, how would the public be informed?

A.81 Licensee would disseminate information to the public through the Manager-Public Information and his staff. Information concerning the emergency would be provided to the news media at the Media Center. Information can be disseminated beyond the immediate TMI area by telecopier, or through a service called "Media Wire", that transmits information to its subscribers. Licensee would conduct news conferences as appropriate. Public information released by Licensee, as well as arrangements for press conferences, would be communicated to the PEMA public information officer and the NRC Region I public affairs officer. Additional information on the dissemination of information to the public is located in Appendix B to the Emergency Plan, the "GPU Nuclear Emergency Public Information Plan for the Three Mile Island Nuclear Generating Station."

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The state would disseminate information through its established procedures.

Q.82 Assume the situation worsens. At least two incore thermocouples now read greater than 700°F and the Emergency Director therefore declares a "Site Emergency." What notifications would now be made?

A.82 At this point, the RAC has established an open line of communication with BRP on the Radiological Line. BRP would receive notification from the RAC of the Site Emergency. BRP will continuously update PEMA, who will keep the five counties informed of the emergency. The NRC would be notified via the Emergency Notification System ("ENS"), which is continuously manned by a Communications Assistant until relieved by the NRC. Other notifications would be made as specified in the EPIP for a Site Emergency.

EP-1

Q.83 If the situation continued to worsen and the projected dose rate at the exclusion area boundary was greater than 100mR/hr (gamma) using actual meteorology and the reactor building design leak rate, then a "General Emergency" would be declared. What additional notifications would be made at this time?

A.83 Upon reclassifying the event from a Site to a General Emergency, the following notifications would be made: (a) BRP, (b) NRC, (c) Unit 2 control room, (d) the five risk counties of Dauphin, York, Lancaster, Cumberland and Lebanon, (e) Pennsylvania State Police, (f) Consolidated Railroad Corp., (g) [illegible]C, (h) ANI, and (i) B&W.

EP-1

Q.84 Anticipating slightly a latter section of your testimony, would an evacuation of the general public necessarily be appropriate in the situation described?

A.84 No. While a precautionary evacuation might be warranted if the status of the plant were unknown or uncertain, a General Emergency does not automatically require an evacuation. The radiation level selected to initiate a General Emergency would result in an exposure (in one hour's time) of 1/10 of the lower limit EPA-recommended PAG. This level has been selected low enough to permit sufficient time to first evaluate the need for and then implement appropriate protective actions.

Consideration would be given to an evacuation if:

1. The release is expected to occur with projected doses approaching or exceeding: 1 R whole body or 5 R to the child thyroid.

2. Release time is expected to be long (greater than 2 hours).

3. Evacuation can be well underway prior to plume arrival, based upon wind speed and travel conditions.

VII. Onsite Emergency Response

Q.85 Returning to the beginning of the scenario, assume that the reactor coolant system hot leg temperature exceeds 620°F, the Emergency Director has declared an "Alert", and the initial accident notifications have been made. Please describe further the mobilization of Licensee's onsite emergency organization.

A.85 Upon recognition of the EAL, the shift supervisor assumes the duties of the Emergency Director. The on-shift personnel staff the onsite emergency organization as indicated in Table 2 of this testimony.

When the duty section superintendent reports to the ECC, he assesses plant conditions, verifies that proper notifications have been made, and relieves the shift supervisor as Emergency Director. The shift supervisor then returns to his normal duties. The Communicator reports to the ECC and assumes the responsibilities of that position. A Communications Assistant also reports to the ECC, relieves the control room operator (CRO #2) manning the telephones, and maintains communication with the NRC on the ENS. A senior radiological controls engineer relieves the radiological controls foreman as RAC and continues providing radiological assessments to the Emergency Director and BRP. The radiological controls foreman reports to the OSC, relieves the senior radiological controls technician, and assumes the duties of the Radiological Controls Coordinator. The Radiological Analysis Support Engineers report to the RAC and perform dose calculations. The OSC Coordinator relieves the shift maintenance foreman

and directs the support of operations in the areas of maintenance, chemistry and radiological controls. The shift maintenance foreman then reports to the OSC Coordinator as the Emergency Maintenance Coordinator. The Operations Coordinator reports to the ECC and coordinates plant operations and operations support through the shift supervisor and the OSC Coordinator.

Q.86 What type of equipment is available onsite to assist in responding to the "Alert"?

A.86 TMI is equipped with an extensive array of protective facilities and equipment to assist in responding to emergency situations. This equipment includes that necessary to provide first aid and medical assistance; corrective and extraordinary maintenance for damage control; and protective clothing, respiratory equipment and survey instruments for radiological controls. More detailed descriptions of the types and locations of available equipment are given in Sections 4.7.7 through 4.7.10 of the Emergency Plan.

Q.87 What type of support might Licensee require from offsite groups in order to respond to the "Alert"?

A.87 Depending on the nature of the situation, offsite assistance could involve police, fire or medical support. The Emergency Plan and its implementing

procedures detail the types of support that offsite agencies provide and the specific means for requesting such assistance.

VIII. Offsite Emergency Response

Q.88 What responsibilities does Licensee have with respect to offsite emergency response?

A.88 In order for offsite emergency response organizations to fulfill their responsibilities to the population at risk, Licensee will:

1. Make initial notification of the emergency to Dauphin County and PEMA.

2. Transmit plant status and dose assessment information to BRP.

3. Provide protective action recommendations, if warranted.

4. Operate a Media Center to ensure that accurate information concerning plant status is provided to the public and the news media.

5. Conduct periodic training programs for offsite agencies.

Q.89 Who is responsible for directing the general public to take protective action?

A.89 Actual protective measures, if warranted, would be taken by the responsible offsite organizations. NRC and FEMA have identified two predominant exposure pathways -- the plume exposure pathway and the ingestion exposure pathway -- for which specific, preplanned protective measures should be available. With respect to these exposure pathways, NRC and FEMA also have identified emergency planning zones ("EPZ's") defining the geographic extent over which this planning effort should be carried out.

Q.90 In your answer you referred to two different EPZ's. What purposes are served by defining such EPZ's?

A.90 EPZ's are the areas defined about a nuclear power plant for which preplanned emergency response capabilities are required. Based on the factors described in Revision 1 of NUREG-0654 (at pp. 10-13), the NRC and FEMA set an EPZ with a radius of about 10 miles for the plume exposure pathway and an EPZ with a radius of about 50 miles for the ingestion exposure pathway.

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These boundaries of about 10 miles and about 50 miles do not mean that protective actions throughout the entire EPZ would be required in the event of an emergency. Certain actions might be required for

residents within a five mile area of the facility, while not necessary for residents living 6 to 10 miles from the plant. On the other hand, if the situation warrants, protective actions could be taken by residents living beyond the 10-mile plume exposure pathway EPZ. The EPZ concept is to define a geographic area where a degree of specific preplanning is required. This preplanning then serves as the foundation for protective actions beyond the EPZ boundaries, if required.

Q.91 How was the plume exposure pathway EPZ for the TMI site delineated?

A.91 The geographic extent of the plume exposure pathway
EP-17(A) EPZ for the TMI site was determined by PEMA. The initial step was to inscribe a circle, with a radius of 10 miles, around the TMI site. The boundaries of this circle were then extended to a close, recognizable marker. Political boundaries, natural geographic features, roads and other readily identifiable landmarks were used in this process. In this manner, appropriate consideration was given to such factors as demography, topography, land use characteristics, access routes and jurisdictional boundaries. The population included within the plume exposure pathway EPZ drawn by PEMA is about 30%

greater than the population included within a 10-mile circle around the TMI site. The boundaries of this EPZ are shown in Appendix 6A of the State Emergency Plan. Figure 6 of this testimony also depicts the boundaries of the plume exposure pathway EPZ for the TMI site.

Q.92 What are the primary functions that must be carried out by offsite agencies within the plume exposure pathway EPZ in order to assure an adequate response capability?

A.92 The primary functions of offsite agencies are to
EP-17(A) develop emergency plans, implement a supporting education program to inform the public about those plans, provide early warning/alert of emergencies to the public, develop public notification procedures concerning protective action recommendations, and provide assistance to the public when protective measures are required. Offsite agencies also are responsible for maintaining lists of resources, both available and required, to assist in providing these services.

Q.93 Aside from developing the actual emergency plans, the first function you mentioned was educating the public about the emergency plans. What steps has Licensee undertaken to assure this is accomplished?

A.93 The function of educating the public about the
EP-4(C) emergency plans is being accomplished through a

general information program to provide the public with an overview of emergency planning around the TMI site and with specific information on how they will be notified of an emergency and what the available protective action options (e.g., shelter, evacuation) are. Licensee's public information and emergency preparedness personnel are coordinating public information activities with PEMA. The main purpose of this effort is to delineate the type of information to be disseminated by the Governor's office, PEMA, county and local emergency management agencies, and Licensee.

PEMA and the various county and local emergency management agencies have developed a public awareness program concerning emergency plans. This program includes plans published in newspapers, brochures prepared and distributed by county and local emergency management agencies, and printed fact sheets that describe actions to be taken in the event of an emergency. Licensee has assisted in the distribution process by mailing brochures with utility bills and by making public information personnel available for assistance to county and local governments when requested.

This public education program will continue as an ongoing phase of the emergency preparedness process.

Q.94 What is the geographic extent of the area covered by this education program?

A.94 The main thrust of this education program is aimed at residents in the plume exposure pathway EPZ (about 10 miles). In fact, a much larger geographic area is covered given the means used to distribute this information.

EP-17(A)

Q.95 The second function you mentioned was early warning. What steps has Licensee undertaken to assure that this alerting function is accomplished?

A.95 Licensee retained the services of consultants to conduct an engineering study for a proposed early warning system for the plume exposure pathway EPZ. Meetings with county communication directors and site specific sound studies were conducted as part of this effort.

EP-15(F)

Based on the sound surveys, a study of existing communication capabilities and an independent reevaluation of the initial study to ensure conformance with the specific recommendations of NUREG-0654, Appendix 3 (Rev. 1), it is estimated that approximately 80 large-scale sirens will be required

to provide early warning throughout the entire plume exposure pathway EPZ. The overall cost of this project is estimated to be approximately $1.2 million. Licensee is in the process of procuring the equipment. The system being installed has the design capability to provide early warning to the population at risk within 15 minutes of a decision by offsite authorities to sound the alert. It is anticipated that the system will be fully operational by July 1, 1981.

Q.96 What is the geographic extent of the area covered by this early warning system?

A.96 The system will provide total coverage of the full plume exposure pathway EPZ for the TMI site. There are several areas where coverage will extend beyond the established EPZ boundary due to the physical location and signal strength of the sirens.

EP-15(F)
EP-17(A)

Q.97 The third function you mentioned was notification of the public to take protective actions. How will this information be disseminated?

A.97 After activation of the early warning system, conventional radio or television would be used to provide the public with information and instructions, including recommendations to take protective actions. This would be accomplished by use of the Emergency

Broadcast System ("EBS"), supplemented, if necessary, by mobile loudspeakers and local police. Fire, ambulance and police personnel would be advised over the state and county communication networks. Schools, hospitals and other large institutions would receive additional notification by tone alert monitors or land-line telephone. State, county and local emergency management agencies have preplanned the public notification program. Their emergency plans describe the procedures and prepared messages that are to be used for this purpose.

Q.98 What is the geographic extent of the area that would be covered by such notifications?

A.98 While primarily geared toward residents in the plume exposure pathway EPZ, this information would be heard by the general public in areas substantially beyond 10 miles from TMI. This is because radio and television station coverage is not limited by any EPZ boundary definition.

EP - 17(A)

Q.99 The last function you mentioned was protective action. With respect to the plume exposure pathway, identify the primary protective measures available to the general public.

A.99 Protective actions are those actions taken in order to minimize radiation dose. The most appropriate

protective action for a particular situation will depend on the magnitude of the release, duration of the release, wind speed, wind direction, time of day and transportation constraints. For the plume exposure pathway the available protective actions include sheltering, thyroid prophylaxis, evacuation, or some combination.

1. Sheltering -- This option requires that people in potentially affected areas shelter themselves in an accessible building that can be made temporarily somewhat airtight. The objective is to isolate the population at risk from potentially contaminated outside air. This can be accomplished by seeking shelter in a personal residence, commercial building, or public building such as a school. Any building in the TMI area that is reasonably winter worthy will suffice.

2. Thyroid Prophylaxis -- Traditionally, it has been assumed that for virtually every significant accident at a nuclear power station the release of radioiodines, with the associated risk of thyroid exposure, will present the greatest demand for protective action. Certain compounds like potassium iodide ("KI") that contain stable iodines may in such

circumstances be useful as agents to block thyroidal uptake of radioiodines.

3. Evacuation -- The most frequently discussed protective action option is the almost complete removal of the population at risk from potentially hazardous situations through evacuation. This option is appropriate when its use is likely to bring about population dose savings commensurate with the associated social disruption. This situation would prevail where the time available from the decision to evacuate to population relocation is compatible with plume movement or in situations where substantial dose savings can be made by avoiding exposure to residual radioactivity (surface deposition) in the wake of sudden severe accidents.

Q.100 With respect to sheltering, is there any geographic limit on this mode of protective action?

A.100 No. This action could be taken in whatever area it
EP-17(A) was felt necessary to protect the public.

Q.101 The next measure you mentioned was thyroid prophylaxis. What is your view as to the feasibility of this protective action?

A.101 Thyroid prophylaxis, or the administration of radioprotective drugs, could be of some value in

providing additional protection to emergency response personnel since these persons would most likely receive larger doses than the general public due to their emergency response activities. In addition, there may be a need to administer radioprotective drugs at institutions with large non-ambulatory populations (e.g., hospitals, prisons) where

EP-17(A) evacuation is not a realistic option. Licensee does not believe that the wide-scale administration of radioprotective drugs to the general population is either necessary or feasible. Final guidance from the Food and Drug Administration on the use of radioprotective drugs has not been issued.

Q.102 Finally, with respect to evacuation, does the definition of the plume exposure pathway EPZ impact on this protective action?

A.102 Yes, to some extent. The evacuation planning effort

EP-17(A) generally is geared toward the area defined as the plume exposure pathway EPZ. The definition of the EPZ boundary, however, is not intended to limit the planning area, but rather to ensure that evacuation plans are prepared for a minimum of about 10 miles. These plans can then serve as a basis for an evacuation extending beyond a 10-mile radius, if such an evacuation is required. The state and five risk

counties around TMI have done some additional preplanning in that they already have undertaken initial work on a 20-mile evacuation plan. This initial work includes identification of evacuation routes, host/reception areas, and the procedures to be used for implementing such an evacuation.

Q.103 In your opinion, is the plume exposure pathway EPZ for the TMI site, as delimitated by PEMA, sufficient to assure an adequate state of emergency preparedness around TMI?

A.103 Yes. As indicated in our response to Question 91, we
EP-17(A) believe that, in defining the plume exposure pathway EPZ for the TMI site, PEMA has properly followed the guidance in NUREG-0654 by giving appropriate consideration to local conditions such as demography, topography, land use characteristics, access routes and local jurisdictional boundaries. Moreover, as explained in our responses to Questions 92 through 102, many of the functions that must be carried out by offsite agencies within the plume exposure EPZ to assure an adequate response capability are somewhat independent of the geographic extent of the EPZ. And, for those functions that are dependent on the geographic extent of the EPZ, we believe the preplanning done by offsite agencies is sufficient so that, if there were a need to take protective actions

beyond the defined EPZ, those measures could be accomplished in a timely and efficient manner.

Q.104 Intervenors have raised certain specific objections to the plume exposure pathway EPZ adopted by PEMA. Please respond to those objections.

A.104 Many of the intervenors' objections appear to be based on the misconception that the plume exposure pathway EPZ is a 10-mile circle about TMI. As we previously explained, this is not the case. Rather, PEMA has tailored the EPZ definition to local conditions.

1. In many instances this has meant that the EPZ boundary has been extended to include the whole of a municipal area that was bisected by the 10-mile circle. Examples of such extensions include the townships of Derry, South Hanover, Fairview, and Conewago. Where a municipal area is bisected by the EPZ boundary, this has been done by using a clearly defined marker that is known to residents in the area. Extending the EPZ boundary further yet, to include all municipal areas bisected by the EPZ, would not be desirable. It would result in an EPZ boundary with long, non-uniform appendages. In some instances, areas 15 to 20 miles from TMI

>-17(A)(1)

(e.g., Dover, Hellam, and Lower Paxton) would then be included in the EPZ, while areas closer to TMI (e.g., Palmyra and Monaghan) would not be included in the EPZ.

2. Extending the EPZ boundary to include all of the "urbanized areas" around Harrisburg and York is unnecessary. In every case it will always be true that there is some area on the boundary of the EPZ. If all of the Harrisburg and York areas are included, then population areas even further from TMI (e.g., Lebanon and Lancaster) will be close to the new EPZ boundary and question will be raised as to why those areas are not in the EPZ. Any line drawing process is always based on judgment. In this instance PEMA judged that not all of the urbanized areas around Harrisburg and York need be included in the EPZ to assure an adequate response capability. We believe that conclusion to be valid. In cases of adverse meteorology (stable dispersion characteristics with low wind speed), and therefore potentially higher offsite doses, the Harrisburg and York areas not in the EPZ probably will have from 5 to 8 hours warning time beyond that available to closer-in areas.

EP-17(A)(2)

Given the preplanning accomplished within the EPZ, this additional warning time should be sufficient for residents in the Harrisburg and York areas to take whatever protective action is necessary. Conversely, if weather conditions are unstable and plume travel time fast, the offsite dose is likely to be smaller and the need for protective action less.

EP-17(A)(3)

3. While we recognize the unique nature of the Old Order Amish community, intervenors have not provided any details about their particular concerns and thus we are unable to respond directly to the allegation.[3] However, we have no reason to believe that, if necessary, adequate protective measures could not be taken in a timely manner for the Old Order Amish community.

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3 Mr. Sholly's responses of August 4 and 29, 1980, to Licensee's interrogatory number 9 indicate that counsel for ANGRY was investigating the factual basis for the concerns about the Old Order Amish. ANGRY's response of September 3, 1980, to Licensee's interrogatory number 17 confirms this fact. As reflected in the letter from Licensee's counsel of September 16, 1980, ANGRY agreed to disclose additional information about the Old Order Amish "within a reasonable time after receipt, rather than in its direct testimony." To date, ANGRY has provided no information dealing with its concerns about the Old Order Amish.

4. Neither PEMA nor Licensee has relied upon 20-mile evacuation plans as a substitute for making an informed judgment as to the extent of the plume exposure pathway EPZ. Rather, we believe that the work done by the counties in developing such evacuation plans provides additional support for the adequacy of the EPZ boundary as delimitated by PEMA.

EP-17(A)(4)

Q.105 Has Licensee undertaken to make estimates of the time needed to evacuate the plume exposure pathway EPZ around the TMI site?

A.105 Evacuation time estimates for the plume exposure pathway EPZ around TMI have been performed by PEMA and by Wilbur Smith and Associates, under contract to FEMA. In addition, Licensee has retained a consultant to perform a third evacuation time study consistent with the revised guidance of NUREG-0654, Appendix 4 (Rev. 1). This work has not yet been completed.

EP-4(H)

Q.106 Will the evacuation time estimate being done for Licensee consider the population density around the TMI site?

A.106 Yes. In preparing the evacuation time estimates, three population components will be considered: permanent resident population, transient population,

EP-4(H)

and special facilities population. Population density was but one of the factors used in determining the evacuation time estimates for these components.

Q.107 Will the evacuation time estimate being done for Licensee also evaluate evacuation times as a function of weather conditions?

A.107 Yes. Adverse weather conditions will be evaluated in two different ways. First, an adverse weather scenario will be defined. The adverse weather scenario assumes a snow emergency condition when roads would be rendered temporarily impassable until PennDOT and local jurisdictions could clear them of accumulated snow. It is assumed that it would take about four hours after a snow storm to plow all major routes which are normally given priority. As a result, the roads have reduced capacity and operating speeds. For purposes of this evacuation scenario, a reduction of twenty percent in the roadway capacity will be made to account for such conditions, including narrowed travel lanes, reduced maneuverability and longer vehicle headways. Second, a factor listed in the evacuation time assessment will be adverse weather delay time. An additional twenty minutes to account for unpredictable isolated delays

associated with adverse weather conditions will be used.

Q.108 Does Licensee's Emergency Plan make provision for minimizing damage to personal property?

A.108 The prime objective of the TMI-1 Emergency Plan is to provide for corrective and protective actions to be taken in the event of an accident at the site. The plans of Licensee and the state and five risk counties are primarily oriented toward the protection of the health and safety of the general public, emergency response personnel and site employees. Protection of personal property, although not a prime objective of these plans, could occur indirectly through the actions and responses required by the plans.

Q.109 Does this mean that no protective measures are available for livestock?

A.109 No. Extensive information on the protection and sheltering of livestock during a radiological emergency is provided in the Pennsylvania Department of Agriculture Plan for Nuclear Power Generating Station Incidents, included as Appendix 7 to the State Emergency Plan.

Q.110 What are the primary functions that must be carried out within the ingestion exposure pathway EPZ in order to assure an adequate response capability?

A.110 Within the ingestion exposure pathway EPZ, it is necessary to identify the major exposure pathways from contaminated foodstuffs and water, and to develop plans for controlling the movement of such contaminated materials. During an actual emergency, response capabilities include: identification of the plume travel path, notification of emergency service personnel and the general public, and dissemination of information outlining protective actions that must be taken to adequately protect and control potentially contaminated foodstuffs and water.

Q.111 How are these functions being implemented around the TMI site?

A.111 An EPZ boundary of 50 miles has been delineated for the ingestion exposure pathway. Within this EPZ, planning is done at the state level by the Department of Agriculture, PEMA, and BRP. Dissemination of information on available protective action options is the responsibility of these state agencies. Additional information is provided in the State Emergency Plan, Appendices 7 and 8.

IX. Maintaining Emergency Preparedness

Q.112 Describe the Emergency Plan training program at TMI-1.

A.112 Licensee has developed a three-part Emergency Plan training program to ensure that all personnel, both onsite and offsite, receive adequate instruction.

1. The general employee training program is conducted annually and i given to TMI employees and contractor personnel permitted unescorted access to Unit 1. The program includes orientation on the content of the Emergency Plan and Implementing Document, employee responsibilities, emergency facilities and equipment, familiarization with station alarms and communication systems, radiation protection, and instructions and requirements associated with accountability, evacuation, and exposure criteria.

EP-18

2. Personnel with specific responsibilities in Licensee's onsite emergency and offsite emergency support organizations receive specialized training for their respective assignments. The Emergency Plan and Implementing Document delineate which personnel will receive specialized training, the type of training, and the minimum required frequency of such training.

EP-15(D)

3. Licensee also provides orientation and training for various offsite support groups. The purpose of this training is to ensure a high state of emergency preparedness and response capability between those groups and Licensee's emergency organization. Groups and personnel that might provide emergency assistance to TMI will be invited to participate in this training to become familiar with TMI (including the physical plant layout), key plant personnel, and the TMI Emergency Plan. Such training will be provided on at least an annual basis.

Q.113 Does this training include realistic drills and exercises?

A.113 Periodic drills and exercises will be conducted in order to assure an adequate state of emergency preparedness at TMI. The primary objective is to verify the emergency preparedness of all participating personnel, organizations, and agencies. Through such drills and exercises Licensee is able to: (a) ensure that participants are familiar with their respective duties and responsibilities; (b) verify the adequacy of the TMI Emergency Plan and the methods used in the EPIP's; (c) test communication networks and systems; (d) check the availability of

emergency supplies and equipment; and (e) verify the operability of emergency equipment.

The Supervisor-Emergency Preparedness is responsible for the planning, scheduling, and coordinating of all emergency planning-related drills and exercises. The following drills and exercises will be conducted on a periodic basis: medical emergency drill; fire emergency drill; repair and damage control drill; communication links test; radiological monitoring drill; radiological controls drill; and a radiation emergency exercise (i.e., a major drill appropriate to a Site or General Emergency). In accordance with 10 C.F.R. Part 50, Appendix E, Section IV, Paragraph F.2, it is expected that federal emergency response agencies will participate in the radiation emergency exercise at TMI at least once every five years.

P-15(D)

P-4(F)

During 1980, more than a dozen Emergency Plan drills were run at TMI. These drills exercised various facets of Licensee's onsite and offsite emergency organizations, as well as state and local emergency response agencies. The results of these drills were used to develop the specific emergency organizations, communication links, and response procedures described in Licensee's Emergency Plan. In order to

fulfill short-term action item 3(e) of the NRC's August 9, 1979 Order and Notice of Hearing, Licensee will conduct a test exercise of its Emergency Plan prior to restart. Currently, Licensee is discussing with the relevant agencies the precise date for such a test exercise.

Q.114 Are formal critiques of these drills and exercises conducted?

A.114 The Emergency Plan requires that a critique be
EP-17(B) scheduled and held as soon as practicable following the drill or exercise. Both observers and participants are encouraged to comment. These comments are presented to the Supervisor-Emergency Preparedness for resolution and follow-up as appropriate. An action item tracking system is used to ensure timely resolution of these items.

Q.115 How are the results of these critiques reflected in the Emergency Plan?

A.115 The critiques may point out weaknesses or defi-
EP-17(B) ciencies in the Emergency Plan, EPIP's, or equipment. The Supervisor-Emergency Preparedness is responsible for coordinating proposed revisions to the Emergency Plan and the Implementing Document and for the upgrading of emergency equipment and supplies. The

Supervisor-Emergency Preparedness submits such recommendations to the Vice President TMI-1 for his review. Recommended changes approved by the Vice President TMI-1 will be incorporated into the Emergency Plan or Implementing Document under the direction of the Supervisor-Emergency Preparedness.

Q.116 In what other ways is the Emergency Plan reviewed and updated?

A.116 The TMI-1 Emergency Plan, including appended letters of agreement, will be reviewed and updated on an annual basis. The Quality Assurance Department is responsible for conducting an independent periodic audit to verify compliance with the Operational Quality Assurance Plan, the Fire Protection Program Plan, Licensee's internal rules and procedures, federal regulations, and operating license provisions. The Supervisor-Emergency Preparedness provides an additional ongoing review of the TMI emergency preparedness program.

P- 17(B)

The TMI-1 Emergency Plan is considered a part of the TMI Nuclear Station-Unit 1 FSAR. Revisions to the Emergency Plan therefore will be administratively controlled in the same manner as amendments to the FSAR. The TMI-1 Emergency Plan Implementing Document

will be incorporated into the TMI Nuclear Station procedures program. As such, the Implementing Document will be prepared, reviewed, approved, controlled, distributed, and revised in accordance with TMI Nuclear Station Administrative Procedures.

Results of each annual review and update will be reported to the Vice President TMI-1.

Q.117 What procedures are in place to assure that sufficient amounts of emergency equipment are always available?

A.117 Designated emergency equipment and supplies and

IP-18 their storage locations are listed in the Implementing Document. This equipment will be maintained, inventoried, inspected and calibrated in accordance with approved TMI Nuclear Station procedures. Equipment, supplies, and parts having shelf-lives will be checked and replaced as necessary. Any item removed for either repair or calibration will be replaced by an equivalent item. Any deficiencies found during an inventory or inspection will be corrected immediately or will be documented for early corrective action. A report of each inventory and inspection, including documented deficiencies, will be prepared and submitted to the Supervisor-Emergency Preparedness, who will ensure

that cognizant department heads assign personnel to correct deficiencies in a timely manner.

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY	)	Docket No. 50-289
	)	(Restart)
(Three Mile Island Nuclear Station, Unit No. 1)	)	
	)	

LICENSEE S TESTIMONY OF ROBERT E. ROGAN, GEORGE J. GIANGI AND ALEXIS TSAGGARIS ON THE ADEQUACY OF ONSITE EMERGENCY PREPAREDNESS AT THREE MILE ISLAND, UNIT 1

Volume 2 -- Figures, Tables and Appendices